WORKERS OF THE NATION

AN ENCYCLOPEDIA OF THE OCCUPATIONS OF THE AMERICAN PEOPLE AND A RECORD OF BUSINESS, PROFESSIONAL AND INDUSTRIAL ACHIEVEMENT AT THE BEGINNING OF THE TWENTIETH CENTURY

BY

GILSON WILLETS

WITH THE ASSISTANCE OF THE FOLLOWING

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MACHINE HARVESTING AND THRESHING IN THE WEST

DRAWN BY W. R. LEIGH

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"Hydraulicking" on the Yuba River . . . .
Ice Harvesting on the Hudson River . . . .
The Salt Industry—New York State Reservation . . . .
Picking Cotton in Mississippi . . . .
An American Tea Plantation . . . .
Harvesting in the Great Western Wheat Fields—Combined Harvester, Cutting, Threshing and Sacking Machine . . . .
Chinese Picking Olives in California . . . .
The Produce Market, Philadelphia . . . .
Cowboys after the Round-up on the Plains . . . .
An Operating Room . . . .
Trained Nurses at Work . . . .
The War Correspondents Mr. Richard Harding Davis and Mr. Stephen Bonsal Talking to Colonel Roosevelt . . . .
News Photographers with Cameras Ready to Snap at a Passing Procession . . .
In an Art School—Free-Hand Class at Work . . . .
In a Camera Factory—Testing the Lenses . . . .
Largest Camera in the World—Exposing the Plate . . . .
The Boy Choir—A Recessional . . . .
Army Recruiting Office—Administering the Oath . . . .
Cadets at the West Point Military Academy—Skirmish Line Drill . . . . .
Gun Practice Aboard a Man-of-War . . . .
Blue Jackets at Sword Practice . . . .
Postal Service—Skinning the Cases, Chicago Post-Office . . . .
Life-Saving Service—Throwing out the Life-Line . . . .
Steamer Going to Fire . . . .
Mounted Policeman Stopping Runaway . . . .

CONTENTS

PART I

TRANSPORTATION BY LAND AND WATER

CHAPTER I

TRANSPORTATION BY LAND

Railroads of the United States—Statistics of Railways—Improvements in Railway Service—Subsidized Railroads—Railroad Combinations—The Greatest Railroad Combination—"Community of Interest" Among Railroads—Railroad Accidents . . 507

CHAPTER II

THE CONDUCT OF A GREAT RAILROAD

Organization of a Railway System—The Railroad President—The General Manager—The Traffic Department—The Operating Department—The System of Signals—The Train Despatcher—The Train Despatcher's Duties—Locomotive Firemen—Locomotive Engineers—Railway Brakemen—Railway Conductors—Parlor, Sleeping and Dining Car Service—"Braking" a Train—Making a Railroad Time-Table 518

CHAPTER III

THE RAILROAD MAN

Railroading as an Occupation—Opportunities in the Railway Service—The Training of Railroad Men—Earnings of Railroad Men—Qualifying as a Railroad Employé—Promotion in the Railway Service—Discipline in the Railway Service—Reprimands and Suspensions—Methods of Discharge—Working Hours of Railroad Men—Sunday Work—Railway Apprentices 535

CHAPTER IV

RAILWAY LABOR ORGANIZATIONS

Railway Brotherhoods and Orders—The Brotherhood of Locomotive Engineers—The Brotherhood of Locomotive Firemen—The Order of Railway Conductors—The Brotherhood of Railway Trainmen—Order of Railway Telegraphers—Brotherhood of Railway Trackmen—Brotherhood of Railway Carmen—Railway Benefit, Pension and Relief Departments 552

CHAPTER V

STREET RAILWAYS

Electric Railways in the United States—Opportunities for Street Railway Employés—Management of a Street Railway—The Motorman—The Training of the Motorman—Promotion of Motormen—New York Street Railway Employés—Metropolitan Street Railway Association—Amalgamated Association of Street Railway Employés 560

CHAPTER VI

TRANSPORTATION BY WATER

The Merchant Fleets of the World—The Merchant Fleet of the United States—The Atlantic and Pacific Fleets—The American Coasting Fleet—The Great Lakes Fleet —Ore Steamers on the Great Lakes—Lake Carriers' Association—The Mississippi River Fleet—The Canal Fleet—The Fleet of Yachts—Harbor Craft—The Fleet of Tug Boats 569

CHAPTER VII

THE CONDUCT OF A GREAT STEAMSHIP LINE

Organization of a Steamship Line—Operations when a Ship is in Port—Cargoes of Ocean Steamships—The Navigating Department—Firemen and Stokers Aboard Ship—Ship's Surgeons and Pursers—Ocean Steamships as Hotels—The Steward's Department 582

CHAPTER VIII

THE SEAMAN

The Education of the Navigator—Ships' Crews in the Merchant Marine—The Kind of Men Who "Go to Sea"—The Life of a Sea-faring Man—Ships' Officers in the Merchant Marine—Wages on American Vessels—The Sailor's Creature Comforts—Conditions on American and Foreign Ships—The Hours of Labor on the Water —Method of Employing Sailors—The Crimping System—Crews of Coasting Vessels—Crews of Great Lake Vessels—Crews of Mississippi River Craft—Seamen's Unions—Seamen's Institutions 590

CHAPTER IX

PILOTS, DIVERS, LONGSHOREMEN, AND EXPRESS SERVICE

Pilots and Their Organization—The Pilot at Sea—The Pilot's Power and His Fees —Divers—Equipment and Methods of Divers—Pearl Divers—Stevedores and Longshoremen—Longshoremen on the Great Lakes—The Express Service—Employment as Expressmen and Express Agents—Expressing Money and Perishable Goods 605

PART II

MINING, AGRICULTURE, AND THE FISHERIES

CHAPTER I

THE MINING INDUSTRIES

The Mines of the United States—Summary of Gold, Silver and Copper Production—Summary of Iron and Coal Production—Summary of Petroleum and Aluminium Production—American Miners—Mine Superintendents—The Company Store System at Mines—The Company Tenement System at Mines—Child Labor in Mines—Accidents in Mines—Profits in Mining Industries—The Largest Mining Exchange 616

CHAPTER II

THE COAL MINING INDUSTRY

Coal Production—Anthracite *vs.* Bituminous Coal Mining—The Total Number of Coal Miners—The Coal Miner's Life—Foreigners in American Coal Mines—The Coal

Miner's Training—The United Mine Workers of America—Conditions in the Anthracite Coal Fields—The Great Coal Strike of 1902 626

CHAPTER III

THE IRON MINING INDUSTRY

The Iron Age—Iron Ore Production—Methods of Iron Mining—The Magnetic Process of Iron Ore Reduction—Machinery in Iron Ore Reducing Works—The Iron Miner's Life—Labor Conditions in Iron Mines—Lake Superior Iron Mining Region 638

CHAPTER IV

COPPER, LEAD AND ZINC MINING INDUSTRIES

The Copper Mining Industry—Butte, the World's Greatest Copper Camp—The Lead Mining Industry—The Zinc Mining Industry—Novel Features of Zinc Mining—Marketing the Product of Zinc Mines—Labor Conditions at Western Ore Mines—Copper, Lead and Zinc Smelting and Refining 645

CHAPTER V

GOLD AND SILVER MINING INDUSTRIES

Production and Consumption of Gold and Silver—Gold and Silver Mining in Rocky Mountain States—Mining in the Cripple Creek Region—Mining in the Klondike—Cape Nome "Diggings"—Processes of Extracting Precious Metals—Methods of Placer Mining—Hydraulic Mining—Gold Mine Prospectors and Speculators 653

CHAPTER VI

PETROLEUM AND MISCELLANEOUS MINING INDUSTRIES

The Petroleum Industry—The Production of Petroleum—Petroleum Refineries—The Standard Oil Company—The Coke Industry—The Natural Gas Industry—Natural Gas Industry in Kansas—Mica Mining—Diamond Mining—The Precious Stone Industry—The Asphalt Industry—The Man Who Gave Asphalt to Commerce—Production of Asphaltum 662

CHAPTER VII

QUARRYING, AND SALT AND ICE INDUSTRIES

The Quarries of the United States—Marble Quarries—Marble Quarry Employés—Granite Quarries—Slate Quarries—Quarriers at Work—Organization of Granite Cutters—Stone Monuments—The Salt Industry—The Salt Combination—Salt Deposits and Production—Processes of Salt Manufacture—The New York State Salt Reservation—The Ice Industry—The Manufacture of Ice—Mechanical Refrigeration as a Trade 674

CHAPTER VIII

THE FARMER

Agriculture in the United States—The Status of the Farmer—Modern Agricultural Pursuits—General Statistics of Farms—Farming as a Business Enterprise—Organization and Co-operation Among Farmers—The Farmer and the Commission Merchant—Mortgages on Farms and Crops—Farmers as Tenants—Farm Labor—Chinese and Negroes as Farm Hands—Prosperity of "Hired Help" on Farms—Earnings of Farm Hands—Agricultural Education—Agricultural Colleges—Government Employment for Agricultural Students and Experts—Home Study for Farmers—Farmers' Reading Courses 690

CHAPTER IX

THE CROPS

Summary of the Great Crops—The Cotton Crop—Negro Labor in the Cotton Fields—The Cotton Planter—The Cotton Picker—Mechanical Methods of Handling Cotton—Marketing the Cotton Crop—The Sugar and Sorghum Cane Crops—The Sugar Beet Crop—The Tobacco Crop—The Tobacco Planter—Harvesting the Tobacco Crop—Growing Tobacco Under Cover—The Tobacco Market—Raising Tobacco for Export—The Rice Crop—The Rice Planter—Lowland Rice Culture—Harvesting and Marketing the Rice Crop—Upland or Dry Rice Culture—The Hop Crop—Hop Planters and Pickers—Harvesting and Marketing the Hop Crop—The Seed Crop—Tea Culture in America 712

CHAPTER X

MACHINE FARMING AND THE CONDUCT OF GREAT FARMS

Development of Machine Farming—How Machinery Increased the Size and Value of Farms—The Farmer's Dependence on Machinery—How Machinery Reduced the Cost of Farming—Summary of Results of Machine Farming—The Western Farms—Farms on the Pacific Coast—Conduct of a Great Wheat Farm—Management of a "Bonanza" Farm—How a Wheat Crop is Raised—Labor on a Great Farm—The Training of Machine Farm Hands 730

CHAPTER XI

FRUIT, FLOWERS AND MARKET PRODUCE

The Fruit Industry—Classification of Fruit—Fruit Transportation and Cold Storage—Ocean Carriage of Fruit—The New York Fruit Market—Fruit Auction Sales and Pushcart Men—California Fruit—The Watermelon Industry—The Apple Industry—The Berry Industry—The Grape Industry—The Grape Basket Industry—The Raisin Industry—The Prune Industry—The Nut Industry—The Flower Industry—Florists—Florists' Exchanges and Organizations—The Vegetable Industry—Market Gardening and Truck Farming—The Truck Farmers' Associations—Market Men 741

CHAPTER XII

THE DAIRY, POULTRY, AND ALLIED INDUSTRIES

The Dairy Industry—Milch Cows—The Milk Trade—The Milkman—The Condensed Milk Industry—Process of Condensed Milk Manufacture—Cheese Factories and Creameries—Butter Manufacture—The Butter Trade—Oleomargarine Manufacture—Cheese Manufacture—The Poultry Industry—The Incubator and Its Work—The Egg Trade—Bee Keeping—The Honey Industry 759

CHAPTER XIII

THE STOCK RAISING INDUSTRY

Live Stock in the United States—Organizations of Cattlemen—Conditions in the Grazing Business—Areas of Production of Live Stock—The Principal Live Stock Markets—Domestic Animals in Cities and Towns—Cattle Raising—The Modern Cowboy—Horse Raising—Hog Raising—Sheep Raising—The Wool Supply—Foreign Wool—The Wool Trade—Goat Raising 773

CHAPTER XIV

HOMESTEADERS, PUBLIC LANDS AND ABANDONED FARMS

Unappropriated Lands in the United States—Rules Governing Entry—How the United States Land Office Conducts a Drawing—Public Lands in Oklahoma—

Public Lands in Missouri—Public Lands in Idaho—Public Lands in the State of Washington—Public Lands in Oregon and New Mexico—Irrigated Land and the Home Seeker—Increase of Homes and Farms by Irrigation—Irrigation by Corporations and the Government—Colonies in the Irrigated Sections—Summary of the Irrigation Problem—Abandoned Farms 785

CHAPTER XV

THE FISHING INDUSTRIES

The Piscatorial Resources of America—Functions and Work of the United States Fish Commission—Employment in the Fisheries Department—The General Extent of the Fishing Industry—The Utilization and Preparation of Fish as Food—Different Methods of Preserving Fishery Products—Fisheries of the New England States—Fisheries of the Middle Atlantic States—Fisheries of the South Atlantic and Gulf States—Fisheries of the Pacific States—Fisheries of the Great Lakes and Interior Waters—Pearl Fishery—Mussel Fishery—The Lobster Fishery—The Oyster Fishery—The Sponge Fishery—The Whale Fishery—Miscellaneous Fisheries 798

PART III

THE PROFESSIONS

CHAPTER I

THE ENGINEERING PROFESSIONS

Engineering as a Profession—Achievements of Engineers—Classification of Engineering—Specialization in Engineering—Engineering Schools and Employment for Graduates—The Training of an Engineer—Conditions of Success in Engineering—Earnings of Engineers—Engineers as Business Men—Institutes of Engineers—The Surveyor—The Civil Engineer—Railroad Engineering—Structural Engineering—Municipal Engineering—Sanitary Engineering—The Mining Engineer—Qualifying as a Mining Engineer—Mining Schools—The Mechanical Engineer—Qualifying as a Mechanical Engineer—Mechanical Engineering Schools—Steam Engineering—Gas Engineering—The Electrical Engineer—Qualifying as an Electrical Engineer—Training and Earnings of Electrical Engineers—Telephone Engineering—Marine Engineering 815

CHAPTER II

CHEMISTS AND CHEMICAL ENGINEERS

Chemistry as a Profession—The Training of a Chemist—The Chemist in the Law Courts—Chemists in Agriculture—Chemical Engineering—Training for Chemical Engineering 838

CHAPTER III

INVENTORS AND MISCELLANEOUS SCIENTIFIC PROFESSIONS

Americans as Inventors—The Training of the Inventor—Achievements of Inventors—Inventions in the Electrical Field—The Reward of the Inventor—Opportunities for Inventors—The Patent System—How to Protect an Invention—How to Sell a Patent—How to Market a New Invention—Astronomers—The Night's Work of an Astronomer—Explorers—Metallurgy as a Profession—Forestry, a New Profession—Positions for Trained Foresters—Preparation for Forestry Work—Positions for Foresters' Assistants—The Farmer and the Bureau of Forestry—Scientists in Government Employ 845

CHAPTER IV

THE MINISTRY AND ALLIED PROFESSIONS

The Ministry as a Profession—Qualifying as a Preacher—Number of Ministers and Vacant Pulpits—Ministers' Salaries—Theological Schools—Theological Students—Sunday-School Teachers—The Catholic Church and Clergy—Training for the Priesthood—Sisters of Charity—The Jewish Church and Clergy—Missionaries—The Achievements of Missionaries—The Practical Side of Missionary Work—The Educational Work of Missionaries—Medical Missionaries—Missionaries as Printers and Publishers—Candidates for Missionary Work—Churches as Employment Agencies—The Practical Work of the Salvation Army—The Practical Work of the Volunteers of America 862

CHAPTER V

THE LEGAL PROFESSION

Conditions of Practice at the Bar—The Specialist in Law—The Law Office—Title and Guarantee Companies—"Ambulance Chasers"—Practice in the Criminal Courts—Practice in the Civil Courts—The Lawyer's Fees—Corporation Counsel—Law Schools—Law School Graduates—Studying Law in a Law Office—Studying Law at Home—Women in the Legal Profession—The Judiciary—The United States Supreme Court 878

CHAPTER VI

THE MEDICAL PROFESSION

Conditions of the Practice of Medicine—Specialists in the Medical Profession—The General Practitioner—The Country Doctor—Physicians as Business Men—The Physician in Public Life—Physicians in Court—Surgeons—Electro-Therapeutics—A Medical Education—The Hospital Service—The Beginner in Medicine—Women in the Medical Profession—Organization among Physicians . . . 890

CHAPTER VII

NURSES, PHARMACISTS, DENTISTS AND VETERINARIANS

Nursing as a Profession—Training for the Profession of Nursing—Pharmacists—Druggists—Drug Clerks—Dentistry as a Profession—Dental Education—The Veterinary Profession—Openings for Veterinary Surgeons—The Education of the Veterinarian 901

CHAPTER VIII

EDUCATION AND TEACHING

Schools and Colleges in the United States—The Public School System—Work of a Board of Education—Conduct of a University—University Extension—Education by Mail—Teaching as a Profession—A Teacher's Qualifications—The Training of Teachers—Cost of a Teacher's Training—How a Teacher Secures an Engagement—Earnings of Teachers—College Professors and Their Earnings . . . 909

CHAPTER IX

LITERATURE AND ALLIED PROFESSIONS

The Profession of Literature—The Author and the Publisher—Authors' Earnings—Book Writing—Novelists—Poetry as a Marketable Product—Short Stories and Magazine Articles—Qualifying as a Short-Story Writer—The Market for Short Stories—Special or "Hack" Writers—Literary Agencies and "Co-operative" Publishers—Libraries—Travelling Libraries—Librarians 916

CHAPTER X

THE PROFESSION OF JOURNALISM

The Newspaper Fraternity—The "New Journalism"—Journalistic Education—Reporters—Newspaper Correspondents—Staff and War Correspondents—The Local Correspondent—Special Correspondents—The Washington Correspondent—Women Reporters—The Woman Reporter's Assignments—Earnings of Women Reporters—Newspaper Editors—The Making of a Newspaper—The Day's Work in a Newspaper Office—The Night's Work in a Newspaper Office—The Evening Edition—The Sunday Edition—The Country Newspaper—The Press Associations—Operations of the Associated Press—The Circulation of a Newspaper—Weekly Journalism—Monthly Journalism 928

CHAPTER XI

ART, ARCHITECTURE, AND PHOTOGRAPHY

American Arts and Crafts—The Earnings of Artists—Portrait Painters—The Painter of Miniatures—Sculptors—Illustrators—The Mechanical Side of Illustrating—Illustrations for Advertisements—Designers—Designers of Book-Covers—Art Education in the United States—The Art Students' League and Its Branches—The National Academy and Its Schools—The Profession of Architecture—The Architect's Training—Earnings of Architects—An Architect's Expenses—Photography as a Profession—The Training of a Studio Photographer—A Photographic Studio—News-Photographers—Color Photography—Various Uses of the Camera—Artists' Models—The Life of Professional Models 949

CHAPTER XII

DRAMA, ENTERTAINMENT AND ALLIED PROFESSIONS

American Dramatists—The Making of a Play—The Dramatization of Novels—Women Dramatists—Theatrical Managers—Combination of Theatrical Managers—Acting as a Profession—Conditions of Stage Success—Vaudeville Managers—Continuous Performance Houses—Organization of Vaudeville Performers—Dramatic Schools and Training for the Stage—The Professional Dancer—The Training of Stage Dancers—Scene Painters—Lecturers and Entertainment Bureaus—Circus Managers—Circus Performers—Circus "Followers"—The American Turf 968

CHAPTER XIII

THE MUSICAL PROFESSIONS

American Musicians and Composers—Musical Education in the United States—Earnings of Musicians—Singing as a Profession—The Singer in Opera—Qualifying as a Prima Donna—Staging an Opera—The Chorus Girl—The Chorus Man—Writing a Comic Opera—The Singer in Concert—In the Choir—Song Writers—The Orchestra—The Band 983

PART IV

PUBLIC SERVICE AND MISCELLANEOUS PURSUITS

CHAPTER I

POLITICAL, DIPLOMATIC, AND CONSULAR SERVICE

Politics as a Profession—Politics as a Business—The Political Machine—Methods of Securing Political Office—Salaries of Federal Officeholders—Holding Office Under the Fee System—The Diplomatic Service—Method of Appointing Diplomats—The Consular Service—Method of Appointing Consuls—How the Consuls Help Business Men 993

CHAPTER II

THE ARMY AND NAVY

The Regular Army—Organization of the Army—The Training of Army Officers—General Conditions at the Military Academy—The Private Soldier—Promotion in the Army—Volunteers and Militiamen—The Navy, Preparing a Warship for Service—The Personnel of the Navy—The Ships of the Navy—General Conditions at the Naval Academy—The Training of Naval Officers—The Enlisted Force in the Navy—The Naval Apprentice—The "Jackie" and Promotion in the Navy—The Landsman—The Marine Corps 1001

CHAPTER III

CIVIL SERVICE AND GOVERNMENT EMPLOYMENT

Positions Under the Civil Service—Competition for Civil Service Positions—Civil Service Examinations—Prospect of Employment and Salaries—The Classified Civil Service—The Postal Service—Organization of the Postal System—Postmasters and Postmen—The Railway Postal Service—The Star Postal Routes—The Lighthouse Service—Lighthouse Keepers—The Life-Saving Service—Life-Saving Station Keepers—Life-Saving Crews—The Revenue Cutter Service—The Marine Hospital Service—The Quarantine Service—The Custom House Service 1015

CHAPTER IV

POLICEMEN, DETECTIVES AND FIREMEN

The Policeman—The New York Police Force—Occupations that Make the Best Policemen—The Mounted and Bicycle Police—The Detective and Detective Agencies—The Training of a Detective—Modern Detective Methods—The Fireman—The New York Fire Department—Methods of Promoting Firemen—The Training of a Fireman 1027

CHAPTER V

DOMESTIC SERVICE AND MISCELLANEOUS PURSUITS

Domestic Service as an Occupation—Wages of Servants—General Conditions of Domestic Service—Disadvantages of Domestic Service—Instruction in Domestic Science—Dangerous Occupations—Employment Agencies—The Auctioneer—The Pawnbroker—The Undertaker 1035

VOLUME TWO

INDUSTRIAL AND PROFESSIONAL PURSUITS

PART I

TRANSPORTATION BY LAND AND WATER

CHAPTER I

TRANSPORTATION BY LAND

Railroads of the United States—Statistics of Railways—Improvements in Railway Service—Subsidized Railroads—Railroad Combinations—The Greatest Railroad Combination—"Community of Interest" Among Railroads—Railroad Accidents.

Railroads of the United States

THOSE States and nations are rich, powerful, and enlightened whose transportation facilities are best and most extended. The dying nations are those with little or no transportation facilities.

A few years ago, two Imperial governments of Europe—Germany and Russia—gave to the world their indorsement of the idea that modern transportation facilities form the surest foundation upon which to build and sustain a nation. The Emperor of Germany in a speech to the Prussian Diet impressed upon his hearers the great importance of extending the railroads and the navigable canals. Moreover, in order that the German nation might have knowledge of the most advanced theories and practice in the construction and operation of railways, an Imperial German Commission was sent to the United States for the purpose of examining American railways and making such recommendations as their investigation should suggest. In the report of this Commission one of the first sentences is, "Lack of speed, lack of comfort, lack of cheap rates, are the charges brought against the German Empire's railways, as compared with those of the United States." The immense sums which the Russians are devoting to the extension of their railways entirely overshadow the demands of both the army and navy. They have in Japan more than one hundred locomotives that were built in the United States. In Russia, they have nearly one thousand American locomotives, and practically every railway in Great Britain has ordered locomotives in this country since the war with Spain.

But it is not alone our locomotives that have attracted the attention of foreigners who have visited our shores. Our railway equipment generally has commanded admiration, and is now receiving the highest compliment, namely, imitation by many of our sister nations.

Some general statement concerning the growth and present magnitude of the railway as an industry is essential to an understanding of railway operation as an occupation. We may even profitably reflect a moment upon the origin and application of the motive power which has, up to the present, been used in conducting railway transportation. Although steam as an industrial force was recognized and variously applied prior to 1769, when Watt patented his engine, we are accustomed to refer to his invention as the real source of progressive industry. Subsequently, in 1807, Fulton first successfully demonstrated the feasibility of using a steamboat to carry passengers and freight; and Stephenson followed in 1829 as inventor of the railway locomotive.

Statistics of Railways

Few believed until Stephenson proved, sixty years after Watt and twenty years after Fulton, that the inland factory could be made to thrive, or that the harvest of the farm or product of the mine could be profitably distributed throughout the country by other means than wagon or vessel. And yet to-day, hardly more than an average lifetime since the locomotive became an understood reality, we have, in the United States alone, 40,000 locomotives hauling more than one and a half million of cars over 200,000 miles of railway, and carrying annually about 600,000,000 tons of freight and more than 500,000,000 passengers, for which service an aggregate of $1,500,000,000 is paid to the railways, and from which sum over $577,000,000 is disbursed to 1,000,000 railway employés. These are statistics in round numbers for the year ending June 30, 1900, except the total railway mileage which is estimated by expert authority to have reached the figure given above.

Estimate, if you can, the tremendous industrial energy and enterprise producing a commerce in one year which pays simply for its movement a sum equal to three times the total revenues of the Federal Government, three-fourths of the entire public debt of the nation, or three-fourths of all the circulating currency, both coin and paper, of the country. Consider, also, what must be the value of that yearly internal commerce moved as freight, of which there are unfortunately no figures to set a mark for the imagination.

Proceeding further with comparison between railways and the Government, we find that the yearly operating expenses of the railways are about two and a half times the ordinary expenditures of the United States, and that as compared to the amount of money paid annually by the railways only to their employés the Government expenses are less by fully one hundred million dollars.

In 1830 there were only about twenty-three miles of railway in the United States, and by 1840 the mileage had risen to 2,818 miles. Ten years later it had become 9,021, and in 1860 the mileage had again been tripled, the figures standing then at 30,635. The succeeding decade covered the period of the Civil War, but the mileage in 1870 had nevertheless reached 52,914 miles. During the ten years to 1880 an increase of more than 40,000 miles brought the total to 93,296, but that phenomenal building record was broken in the following decade by an addition of nearly 70,000 miles, giving the country an aggregate of 163,597 miles; and in 1900 this had been raised to 193,345. The estimated increase brings the total in 1902 up to 200,000 miles.

It is also instructive to note that the number of railway miles per 10,000 inhabitants in 1890 was 25.44, and in 1900 it was 25.99, indicating that population and railway mileage increased at practically the same rate during the period covered by the last census. Another way of presenting the results of later railway construction is found in the statement that in 1890 we had 5.51 miles of line, and that in 1900 we had 6.51 miles of line for every 100 square miles of territory, showing an increase of exactly one mile per 100 square miles in the ten years.

The total capital of railways, including both stocks and funded debt, was nearly eleven and one-half billion dollars in June, 1900, and the capital per mile of line was $61,490. The aggregate value of railways as represented by their reported capital is about 12 per cent, that is to say, nearly one-eighth, speaking roughly, of the entire wealth of the nation, which has been estimated at $94,300,000,000.

There were 2,023 railway companies in the United States in the year ending June 30, 1900, of which 1,067, about half, were operating companies, 157 were companies owning private lines, and the remainder were companies owning roads but not operating them. Each of the companies must have a corps of officials, ranging from Chairman of the Board of Directors or President down to those occupying the lower subordinate positions, and every operating road must employ, according to its mileage and traffic, a large or small force of employés.

The figures given above in regard to railway mileage are those for single track only. The total mileage of all tracks, first, second, third, fourth, yard and siding, is about 260,000 miles. The railway mileage of the world given in Archiv für Eisenbahnwesen (May-June, 1901), as existing at the end of 1899, was 479,900 miles, of which Europe had 172,621; Asia, 35,938; Africa, 12,502; Australasia, 14,675; South America, 27,874; United States, 189,295, and all remaining North America, 26,995. The mileage given for the United States seems to have been a little understated.

Improvements in Railway Service

The construction and management of railways operate to overcome the natural tendency of population to concentrate in a few large cities or else distribute itself among a great number of small hamlets and villages or upon farms in sections where the hamlet or village constitutes the source of merchandise supply. The railway enables the little village to establish and maintain factories, elevators and mills, makes mining profitable, and provides many markets for grain, live stock, lumber and all products of the mine, forest and field; it induces the building of villages and transforms the village into the town, and the town into the city.

A people possessing industrial enterprise sufficient to eventually supply a railway with adequate traffic will in these days soon hear the whistle of the locomotive and see their produce speed swiftly forth to myriad points of distribution and sale, and every mile of railway track through open country generally renders the surrounding section capable of being utilized for numerous purposes of industry and habitation which, with the railway absent, could not be attempted. The railway opens all markets to existing localities and multiplies producing localities throughout every section. It draws population to its line, but distributes the people along its line, and such distribution necessarily results ultimately in the growth of a large number of populous cities and towns. This is the marvellous agency whereby we travel to-day in every comfort between New York and Philadelphia in two hours, whereas our fathers spent two days at least, in comparative discomfort, to accomplish the same journey.

It is by this magical facility that an ordinary family dinner can be served, which includes, without special effort or unusual cost, oysters grown in eastern waters, fresh salmon caught in the State of Washington, beef from cattle raised in Texas, and early vegetables produced in Georgia or California. And all this has become changed from dream to reality by engineering skill in construction and reconstruction, locomotive and car building, and methods of practical operation which have improved from time to time to an extent fully as great as from decade to decade the mileage itself has increased. The first "Pullman car" was constructed in 1865, but the commodious and elegant drawing-room car or sleeper of to-day is as far ahead of the original pattern as the modern hotel is beyond the country inn. The first practicable vestibule train, doing away with the jolting together of the cars, and providing safe passage through the entire length of the train, was run in 1887, and now vestibuled trains are common means of first-class travel. The dining car, another feature of long-distance travel, which, indeed, is also patronized during short journeys covering meal hours, no longer excites comment; and nearly all limited trains are now provided with library, buffet and observation cars. The air-brake, whereby the train is controlled by the engineer instead of half a dozen trainmen using hand-brakes at a signal whistle from the locomotive, is an appliance with which all freight and passenger trains must be equipped under national law.

Improvements in the cars themselves and the size and power of the locomotives have brought about such changed conditions that, instead of the usual train of ten cars, we often see forty or more (and one as high as eighty has been reached), loaded with articles of many kinds or freight of one kind, consigned to this hamlet or that city, or "clear across the sea," as the meeting minds of sellers and buyers have ordained.

To carry on this enormous business through transportation must be provided. Forty years ago this branch of railway operation had received but little attention. To-day you ride from New York to California in the same car, and your shipment from Portland, Maine, to Portland, Oregon, is upon a through bill of lading and a through rate over half a dozen or more lines. Any railway agent can name you a rate of fare or freight through from any point in the United States to any other point in the United States, and if you think the rate given is incorrect you can verify it by a telegram to the Interstate Commerce Commission, which has all railway tariffs on file in its office.

Subsidized Railroads

The following railroads receive subsidies or other aid from the Federal Government:

Union Pacific; Central Pacific; Central Branch; Sioux City and Pacific; Atchison, Topeka and Santa Fe; Chicago and Northwestern; Chicago, Burlington and Quincy; Chicago, Milwaukee and St. Paul; Chicago, Rock Island and Pacific; Chicago, St. Paul, Minneapolis and Omaha; Choctaw, Oklahoma and Gulf; Dubuque and Sioux City; Missouri, Kansas and Texas; Missouri Pacific; Northern Pacific; Oregon and California; St. Joseph and Grand Island; St. Louis and San Francisco; St. Louis, Iron Mountain and Southern; Santa Fe Pacific; Southern Pacific of California; Texas and Pacific, and Wisconsin Central.

The report of the United States Commissioner of Railroads states the following facts:

The marvellous and steady increase of railroad traffic over the land grant and bond-aided roads, as shown in the report of this bureau, is a striking evidence of the prosperity of the people, and especially of the growth of the West.

The physical conditions of the roads in question have improved in fully equal ratio with their great financial increase. Substantial improvements have been made in the main lines; heavy steel rails have taken the place of lighter quality; iron and steel bridges have replaced wooden, and the ballasting has been materially improved.

Railroad Combinations

During the past few years we have witnessed numerous consolidations or confederations of railway lines, some of which have been of such magnitude, both in mileage and amount of capital affected, as to startle the world. Even while this is being written the public press is telling of the practical absorption of the great Louisville & Nashville System by its rival, the Southern Railway Company, or by interests which control the latter company, thus extending the management or direction of 7,000 miles of railway to an additional 5,000 miles. Another pending merger is that of the Plant System of railways with the Atlantic Coast Line, each having about 2,000 miles. We are all more or less familiar with the changes made not long ago in the management of what have been known as Vanderbilt roads, which resulted in the greater unification of those lines, and with the extension of the Pennsylvania influence through acquirement of control of the Baltimore & Ohio, and changes in the stock ownership of the Norfolk & Western, resulting in the harmonious working of that railway with the Pennsylvania. It is also understood that the Chesapeake & Ohio is dominated by the Vanderbilt and Pennsylvania interests. With these latter consolidations and communities of interest it is understood that the Pennsylvania and New York Central Systems practically control the trunk line railroads to all that portion of the Atlantic Seaboard from Norfolk and Newport News to Boston. There have been numerous other consolidations or unifications of existing interests, among which is the device adopted by what is known as the Northern Securities Company incorporation, and which has been since its organization the subject of strong attack in the Federal courts. The object, of course, is economical administration, and that includes not merely reduction of operating cost and cutting off needless miscellaneous items of expense, but the elimination of that form of competition which has always resulted in reducing the revenues of the roads through secret concessions made to shippers to secure business.

The accomplishment of these great financial schemes is hardly part of the occupation of a railway official, though the inception and many of the details of such a scheme probably lie with the Presidents or Chairmen of Boards of Directors, and they are here mentioned with a view of indicating the current tendency to common control of railways, which is now arousing widespread interest, and the effect of such combinations upon railway operation and railway occupations. That they do affect railway occupations is shown by the fact that consolidation of two lines means usually the doing away of one of two sets of officers, and when such mergers involve large systems they cause a new division of the labor of administration, sometimes creation of the office of General Traffic Manager or a new Vice-President, and the employment of additional division agents.

The following arrangement or table is based upon operating control and not merely upon ownership. Operating control may be based upon ownership, or an arrangement effected between owners, or by common consent. Thus the Vanderbilts do not own a majority interest in either the Delaware, Lackawanna & Western or the Chicago & Northwestern, but both are operated in accordance with their policies. Neither does the Pennsylvania system own the control of either the Chesapeake & Ohio or the Norfolk & Western. In the former the Vanderbilts own an important interest. In some cases the unity of operating amounts to little. Thus there is no evidence that in traffic matters the western lines of the so-called Morgan-Hill system favor, or are favored by, the Erie. As the present railway mileage of the United States is about 200,000 miles the statement represents something like seventy-five per cent of the whole.

Vanderbilt System

	MILES
Boston & Albany	394
New York Central & Hudson River	3,357
Delaware, Lackawanna & Western	947
Lake Shore & Michigan Southern	1,411
Michigan Central	1,635
New York, Chicago & St. Louis	513
Cleveland, Cincinnati, Chicago & St. Louis	2,287
Lake Erie & Western	890
Indiana, Illinois & Iowa	306
Chicago & Northwestern	8,624
Pittsburg & Lake Erie	180
Total	20,544

Pennsylvania System

	MILES
Pennsylvania Railroad	4,932
Baltimore & Ohio	4,208
Long Island	392
Western New York & Pennsylvania	549
Pennsylvania Company	1,865
Pittsburg, Cincinnati, Chicago & St. Louis	1,601
Cleveland, Akron & Columbus	197
Grand Rapids & Indiana	582
Terre Haute & Indianapolis (Vandalia)	599
Chesapeake & Ohio	1,562
Norfolk & Western	1,697
Total	18,184

Morgan System

	MILES
Central of New Jersey	680
Philadelphia & Reading	1,454
Lehigh Valley	2,178
Southern Railway	7,572
Cincinnati, New Orleans & Texas Pacific	336
Mobile & Ohio	874
Central of Georgia	1,845
Total	14,939

Morgan-Hill System

	MILES
Erie	2,554
Great Northern	5,451
Northern Pacific	5,649
Chicago, Burlington & Quincy	8,171
Total	21,825

Harriman System

	MILES
Illinois Central	5,357
Chicago & Alton	918
Union Pacific	3,033
Southern Pacific	9,586
Oregon Railway & Navigation Company	1,136
Oregon Short Line	1,480
Total	21,510

Gould-Rockefeller System

	MILES
Wabash	2,502
Wheeling & Lake Erie	469
Missouri Pacific	3,551
St. Louis, Iron Mountain & Southern	1,773
St. Louis Southwestern	1,293
Texas & Pacific	1,690
International & Great Northern	935
Denver & Rio Grande	1,722
Rio Grande & Western	662
Total	14,597

Belmont System	miles
Louisville & Nashville	3,758
Nashville, Chattanooga & St. Louis	942
Georgia Railroad	624
Total	5,324

Separate Lines (*The more important*)	miles
Boston & Maine	3,278
New York, New Haven & Hartford	2,037
Seaboard Air Line	2,600
Atlantic Coast Line	2,233
Plant System	2,178
Pere Marquette	1,821
Chicago, Milwaukee & St. Paul	6,597
Chicago, Rock Island & Pacific	3,819
Chicago Great Western	930
Wisconsin Central	1,043
Atchison, Topeka & Santa Fe	7,860
St. Louis & San Francisco	3,200
Colorado & Southern	1,142
Total	38,738

As before stated, the Atlantic Coast and Plant Systems are or are about to be merged, and the Louisville & Nashville, with its subsidiary or affiliated roads, the Nashville, Chattanooga & St. Louis and the Georgia, composing the "Belmont System," are to be considered as part of the "Morgan System."

The Greatest Railroad Combination

The Northern Securities Company, formed in the latter part of 1901, is the first billion-dollar railroad combination in history. This company is a union of the great northwestern railways, and is the greatest example of the "community of interest" idea.

Immediately upon his return to St. Paul, after the great Northern Securities deal, Mr. J. J. Hill made the following statement:

> The Northern Securities Company is organized to deal in high-class securities to hold the same for the benefit of its shareholders and to advance the interests of the corporations whose securities it owns. Its powers do not include the operation of railways, banking, mining, nor the buying or selling of securities or properties for others on commission; it is purely an investment company, and the object of its creation was simply to enable those who hold its stock to continue their respective interests in association together and to prevent such interests from being scattered by death or otherwise; to provide against such attacks as has been made upon the Northern Pacific by a rival and competing interest whose main investment was hundreds of miles from the Northwest, and whose only object in buying control of the Northern Pacific was to benefit their southern properties by restraining the growth of the country between Lake Superior and Puget Sound, and by turning away from the northern lines the enormous oriental traffic which must follow placing on the Pacific Ocean of the largest ships in the world.

A staid financial journal, as little given to superlatives as a book of logarithms, called the Northern Pacific panic of May, 1901, "the most extraordinary event in Wall Street history." That event subsequently found a fitting sequel in the organization of the second largest corporation in the world, a corporation which will regulate, if not control, most of the traffic, by land or sea, in the hemisphere between Chicago and China. A fact so big with meaning as this comes slowly to the understanding. We must patiently add millions to millions, ships to ships, railroad lines to railroad lines, and even then we have only an unmeaning statistical skeleton, dim and overpoweringly huge. But presently we begin to feel the animating spirit, the hidden life, of all these great things.

It is not of so much importance that this corporation owns three railroad systems with twenty thousand miles of track, and many ships, and has gross earnings beyond a hundred millions a year, as it is that it has practically no competitor, that it is absolute dictator in its own territory, with monarchical powers in all matters relating to transportation. Nor does even this indicate the full significance of the facts. The most cursory examination will show that the men behind the new corporation are of those who control a large proportion of the other railroads of America, that the same influences sway the greatest corporation in the world, the United States Steel Corporation, which, in its turn, is closely intimate with that other financial power, the Standard Oil Company.

"Community of Interests" Among Railroads

The following statement of the origin and application of the community of interest idea as related to railroad affairs is taken from the testimony before the Industrial Commission, of Mr. Jacob H. Schiff, the New York financier and member of the banking firm of Kuhn, Loeb & Co.:

As I take it, this community of interest idea arose in the desire of the railroads, or the owners of railroads, to protect themselves against the demoralization, and, as a consequence, depression in the value of their properties, which was brought about by antipooling legislation. It is human nature that a producer and shipper wants at all times to get something better, to get ahead of his neighbor; so the practical consequence has been that when a shipper made a certain rate of transportation with the railroad company his neighbor went to the competing road and, by straight or crooked means, endeavored to get lower rates than his neighbor received.

That naturally brought about demoralization of rates, and it damaged both the transportation interests and the producing interests. It is evident that there is little safety to the products if he is not certain that his competitor pays exactly the same charge for transporting his goods or products that he pays himself. There is just as much danger to him as there is to the railroad if it does not get just exactly the same rate that the competing railroad receives. This unsettled condition produced a state of affairs which, in my opinion, has been more dangerous to the vital interests of the country than any benefits that could have possibly been derived from antipooling legislation. It demoralized both the shipper and transporter alike, and property of all kinds suffered by it; not only property suffered, but labor suffered.

It is evident that when rates are depressed the railroads cannot pay to the working forces the same compensation or remuneration that they can in times when they get full rates for their transportation.

This state of affairs brought about a gradual coming together of the railroad interests, and induced them to buy into one another's properties. For instance, if I held stock of "A" company and you held stock in "B" company, and my shares were depressed in value because you were competing with me—each of us cutting the rates of the other—our interests would evidently be better served if you owned some of the stock in my company and I owned some of the stock in your company. In other words, if we had a community of interest.

That is, in simple words, the process which has been going on on a large scale among the railroads, and which, in my opinion, while it is not completed yet, will naturally bring about some protection, as the way to perfect peace is always through war. I believe when brought to an entire completion, it will be a blessing to the laboring man, it will be a security to the shipper, and it will be a benefit to the owners of railroad property. I believe the community of interest will not only result in the community of interest between railroad property, but it will be community of interest between railroads, shippers, and labor.

Railroad Accidents

How to prevent accidents is probably the most serious and difficult of the numerous operating problems which railway managers are called upon to solve. The many improvements which have been added to railway equipment and the high degree of efficiency which has been attained in the management of trains render railway travel in the United States comparatively safe. Passengers now give scarcely any thought to the possibility of accident when they undertake a railway journey. The chance of losing life while on the rail, or even of being injured, is so slight that it can hardly be said to exceed the risk run in going from point to point in any city or town. In 1900, out of about 576,865,230 passengers carried, only 249 were killed and 4,128 were injured. That means, if you travelled by rail in 1900, your chance of being killed was one in 2,316,648, and your liability to injury, great or slight, was one in 139,740. With greater density of traffic upon railways the liability to accident is increased, and this accounts for the greater number of casualties than in the year preceding. For that year 239 passengers were killed and 3,442 were injured. In 1895 the figures were 170 killed and 2,375 injured, while in 1892 there were 376 killed and 3,227 injured.

On the other hand, the railway employé engaged in conducting transportation or in yard or switch work is performing labor of a character which must be termed exceedingly hazardous. While of all the hundreds of millions of passengers who rode on railways in 1900 only 249 were killed, 2,550 railway employés lost their lives in railway service during the same year, and 39,463 of those employés were injured. One employé out of every 399 was killed and one out of every 26 was injured. Taking the trainmen alone, the ratio of killed was one to every 137 employed, and of injured it was one in eleven.

The railways, of course, are deeply interested in preventing these accidents to employés and in reducing the number, but their efforts thus far have been unavailing. A fruitful source of accidents to the employés has been the coupling and uncoupling of cars. Formerly this was done by hand, a man going between the cars to guide the coupling apparatus or to pull out the pin in uncoupling. This practice has been abolished through the introduction and general use of the automatic coupler, which was adopted as a standard by the railway car builders fifteen or twenty years ago. But although such standard coupling mechanism was adopted the railways did not at once equip all cars with it, and it was not until the Safety Appliance Act was passed by Congress in March, 1893, that any serious attempt to completely reform all equipment in this respect was undertaken. This law came into full operation on August 1, 1900, and since that date it has been unlawful for any railway company engaged in interstate traffic to use any car for that traffic not equipped with a coupler coupling automatically by impact, and by which the car may be uncoupled without the necessity of men going between the ends of the cars. Another change required by this law was the placing of the couplers a uniform height from the tops of the rails, and still another was that each car should have grab-irons or handholds at the sides and ends. A further requirement in the Safety Appliance Act is that every train shall have in it a sufficient number of cars fitted with the air-brake to enable the engineer to control the train, thus avoiding the necessity of stopping the train by means of hand-brakes on the different cars. Some of the beneficent results of this law are found in the decreased number of accidents from coupling and uncoupling cars. In 1893 there were 433 men killed and 11,277 injured in coupling and uncoupling; in 1900 there were only 282 killed and 5,229 injured.

Another law, passed by Congress March 3, 1901, requires monthly reports of all railway accidents through collisions or derailments to the Interstate Commerce Commission. The principal purpose of this Act is to furnish a basis for more satisfactory accident statistics.

CHAPTER II

THE CONDUCT OF A GREAT RAILROAD

Organization of a Railway System—The Railroad President—The General Manager—The Traffic Department—The Operating Department—The System of Signals—The Train Despatcher—The Train Despatcher's Duties—Locomotive Firemen—Locomotive Engineers—Railway Brakemen—Railway Conductors—Parlor, Sleeping and Dining Car Service—"Braking" a Train—Making a Railroad Time Table

Organization of a Railway System

VERY few persons comprehend the organization and management of the large railway systems which are now such an important factor in the commercial affairs of the country. The general organization is about the same in all the large systems, there being, however, some differences in the titles of department officers and matters of detail, according to the fancies of the directors or president, or the peculiar necessities of each line; but as the railroad properties in this country are held in private ownership, it is presumable that their owners try to operate them so as to obtain the best service at the least cost, and that therefore no extravagant or unnecessary positions or departments are provided.

The business of a railroad is generally carried on by these departments; viz., the accounting department, sometimes presided over by a comptroller, who may report either to the general manager or the president, according to the road's scheme of organization; the traffic department, which may have for its head a traffic manager, assisted by general freight agents and general passenger agents; the operating department, in charge of a general superintendent.

The accounting department is the one in which the accounts are kept, and the auditor, who either assists the comptroller, or, where there is no comptroller, is responsible to the general manager, receives an impression copy of each "way-bill," which shows the name of the shipper, the point of shipment, the name of the consignee, the destination, the marks and the weights and the freight charges on each consignment of freight carried over the road. This way-bill he scrutinizes, or causes to be examined very carefully, and sees that the charges are in accordance with the rates announced by the general freight agent. If they are found correct, he makes from them numerous records, crediting agents or connecting railroads or charging others. The ticket agents send him either daily or weekly or monthly reports of their sales, which are checked with the tickets forwarded to him by the conductors when taken up on the trains.

As a rule the heads of departments are comparatively young men, and the demands on the brains and strength of these officers are so severe that they seldom die in the service from old age. They are generally well, but not extravagantly, paid, the salary varying, according to the importance of the road. The clerks in the departments are usually men of ability and are well informed. Each is fitted by talents, experience and education for some particular kind of work assigned to him.

The personnel of a great railroad system is like that of an army: the president is the general-in-chief; the vice-presidents are major-generals; heads of departments are brigadier-generals; and division superintendents, assistant superintendents of motive power, assistant engineers, etc., etc., are colonels; while the officers and men employed in the various departments are made up like so many regiments. The employés of the system constitute, indeed, a veritable industrial army, and among them are representatives of every country on the globe, from the original American—the Indian—to natives of India, China and Japan.

The Railroad President

It is generally supposed that the president of a large railway system has an easy place to fill, and gets a large salary for doing comparatively nothing. In some cases this may be true, and in such cases it may be true also that that dignitary is nothing more than a figurehead, whose real duties are performed by a vice-president or a general manager, and who may not have a very intimate idea of the manner in which the business is carried on, except that at the annual stockholders' meetings he will present them an elaborate statement of the earnings and expenditures which have been prepared for him. Such railroad presidents, however, are rare, and it is safe to say that most of them, in this day at least, earn their salaries. The president of a railroad should be, and generally is, the financial head of the company, and it is usual for him to delegate to the general manager the management of the operations of the road in all its details. The general manager is, therefore, necessarily a practical railroad man, and from him the officers of all departments of the road having to do with its operations usually receive their instructions.

It may be believed that the modern tendency in railroad companies is to concentrate all of the power in the hands of the president, to the belittling of minor officials. This is not always the case. In fact, the contrary is true. Fewer details are now controlled by the president of a great railroad. His powers are curtailed. He is bound by his own rules. While his field of action may be larger than that of the president of a small road, nevertheless he is much more trammelled in the scope of his authority. As to the duties of a railroad president and the serious problems he has continually to face, it would be difficult to frame any statement including them all. The field of action is very large, and the duties very numerous. When the fact is considered that it is only the important things that ever come before him to be settled, it may be seen that his responsibilities are enormous. A railroad being a quasi public affair, the president must not only suit the directors of the road, but must run the road satisfactorily to the public, or the different legislatures will take him to task. The public is very exacting, and this makes the president's position all the more onerous. In spite of the abuse of demagogues, the moral tone of the railway business is as high as that of any other branch of industry. Railroad managers are frequently misrepresented. The portion of the public, however, having the largest dealings with railroads places implicit trust in the officials, oral agreements often taking the place of written contracts. To please everybody is a difficult matter. Unfounded attacks often worry the president. But he must cultivate patience and imperturbability, and keep the road up to the highest possible standard. Much is demanded of a railroad president. His position is hemmed in with perplexities. If he is the man for the place he must conduct affairs smoothly yet rigidly. Among the many interests which he has to consider are the problems of keeping earnings up and expenses low, of satisfying the taxing power, of meeting the demands of the legislatures, of pleasing the public, of keeping contentment among the employés, to say nothing of satisfying the stockholders. Compromises must often be made, and the president must do the best he can for the interests of his road, although he may often not get full justice for his company.

The General Manager

A general manager must know every process of railroad construction and operation and their principles. The incumbent of this office on a Western railway, desiring to have his son follow the profession of railroading, resorted to a very practical method. The young man received the best of training in a good technological school. This, however, was merely a preliminary step. After graduation, he was not "jumped" into a high office on his father's road. On the contrary, he joined a surveying party in the humblest capacity, "carrying chain" for a good while. As he was well posted in engineering, his next step was to assist in laying out a new line of railroad. He then went into the shops, and, with apron, lathe and bench worked as hard as any artisan. By this means he gained an invaluable, practical knowledge of the building of cars and locomotive engines. The personal contact with the men in all these branches of the service was of immeasurable benefit to him in later years. He was enabled to sympathize with their points of view, and to see how they looked upon life and work. After this he took service as road master of a line in a different section of the country, where he had a chance to show his executive ability in managing other men. When, finally, he was appointed division superintendent on his father's road, he had worked his way up, and was fully and practically equipped for the place. This is the judgment of an important officer on a great railroad as to the making of a railroad man, and may be taken as final.

In order to make a good railroad manager, certain special qualities are requisite. In the first place, the desire to do full justice to the humblest employé is necessary. Equity and fairness to all must be the foundation. Nothing makes men so discontented and rebellious as open injustice, and a reputation for the possession of this characteristic will spoil the career of any railway official. The men must respect and trust their officers. The complaint of no employé, however humble, should be ignored or cavalierly dismissed. The work of each man is important to the safety and welfare of the road, and each man is entitled to a hearing, from motives of general policy, if nothing else.

A vital necessity in the make-up of a railroad manager is quickness of decision. In the questions arising in the operation of a railroad there is no time for delay. Everything must be "rushed" and accomplished on "schedule time." The problems of the hour brook no procrastination nor hesitation. The general manager who deliberates is out of his proper sphere. He must think and decide as quickly as a general in action, when war is raging.

The good railway manager must have an unerring judgment of human nature. His employés are to be intrusted with great responsibilities. Even the work of the humblest railroad worker is important to the safety of the public. Rail-spikers, switchmen, yardmen and trainmen—none can be ignored. The lives of multitudes are dependent upon their faithful and intelligent service. To choose these men is a great responsibility, and no one without a good knowledge of human nature and great skill in reading character is qualified for a position of authority upon a railroad. The general manager has to use this choice in the selection of men for the higher positions. He must always back up and support the men who have given him reason for satisfaction.

The Traffic Department

The traffic department of a railroad is really the commercial department. It is divided between a general freight agent and a general passenger agent, both of whom report to and receive their instructions from a general traffic manager, or where there is no traffic manager, from the general manager. The general freight agent has charge of the fixing of rates for the transporation of freight, and under his supervision soliciting agents and travelling agents watch the movement of traffic and secure the road such of it as can be controlled. All claims for loss, damage or overcharges on freight transported are adjudged by him or the agent acting under him.

The general passenger agent supervises the passenger traffic in the same manner that the general freight agent supervises the freight business, and it is his duty to see that his road is properly and sufficiently advertised, that it is properly represented in the ticket offices of all connecting lines and to supervise the printing and supply of such tickets to the agents of his line as the needs of his patrons demand.

If any Thursday night you should place a letter on the mail train leaving New York at 9.15, you may be sure that your correspondent in San Francisco will be reading it the following Monday night—four days from New York. The framers of our Constitution would have considered a man entirely beside himself who would have suggested such a possibility.

In the United States the first-class passenger fares paid in averaged 1.98 cents per mile, although on some large railways the average was several miles less than two cents per mile; in England, the first-class fare is four cents per mile; third-class fare, for vastly inferior service, is two cents per mile, but only on certain parliamentary trains. In Prussia, the first-class fare is three cents per mile; in Austria 3.05 cents per mile, and in France 3.36 cents per mile. Our passenger cars excel those of foreign countries in all that goes to make up the comfort and convenience of a journey. Our sleeping and parlor-car system is vastly superior to theirs; our baggage system is infinitely better than theirs and arranged upon a much more liberal basis. American railroads carry 150 pounds of baggage free, while the German roads carry only 55 pounds free. And to-day two regal trains are making the run between New York and Chicago in twenty hours, enabling business men to go from one city to the other and return, losing but one day from business in the operation.

These are some of the achievements of American railways in passenger service that have not been approached in any other country on the globe, and it is achievements of this character that have made it possible for the United States to expand their commerce with such astounding rapidity.

In the traffic department, business knowledge and a salesman's skill are necessary, and not a technical expertness in railroad operation. Firmness and justice are requisite for the traffic man, with ability to develop business and create it. He must be well posted in mercantile matters, values, methods, and trade channels.

The Operating Department

The operating department is one of the most important departments of a railroad, and the success of the whole depends on its efficiency. It is in charge of the general superintendent, assisted by a superintendent of roadway, a superintendent of machinery, and a superintendent of transportation. The superintendent of roadway has charge of all tracks, and usually all bridges and buildings pertaining to the track department, although some roads provide another officer, who looks after bridges and buildings alone. The superintendent of roadway is assisted by roadmasters, who have charge of divisions, varying according to the physical features of the track. These roadmasters direct all work performed on their divisions by section foremen and trackmen. The superintendent of machinery has charge of all locomotives, and is responsible for the performance of proper service. He has also charge of enginemen, firemen and machinists.

The superintendent of transportation has charge of the movement of trains over the line, appoints conductors, brakemen, agents and train despatchers, sees to the distribution of cars and equipment where needed, and is generally responsible for the safe and speedy movement of passengers and freight. He is assisted by trainmasters, whose duties vary on many lines, but who are generally immediately under the direction of the superintendent of transportation.

Regarding the actual operation of trains—the organization that keeps the "wheels going round," and which, above all, looks to the safety of passengers—one may begin by saying that the movement of every train is watched more closely, more carefully, than the suspect who is being shadowed by detectives. From the time a train leaves the Grand Central Station, in New York, for instance, until it arrives at the end of its run, its progress is not only watched, but its exact location is reported every few minutes by telegraph. It is as a continuous line of men, each with his finger on a telegraph key, stretched along the track—a fence of human beings—from the starting to the terminal point.

At the home office sits the train despatcher, under a green-shaded light, bending over his "train sheet," on which he records the movements of every train on any part of the track on his division. At the Grand Central Station the train despatcher has charge of every train, north or south bound, between New York and Albany. There are about one hundred such trains each way every day. The telegraph operator at each station, as a train passes, clicks off the time and number of the train, his message being received in the train despatcher's offce. Thus, as if drawn upon canvas before his very eyes, the train despatcher sees exactly where each train is. If one train is delaying another, if a freight train is in the way of a special, the despatcher wires the blocking trains to move out of the way, naming the exact spot to which it shall move. And it must be emphasized, that as careful an eye is kept upon a cattle train or a freight train as upon the most luxurious limited or the most important express.

Thus, in sunshine or rain or blizzard, at noon or midnight, with every passing second, with every turn of the wheels, the train you are riding in is safeguarded. When the passenger stretches comfortably between sheets in his berth in the sleeping-car, when he turns over to pleasant dreams, does he ever think of the men, unseen, unheard, who are watching his travelling bedroom every inch of the way as it rushes over the track? Responsibility for that passenger's life and limb lies every second with some one, somewhere. The number of persons employed in looking after the traveller's comfort is but a corporal's guard in comparison with the legion which has the traveller's safety in custody.

The System of Signals

"Asleep at the Switch" could not have been written if the great railroad systems of the poet's time had been what they are now. The melodramatic situation used to such advantage—the switchman snoring at his post, the train coming madly on through the night and saved in the very nick of time by a maiden with her hair standing on end—would not be true to life in these days. The fate of a trainload of passengers is no longer left to a single man who may or may not snuggle up to his switch and take a nap.

With the "block" system now in operation on the main lines, a man "asleep at the switch" would practically stop the running of trains for miles back. The sleeper, in other words, would virtually tie up the operation of the road until some one woke him up. For the object of the block system is to block trains, to keep them a certain distance apart. A block is the distance between towers—the distance varying all the way from less than fifteen hundred feet to over three miles. Only one train is allowed in a block at a time.

The system is so simple that it can be described in a few words. The signals at each tower are controlled by the man in the tower ahead. That is, no towerman can give the signal "All clear" until that signal is unlocked by his co-laborer in the next tower. Thus, a train leaving the Grand Central Station in New York is controlled as follows: On approaching tower one the towerman asks tower two for an unlock by ringing three bells. If block is clear between towers one and two, towerman at tower two unlocks tower one by pushing a plunger in a cabinet. Tower one then clears signals, and after the train has passed he announces the train approaching tower two by riging four bells. And this method is carried out all the way to the end of the line.

Still, the block system does not alter the old rule for trainmen. When a train stops at an unusual place, the trainman, as in former days, must hurry back over the track for at least three-quarters of a mile, and place a torpedo on the track. Then he must continue further back one mile and place two torpedoes. If his train pulls away before another train comes along, he picks up the torpedo nearest the train, leaving the others on the track.

Torpedoes are called audible signals. When the engineer strikes the first torpedo he slows up, and if he does not strike a third he knows then that the track has been cleared and again goes ahead full speed. If he strikes two torpedoes, however, he slows up and proceeds with extreme caution, knowing there is danger within one mile ahead. At night, in addition to the torpedoes, the trainman must light a fusee, a red light, which burns exactly ten minutes. An engineer coming upon one of these fusees knows that a train is ahead within ten minutes, and does not proceed until the fusee has burned out.

The Train Despatcher

It may be truthfully said that there are few subjects so directly affecting the safety of millions of people who travel by railroad of which so little is known by the general public as train despatching. Nor is the safety of those who travel the only important factor in this branch of railroad service, for in its successful working is involved to a great extent the safe and quick despatch of the millions of tons of freight transported daily over the railroads, an accident by collision or otherwise to a single train of which would entail a loss of thousands of dollars, aside from that sustained by the railroads in damage to motive power and equipment. And as it can also be said that only a very small proportion of the railroad fraternity understands the magnitude and importance, as well as the complexity of the train despatcher's duties, it is not surprising that so little is known or understood of them by others. Indeed, with the exception of conductors, telegraph operators and such of the superintendents as have given the matter special study, there are few in the railroad corps who, at best, but imperfectly understand, in its entirety, the peculiarly intricate nature of the business; and there are perhaps none, except those who have been in the "harness," who can adequately appreciate its responsibilities.

The train despatcher on a railroad has entire charge of the movement of all trains and of engines without trains, and conductors and engineers while in charge of trains and engines must obey his orders. It is in the first of these—namely, the movements of all trains and engines—that his chief and most exacting duties originate. Every road has, of course, a schedule of the trains, both passenger and freight, which it is deemed necessary to run for the proper transaction of business. This schedule is changed from time to time as the varying conditions of business on the line require. The time each train is due at every station is shown on it, as are also the points and times when and where trains meet and pass each other. It gives, too, the rules and regulations by which conductors and engineers running these trains are to be governed. Conductors and engineers are each provided with one of these schedules, and are supposed to thoroughly understand them in all their details. They must know that such and such trains have absolute right to the roads over all others, and that all others must, therefore, be kept out of their way; they must know that other trains have a right to the roads over some others for thirty minutes or an hour, as the case may be, beyond their time, and must govern themselves accordingly; they must know that certain trains going in one direction have varying rights over those going in the opposite direction, and must be ruled thereby; in short, they must know what rights the trains they are in charge of have as against other trains, how those rights are affected by the rights of other trains, and how the rights of other trains are affected by their trains rights. All these they are supposed to learn from the "laid down" rules and regulations, which, it would be supposed, are always as clear and as terse as English language makes possible. Candor compels the statement, however, that such is not always the fact, and that in many cases action, based upon a literal construction of them, would be almost opposite to that in practice.

The Train Despatcher's Duties

If every thing worked satisfactorily in accordance with the plans of the schedule, the train despatcher's duties would be light, but by reason of the daily irregularities of the surrounding factors that so largely enter into these plans, the variations in the volume of business and a thousand other things incidental to such a large operation as the running of a railroad, this is rendered utterly impossible. The schedule may be likened to a theory on a grand scale, which can only be put into operation with anything like success by the utmost care, watchfulness and untiring efforts of the train despatcher. He must understand the rights of all trains under every varying circumstance, and must see that each conductor and engineer understands them as he does; for, in order to facilitate the business, he may find it necessary at any moment to suspend, in part or in whole, the rights of given trains, and confer greater rights upon some others, and this is because it frequently happens that by holding one train five or ten minutes he may be able to avert a delay of one or two hours to some other train. The conductor has his own individual train to look after, and is concerned only for it, but the train despatcher is concerned for all the trains on the line—thirty or forty, perhaps, at one time, as the case may be—and must, as it were, exercise a sort of paternal protection over them, giving each the attention its importance deserves, now holding No. 1 to help No. 2 along, and perhaps again holding No. 2 to allow No. 3, of more importance, to proceed without detention, and so on. His orders supersede the rules and regulations governing the movement and time of trains, and must be obeyed to the letter.

The chief and the trick despatchers are never very far from the ends of their wires. Sundays, holidays, nights and noons they are ever near the telegraph sounder. As a rule, they stay where they work, the "trick" despatcher doing his turn of so many hours, the chief despatcher being theoretically always on duty, sleeping or waking. The train wire is never for a single moment, from January first to December thirty-first, without a despatcher at the end of it. The chief train despatcher must know the speed of each engine, her pulling capacity, the diameter of the driving wheels, the size of her cylinders, how many cars each side track will hold, how many cars can be stalled in the yard without blockading, the average amount of business at each station and the number of cars needed. All this and hundreds of other matters—even the dispositions of every trainman, engineman and operator in his division, the train despatcher learns by experience.

All orders emanate from him, and he is the sole judge, until they are executed, of their reasonableness, their judiciousness, their correctness and their effectiveness. While checks on all others engaged in the train service may be devised, he stands alone without a monitor. The conductor has simply, as the head of one train, to act in accordance with his instructions, which are always either printed or written. In case of doubt they are easy of access for reference, and if, through forgetfulness, he was about to run counter to them, the engineer, who has been provided with the same instructions, would be apt to remind him. The train despatcher is not provided with this safeguard; he must rely solely on the verity of his own consciousness to save him from mistakes, and forgetfulness must be a vagary unknown to him. Notwithstanding the oft-repeated assertions of speculative philosophers that we can never know anything with certainty, he must have a full and complete conviction that he knows what he knows, or he will be plunged into such suspense and anxiety at times as will make him "desire his mother had never borne him." If he makes a mistake, unlike the conductor, he has no chance to rectify it. After the trains have once left the station, they are then beyond the power of recall, and his only hope that a collision, with its consequent horrors, will be averted, is that the engineers may see each other in time to stop, a rather uncertain probability, if the road should happen to be curved.

Train despatching is a scientific system, and is practically uniform on all roads. The scientist makes the time-table according to the laws of proportion, and according to the rights and privileges of the different classes of trains. But upon the ability of the train despatcher the railroad company depends for the successful operation "as per the *working* time-table."

Locomotive Firemen

The engineer and fireman hold important and responsible positions. They are better informed and receive better pay than their predecessors. The field is enlarging constantly, and with the prospect of a new motive power in place of steam, only well equipped and capable men will be sure of retention as engineers in the employ of the roads. To become an engineer a young man must serve an apprenticeship. There is surely sufficient inducement for him to do this, for a locomotive engineer of some experience often earns two thousand dollars a year, working only half the week, and being sure of keeping his place for life, unless something extraordinary occurs. If well equipped he is also in the direct line of promotion, in frequent instances becoming a master mechanic, a division superintendent, a superintendent of motive power, etc.

The apprenticeship for a locomotive engineer is served as fireman. So well are these firemen chosen from the numbers of applicants that more than ninety per cent of them become engineers. A young man of fair education, writing a good plain hand, neat in person and dress, and sound in health, will have little difficulty in having his name placed upon the waiting list. So extensive and so rapidly expanding is the railroad business of to-day that men are in demand, and the applicant generally has but a short time to wait before securing an engagement as fireman. The beginner is generally placed on a switch engine, although sometimes on a freight train, serving on the extra list until he gets a regular engine. The engineer is his teacher. The fireman must keep the engine clean and see that the fire is just right. He must especially be economical of fuel. Careless firing on several engines would mean a large loss to the company. A fireman gets very good pay for a beginner, the salaries amounting to about fifty-seven dollars a month for switch engine firemen, seventy-five dollars for through freight firemen, and as much as ninety dollars on passenger trains. The fireman's work is hard, and men who have done manual labor are of course best fitted for it. The fireman must know his engine thoroughly, and should be able to run it, if emergency requires, in place of the engineer.

Locomotive Engineers

As to the locomotive engineer, he should examine every part of his engine before each trip, not detailing this duty to any one else. If he spends an hour or an hour and a half in this inspection he is not doing too much. Most particularly true in railroading is the old adage to the effect that "prevention is better than cure." The engineer, when his train has started, must be continually alert. He can not be idle or indifferent for an instant. There are many details for his attention. The water in the boiler must be kept at a proper height. The air-brakes must be in the correct condition for immediate action. There must always be steam enough to run the train and to heat the cars. Grade crossings must be watched, with proper sounding of the whistle, and a constant lookout must be maintained for block signals. The engineer must be able to detect instantly any failure or defect in the machinery, and must know how to make repairs, when occasion arises. The coolness and judgment of some locomotive engineers really amounts almost to a sixth sense. Long experience gives them a certain intuition, for which no rules can be given, which often saves hundreds of lives. To do the proper things in the proper order, with instantaneous decision, this is the characteristic of a good engineer. When a train is moving at the rate of ninety feet a second there is no time for delay in emergencies.

Of course there are disagreeable experiences occasionally to be faced by the locomotive engineer. It is very trying, for example, to be put in charge of some inferior old engine and be expected to make as good time with it as with a perfect modern machine. Then, again, there are bad weather conditions. In great snow-storms, when drifts cover the track and the cold is terrific, the resourceful engineer often has to do fourfold his usual work. He must know when *not* to slow down for a drift, and what to do when stalled by snow. Long hours are sometimes his fate under these trying circumstances, especially in the through freight service. Railroading, however, is not nearly so hazardous as it was formerly. As a rule, railroad men live as long as other men, and most of the life insurance companies insure firemen and engineers at a slightly advanced premium. They are not considered bad "risks." Such has been the improvement in roadbeds and management that the loss of life is very slight.

The locomotive engineer works under orders. The rules of the road govern all his actions, except in emergencies. As for pay, the engineer's salary is a very good one. The best roads pay their switch engineers about $100 a month, their freight engineers from $140 to $150, while a passenger engineer gets from $150 to $175. These rates will certainly compare very favorably with earnings in other professions. The hours of work vary somewhat. Ten hours every day in the week, with one hour's nooning, is the stint for switch engineers; ten hours a day for freight engineers, and an average of eight hours a day for local passenger engineers, with three Sundays off in the month. For through passenger engineers the hours are from fourteen to sixteen hours every other day. The "lay off" at the end of the trip is included in their working time.

As a general principle, the better the education, the better the engineer. All young men who think of becoming locomotive engineers should take a course in mechanics and electrical engineering. The best informed engineers are trusted and consulted by the company, and this is in itself a reward of efficiency. The better educated the engineer, the broader his vision. Officers and men trust each other, and thus disputes are quickly settled.

Railway Brakemen

Men who seek employment as brakemen, with the view to become conductors, are of a much higher class now than formerly. As in the case of firemen, the brakemen are no longer hired by their immediate superiors, and subject to discharge by them. The conductor does not now employ or dismiss the brakeman, nor wholly regulate his promotion. The superintendent has the power of hiring and dismissing brakemen at present. Of course, if the brakeman constantly offends the conductor by badly performed work, his reported delinquencies will speedily result in his discharge. As in other first appointments, the character and fitness of the applicant for the position of brakeman is carefully scrutinized. But that the selections are well made is proved by the fact that about the same proportion of brakemen remain in the service and are promoted as is the case among the firemen—that is to say, about ninety per cent remain. In former days brakemen began with freight trains and went, later, to the same service on passenger trains, then going back to freight trains as conductors, and next being promoted to the conductorship of passenger trains. The brakeman's work was very hard in the days of the hand-brakes, but all that is changed now. Men had to be of great strength and endurance to stand the work. They had less ambition, and an appointment as freight conductor was the zenith of their hopes. The present applicant for engagement as a brakeman fills out a blank which contains examination questions as to the two hundred rules of the road, and he must have a five years' reference as to character. The superintendent thus has something on which to base his judgment in appointing the young man. As is very natural, preference is given to the sons of conductors and engineers of the road, and an effort is made also to secure young men who live in towns along the line, so that they will be contented to remain in the service, home ties restraining them from leaving for employment on some other road.

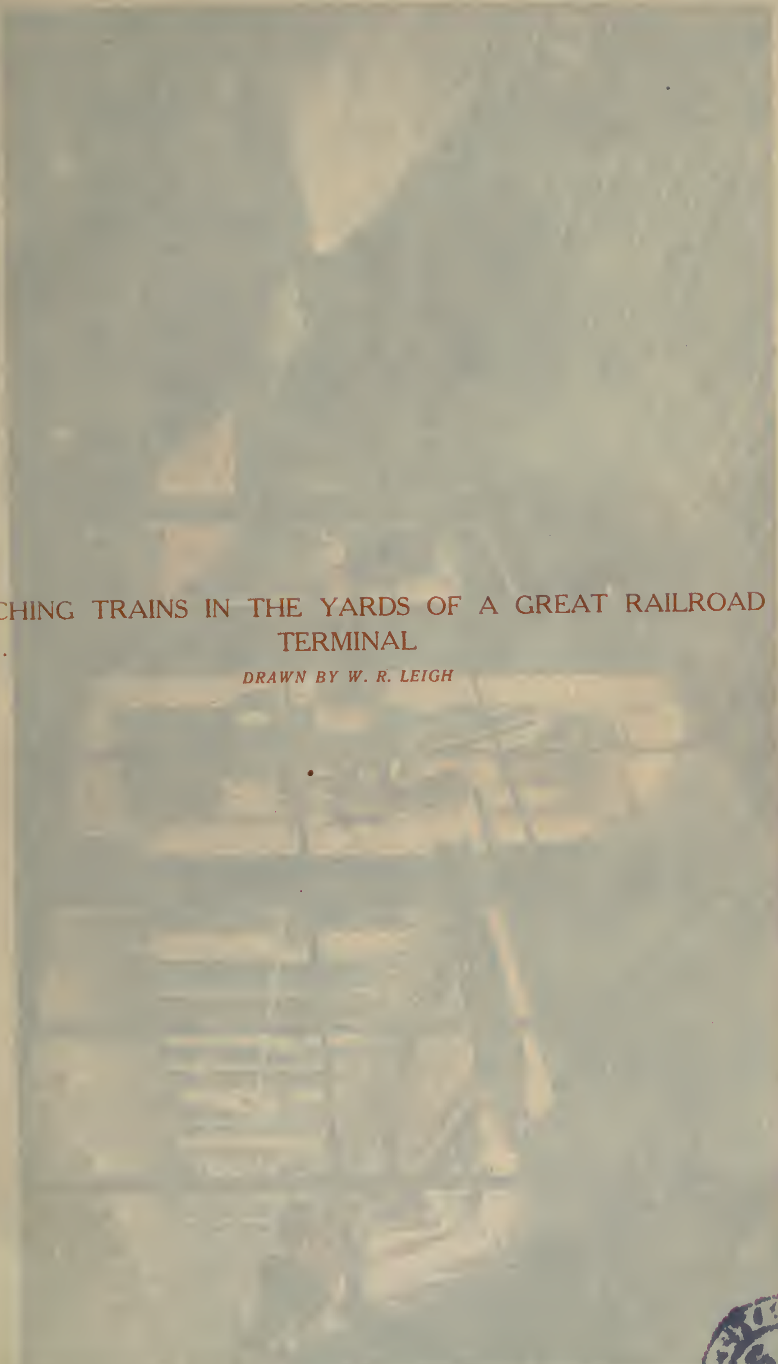
The conditions favoring the applicant for work as a brakeman are essentially the same as with applicants for engagement in other branches. Strong, healthy, sober, willing and active—that is about it. He should also be able to write a good hand. Good spelling will help him immensely. He begins as an "extra," in the freight service, and is regularly hired when his conductor reports him proficient. Not only must he be willing to work, but he must be ready to do more than he is paid for. These little additional services are always remembered in his favor, and often determine his advancement. While on the list as an "extra" the brakeman is not required to report at the yards except when summoned, but he must always be accessible to call, leaving his address with the company. Like the fireman and engineer, he must take nothing for granted, but must attend to every duty personally, trusting none of his work to others. The brakeman has a good deal to do. He must see that the brakes are in perfect working order. The car seals must be inspected. He must record the car numbers and seal conditions. Then he must look after the "equipment" for the trip. In the "caboose," he must keep a supply of lanterns, frogs, chains, waste, oil, tools, torpedoes, etc., and see that they are all "fit." He must couple the cars and examine the state of the wheels. He must help the conductor in "proving" the seals and numbers of all the cars, just before starting on a trip, calling out the numbers on his side of the train while the conductor inspects them on the other side. Or he must carefully look after the equipment, brakes, coupling and running gear. This last is very important, and often prevents accidents and delays. No small part of a brakeman's work is keeping guard against tramps and thieves. Robbery is a constant menace, and vigilance is required.

The capable brakeman is generally very soon promoted, and as conductor he must be more self-reliant than ever. He must perform or personally oversee absolutely everything which comes within his province. He should not take it for granted that his brakeman has cut off cars, for example, but should see for himself that it has actually been done. In case of accident a good conductor will not lose his presence of mind. He must instantaneously set his men to flagging approaching trains, placing torpedoes, and, if it is dark, swinging the lanterns in signals. A careful watch must be kept of the cars against fire or water or thieves. He must be ready to make repairs up to a certain extent, in case of breakdown, or if he can not clear the track, he must at once inform the nearest telegraph station.

On the great roads the pay of a freight brakeman is $2.10 a day, while passenger brakemen receive salaries of from forty-five to fifty-five dollars a month.

With the evolution of railroading, and the introduction of air-brakes and other improvements, the brakeman has developed into the "train man." He is no longer porter, cleaner, train boy, and brakeman combined. He never uses the hand brakes save when the air brakes fail.

His duties in the new service are, however, sufficiently arduous. He still has to see that the train is in proper shape, and to protect it from rear collisions, in case of accidental stoppage. He comes closely into contact with the passengers, if on a passenger train, and must learn patience and good



SWITCHING TRAINS IN THE YARDS OF A GREAT RAILROAD TERMINAL

DRAWN BY W. R. LEIGH

manners. He should remember that passenger trains are run for passengers. His experience in dealing with all kinds of people will be one of his best assets when there is talk of his promotion.

Railway Conductors

As conductor, his responsibility is enormously increased. He must remember that the company is behind him, and liable in civil suits for damages for his mistakes in putting persons off the train, for example. He is master of the train, and all are under his orders. The engineer is the only one else who has any responsibility apart from him. The conductor must save time at the stations by getting away quickly. He must take especial care of the passengers, telegraphing to the next station for a physician in case of illness, adjusting quarrels without losing his own temper, and using his judgment at all times. Better carry a dead beat occasionally than to put him off the train by force. Tact is invaluable.

The prospects of promotion and of a good continuous livelihood for a young man beginning as a brakeman are as good as in any other business. As in other positions on the railroad, the better his education, the better his chances. And faithfulness always counts.

Parlor, Sleeping, and Dining Car Service

The comfort of passengers on parlor, sleeping, and dining cars has been reduced to a science. The modern sleeper costs thirty thousand dollars. The dining cars may not always pay the railroads, but they are maintained at the very height of the car builder's art, and are as well equipped as the best hotels. Every house must have a housekeeper, and the dining car is nothing but a house on wheels. So there is a housekeeper, or superintendent. He takes care to give people seats which he thinks will please them, knowing, for instance, that few ladies like to ride backward on the cars. This superintendent makes it his object to see that passengers are suited. In the car-yard the "diners," "sleepers" and day coaches are put into proper condition for the journey. They are first stripped bare of everything detachable. The carpet is taken up, beaten, and then cleansed with hot air. The berths are opened and emptied, and the blankets, pillows and curtains are thoroughly cleansed with hot air, after being brushed and beaten, and are kept in a wholesome and sanitary state. Fresh linen is, of course, used with every passenger. The mattresses also receive their share of attention. The car itself is cleaned by a blast of compressed air, conveyed through a long hose with a pressure of eighty pounds. All seats and chairs are touched by its cleansing breath, and not an inch of velvet escapes. Scrubwomen finish the cleaning process, and the car is again ready to be arranged for the road. Disinfectants are used at frequent intervals, and cases of contagious diseases are always immediately reported. Before starting on its trip, the car is dressed for the journey. The freshly cleaned carpets are put down. All the paraphernalia of the berths is replaced, the tanks are filled, and the porter assumes his neat uniform.

The dining car is stocked with edibles. Felt covers the bare tables, and over this the snowy tablecloths and shining glasses make their appearance. The kitchen affords not as much room as a galley on a steamship. It is a very tiny place, only about fifteen feet long, with a narrow aisle, but it is equipped with the latest and best of ranges, steam heating tables, and several refrigerators, with a plentiful supply of hot and cold water. Fish, meats and game are kept in separate refrigerators, in perfect condition for cooking, as desired. There is also an iced "wine-cellar," which is kept locked, save when some of its contents may be demanded by a passenger. There are generally three cooks to a kitchen. They earn good salaries, the head cook getting about seventy-five dollars a month, the second cook receiving forty-five dollars, while the third cook bides his time and expects promotion. They wear white uniforms. There is a pantry from which the waiters are in contact with the kitchen only through a small window.

The buffet-car contains a kitchen in a nutshell, and the bill of fare is extremely limited, with one man as cook and waiter.

The porter of the sleepers and parlor cars is an important personage, who can do much to make or mar the comfort of the passenger. His duties are multitudinous. He does fifty different things a day for fifty different people, and is generally rewarded with a fair-sized fee, or ought to be. So is life on the rail made easy, and so is the great American travelling public accommodated.

"Braking" a Train

A party of railroad men were making a journey in a special train through Pennsylvania. They came to a town where mammoth factories were built in a row more than half a mile long. "Hats off to Westinghouse," cried one of the party, and every man doffed his travelling cap.

In the factories, past which the train was speeding, thousands of men were employed making a device which has reduced to the minimum the slaughter of railroad employés—the air-brake.

Just previous to the year 1868, George Westinghouse conceived the air-brake which has since revolutionized the speed of railway travel. Since the first brake was introduced it has been developed to such an extent that passenger trains run with safety at speeds of sixty and seventy miles an hour, and freight trains are controlled down grades exceeding two hundred feet per mile. The quick-action brake, with which passenger, baggage, mail, and express cars are equipped, has been modified so that, if desired, a high-speed reducing valve can be added to each equipment; this valve makes it possible to use a higher cylinder pressure at fast speeds, where the danger of wheel sliding is at minimum, and this pressure is automatically reduced as the speed of the train is decreased and the danger of wheel sliding is greater. Without changing the quick-action freight equipment from the standard, the engine equipment has been so changed that the engineer has at his command a device by means of which the braking power on the train can be readily changed to meet the conditions presented in either a light or loaded train, a higher braking power being used with a loaded train where the danger of wheel sliding is slight. With this form of brake a passenger train of three hundred tons, travelling at sixty miles an hour, can be stopped in about 4,500 feet, or in about ninety seconds, and in case of an emergency, in 1,200 feet, or in thirty-one seconds. A freight train of eight hundred tons, running at thirty miles an hour, can by an emergency application be stopped in 300 feet, or eleven seconds.

Up to the present time about one and a half million of air-brakes have been applied to freight cars in this country, while practically all engines, tenders, and cars in passenger, mail, baggage, and express service have been equipped with air-brakes. Ninety per cent of the air-brakes now in use are the product of the Westinghouse establishment. The capacity of the plant is one thousand sets of brakes a day. The company also has plants in Canada, England, France, Germany, and Russia.

A special instruction car, equipped with complete sets of all air-brake and signal appliances, is furnished gratuitously by the air-brake company to any road desiring it. The car is fitted up to meet the conditions encountered in practical railway service as illustrated by thirty operative brakes. It is in charge of a chief instructor and an assistant, whose business it is to instruct engineers, conductors, firemen, and repairmen in the operation and maintenance of the different appliances. After a proper amount of instruction, each pupil is required to pass a satisfactory examination, and is given a certificate bearing his rating. When this car is en route over a railroad system, the officers usually require that each employé pass a satisfactory examination, and that the men continue their attendance at the car until they obtain a certificate which has at least a standard rating. These requirements tend to procure greater protection to the travelling public, as well as to the railroad property. Up to the present time the annual mileage of the instruction car is about 70,000 miles, and the number of railway employés instructed and examined is about 170,000. The air-brake instruction car has been in service more than twelve years. The principal lecturer in the faculty of this modern college of applied science claims that his institution has more alumni than any other college in the world.

Making a Railroad Time-Table

Preparation of the time-table which governs the running of trains on any road of considerable length is one of the most particular of railway details, and the arrangement is very ingenious and simple, though the work itself is a decidedly intricate and difficult task. The instruments employed are of the simplest sort, merely very sharp pins, with large round black or colored heads, spools of colored silk thread in connection with a large smooth pine board, like a blackboard, covered with white paper, securely pasted to the board. These are the instruments by which are worked out the schedules of all the trains, freight and passenger, of the roads, and this is how the schedules are constructed: The chart on the "blackboard" is ruled with lines certain distances (representing five minutes) apart, using generally a space of two inches to the hour; and the chart thus ruled for twenty-four hours would be four feet in width. The first hour on the left-hand side of the chart is six o'clock A.M., and the last hour on the opposite side is also six o'clock A.M., thus bringing the hour of six o'clock P.M. in the middle of the chart. The hours are represented by heavy lines, each five minutes are represented by light lines, and quarter hour lines are usually ruled with a different colored ink. The hours are shown by figures at the top and bottom of these lines. Horizontal lines showing stations are ruled on the chart, and carefully scaled according to distances between the stations, the name of the station and its distance from the starting point of the schedules under preparation being shown at both ends of these horizontal lines. A thread of a certain color represents a passenger train, another color means a freight train, and the color of the threads also indicates in which direction the train is to move.

Now, as to the construction of the time-table. It is agreed that the running time of a train shall be, say, forty miles an hour, and to illustrate the tracing of one train will show the general manner of running all of them. A passenger train leaves the first station, or starting point, for instance, at eight o'clock A.M., a pin is placed on the horizontal line representing the starting station at the eight A.M. time or vertical line, and the end of the thread fastened to it. If the division over which the train runs is 160 miles another pin would be placed on the chart at the twelve o'clock noon time line on the horizontal or station line at which the train completes its run. If its run is over a division of eighty miles, the pin would be placed on the horizontal line at ten o'clock, and so on. If this train is to stop, as is most likely, say, ten minutes at some station for coal or water, the thread representing the train is stretched on two pins ten minutes, or two time spaces apart on the station line at which the train is to make the stop; the thread is then drawn tightly, and by following it closely the time lines will give the time of the train at every station on the line. When the train has a heavy grade to climb, on which it can not run at the rate of forty miles per hour, a pin is put in at the station at each end of the grade, and the thread slanted to allow for slow time between those points.

Wherever threads running in opposite or in the same directions cross each other, trains must meet, and the pins and thread are so adjusted as to make the trains meet or pass each other at stations. On time-tables used by employés the figures at meeting or passing stations are printed in heavy type, so that they are easily distinguished from other figures of smaller type at stations where trains do not meet or pass. The printer's proof of the time-table, after it has been constructed, has to be carefully compared with the chart to see that the time at all stations and the meeting or passing points of all trains are correctly shown. This is the way a railroad time-table looks weeks before it gets into the passenger's hands.

CHAPTER III

THE RAILROAD MAN

Railroading as an Occupation—Opportunities in the Railway Service—The Training of Railroad Men—Earnings of Railroad Men—Qualifying as a Railroad Employé—Promotion in the Railway Service—Discipline in the Railway Service—Reprimands and Suspensions—Methods of Discharge—Working Hours of Railroad Men—Sunday Work—Railway Apprentices

Railroading as an Occupation

WITH over a million employés of all classes engaged in railway transportation in the United States, each person so employed affects the interests of at least four more. Here, then, are five millions whose welfare depends upon railroads. But five millions are not all. Many more millions, employed in kindred industries are affected. As shown in previous chapters, there are thousands engaged in locomotive works, more thousands in car shops, still more in the manufacture of steel and iron rails and in many other industries and professions upon which railroads depend for supplies and for services. It is plain, therefore, that railroading as an occupation affects the present and future of more persons in the United States than any other avenue of employment excepting agriculture.

Railway labor is of general interest because upon it the prosperity and growth of the country becomes more and more dependent. Suspend operations on a single railroad system for one day, and a thousand industries suffer, and much money is lost. Railway employment has taken the lead in meeting nearly all the problems of the wage-earner. Organized labor has here accomplished more than in any other department, for here it has learned its most helpful lessons, here suffered its worst defeats, here achieved its most glorious victories. In respect to the relations of employer to employés, in the railway world, many good ends have been attained. Provision for the uncertainties of life has been made. The old age problem in occupations has been met.

Many of the greater railroad corporations pride themselves upon the establishment of a system or a method of management, which enables them to retain employés in their service. In their turn, the men are as proud of their uniforms and service stripes as are the men who wear the cloth of blue in the army or navy. It is a fact that the roads which have developed the highest degree of *esprit de corps* among their employés, are the most successful. The development of *esprit de corps* depends principally upon these two things: conditions of promotion; and causes and methods of discharge. The majority of employés are influenced by these considerations in one of two ways: either abandoning railroad life altogether or quitting service with a particular road; or in adopting railroading as a permanent occupation.

It is said that the general manager of ten thousand miles of railroad wields a power more absolute than that of the government of any State in the Union. In the railway service each man's power increases as he climbs upward. When he was only a trainmaster, he was a power. Even a section foreman is a power; for he has at least six men under him. The conductor is the boss of the trainmen; the engine-driver is the boss of the fireman; and the trainmasters, yardmasters, division superintendents, all are bosses, all have power. It is their opportunity to gratify a love of power that draws so many young men into the business or profession of railroading.

Opportunities in the Railway Service

The chances for young men in the railroad business are these: plenty of work; strict attention to duty; working overtime cheerfully whenever occasion demands; good living wages or liberal salaries the reward; positions secure as long as the man is faithful to requirements; promotion the prize for ability and intelligence.

Railroad men can rise from the ranks to positions of great responsibility as do men in the army, or in any great industrial enterprise. Many of the heads of departments and high officials of more than one great railroad system of to-day worked their way up from the ladder's lowest round. One was a brakeman, one an office boy, several were messengers, and one or two were station agents. These men had no honors thrust upon them; they had to earn their laurels step by step, inch by inch, by harder and more intelligent work day after day, year after year. It is a fact not generally known that the two men who are nearest to the Czar of Russia, and who, perhaps, have a greater influence than any others in shaping the commercial policy of the present government of that great empire, are M. de Witte, the Imperial Minister of Finance, who, sixteen years ago, was a station agent at a small town on one of the railways of Russian Poland, and Prince Michel Hilkoff, who, when little more than a boy, left St. Petersburg to seek his fortune, learned mechanical engineering in the city of Philadelphia, and who is to-day the Imperial Minister of Railways of the Russian Empire and a member of the Cabinet of the Czar.

If even in Russia a man can rise from the position of station agent to that of Minister of Finance, what glorious opportunities for advancement are to be found in the United States!

On the point of the early retirement of railroad men, it may be said that, as a rule, some lighter employment is found for them when they grow old. The men are not retired earlier than in other businesses. It is true, however that only young men are hired for the service.

The personal life of employés should be free from dissipation, as nothing will so injure their prospects. Faithful service is sure to be noticed by the heads of departments, and is the best way to secure promotion. Favoritism in promotions has almost disappeared. As to the line of service which a young man should enter, with a view to holding, some day, a high position, the "personal equation" must in every case be considered. It is not so much a matter of departments as of the man. Physical strength counts for a good deal. Robustness and vigor are necessary for the railroad man, as the business is very exacting and arduous.

The Training of Railroad Men

Few of the higher railroad officials of to-day have had the benefit of a technological school education. Practically without exception they all began at the bottom rounds of the ladder, and worked up, step by step, through arduous labor, to their present positions. The young man of the present time who goes into the profession of railroading, will, in many cases, have had a technical training in a good professional school. Just the same, no one can step from the classroom of a technological school directly to a high office in the service of a railroad. Practical, every-day experience will be as necessary in the future as it has been in the past. Promotion may be quicker, owing to the preliminary school training, that is all. Book-lore is a good thing, but first-hand knowledge is indispensable, and no one will ever occupy a high position in operating a railroad without this equipment of personal, practical experience; nothing can take its place.

The conditions of modern railroad travel, involving the use and repair of highly elaborate machinery, particularly air-brakes and locomotive attachments, demand in the average train hand a considerable degree of accurate mechanical information. This is necessarily the case, since in even the most subordinate position he is invested with the utmost responsibility, as regards both the operation of the train and the safety of the passengers. Railroad companies, therefore, require that each man shall pass a satisfactory examination in the details of operation and repair of the apparatus he must be called upon to handle. Many of them, also, provide special instruction for their employés, to supplement such knowledge as they may have derived from practical experience. Most of the subjects are so involved, however, that it is generally difficult, if not quite impossible, to meet the needs of each man, as they should be met: hence both employers and employés welcome any attempt at systematic education. As has been amply demonstrated in recent years, the instruction requisite for a well-equipped railroad man, as also for the practical worker in a number of other trades and callings, can be eminently well furnished by the correspondence method, now such a prominent feature of American education. One of the leading correspondence schools in the country has, of late years, undertaken to meet the needs of railway employés by systematic courses in the details of locomotive and air-brake construction, operation, and repair; imparting the information, not only by correspondence, but also by direct demonstration, lectures, etc., in specially-built instruction cars that periodically make a tour of nearly all railroads. Many of the largest railway companies have delegated the instruction of their employés to this institution, while the majority of them offer every facility to the progress of the instruction cars, and to the men attending the demonstrations.

In addition to six air-brake instruction cars, there are twelve special lecture cars, constantly traversing the country and affording technical instruction to nearly 25,000 men. On each of these cars there is a complete equipment of railroad apparatus which is thoroughly explained, both as regards general principles and as applied in the practice of each particular road. The more difficult facts are set forth by stereopticon lectures. In the meantime, the students are thoroughly trained by correspondence, receiving a lesson at a time to be learned, and forwarding answers by mail for correction and revision. By these methods locomotive engineers are enabled to obtain a clearer and more thorough knowledge of their engines; the theory and construction of all the working parts, including the familiar troubles and accidents affecting them, and the methods of repair—the operation of high-speed air-brakes, steam-heating apparatus, air signaling systems, and all the details of his daily routine of duty. Firemen are also instructed as to the methods of feeding the furnace, so as to economize coal and obtain the best effect of the heat. This is desirable, since as has been well said, "an unskilful fireman can do more to decrease the efficiency of a locomotive than the most skilful designer can do to improve it." An ambitious fireman may thus be trained to take an engineer's position, in due course; trainmen, by acquiring a thorough understanding of the apparatus with which they have to deal, are enabled to fit themselves for such promotions as are offered. The records achieved by correspondence schools amply demonstrate the fact that the average railroad employé is only too eager to obtain thorough information on the details of his apparatus and on general technical points.

Earnings of Railroad Men

There are two questions in railway employment which statistics undertake to answer. The first pertains to the number of men employed in transportation and the relation which this number holds to the length of line operated and to the traffic carried. The other pertains to the classification of railway employés and the average amount paid for their service in the several classes of employment. From the point of view of the railway manager, these data, kept in a uniform manner from year to year, are significant when placed in comparison with the amount received for traffic; and it is of importance to the railway employé as indicating the trend of average wages in the railway service. The general public is also interested, of course, in knowing the number of persons employed from year to year in this great branch of industry, the amount of wages received by them, and how such wages are distributed.

The following table, taken from a Statistical Report of the Interstate Commerce Commission shows eighteen classes of employés, the number employed in each class, and, approximately, the number employed per hundred miles of line in the United States at the present time:

	Number	Per 100 m. of line
General officers	4,916	3
Other officers	4,669	2
General office clerks	32,265	17
Station agents	31,610	16
Other station men	89,851	47
Enginemen	42,837	22
Firemen	44,130	23
Conductors	29,957	16
Other trainmen	74,274	39
Machinists	32,831	17
Carpenters	46,666	24
Other shopmen	114,773	60
Section foremen	33,085	17
Other trackmen	226,799	118
Switchmen, flagmen and watchmen	50,789	26
Telegraph operators and despatchers	25,218	13
Employés—account floating equipment	7,597	4
All other employés and laborers	125,386	65
Totals	1,017,653	529

The same report shows that 36,451 are employed in the service of "General Administration"; 324,946 in "Maintenance of Way and Structures"; and 197,799 in "Maintenance of Equipment"; and 450,063 in "Conducting Transportation," and 8,394 are stated as "Unclassified."

The same authority furnishes the following information as to the average daily compensation: General officers, $10.45; other officers, $5.22; general office clerks, $2.19; station agents, $1.75; other station men, $1.60; enginemen, $3.75; firemen, $2.14; conductors, $3.17; other trainmen, $1.96; machinists, $2.30; carpenters, $2.04; other shopmen, $1.73; section foremen, $1.68; other trackmen, $1.22; switchmen, flagmen, and watchmen, $1.80; telegraph operators and despatchers, $1.96; employés—account floating equipment, $1.92; all other employés and laborers, $1.71

Before Mr. Samuel R. Calloway left the presidential chair of the New York Central Railroad, for a similar position as the head of the American Locomotive Company, he was called by the Industrial Commission as a witness. The following paragraphs are from his testimony:

After being employed it depends upon the railroad employé himself as to his remaining. So long as he faithfully discharges his duty, there is no reason why an employé should not remain in the service and be in line for promotion when opportunity offers, which promotion is dependent upon such performance and further capacity for increased responsibility. There are no physical conditions required, except in case of employés who are required to take signals, such as enginemen, firemen, conductors, and trainmen; such employés have to pass an examination as to their eyesight and hearing.

As to rates of wages of different classes of employés: Most of our men are paid for the number of hours' work and for the number of miles made, the average pay of employés being as follows: Telegraph operators, $52.50; block-signal men, $46.50; other signal men, $49.00, which includes baggagemen, station clerks, etc.; enginemen, $114, although their wages vary from $90.00 to $175.00; firemen and wipers, 59.00, firemen getting from $50.00 to $84.00; conductors, $86.00, their baggagemen and trainmen's wages varying from $40.00 to $70.00; mechanics and helpers in shops, $49.00; other shopmen, $40.00; roadmasters and track foremen, $49.50; roadmasters being paid on an average from $100.00 to $125.00 per month, and track foremen from $40.00 to $50.00; track laborers, $35.50; switchmen, flagmen, watchmen, etc., $40.00; mechanics and helpers on road, $56.00; employés of floating equipment, $58.00.

We have no reductions and no deductions, except for value received, such as rent, board, uniform. For instance, if a man puts an order in that his rent is to be deducted from his wages and gives it to the person from whom he rents or boards, we take that out; otherwise there are no deductions, except by arrangements with the employés themselves.

Part of the testimony given before the Industrial Commission by Grand Master Sargent, of the Brotherhood of Locomotive Firemen upon this matter of wages is as follows:

The employés in the principal organized branches of the railway service are quite generally employed at rates of compensation and under terms of employment mutually agreed upon between the officers of the railway company and committees representing the men. In addition to these rules, the men are subject to the rules of the company relative to movement of trains, conduct of men, and property entrusted to their care.

The basis for pay for enginemen and for trainmen in freight service is the number of miles run, with a premium allowance as agreed upon. The trainmen in passenger service are generally paid by the month, although on many important roads they are paid by the mile or the trip.

The standard for engineers in passenger service is three and one-half cents per mile; in freight service, four cents per mile; for firemen fifty-eight per cent of the engineer's pay. The standard rate for conductors in freight service is three cents per mile; for brakemen, sixty-six and one-half per cent of the conductors' pay. Passenger conductors get from $100 to $125 per month, and passenger brakemen from $50 to $70 per month. The standard pay for yard foremen is twenty-seven cents per hour for day work and twenty-nine cents per hour for night work, and for yard switchmen is twenty-five cents per hour for day work and twenty-seven cents per hour for night work. In the Southern States colored men are used a great deal as firemen and brakemen. This practice has a strong tendency to unfavorably affect the rates of pay of men on neighboring roads, for the colored men work much more cheaply than white men.

Telegraphers, train despatchers, and station agents are generally paid by the month, and it is but of comparatively recent date that the unfavorable and unsatisfactory conditions which have surrounded them in their work have been ameliorated to an appreciable degree. The rates of pay in this service varies with the importance of the station at which the men are employed.

The standard rate for train despatchers is $125 per month, working eight hour tricks. The standard for station agents and telegraphers is fixed by establishing a minimum salary, and adding thereto as is proper in consideration of the responsibility assumed and the work performed. The pay of station agents and telegraph operators runs from $40 to $85 per month. As a rule the rates of wages are quite stable, the wages of the men who work by the mile or the trip being affected by the volume of business.

Qualifying as a Railroad Employe

There is in the railroad service of this country an increasing tendency to systematic methods in the selection of railroad employés, in marked contrast to the somewhat haphazard methods of even the larger corporations of a decade or so ago, when methods of employment closely analogous to the methods in use in establishments of much less importance and scope of service prevailed. The past decade has witnessed an important change in this respect and existing conditions foreshadow still greater changes in the near future. The railroad service, it is now realized, is essentially a public service, and when a man enters it he may with proper capacity and behavior expect to remain in it for life. It is a continuous service no matter what rank he occupies or in what branch of the service he may be placed. It is a dignified and useful life-work, worthy of all the toil and training necessary to make one competent to the tasks it brings him. A large proportion, probably twenty-five per cent, of the million men employed on the railroads of the United States are unskilled laborers. For these the conditions of employment are naturally the same as those of other industries—physical health and willingness and ability to perform manual labor.

When one speaks of the qualifications demanded bythe railroad service he usually refers to the skilled employés in the shops, in the train service or in the general offices or at stations. For these places the railroad corporations are generally anxious to secure men having first of all a good common school education, who are willing to begin at the bottom or with the lowest paid work in either of the subdivisions of the transportation business, and work their way into that department of the service, and that position for which experience and demonstrated ability may seem to best fit them. In this industry, as in most others, the better general training and education a man has the more likely he is to rise rapidly, but however good a man's general education, it is none the less necessary that he should begin at the bottom and work himself up through every detail of the complex business of transportation. Experience is indispensable, no matter how thorough the groundwork of general theory may be laid.

It is a growing custom with the more important companies to require formal applications from those who desire to enter their service. This application must be filled out in the handwriting of the applicant, give general information as to his age, previous employment, and be accompanied by a certificate of character; and if the position applied for is such as to demand it, a certificate of physical condition also. The conditions for admission to certain classes of employment demand physical examination of the most searching character, including tests of sight and hearing, and for nearly all departments of the service on a large proportion of the more important railroads, except unskilled laborers, some technical examinations are required. Thus, for example, an applicant must pass an examination upon the rules of the branch of service for which he applies, and after being admitted to the service all employés must undergo frequent tests of familiarity with the rules. Classes are held from time to time by superior officers charged with the duty of examining employés, at which test cases are submitted and discussed for the purpose of illustrating the applications of the rules. It may be remarked here that the rules of railway operation are very generally uniform, and are now largely based upon standard codes adopted by the American Railway Association and other railway technical organizations made up of representatives of nearly all the leading roads. The standard codes for the various departments of service are at least taken as a basis, though sometimes modified to suit special needs and the experience of different roads.

The gradual extension of standard codes of rules will tend to facilitate the transfer of men from one system to another and unify the conditions of railway employment.

The application blanks of many roads state that for positions above that of laborer, no person will be employed who can not read and write the English language, or who does not possess a knowledge of the rudiments of arithmetic. Minors are not employed in train, yard, or engine service. Employés dismissed from the service are not re-employed without the consent of the head of the department or division from which dismissed, and the approval of the assistant general superintendent. Applicants for employment or reinstatement are obliged to undergo the same examinations as applicants for employment.

The majority of the employés in the road department are common laborers, and there are no special requirements for admission to the service other than physical ability to perform the labor required, and to be of the age of twenty-one. In selecting men for the higher grades of service, those are selected who have a technical education to fit them for the requirements of the position, and they are also usually required to begin in the lower ranks, which, of course, gives them the necessary experience.

Many roads demand a "clearance card," a paper giving the record of the applicant, and the cause of his discharge from the road for which he previously worked. The card must be signed by an official of the company.

The methods of application given in the foregoing paragraphs and the qualifications mentioned, apply in a general way to about forty per cent of all railway employés.

The qualifications demanded in the grades of the service comprising the remaining sixty per cent of railway employés are about the same as in the ordinary business world—that is, for such grades as general officers, office clerks, and skilled mechanics.

As in all modern fields of endeavor, the better a man is educated the more rapid his rise in railway service.

Certain railway companies have joined in the war on cigarettes, by refusing to employ habitual cigarette smokers, assuming from experience in many instances, that such men suffer from a disordered nervous system and are therefore physically disqualified as railroad men. Excessive use of intoxicating liquors by any of its employés is not tolerated by any road, and many roads demand their hands to be white ribbon men absolutely.

Age qualification is more of a factor than it used to be. To-day a man over thirty-five years old finds it difficult to secure employment with any railroad, unless he is an experienced hand. Many roads will not employ any man, experienced or not, who has passed his thirty-fifth birthday.

Promotion in the Railway Service

It has been said that railroad service is a profession. It would be more proper, perhaps, to say that it embraces all the professions. Proficiency in any branch leads to promotion. Except upon very small railroads, however, it is not expected that the head of a department must be entirely proficient in other branches of the service. The Superintendent of Motive Power, for instance, need not be an expert Traffic Manager or General Freight Agent. The small roads, therefore, are the best for beginners, the best schools for general education in the business. The beginner, learning at first a little of everything, may select the branch of the service for which he is best adapted, and may thus lay the foundation of special knowledge and develop into specialists.

The young man entering the railroad service, if he really wishes to advance, must choose a particular branch of the service, rivet his attention to this and stick to it until he wins his prize. Here, as well as in every other department of modern work, specialization is the rule. Any one of several roads leads to the office of division superintendent and from there to the office of the general manager, and even to the presidential chair the track is straight.

There are, as has been elsewhere said, fully a million employés in the railway service, but not more than ten thousand of these are general officers. In other words, in every hundred employés there is only one general officer. Apparently, the competition for the high places is so great that only by a miracle can the young man hope to reach the top. But this is only apparent, for the proportion of mediocrity, dullness, feebleness of character, weakness of morals and inattention to duty is so large that the superior officers of the railroads are ever on watch for men worth promoting. To have "worked his way up from the ranks" is the very best that can be said of the officer of a great railroad corporation. Promotion in this line of industry depends, as a general rule, entirely upon demonstrated ability and not upon "influence," or what may be termed, "politics." Sentiment plays no part, and favoritism very little, unless the recipient of it can show substantial qualities as well.

On a large proportion of American railroads the "Civil Service" principle is recognized. Men are employed only in the lower ranks in the various departments, and are encouraged to keep in constant training for the next higher grade.

Examinations are held periodically under the direction of responsible officers. Freight train men are promoted to the passenger train service, firemen to enginemen, brakemen to conductors, and thus through all grades from track-walker to general manager.

The Illinois Central Railroad system now regulates promotions as follows:

All employés are regarded as in the line of promotion, advancement depending upon their loyalty to the company's interests, faithful discharge of duty and capacity for increased responsibility. Examinations for promotion are held from time to time as required. Examinations for promotion in train service include physical condition, rules of transportation department, air-brake practice, and such special examination as the regulations of other departments require. For promotion to the position of conductor, the applicant must have had two years' experience in train service. Employés desiring promotion to conductors must make application in their own handwriting for examination, stating age, experience and general qualifications for the positions. Applicants for the position of engineman must, in addition to the requirements of the machinery department, pass examination as to their physical condition, and the rules of the transportation department. Applicants who fail on the first examination must, within one year, make written application for re-examination. Those who fail on the second examination are dropped from the service. Flagmen, brakemen or firemen who do not apply for examination within five years may be dropped from the service.

Another road makes promotions in this manner:

In case of a vacancy, either by death, resignation, dismissal or promotion, or in case of a new position being created or additional employés being required in any position above the lowest rate of pay, the most capable man in any lower position is promoted to fill the vacancy, no matter in what branch of the service he may be. In order to have material in every branch of the service, heads of offices, departments and divisions are instructed to select only the best applicants for such positions as students, apprentices, office boys, clerks, operators, switchmen, brakemen, firemen, section foremen, etc., these being the classes from which promotions are usually made; the heads of departments are also instructed to make it a rule to employ no new men for any position that can be as well filled by promoting a man already in the company's employ. Promotions from one branch of the service to another are looked upon as being desirable, and every employé is encouraged to acquire a general knowledge of the business, especially of that branch toward which he has a natural inclination. To this end, heads of offices, departments and divisions are instructed to notify the general superintendent, the general traffic manager or general manager of employés who are especially worthy of promotion to other departments.

Nearly all railroad companies are as anxious to promote their employés as are the men themselves to receive promotion. The higher the position the more important it becomes that the incumbent be experienced. Hence it is that most roads engage new men only in the lower grades of service. The system may be compared to that followed in the organization of an army. The newly enlisted man must enter as a private, and the newly commissioned officer must begin his army career as a second lieutenant. Just as the enlisted man and the officer can work their way upward, so can the railway employé forge ahead, even to the very top. Many of the highest officials of the greatest railroad companies began as trainmen. Many college graduates work their way upward in the service from the cabs of freight engines, beginning as firemen.

The man who looks upon "railroading" as merely temporary employment is not wanted. Railroading should be looked upon as a permanent occupation and adhered to as a career, a life work.

Discipline in the Railway Service

Discipline in railroad service is as important as in the regular army. Obedience—that is the chief support of discipline, and upon obedience the success of a railroad, no less than that of an army, depends. But for a railroad employé to merely obey is not enough. He must obey promptly, even on the instant. Next to obedience, he must possess the qualities of constant watchfulness, must be ever reliable and steady.

On its part, in order to secure discipline, the road must have managers who are born leaders, and the organization must have as few flaws as possible. This is especially true in the case of great railroads employing large armies of men.

The best disciplinary rules for the railway service that have yet been devised are those contained in the Brown system. This system of administering discipline has been adopted by fifty-seven different railroad lines, embracing about one-third of the entire mileage of the country. Of course, it has been modified or extended to meet the requirements and conditions on each particular road. In general, however, it may be described as a merit and demerit record system. It took its name from that of its inventor, Mr. George R. Brown, general superintendent of the Fall Brook Railroad, New York. The foundation of the whole system is a record book, in which is entered a personal record of every employé.

Next in importance to the record book comes the bulletin. Whenever an "irregularity" occurs, one of these bulletins is posted in a conspicuous place, where all who are connected with the department in which the irregularity occurred may read it. Names are not mentioned, but the men usually know to whom the remarks refer. These three classes are comprised in nearly every bulletin: First, the description of the "irregularity"; second, how the accident could have been avoided; third, how it affects the company's interest.

The record book and the bulletin together comprise what is sometimes called "discipline without suspension." Mr. Brown describes the record book as follows: "In it I write down a brief statement of every irregularity for which a man is responsible. This record takes the place of the 'lay off,' and is dreaded nearly as much. The man goes to work at once and no one but himself suffers, and he only in reputation at headquarters. When a man commences to make a record in the book we call him in and talk with him. He is reminded that if this gets too long we shall have to consider him a failure for our service, show him his weakness, and give him another chance. But he understands that it will not be entirely for the last offence that he is dismissed; the 'suspended sentence' cases are against him. When the page is full of irregular circumstances the judgment is usually written at the bottom in two words: 'Discharged, incompetent'."

The record and the bulletin together, serve:

1. To secure a higher state of efficiency. Strict discipline is essential to successful operation; no continuous service performed by man can be perfect, but a high state of discipline and a careful selection of men will produce a high class of service, and successful operation will be the result.

2. To avoid loss of time and wages of employés, resulting in possible suffering of those dependent upon their earnings, as well as demoralization of employés by enforced idleness.

3. To avoid unnecessary severity in the dismissal of an employé, or requiring him to serve an actual suspension for a single offence that does not injuriously reflect upon his reputation, conduct, capacity, or future usefulness in the service.

4. To remove the false, but too common, impression in the minds of employés who have served actual suspension, that the amount lost to them in wages is a payment to the company for the loss and trouble caused it, and that in the future settlements can be made in the same manner.

5. To avoid frequent service changes by considering each case of an erring employé on its merits, weighing his character, previous record, and future availability, without regard to parallel cases of other employés.

6. To advance the education of employés through the medium of bulletin notes, enabling them to avoid the mistakes made by others.

7. To establish in the service a feeling of security, in the confidence that faithful service will be recognized and rewarded by uninterrupted employment, and the certainty that reward and promotion will not follow indifferent service.

And to these seven objects of the system, the railroad companies add:

To avoid the dismissal of an employé for a single violation of the rules, or of good practice, that does not injuriously reflect on his reputation, conduct, capacity or future usefulness.

To judge each case of an erring employé on its merits, with due regard to his previous record and future availability, considered with reference to the interests of the company and its duty to its patrons.

That all may become acquainted with each case for which discipline is imposed, and learn something from the failure of others.

To encourage and stimulate all employés to co-operate with the officers of the company in all matters tending to produce harmony, economy, safety and efficiency, and thereby secure better service, resulting both in profit and credit to the company and to its employés, as well as increased satisfaction to the public. Each employé can work with the knowledge that the excellence of his record, the prospect of his continued employment, his promotion, and final success, depend on his own good conduct and exertions. By notably good and faithful work, he can accumulate a stock of credits that will practically ensure him against dismissal in case of some oversight or error that otherwise would deprive him of employment. The most efficient men will be encouraged, developed, benefited and retained; while those who prove to be unfit for the railroad service, though dismissed, will be dealt with fairly and justly.

To enable the employé to gain in purse, in self-respect, in manliness, in interest in his work, in permanence of employment, in loyalty to the company, and in solicitude for its interests; and by which the company expects to gain a man more contented, more intelligent, more courteous, more watchful and zealous for its interests, realizing that they are practically his own, thus securing a more harmonious, economical and efficient service, in which the element of force is not predominant.

Reprimands and Suspensions

Circulars relating to reprimands and suspensions issued to employés by the various railroads which have adopted the system accord more or less with the following:

Reprimands will be noted on the records of employés who may receive same. Suspension, though for a certain number of days, will be nominal. Instead of actual suspension, the employé at fault will be allowed to continue at work. A charge will be made on the record in the book in the superintendent's office of every case of neglect of duty, violation of the rules or of good practice, accidents, improper conduct, etc., resulting in discipline of an employé, with the penalty imposed, as may be determined by the superintendent.

Record bulletins will be issued by the superintendent not oftener than fortnightly, and posted at division terminals on a special board. These bulletins will be educational; they will be issued for, and give a brief account of, each case that has resulted in discipline, and state how it could have been avoided, but will omit all reference that would identify the person at fault.

Such acts as disloyalty, dishonesty, desertion, intemperance, insubordination, wilful neglect, gross carelessness, immorality, violation of rules whereby the company's property is endangered or destroyed, making false reports or statements, or concealing facts concerning matters under investigation, etc., will subject the offender to summary dismissal.

Credit will be given on the record and may also be bulletined, for notably excellent conduct, deeds of heroism and loyalty, good judgment in emergencies, etc. These special credits will be given full consideration in connection with any charges entered.

An accumulation of poor records, showing that any employé is not a desirable man for the service, will call for the special consideration of the superintendent, and may, after a hearing, bring dismissal, though he may not have committed any offence that of itself would have warranted dismissal.

It is expected that the system of "Discipline by Record" will prove of great advantage alike to the company and to its employés and their families. Wages will not be lost by disciplined employés who are not dismissed, except for such time as may be required for satisfactory investigation, in attendance at the office of the superintendent, or by themselves looking up facts, witnesses, etc., after which the employé will return to his work. It is also expected that it will encourage and stimulate all employés to co-operate heartily with the officers of the company in matters pertaining to harmony, economy, safety and efficiency, thereby securing better service; and increasing benefits, security, and satisfaction to the public and to all.

Methods of Discharge

The station master, the section foreman, the yard master, the roundhouse superintendent, the division superintendent, all these and others who are responsible for the work of men under them, have the first "say" in the matter of discharge. If the man thus discharged has grounds for objections, he enters his protest formally, and his case in due time comes before the board of inquiry.

The latest method of discharge in railroad service is administered in three forms: First, reprimand and record of deficiencies; second, suspension from work and pay for a period of from ten to sixty days; third, dismissal under the conditions named above. These three forms are comprised in the "Brown system," or "Discipline by Record."

Gross carelessness or neglect, insubordination while on duty, dishonesty—these flagrant violations of rules, on many roads, lead to the instant discharge of the offending employé without appeal. On the plan, however, that to err sometimes is but human, and that the most intelligent or most reliable man may make a mistake despite his own best effort, some roads are inclined to take a lenient view of a first blunder, basing punishment upon the offender's past record.

Formerly, the causes of instant dismissal comprised a formidable list. Now, however, this list has been greatly shortened. All the greater roads have a kind of a court of appeals called a "board of inquiry," before which it is possible for even a track-walker to place a grievance. Such boards of inquiry usually include employés of the same grade as the person under indictment, and their vote is of equal value with that of the highest officer on the board. This practice has served to place a check on the arbitrary discharge of an employé by hot-headed, unreasonable bosses or foremen.

Generally speaking, it is no longer possible for even trackmen and day laborers to be unjustly discharged by the section foreman. Before a man is discharged, under the present method, these three points are considered: The relative seriousness of the offence, the man's past record, his promise of future usefulness.

The methods of discharging employés vary with different railroads.

One road, which has 8,000 employés, refers such matters to a board of inquiry. This board consists of three or more officers. It is their duty to investigate violations of rules, and reports of misconduct and neglect. The punishment for minor offences is a reprimand, which is written in the books and forms a part of the employé's record. Several of these reprimands will amount to an "accumulated bad record." Graver offences are punished by suspension for thirty days or more. "Unpardonable offences," such as incompetence, intoxication, gross neglect and an "accumulated bad record" are punished by this board with dismissal.

All superintendents, division officers, shop foremen, etc., of another road, employing about 4,000 men, are required to keep personal records of all employés in their charge. Delinquencies, such as forgetfulness, obstinateness, carelessness, laziness, extravagance, disagreeableness, quarrelsomeness or intemperance, are written in these records. Investigations are made in certain cases, and dismissal will follow when a man's record falls below the general average.

Another road has a rule by which such acts as disloyalty, intemperance, dishonesty, gross carelessness and similar offences are made punishable with dismissal. Entries in the record-book are made of cases of neglect, violation of the regulations, etc. Credits as well as demerits are recorded. Thus a man's record determines his retention or discharge.

The question of discharge has always been very seriously considered by all the labor unions. They have always fought against the practice of arbitrary discharges. Officers long in the railway service have observed that discharges made in haste or in temper or excitement are very often unjust. The strictest disciplinarian on a railroad is apt to be the lower grade of foreman, just promoted. Unused to authority, he employs it badly. The next rank of foreman comes next as a "headsman." He is very often from some other road, and will not take time to become acquainted with the men and their methods. Many railroad men condemn the discharge of employés for the so-called "unpardonable sins." It is, they claim, merely a system of discharging on account of a single error men of good character, habits and capacities, for new men, unknown and untried. Drunkenness, of course, can not possibly be condoned. The old railroad officer knows that the most undesirable man on a road is the man who is shiftless and "unlucky." Such a man never does anything quite right. He is always ill on stormy days. He is not strong enough for a long run. He is always getting into minor difficulties. His train breaks in two, or gets off the track when switching. Unmeaningly, he is incompetent, and "a detrimental" to the road, causing the company much loss.

The power of discharge is a grave one. Its enforcement in special cases may work great hardship to the employé, who may, perhaps, have to move his family to another town, and may be out of employment for a month or two. Railroad people claim that a good foreman should possess sufficient intelligence and force of character to command obedience. It is erroneous to suppose that obedience is given solely through fear of discharge. This is not the case. Firemen and brakemen work just as faithfully now as they did when they were subject to discharge by engineers and conductors. One might almost say, the better the foreman the fewer the discharges.

Working Hours of Railroad Men

In New York, Ohio and Minnesota the legal day's work of all classes of railroad men is ten hours. In many States laws have been passed in which the maximum number of hours a railroad man may work, if necessary, on any one day, is specified. The number of hours of rest that must be allowed after a maximum day's work, is also specified. New York allows the railway employés to work twenty-four hours at a stretch when the public service requires it, but he must then have eight hours rest. In Michigan the law is the same as in New York; in Minnesota, twenty and eight; in Ohio, fifteen and eight; in Colorado and Nebraska, eighteen and eight; in Florida, thirteen and eight. Every railroad company, however, seeks to avoid keeping any employé on duty beyond the normal period of ten hours. Public welfare demands that the men responsible for the safety of a train be in good health and in normal physical condition while on duty. Still the very nature of railroad operation renders the number of hours of work necessarily irregular. Storms, washouts, accidents, any unusual conditions of weather or traffic, keep men on their posts beyond the time fixed as a regular day's work. Men have worked continuously twenty-five to thirty hours, and circumstances have sometimes demanded the services of a train crew continuously for thirty-six hours.

Trackmen in the South and West usually toil from sunrise to darkness. In the North and East the day's work of a trackman is not often prolonged beyond ten or eleven hours. In bad weather, trackmen often have to leave their beds in the middle of the night to make repairs. For the track foreman is responsible for the condition of the track at all hours, and in case of necessity he must call out his entire gang regardless of time or circumstance. Some roads pay for this overtime at regular rates, if occurring in the day-time on ordinary working days, and at time and a half rates if at night or on Sunday. Other roads pay nothing at all. Where the pay is on the piecework basis, the question of pay on overtime is seldom brought up.

The general rule is that overtime at the regular rates of all employés outside of the general office force is allowed on all the great railway systems.

The average day's work throughout the country at present is eight to ten hours for trainmen, engineers and firemen, and ten to twelve hours for telegraphers and yardmen. All other grades, both indoors and out-of-doors, work from eight to ten hours. Trainmen on fast express trains, making good wages on the mileage basis, often work only five or six hours a day. On this subject Grand Master Sargent, of the Order of Locomotive Firemen, in his testimony before the Industrial Commission gave the following facts:

> Road, train, and engine men have little or no complaint as to hours of service. They are generally paid for all excess hours, and the necessity for their being awake acts as a protection against unreasonable demands upon them. Ten hours for one hundred miles is the standard rule in freight service for road men. Yard men are frequently required to work twelve hours for a day, which we consider as excessive when compared with the requirements in other occupations. The number of hours for these men should be but eight, and certainly not over ten. The telegraphers have much to complain of in this direction, as they are frequently required to remain on duty long hours.
>
> Train and engine men, as a rule, are paid overtime on a very fair basis. Telegraphers are allowed overtime on many roads, but on many more they are not. Twelve consecutive hours is considered a sufficiently long day for them, and, in our opinion, telegraphers who, having worked twelve consecutive hours, are called for duty during the next succeeding twelve hours, should be allowed extra pay for time so used.

Sunday Work

About one-half of the total number of railway employés in the United States are obliged to work on Sunday. The manufacturing, supply, clerical and other departments not absolutely necessary to the safe movement of trains, must work all or part of Sunday. Sunday traffic, both freight and passenger, amounts to about fifty per cent of the traffic on week days. Where excursion trains are run, the passenger traffic, of course, is oftentimes greater than on other days.

From the nature of things there must be some Sunday work on railroads. But a glance at the records of several companies will show that proportion of employés who have to work on Sundays is often comparatively small. The Boston and Maine Railroad operates about twenty-three hundred miles of track. Of its twenty-two thousand employés, ten per cent of those engaged in the car department, twenty-five per cent of those in the transportation department, and twenty per cent of those in the motive power department work on Sunday. A road employing eight thousand men works twenty per cent of its enginemen, firemen, conductors and brakemen on Sunday, fifty per cent of its station agents, ten per cent of its clerks, and ninety-five per cent of its telegraph operators.

Of the four thousand men employed by the Chicago and Great Western Railroad Company about thirty-five per cent have to do Sunday work. The Illinois Central Railroad Company employs about thirty-two thousand men. On this road all stations, warehouses, and places for receiving or delivering freight are closed on Sunday. Thus hardly any of the employés in this department have to work on Sunday. In the engine, train and yard service, fifty per cent of the men work on Sunday sometimes. In the road department about ten per cent of the men have Sunday work.

Railway Apprentices

Formerly the status of an apprentice was a legal one, and he was obliged to serve out his time with his employer. All this has long been a dead letter. The railroads have had to face this matter of apprentices, and some of them have endeavored to develop a sort of an apprenticeship system. Some shops have sets of "helpers," without much training. The so-called "graded" or "preferred apprenticeship" obtains on some railroads. The "preferred apprentice," because of more natural ability, or the fact that he has had a technological school training, is marked for rapid promotion. He begins at the bottom, but is soon advanced. Although many roads do not like this system of apprenticeship, yet it has worked well on the Pennsylvania Railroad, in the great Altoona shops. In these shops the apprentices are registered in the general manager's office, and a record is kept of their progress. On these reports their promotion is based. These apprentices are expected to have a diploma from some good technological school. The system of "preferred apprentices" was tried with excellent effect in the roadway department of a division of the Southern Pacific Railway, in 1894. A dozen young engineers were employed as trackwalkers. The trackwalker has to pass over three to ten miles of the road daily, keeping the bolts tight, and reporting defects in the track, helping in general section work when not otherwise engaged. These young men were regarded as assistant foremen, and were promoted to section foremanships and to roadmasterships when vacancies occurred. When qualified, they were advanced to assistant engineerships in the track department. Plenty of capable young civil engineers were ready to take up this work with the expectation and promise of speedy advancement. The experiment was a complete success. It met with so much opposition from certain sources, however, that it was discontinued.

CHAPTER IV

RAILWAY LABOR ORGANIZATIONS

Railway Brotherhoods and Orders—The Brotherhood of Locomotive Engineers—The Brotherhood of Locomotive Firemen—The Order of Railway Conductors—The Brotherhood of Railway Trainmen—Order of Railway Telegraphers—Brotherhood of Railway Trackmen—Brotherhood of Railway Carmen—Railway Benefit, Pension and Relief Departments

Railway Brotherhoods and Orders

THE railway men of the country are to a large extent enrolled in one or another of orders or brotherhoods as follows: 1. The Grand International Brotherhood of Locomotive Engineers. 2. The Order of Railway Conductors of America. 3. The Brotherhood of Locomotive Firemen. 4. The Brotherhood of Railroad Trainmen. 5. The Order of Railroad Telegraphers. 6. The Brotherhood of Railroad Trackmen of America. 7. The Brotherhood of Railway Carmen of America. 8. The Brotherhood of Railroad Bridgemen. 9. The Switchmen's Union of North America.

In breadth of scope, and in thoroughness of organization as well as in businesslike methods in which they are conducted, the leading brotherhoods and railway orders compare quite favorably with any business enterprise. Most of the organizations have been in operation for several years—the oldest, the Brotherhood of Locomotive Engineers dating back to the time of the Civil War. All of them are fashioned after the same model, generally speaking, though the differences in the way in which emphasis is laid on one or another of their chief features explains in a measure their unusual success as labor organizations are estimated. There is also the Brotherhood of Railroad Bridgemen, composed of the men employed in the bridge and building departments of the railways which was recently organized on lines substantially similar to the other Brotherhoods and Orders before mentioned, and the Switchmen's Union of North America, a re-organization of the Switchmen's Mutual Aid Association, which was at one time a large and flourishing organization. Besides these organizations, the Brotherhood of Locomotive Engineers, the Order of Railway Conductors and the Order of Railway Telegraphers and the Railroad Trainmen and Firemen have Ladies' Auxiliaries similar in plan to the orders themselves in which the wives and sisters of the railway employés work for the betterment of their own intellectual and material conditions, and endeavor to assist in the relief work of the Brotherhoods in looking after their members and their families.

The Brotherhood of Locomotive Engineers

The oldest of these organizations, the Brotherhood of Locomotive Engineers, and its work is well described by the Grand Chief, in his testimony before the Industrial Commission:

The object of the Brotherhood of Locomotive Engineers is to promote the welfare and interests of locomotive engineers, elevate their standing and character in society as men, provide for the widows and orphans of their members, and protect their labor. Those who are not familiar with the conditions of railroad men prior to the organization of the Brotherhood, cannot form any just estimate of our work. It may not be generally known that railroad men in the early days, speaking of them as a whole, were given to habits of dissipation and vice. Intoxication was quite general; habits were generally so bad that they led to the formation of this brotherhood for the purpose of bettering the condition of the men. That was the primary object. It is the great mission of the brotherhood. At that time the question of wages was not raised at all. After awhile that question came up.

An effort had been made some ten years before the brotherhood was established, on a road where I was employed, to obtain a slight increase of pay. At that time the wages of locomotive engineers throughout the country were $60 a month, firemen, $30, freight brakemen, $25, freight conductors, $40, passenger conductors, $60. Those were the almost uniform rates of pay for that class of service up to the formation of the brotherhood. After that we appointed committees on the roads where our brotherhood was established. They were known as general boards of adjustment, whose duties were, if any difference came up between the company and the men, to investigate and ascertain the facts. If they found, upon investigation, that the grievances were just, they waited upon the officers of the road. If they went to effect a settlement with the general manager of the road, and they were not satisfied and wanted the protection of the organization, they were required to send for the chief executive. It was his duty, on receipt of the communication from the committee, to proceed at once to the road and seek a conference with the general manager, and president if necessary, and use all honorable means to effect a peaceable and amicable adjustment of the differences that he found existing between the men and the company.

In nearly every case, with few exceptions, during my administration of twenty-five years, we succeeded in effecting an amicable adjustment, establishing what we call written agreements between the company and the men; so that to-day we have written agreements embodying the rate of pay, the rules for the government and protection of the men, with ninety per cent of the roads in the country.

We have succeeded, through the efforts of our organization, in increasing the wages of locomotive engineers from $60 per month to three and one-half cents in passenger service, and four cents in freight, per mile run. The firemen, through their organization, increased their wages in proportion.

A hundred miles or less constitutes a day's work, three and one-half cents in passenger service and four cents in freight, through, I might say, the Middle and Western States. In the Southern States the rate is three and four for the same class of service. There has always been a difference between the South and the North in that respect. One hundred miles or less constitutes a day's work; ten hours or less constitutes a day's work.

In 1867 we established an insurance department. It is conducted on the assessment plan; it was patterned after the Metropolitan Police Force of the city of New York at that time. Through this insurance department we have paid to the widows and orphans nearly $8,000,000.

We issue four policies; we may take one of the four, $750, $1,500, $3,000, and $4,500 is the limit. A large number of our subdivisions also have what they call weekly beneficial assessments, which pay ten and twelve dollars a week in case of sickness or injury. It is a rare thing now to find a locomotive engineer, a member of our brotherhood, who indulges in anything intoxicating. The laws of the organization prohibiting excessive drinking are very strict. In order to become a member of our brotherhood, a man must be a man of good moral character, temperate habits, able to read and write, and have had one year's experience as a locomotive engineer.

He fills out an application, which is referred to an investigating committee, which inquires into the character and standing of the applicant, and upon their recommendation he is admitted. One year we expelled from our organization one hundred and seventy-two members for intoxication. That was about the fifth year of the existence of our organization. It becomes the duty of the division, when they expel a member for intoxication, to notify the company, so if they retain him in their service they do it on their own responsibility; and I have known the company to retain an engineer after they were so notified. Other railroad companies, however, co-operated with us in ridding the service of that class of men.

Men employed in railway service differ very much from men engaged in other pursuits, from the fact that they are subject to so many different masters. You may commence with the roundhouse foreman, if you please; then comes your yard master, your train despatcher, your master mechanic, the division superintendent, general manager; the ordinary employé is subject to them all.

We have never dictated to a railroad whom they shall or shall not employ. We have asked the railroad companies to give the oldest men in the service, if competent and worthy, a preference of engines and runs. We have succeeded in many places in having that embodied in our written agreements, but we have never resorted to coercive measures to bring it about. We have never attempted to interfere in any way with the railroad company employing men, whether they belonged to our organization or not.

The Brotherhood of Locomotive Firemen

The Brotherhood of Locomotive Firemen was organized at Port Jervis, New York, in 1873. When first organized it was merely a benevolent society, commonly known as an insurance society, and its mission was to organize the firemen into a brotherhood for advancement and improvement socially and educationally. It was not until some years after its organization that it assumed what is now one of its leading functions, the protection of its members and the promotion of closer and more beneficial relations between employer and employé, and the formulation and enforcement of rules and rates of pay governing the callings of its members. The Brotherhood of Locomotive Firemen has, it is estimated, some 40,000 members distributed throughout the United States. Along with its efforts in the direction of uplifting its members the Brotherhood constitution provides for the temporary suspension of any member guilty of using intoxicating liquors to excess on the first offence and expulsion for the second offence. Similar penalties are provided for other immoralities. Among other provisions of the same character is one prohibiting any lodge from deriving revenue from the sale of liquors at picnics or entertainments held by any lodge. The beneficiary department of the Brotherhood is compulsory for all members who are entitled to participate in its benefits. The grand lodge has power to levy assessments to provide for such benefits, which assessments range from two dollars (payable as often as is necessary to meet outstanding claims) for a $1,500 beneficiary certificate to seventy-five cents for a $500 certificate. In case of total disability beneficiary certificates are paid in full the same as in case of death. The protective department of the Brotherhood provides that any member who considers that he has been unjustly dealt with by his employer may refer his case to the protective board of the lodge having jurisdiction, and if his grievance is real this protective board endeavors by peaceful methods to adjust the difficulty, and is pretty generally successful. The order maintains a protective fund of $100,000 by assessment of seventy-five cents per quarter on each member as long as this fund remains below $100,000. The order conducts for its members a prosperous and well-edited monthly magazine, which discusses matters connected with the order and with labor matters in general, and furnishes at will a large amount of general literature suitable to its clientage. The Brotherhood has an employment bureau also, and endeavors to find employment for members out of work.

The Order of Railway Conductors

The Order of Railway Conductors of America is also one of the oldest and most prosperous of the railway employé's organizations. It was formed in 1878, and had in 1900 a membership of about 25,000, which maintains something more than 400 local unions. Any person actually employed as a conductor on a steam surface railroad outside of yard limits, and who has had at least twelve months' actual experience, is eligible to membership. The order has an insurance mutual benefit department in which members under thirty years of age may insure for sums varying from one to five thousand dollars; members from fifty to sixty years of age may insure for one thousand dollars, but members over sixty years of age are not permitted to join the mutual benefit department. Regular monthly assessments aggregating sixteen dollars on each $1,000 of insurance are collected, and when this does not prove sufficient additional assessments may be levied by the insurance committee.

It is the general policy of this order to obtain written agreements with employers fixing wages, hours and conditions of employment. Most railway companies have made such agreements with their men.

The organization has also the usual grievance committees, both local and general, and has also the customary protective fund, which is kept entirely separate from the insurance funds of the order. A well edited and prosperous monthly magazine is the official organ of the order.

The Brotherhood of Railway Trainmen

The Brotherhood of Railway Trainmen has a membership of some 45,000. It was organized in 1883, and its field is the entire United States and the Dominion of Canada, its membership embracing men in the train and yard service of the railroads in this territory. Like the orders already described, its objects are the promotion of the general welfare of its members, and the advancement of their social, moral and intellectual interests, the protection of their families by the exercise of systematic benevolence so needful in the unusually hazardous calling of the members of the order. The order has also a system of insurance against death and total disability under proper safeguard as to admission, as in the case of the other Brotherhoods, provision for which is made by assessment, and it also accumulates in the same manner a fund for the protection and relief of the members, which may not be used for any other purpose, except by a two-thirds vote of the grand lodge in convention assembled.

Its methods of adjusting grievances between its members and their employers are substantially similar to those of the orders already mentioned. This Brotherhood also makes provision for legislative boards, which serves in any state for which they are selected during a session of the legislature in which the Brotherhood is interested. The duty of this board is to use its influence by co-operation with the representatives of other labor organizations or otherwise, to secure the enactment of such laws as will promote the interests of its constituents.

Order of Railroad Telegraphers

Of still later date than the Brotherhood above referred to is the Order of Railroad Telegraphers, which was organized in 1886, and whose territory includes the United States, Canada and Mexico. This order had a membership in 1900 of between 15,000 and 20,000 members constituting 77 subdivisions or local lodges. Women as well as men are eligible to membership in this order, the broad conditions of membership being good moral character and three years' experience at some time as a telegrapher. The use of alcoholic liquors as a beverage is sufficient cause for rejection of any application for membership. The Order has a mutual benefit department which was established in 1898. Any member of the Order in good standing and in satisfactory physical condition is compelled to be a member of the benefit department. It issues three classes of certificates, viz.: Series A, limited to $300 on which bi-monthly payments of 35 cents are required; Series B, limited to $500, on which the payments are 50 cents every two months, and Series C, limited to $1,000, on which the dues are $1 every two months. Members eighteen years of age and not over forty-five may hold either of the three classes of certificates, but members forty-five years of age and not over fifty are restricted to series A and B. Forfeiture of membership in the mutual benefit department carries with it suspension from the order without notice until reinstated. Whenever assessments thus provided prove insufficient to meet the death claims, extra assessments to meet the deficit may be made. Like the other orders this order makes written agreements with the employers of its members fixing wages and hours and conditions of labor.

It has also local and general committees for the investigation and adjustment of the disagreements or grievances arising between its members and their employers. The order has its official magazine.

Brotherhood of Railway Trackmen

The Brotherhood of Railway Trackmen came into existence in 1891 as an educational and fraternal society to which only roadmasters and foremen of gangs of road workers were eligible, but in 1898 its scope was enlarged to include all employés assigned to the work of maintenance of way.

Its territory is the United States and Canada. The membership of the order was estimated at 3,000 in 1900, and these were comprised in 142 subdivisions. Members of the order between the ages of eighteen and fifty-five in good physical condition may be admitted to the insurance department of the Brotherhood by complying with its rules and paying one dollar monthly on a certificate of insurance for $1,000 or 50 cents a month on one for $500. In case of total disability, which is defined as the loss of both legs or both arms, or both eyes or one leg and one arm, the member is entitled to the full value of his insurance certificate the same as in the case of death. All members are compelled to contribute to the protective fund of the Brotherhood to the extent of 50 cents per quarter.

Brotherhood of Railway Carmen

Another organization of railroad workers is the Brotherhood of Railway Carmen of America, which was organized in 1890 to include all the men engaged in building, inspecting, repairing, oiling and cleaning railway cars in the United States, Canada and Mexico. The organization as now existing was formed by consolidation of the Brotherhood of Railway Car Repairers, organized at Cedar Rapids, Ia., in 1888, and other similar organizations formed about the same time. The membership of this order is not large, it being estimated that it had a membership in 1900 of about 3,500 in 90 local unions. A member of this Brotherhood who has no visible means of support and makes no effort to obtain support for himself or family may be suspended or expelled at the discretion of the lodge, and any member of the Brotherhood engaging in the sale of intoxicating liquors or in any unlawful business must withdraw from the order. The beneficiary department of the Brotherhood is separately organized, but with the same officers as those of the grand lodge. Any member in good standing, not over sixty years of age, is eligible to membership in the insurance department. Certificates are issued for $250, $500 and $1,000, on which periodical assessments are required at the rate of twenty-five cents, fifty cents and one dollar, respectively.

Railway Benefit, Pension and Relief Departments

The various railway benefit, pension and general relief departments are: (1) Accident Insurance, (2) Hospital Relief, (3) General Relief Departments, (4) Pensions, (5) Savings Funds, and (6) Young Men's Christian Associations.

Certain railway companies have made arrangements with accident insurance companies whereby the most favorable rates are obtained for their employés. Many railway companies urge their employés to carry such policies. In some cases the companies collect the premiums by deducting the amounts from the wages of the employés. A few corporations require all employés in the train service to carry accident policies. To aid their employés to secure the best accident insurance at the lowest rates, many companies bear a large proportion of the premium paid for insurance.

Hospital relief is the oldest form of relief and the most general. It is often organized by the employés, but frequently the companies aid the enterprise. The Association is usually formed under the direction of the company, and its object is to provide hospital accommodations for sick and injured employés. A specific deduction from the wages of employés is made to which is added the aid given by the company. Sometimes the company gives land and buildings, and sometimes makes up the annual deficit to provide the amount of relief actually needed.

Under the guidance of railroad officials some railway systems have formed what is called railway relief departments. These departments usually form part of the railway service and are organized for the purpose of enabling employés to contribute definite sums from their monthly wages to a fund administered by the department for the benefit of its members. Membership in these departments used to be compulsory, but now it is voluntary.

Pension relief is now provided for by a few American railways. Such form of relief sprang from the same thought, and evolved naturally from the experience of the companies in the other relief features just described. Pension features as a rule rest upon a more truly humanitarian or philanthropic basis than do the general relief departments. They are not to the same extent open to the charge that they are instituted for the purpose of holding employés in the service or preventing them from joining labor organizations which provide their own schemes of insurance. It would hardly be possible for any labor organization to undertake unaided the heavy financial responsibility of guaranteeing pensions or superannuation allowances.

The Pennsylvania Railroad superannuation plan and pension department went into effect on January 1, 1900. It has for its purpose the payment of regular allowances, from the funds of the company, to two classes of employés relieved from active service: (a) all officers and employés who shall have attained the age of seventy years, and (b) all officers and employés sixty-five to sixty-nine years of age, inclusive, who shall have been thirty or more years in the service, and shall, in the opinion of the board of officers, have become physically disqualified.

It is said that no other railway company in the world, whether under State or private control, possesses a joint fund whose direct and general beneficial features present the admirable system and thoroughness so manifest in the Pennsylvania Railroad system.

Many railroads have a savings feature, together with the pension feature and relief feature, as part of the relief department. Some roads have also a special savings fund for their employés. The object of the savings "feature" is to provide a savings bank for employés and their near relatives, and to provide a method for lending them money on easy terms for the purpose of acquiring or improving their homesteads. The object of the special savings fund is restricted to the work of an ordinary savings bank. The rate of interest allowed by the Pennsylvania Railroad, for example, on all deposits made by its employés is three and a half per cent. The agents at over one hundred stations on the lines east of Pittsburg act as depositories of the fund.

Closely allied to the other relief associations are the railroad departments of the Young Men's Christian Association, which have been an important factor in the industrial betterment of railroad employés. These Associations are now organized at over 150 division points, with a membership of over 37,000 railroad employés. The railroad corporations now contribute annually over $180,000 toward the support of this work.

These Associations offer many attractions which are peculiarly valued by railroad men, because of the nature of their employment, which deprives them of many opportunities easily enjoyed by the average workingman in other occupations.

The Associations form a common meeting ground for capital and labor, employer and employé, and for the promotion of mutual understanding and sympathy. This is an ideal that has been realized in greater measure than is found in any other organization where employers and employés come together. The Association throws around railroad men a strong arm of protection from moral dangers peculiar to their calling, and extends to them a sympathetic hand in many cases of difficulty.

CHAPTER V

STREET RAILWAYS

Electric Railways in the United States—Opportunities for Street Railway Employés—Management of a Street Railway—The Motorman—The Training of the Motorman—Promotion of Motormen—New York Street Railway Employés—Metropolitan Street Railway Association—Amalgamated Association of Street Railway Employés

Electric Railways in the United States

ELECTRICITY is the successor of horse and cable power for street railways. Its adaptability to long as well as short distance traction roads has also led to its use in suburban and interurban transportation. The first commercially successful electric street railway was operated at Lichterfelde, near Berlin, in 1881. In the year 1884 electric lines were constructed in Cleveland, Ohio, and Kansas City, Missouri. The greater economy and efficiency of electric roads were quickly recognized, and to such extent that while we had but 89 miles of such road in 1888, the mileage had grown to 9,008 miles in 1894. There were 20,442 miles of electric railway in the United States in 1900, and this is estimated to have increased to nearly 25,000 miles at the beginning of 1903. The total stock and funded debt of electric roads in the United States January 1, 1903, far exceed $2,000,000,000.

So rapid has been the development and extension of electric railways that they are now serious rivals of the steam railroads. Coming into vogue only about fifteen years ago, as street railways, the steps of evolution to the suburban, interurban and combination systems were soon taken. We have now, by the combination of interurban companies, continuous lines, in many cases more than a hundred miles long, operating very often in direct competition with the steam railways. Almost every village now has its electric road. There are 2,224 steam railways and 1,218 street railways. There will be undoubtedly a growth and increase of city electric lines. But this will probably not compare with the development of interurban electric roads. These long-distance routes will generally be competitors of steam railways. Some few, of course, will be feeders. This paralleling of steam railways by electric systems has already become common.

Opportunities for Street Railway Employes

Street railroading the country over, considered as a pursuit for young men, now compares most favorably with any other calling. The right sort of young man may find in it a pursuit in which he can start in at the bottom with every prospect of gaining a good, a permanent and an honorable livelihood. The pay is very good, from the beginning. Even the switchman is paid as a member of a trade, getting two dollars per day, where, for similar work, boys used to get fifty cents per day. The street railway business is said to be positive proof of the absurdity of the claims that consolidations of capital are injurious to the best interests of the working men. Much has been said holding up to popular condemnation these vast consolidations, as destroying competition and reducing the number of workmen. But in New York, for example, the result has been quite the contrary. Many roads have been merged into one, but by this consolidation the number of employés has been increased instead of diminished.

The efficiency of a street railway system, indeed, depends not only upon its mechanical equipment, but also upon the staff of employés, upon the personnel, from the president down to the humblest workman. The business presents inducements to those who enter it, and there are good chances of rising to high positions of responsibility for those who begin at the bottom. The motorman or conductor who properly fulfils his duties has a better chance of promotion to a responsible and well-paid position than the clerks in a department store. To rise in the business, a young man must take it seriously, and not use it as a mere makeshift. He must have the idea of remaining in it permanently, and of doing his best to work up from the ranks. Certain men enter the service only temporarily. In the New England States the Maine lumbermen come down to the cities and take work on the street railways for the summer. In many sections college students spend their vacations in this service, returning to college when the term begins. Farm hands out of work occupy their winters by acting as conductors or motormen, or filling other subordinate positions in connection with the roads. These men, by reason of their sporadic and uncertain service, can not expect promotion.

The vast majority of employés, however, expect to stay. And to these advancement comes. The young man entering the street railway service will find certain attractions in it. In the first place, the work is undoubtedly healthy. Compared with other classes of work, the hours are reasonable. The permanency of the work is also to be considered. The efficient and faithful employé is sure of remaining as long as he wishes, and of improving his position. Young men should remember that all well-managed companies throughout the country select their higher officials from the employés who have been found worthy of promotion. Vacancies occur from time to time, and they are promptly filled by the appointment of some employé to the place. On one of the largest street railways in New England, for example, the superintendent of transportation and all of the division superintendents are men who have risen from the ranks of motormen and conductors, or stable hands. In positions of the next grade are several hundred men who began at the foot of the ladder, some of whom are now earning salaries of five thousand dollars a year. The vast expansion of the street railway system causes a demand for skilled workmen. The field is continually broadening, with the construction of new surface, subway and elevated systems.

Of course there are certain necessary conditions which applicants for street railway employment must fill. In the first place, a young man must be physically capable to endure the hours of standing incident to the work. His nerves must be steady, his eyesight and hearing must be good. He must have a normal vision. Color-blindness is a disqualification. As in other callings, good character is an essential. Tact is absolutely necessary to the conductor; for who comes in contact with more kinds of men? He must have a large stock of patience. He must not be deficient in firmness. Ignorant, stupid and boorish people are to be handled, and the conductor who can always keep his temper, and maintain an unruffled mind, is a prize to the company, and is soon pushed ahead. These men know that the company stands loyally behind them in any difficulty in which they are not at fault and is ready to defend them and protect them from abuse.

Management of a Street Railway

The Metropolitan Street Railway system of New York controls what were formerly twenty distinct roads, separately managed, yet the new company employs five times as many men as all the old roads taken together. Glancing at particular lines under this management, the Fourth Avenue line, formerly running 120 horse cars per day, now runs 265 electric cars, each making the transit in less than half the time required by horse power. In the matter of pay, wages formerly ran from fifty cents per day for switchmen to $1.75 for drivers. Instead of this scale we find that at present the switchman earns $2 and the motorman $2.25. The gross earnings of this road have mounted from $750,000, when horses were used, to $2,300,000 under electricity. The entire staff of employés is upon a much better and higher basis. Electricians and mechanics find steady employment and good pay. The superintendent ranks with other professional men.

A great concern like this naturally divides itself into departments, each of which is of great importance. For example, the president has originated a department for the Maintenance of Way, which supervises the condition of the roadbeds; a Maintenance of Equipment Department, Engineering, Motive Power, Financial, Accounting and other departments, with expert and high-salaried men as heads of each. They are always on the lookout for bright and able assistants, who are very well paid, and who have every opportunity to advance themselves. So nicely is everything adjusted that the whole enterprise moves along smoothly. A boy beginning at the bottom has a sure future, if he is energetic and faithful. Improved service creates new traffic, with more places for workmen to fill. In the new order of management, stockholders will not tolerate nepotism. They want, and get, good men from the ranks.

The capitalist in the new régime is willing that the executive work should be done by the experienced man who has proved his fitness. So that consolidation does not restrict opportunity for the poor man. Quite the contrary is the fact; it creates new opportunities. Looking at the railroads, we see at the head of the New York Central a former freight clerk, at the head of the Southern Pacific also a former railway clerk. In former days the conductor was more important than the driver. But with the general introduction of electric power, the position of the motorman has become quite as important.

The Motorman

A motorman's position is no sinecure. He must be very well balanced and ready for any contingency. He must not only think quickly, but he must have the habit of acting quickly. And he must not get confused, no matter what the circumstances may be. It may be seen, therefore, that the motorman requires a very good mind, as well as a strong, enduring body. The motorman must not forget that the company is always looking for competent men with whom to fill the higher positions, as the business of the road increases. Men who are trained in the service, who have begun at the bottom, are absolutely necessary.

A grade above the conductor and the motorman comes the starter, and his position is the first step in their promotion. After the starter comes the inspector, chief inspector, division superintendent, and the other officers. The starter is in the direct line of promotion to these places. Individual excellence is more readily recognized in these positions, as the men who fill them are so much less in number. The starter knows that he is in the line of promotion, and at once endeavors to learn all about the operation of the system on which he is engaged. Electricity, mechanics, civil engineering, track construction, car repairing, general equipment, the handling of great crowds on special occasions—the starter must learn a little or a good deal of all these things. The larger the range of subjects on which he is posted, the better an official he makes and the greater his chances of promotion to the next grade of service.

The street railway service is recruited from all classes. Many of the employés come from the country. And for a farmer's boy this business affords a very good opportunity to begin life in the city. He is very well equipped for the work. He is not afraid of summer's heat nor winter's cold. He is used to an outdoor life. He has a strong constitution and abundant health. On some of the New England street railway systems the majority of employés in charge of the handling of cars and the management of traffic were country boys, who have won their way to these good positions by faithful work.

Those who intend to become motormen should, if possible, read some good books on electricity. There are several in the market. Electrical magazines should also be read. There are also two or three good street railway periodicals which should be perused. Every accession to a street railway man's knowledge of the business is sure to be of benefit. It may be seen that this calling is worthy of ambitious work, and that it certainly offers good prospects to energetic young men.

The Training of the Motorman

In certain cities the motorman receives a special training. He is educated to meet physical emergencies. In some cities there are regular schools for the training of motormen. The men are taught the routes of the various roads. They learn all the signals used by the different companies in their city or vicinity. They acquire the knack of running the cars properly, and are instructed in their mechanism. They are informed as to their proper course in case of accident. They are thus fully equipped for their duties, and are ready to run a car.

Presence of mind, good judgment, and a cool head are qualifications which every street car motorman must possess. And he is not given a car until he has convinced an instructer that he really has the "motorman's head." The "motorman's hand" is, of course, of equal importance, but unless the candidate for the front platform of the car first displays the requisite mental qualities, the utmost skill with his hands counts for naught.

The modern car driver in New York begins his education in a quiet school room. When President Vreeland, of the Metropolitan Street Railway, established a school for the training of motormen, street railway men laughed at the idea, declaring it impracticable and prophesying that it would have the life of a mere fad. But within a few weeks after the school was opened, its practical usefulness was proven.

As in the army and in all fields of service requiring physical endurance, the applicant for position of motorman must first pass the doctor. This test of physique is as rigid as any examination for life insurance. If the applicant passes the supreme test, that of eyesight, he then enters the training school. It is here that he must display a cool head, here he acquires mechanical knowledge of the machine he is to control, here he is given preliminary lessons in electrical engineering. In the class room, instead of desks, are thirty dummy car platforms, each fully equipped with the necessary electrical apparatus—controller, brake, ground switch, fuse box and all. But before he takes his place on a dummy platform, the novice is given a book of rules, which henceforth is to be his testament. He must know these rules as an actor knows his lines—so thoroughly that the book may be thrown away. To forget a rule once may be forgiven. To forget twice, thrice, may result in his discharge as incompetent. The most important of these rules, the one most rigidly enforced, is: "Never leave the car platform even for a second without removing the handle of the controller." The wisdom of this rule is familiar to any person who has ever ridden on an electric car. The passenger who might be tempted to touch that handle in the absence of the motorman sets the car in motion and endangers the lives of all aboard.

Now on this dummy platform the novice learns how to start a car and how to "down-brakes" without throwing the passengers in a heap on the floor. On the other hand, he is shown how to bring the car to a stop in the shortest possible time in case of emergency, or to avoid an accident, regardless of inconvenience to passengers. These lessons are rehearsed over and over again, the instructor playing the part of a conductor on a car in actual motion, giving signals with the regulation number of "bells." Then to the pupil are revealed the mysteries of the apparatus. He is shown the mechanism that yields obedience to every movement of his hands. At the same time he is shown what to do in the event of the failure of the installation to act.

The next grade in this school, the highest, is the most interesting. The pupil is now in the senior class. He takes his place on the platform of a skeleton of a full-sized, fully equipped car. As the car is supported on jacks, the wheels spin round harmlessly. Here the motorman must prove that he is ready to take a car from the Battery to Harlem unaided. It is supposed that at Union Square the car suddenly comes to a standstill, refuses to budge. The motorman turns on the light to see if the current is flowing. If so, then something about the car itself is the cause of the breakdown. Seizing his controller handle, the motorman jumps off and proceeds to investigate. He examines the overhead switches, the fuse boxes, and so on, until he finally discovers the seat of trouble, and begins at once the labor of repair. Such is the advantage of this preliminary training in electrical engineering. By being able to make repairs without awaiting the arrival of an electrical engineer, he avoids a blockade of the entire system.

After this school work comes the crucial test—that of actually running a car the entire distance of the road. An expert motorman accompanies the new man, superintending the movements of his hands, with all the care a teacher of driving would lavish upon the pupil on the box of a coach with a spirited four-in-hand to control. If on the trial trip the new man is not satisfactory to the instructor, back he goes to the training school. If upon a second trial trip he is still found wanting, he is dismissed. If he has proven himself proficient, he is given a uniform, a number and a car, and the safety of human life is intrusted to his care.

Promotion of Motormen

The field of electricity is already so immense and is growing so rapidly that it affords ample opportunity for any and every class of thoroughly trained man. The student from the technical school, thoroughly trained in the theory and operative principles of every type of electrical apparatus, but with little or no practical experience in applying his knowledge to actual working conditions, is in a certain sense in about the same position as the man whose practical experience is exhaustive, but who knows nothing particular of theories. It is, of course, the happy blending of the two that makes the well-trained electrician. A natural law, apparently applicable to most human affairs as well, ordains that where there is a well-defined demand an adequate supply must meet it sooner or later. In this time of great opportunities there is no reason why an intelligent and ambitious man should pass his life in a subordinate and ill-paid calling, because "his early training was deficient." Indeed, if he realize the fact, he will understand that, to do even a minor duty well, he must understand what he is doing and why. Thus, the motorman on a street railway car by beginning a systematic and careful study of the theory and working of the electric motor, not only is able to better fill his present position, but has actually taken the first step toward a larger and more profitable field of employment. By mastering the theory of the street-car motor, he is on the way to fit himself as engineer in some stationary power plant, or for any one of the numerous positions in which electric motors are used. He is, moreover, able to repair such common mishaps as burning out in a controller connection or blowing out a fuse; thus avoiding many of the familiar causes of delay that often block traffic on electric lines. Such employés as conductors, inspectors and barnmen find vast opportunities offered, by technical knowledge, both for advancement in their own positions and for changes for the better in other connections.

Formerly, in order to obtain the necessary technical knowledge, a subordinate employé in any mechanical line was obliged either to attend some day or night school, which he frequently could not do, or else to pursue a course of independent reading, which seemed equally hopeless, even when the books were available. Now, there are the best possible advantages offered to intelligent men by the correspondence method of instruction, which, beginning at the simplest principles, is able to carry him through to the most advanced knowledge, under the careful instruction of experienced teachers. This plan, which can not be too often mentioned with approval, has enabled many a man who has begun at the proverbial "foot of the ladder," to advance himself to almost any position that his intelligence and industry will warrant. Men who have begun as motormen have been qualified as electricians, while others have materially advanced themselves to various intermediate grades in the street-railway industry, or obtained good positions as motor engineers in other connections. In the field of electricity, as in other branches, there is "plenty of room at the top," and the man in the ranks stands as good a chance of promotion, if he will improve his time, as any graduate of a technical school.

New York Street Railway Employes

When President H. H. Vreeland took charge of the twenty odd street railroads making up the present Metropolitan Street Railway system in New York, he found a singular lack of community of interest among the men employed on the various lines throughout the city, due to the slipshod manner in which this force was recruited, and to the lack of any means of social intercourse. To both of these causes was largely due an inefficiency that called for immediate correction.

In reviewing the matter, it was apparent that among men brought together by the recruiting methods then in existence social intercourse was practically impossible, on account of the brevity and uncertainty of the tenure of employment, and Mr Vreeland's first efforts were directed to correcting this instability. He found that the men were employed, in the majority of instances, through political influence, and with very little reference to their capacity or adaptability to the work they were expected to perform, with the natural result that discharges among about 4,000 men amounted to about 300 a month.

Immediately a reformation in the recruiting methods was inaugurated, and the Metropolitan began to recruit its labor in the open market, where it selected the best that was offered, making character, health and intelligence the only qualifications necessary to enter the ranks. Within a year the results of this reform began to manifest themselves in all directions. While the number of operatives was very rapidly increased, the number of discharges steadily decreased, until they were diminished to as many in a month as had previously occurred in a single day. Coincident with the reform in recruiting, there was developed a system of discipline at once rigid and equal. No man was to be deprived of his employment without a hearing and for reasons which were explained to him. The arbitrary power of small officials was curtailed and centralized. The men grew in dignity, responsibility and efficiency, and the day was ripe for furnishing some means for social amusement and benefit.

Metropolitan Street Railway Association

Then came into existence, through the motion of the men themselves, the Metropolitan Street Railway Association, which is justly regarded as the most unique labor union in existence. It is not patronized by the corporation whose property it operates; it pays its own bills, nurses its own sick, and buries its dead, on a system devised by its board of trustees, and is, in fact, the cheapest and promptest insurance of the kind now in existence. It has collected, distributed and invested, during the brief term of its existence (1897-1902), over $100,000, at an expense of administration that is so insignificant as to surprise even insurance experts. Its main objects are to secure for its members free medical attendance, one-half of their wages when illness overtakes them, and $300 in case of death. These purely material benefits, to say nothing of monthly entertainments, theatrical, athletic, musical, and instructive in character, are secured at an expense of fifty cents per month. It pays no salary, and its members are consequently entitled to receive a larger actual cash percentage of the dues paid than in any other known mutual assessment association. Its membership has grown in six years from a little over two to five thousand. It invests its surplus in the securities of the properties its members operate. It has a library of 1,500 books and furniture, pool tables, and other means of recreation, representing an outlay of about $8,000.

As evidence of the purely voluntary character of this natural development under free conditions, it is necessary to state that employment on the company's property is in no way influenced by membership in this association. The men exercise their own free will in the matter of joining or remaining aloof, and the discipline of the company is exercised impartially as to demerits and promotion alike on members and non-members of the association. Membership in the association secures no man immunity, and refusal to join in no way affects the recognition of his merit as an efficient employé. The gradual progress of the association is best told by the table following, which furnishes at a glance its growth year by year, the sources and amount of its revenue, and the sums annually disbursed for sick benefits and death claims:

	1897	1897-98	1898-99	1899-00	1900-01	Total
Dues and Initiation Fees,	$7,877.99	$14,711.50	$15,100.00	$19,636.00	$20,070.00	$77,395.49
Entertainments,Interest, etc.		2,356.52	5,283,91	5,742.68	8,399.44	21,782.55
Sick Benefits paid	1,666.00	9,255.00	10,870.00	10,225.00	14,193.00	46,209.00
Death Claim paid	450.00	3,547.50	3,600.00	4,302.50	3,099.00	14,999.00
Membership	2,263	2,604	2,620	3,312	4,071	

The history of this association furnishes further evidence, if that be needed, that freedom and opportunity with working men will inevitably bear more fruit than sympathetic patronage. In this case the opportunity was furnished by steadying the employment in a single community of over 10,000 able-bodied wage-earners. Anxiety concerning to-morrow being removed, first by steadying the employment, and next by the security against disease and death, a growth like this was demanded and made possible. If one considers the fact that every able-bodied man has several individuals depending upon him for support, some idea may be had of the immense civic service brought about in the City of New York by the Metropolitan Street Railway in unifying the street car service of the city, and affording an opportunity for the free development of such an institution as this association.

Amalgamated Association of Street Railway Employes

This organization has been instrumental in improving the condition of street railway employés on two important counts: first, the reduction in working hours from fifteen, sixteen, even seventeen, hours a day to a maximum of twelve; second, and increase in wages from $1.25 a day to from eighteen to twenty-two cents an hour. The association has 15,000 members in several large cities. The local initiation fee is one dollar, and the dues fifty cents a month. A death benefit of $75 is paid, and sick benefits of from $3 to $5 a week.

CHAPTER VI

TRANSPORTATION BY WATER

The Merchant Fleets of the World—The Merchant Fleet of the United States—The Atlantic and Pacific Fleets—The American Coasting Fleet—The Great Lakes Fleet—Ore Steamers on the Great Lakes—Lake Carriers' Association—The Mississippi River Fleet—The Canal Fleet—The Fleet of Yachts—Harbor Craft—The Fleet of Tug Boats

The Merchant Fleets of the World

NEVER before in the world's history has so much money been invested in shipping as at the beginning of this century. Never before have the nations of the world exchanged by water such enormous quantities of their respective products. Never has travel by sea been so general. Never has the sea furnished occupation and a livelihood the world round for so many men.

The aggregate value of the seagoing merchant steamers of all nations is about one billion of dollars, and of sail vessels about $150,000,000. Besides the fleet thus valued are, of course, thousands of small craft of less than one hundred tons, which ply on navigable rivers, canals, bays and sounds, and are never out of sight of land, though employing many thousand men. A billion one hundred million dollars fully represents the amount of the world's capital afloat in the various forms of salt water vessels. The capital and funded debt of the railroads of the United States alone is ten times larger than this total. In a year of prosperity these vessels will earn about $700,000,000, though at the present time ocean freights are at a low point. Of these gross earnings, only a moderate share, less than seven per cent at this time, will represent clear profits. The steamers when fully employed burn during the year nearly 50,000,000 tons of coal, which, taking prices the world round, means an expense of over $200,000,000. The wages of 600,000 men who officer and man these vessels amount to $100,000,000 more, and to the wages must be added about $35,000,000 for the provisions the crews consume. Marine and fire insurance, interest on capital and a fair allowance for the amortization or liquidation of bonded debt require about $140,000,000 more, and repairs and renewals will carry that total to $200,000,000. Port charges doubtless count about $100,000,000, the tolls collected for the Suez Canal alone reaching $18,000,000. When the expenses incurred for the passenger trade, for accidents and losses, for handling cargo, for rent, taxes and administration, and the score of minor details of the ocean carrying business are considered, it will be evident that the ship-owner at present who secures a clear profit of six per cent on his investment has reason to felicitate himself. The dividends paid by the railroads of the United States in a single year are doubtless double the amount of the dividends paid to all the ship-owners of the world.

The Merchant Fleet of the United States

The merchant marine of the United States is now the greatest in tonnage in the country's history, reaching nearly 6,000,000 tons. No other word is so often misunderstood as the word ton when applied to merchant vessels. It is not a measure of weight (2,240 or 2,000 pounds) but a measure of capacity, and had its origin in the tun of olden times. The ton nowadays means 100 cubic feet when applied to a merchant ship. When applied to a steel man-of-war, on the other hand, it means the weight of water displaced by the vessel with her armament, coal, crew and supplies all on board.

In the United States, as elsewhere, while tonnage increases, the number of vessels grows steadily smaller with the increase in their size. Just as "department stores" in the large cities are taking the place of scores of small retail shops, so on the water, one great cargo steamer at present will perform during a year the work of thirty or more of the square-rigged ships, once the glory of the United States and of the seas. This change has, of course, materially affected the opportunities for employment on the ocean. The thirty ships would have had thirty different masters, where now one man is supreme. They would have had sixty or seventy officers, where now less than a dozen will suffice. Where formerly there would have been five hundred men, who could "hand, reef and steer," now perhaps there will be thirty able-bodied seamen, and fifty or sixty men shovelling coal and directing the engines in the hold of the ship. The United States, for various reasons, has clung to sail vessels longer than other nations, but even with us the full-rigged ship has steadily disappeared, and there are now less than 100 left of the types which were the scenes of the history and romance of half a century ago.

In round numbers 24,000 vessels of all sizes and descriptions, from the cat-boat to the transatlantic or transpacific liner, are entitled to carry the Stars and Stripes. Of these about one-third are propelled by steam, electricity or naphtha. About 3,500 are canal boats or barges, and the balance rely on canvas and the "unbought wind" for propulsion.

On the ocean our country does not play an important part, except as our Navy, on which several hundred millions of dollars have been spent in twenty years, renders us a formidable naval power. We have, however, an exceptionally fine fleet of steel passenger and freight steamers on the Great Lakes, a large tonnage on the Mississippi and its tributaries, the Hudson, and other rivers, and on the great bays and sounds along our coasts American craft of every description find profitable occupation. Thus in tonnage we rank next to Great Britain, though the ships of Germany, France, Norway and other countries are seen more frequently than American ships in foreign ports.

The Atlantic and Pacific Fleets

The Atlantic passenger service from New York alone requires a fleet of over one hundred steamers, of three-quarters of a million tons. They carry some years nearly a million passengers of all descriptions. The aggregate number of persons employed by the companies having terminals in the Metropolis is about 100,000, afloat and ashore, and if the steamers sailing from other American ports are included the number of employés is easily 200,000.

The Pacific passenger service employs a fast growing fleet of fine steamers belonging to companies having terminals at San Francisco, Puget Sound and Vancouver. Two American companies operate eight steamers between the United States and Asia, and another American company has a line of three steamers to Australia.

Traffic on the Atlantic was a subject of importance in 1902 in the world of commerce, owing to the merging of several great lines, forming a so-called "Steamship Trust." One result of the combination was the preparation of a schedule whereby steamers would leave New York for Europe every day, except Fridays and Sundays, throughout the months of greatest traffic. Fridays are excepted because superstitious sailors refuse to start on a voyage on that day of supposed ill luck.

The Atlantic "ferry" of to-day is an interesting contrast to the steamship that crossed the Atlantic in 1819. That first Atlantic ferryboat was an American craft—the *Savannah,* from New York to Liverpool. Eighteen days out, her engines consumed the last of her pitch-pine fuel and she had to finish the voyage under sail, entering the Mersey on the thirty-second day. To-day, as before stated, there are more than a hundred "ferryboats" representing fourteen or fifteen lines, and burning, not pitch-pine, but—many of them—a ton of coal every five minutes, or 300 tons a day. These steamers plying between New York and European ports bring to this country every summer some 100,000 cabin passengers, of whom fully 80,000 are home-coming Americans.

Sea captains, generally, believe that ocean travel in steamships is safer than in the old sailing vessels. Navigators can control steamers more readily than "sailers." Gone, perhaps, are the days dear to mariners, of sailing vessels that were all silence and cleanliness as compared to the thump of engine and soot of funnel of the steamers of to-day; and gone may be the days when the mariner "shifted his quid," and said "shiver my timbers," and "hitched" up his tarry trousers. But now when the traveller starts for somewhere on a steamship, he knows that he will get there, "as per schedule," and no mere calm can delay the ship.

In the matter of size and carrying capacity, combined with speed, the steamship is a far more important factor in the development of commerce than the sailing ship. The White Star steamship *Celtic,* for example, is many feet longer than was the *Great Eastern,* fourteen feet longer than the *Deutschland,* and in the matter of flotation could transport any two modern battleships, with space still left for cargo. In exact figures, the *Celtic* is seven hundred feet long, seventy-five feet wide, and forty-nine deep. Imagine a building nine stories high, and nearly as long as three ordinary city blocks, and you have some idea of the dimensions of the *Celtic.* The New York City Hall could be hidden, all except the tower, inside her hull. One of the officers of the ship has estimated that 360,000 men could stand on her nine decks—fifty lines of men and eight hundred in each line, or forty thousand in all, on each deck. She has accommodations for 2,859 passengers, besides a crew of 335, which means that any town with a population of 3,149 could live aboard the *Celtic* with almost as much comfort as in a hotel. The *Celtic* can carry over 18,000 tons of actual cargo, her gross tonnage is 20,904, and her displacement at load draught is 38,220, or a displacement double that of the *Kaiser Wilhelm der Grosse,* and 10,300 tons more than the *Great Eastern.* Accepting Sir Isaac Newton's estimate and the Bible figures, we may conclude that Noah, his family and living cargo, would be better accommodated on the *Celtic* than on the Ark.

In the matter of speed, it is hardly necessary to dwell here upon the superiority of the modern steamship over any sailing vessel. Marine engineers are even now talking of steamers that will make the voyage from New York to Southampton in four days. The power developed by the modern ocean steamship is also a feature of comparative interest. Does the reader realize what 20,000 horsepower is? This is the horsepower of the *St. Louis* and the *St. Paul.* A distinguished Englishman recently compared a vessel propelled by such engines with an ancient galley propelled by oars. "Take her length as being 600 feet, and assume that place be found for as many as 400 oars on each side, each oar worked by three men, or 2,400 men in all; and allow that six men under these conditions could develop work equal to one horsepower; we should have 400 horsepower as the result of the work of 2,400 men. Double the number of men, and we should have 800 horsepower, with 4,800 men at work, and at least the same number in reserve if the journey is to be carried on continuously." Contrast the puny result thus obtained with the power of the engines of the *St. Paul,* which are capable of developing, on the above mode of calculation, a power equal to that of 117,000 men, and that is without allowing for constant relays.

The American Coasting Fleet

All foreign vessels for a century have been excluded by Act of Congress from engaging in the coasting, or coastwise, trade. Passengers and cargo, accordingly, can be carried only in American vessels from one port of the United States to another. This law has recently been extended to include Porto Rico and Hawaii. By this peculiar enactment an American traveller can sail from Key West to Havana, a distance of only ninety miles in any foreign vessel which may be available, but if he wishes to make the voyage from New York to Honolulu, a distance of about 16,000 miles, or more than half the distance around the world, he must travel on a vessel under the Stars and Stripes. This law was enacted primarily as a protective measure to develop the shipbuilding industry, and it has been quite effective in this direction. Indeed our present shipbuilding establishments on the seaboard owe their existence to that law and to naval contracts. Many lines of coasting steamers have been established connecting New York, Boston, Baltimore, Philadelphia, Brunswick, Charleston, Savannah, St. Johns, New Orleans and Galveston, and on the Pacific coast, San Francisco with American ports south and north to Alaska. An American line of coasting steamers now runs from New York around Cape Horn to Honolulu and San Francisco.

A large freight business is also carried on by schooners along the coast. This particular type of vessel is especially American, and of late years wooden schooners have been built in Maine with five and six masts, in tonnage equalling full rigged ships. The limit of construction in wood appears to have been reached, and our builders next year will launch steel schooners that in carrying capacity will excel the greatest ocean steamers of quarter of a century ago. These large schooners are as a rule equipped with small engines so that sails are hoisted and lowered by machinery, and much of the work of loading and unloading cargo is similarly done. As only ten men are needed to man a vessel so rigged and equipped, these schooners are among the most economical types of vessels afloat. The trades in which they can engage, however, are restricted by structural conditions, and they are seldom to be met with far from the coast.

The Great Lakes Fleet

Modern American shipping and shipbuilding have attained extraordinary development on the Great Lakes. Those bodies of fresh water, virtually excluded from connection with the sea and from the foreign competition which obtains there, seem to have furnished special opportunities for the display of American characteristics. The season is short and business must be done with a rush. The period of Lake navigation is generally from April to November, and within seven or eight months must be crowded the work which on the seaboard is performed throughout the year. In no other places in the world have mechanical processes for the quick loading and unloading of cargo been brought to such perfection. In a single day steamers have discharged cargo of 6,000 tons or more and taken on another cargo nearly as large. The season of navigation, limited, of course, by the ice-bound condition of narrow channels and harbors during the winter, has its effects on wages which are higher on the Lakes even than on other American vessels. While severe storms visit these waters, labor is less arduous than on the North Atlantic. Consequently during the Lake season there is always a considerable migration of seamen from foreign vessels on the seaboard to work on American Lake vessels, and at the end of the season these men return to the ocean. This is one cause for the frequent desertion of seamen from foreign vessels in the United States. The yachting season on the Atlantic and the Alaska fishing season on the Pacific are almost simultaneous with the season of Lake navigation, so that during the warmer months of every year foreign ships in our harbors often find it difficult to prevent their seamen from leaving to enjoy temporarily at least the special advantages offered by the United States. American tonnage on the Great Lakes exceeds the entire merchant fleet of Italy or Spain.

Distinctive, indeed, and in a class by itself, is the modern ship of the Great Lakes. It differs both from the ocean freighter and from its predecessor in the Lake carrying trade. Methods and conditions are suited by the Lake craft of the present day. These Lake boats do not draw so much water, that is to say, they are not so deep as the ocean vessels. In length and beam, or breadth, however, they are not far behind. The Lake boats are modelled strictly with a view to their carrying capacity, with little depth of hull, and with the idea of loading and discharging cargoes with the greatest speed. So successful has this modelling become, that length for length, and beam for beam, the Lake boat will carry more freight than an ocean steamer.

Since the first tentative lines, the commerce of the Great Lakes has grown enormously. Channels and harbors have constantly been improved by the United States Government. The depth of water in many channels has been only sufficient for vessels with a draught of seventeen feet. Dredging is expected to increase this depth to about nineteen feet in the near future. In fact, the latest boats are modelled for a full cargo draught of about twenty feet. The lines of these boats are not very graceful. The decks display a great many hatchways. The bottoms are flat. The strong construction necessary for ocean freighters is not deemed obligatory; and thus these boats are cheaper in proportion to their tonnage than the ocean craft. There generally is no deck between the spar-deck and the water bottom. The engines are at the stern, and are not of very high power. The coal bunkers are small, and the boats do not carry many winches and derricks. There are few bulkheads, the spaces between them being large. These boats are loaded with extraordinary rapidity. Whatever figure the United States cuts upon the ocean, in the carrying trade, more than 89 per cent of the tonnage of the Great Lakes is American. More than half the surface of the Lakes is within our boundaries. The distance from one end of the system to the other is not paltry. From Duluth to Ogdensburg the distance is 1,235 miles. With a deeper canal to tidewater, this trade could be quintripled in extent. The Erie Canal is not more than eight feet deep, which does not suffice. Projects for a canal of the adequate depth are under consideration.

Ferry lines have been established by railways, carrying loaded cars between ports. One of these ferries plying at Mackinac carries thirty cars.

Mention should be made of the so-called "whale-back" boats, designed

From Stereoscopic Photograph by Underwood & Underwood, New York

TRANSPORTATION ON THE MISSISSIPPI RIVER

A CONGESTED FREIGHT YARD

Vol. II., p. 574

for great capacity combined with economy in construction. It is said that the sailors do not like them, as they are uncomfortable in bad weather.

The navigation season is only two-thirds of the year. Speed in loading and unloading is necessary to make many trips. Such are the facilities, that a cargo of wheat may be taken aboard at the rate of a thousand bushels a minute.

There are some fine passenger boats on the Lakes, two of these measuring 383 feet over all, and having a speed of more than 21 miles an hour. Another Lake passenger steamer measures 295 feet over all.

The Lake sailor deems his life a harder one than that of his comrade on the ocean steamer. There is really some reason for this. In case of storm there is nothing a sailor likes more than sea room. On the ocean there is either open sea, or, at the worst, land only on one side. On the Lakes this is different. A lee shore is never very far away. The waters are also more crowded, and the channels are often narrow. The harbors, likewise, are very much more difficult to enter. Storms arise with startling suddenness, and there is no scudding under bare poles for any distance without danger of striking the shore.

The Lake captain does not sail by dead reckoning, but rather by the compass and the shore line. He must make one or two ports a day. He is his own pilot. In fact, his duties are extremely arduous.

Lake freight rates are very low, with the prospect of further reduction.

Ore Steamers on the Great Lakes

One of the most interesting craft on the Great Lakes are the ore steamers. Vessels of this type cost on an average about $350,000. For a trip of ten days they require about $1,000 worth of fuel. The insurance for this time is about $500. Not many men are needed on these boats, officers and crew not numbering more than twelve. The salaries vary from $1,200 to $1,800 for the captains. The first mate and the chief engineer get about $1,200. There is a profit for these boats in shipping ore at fifty cents a ton. The price often reaches $1.25 a ton, and there is a fortune in the business. The gross receipts of some of these ships have amounted to more than $11,000 for a single trip, the craft paying for themselves in a few seasons. It costs only about one-quarter as much to ship ore by water as by rail. Very often a steamer will tow one or two schooners, which are really nothing but barges, although they carry sails. These barges have enormous tonnage, and can carry even more ore than the steamers can hold. Shipping offices are maintained in all the principal ports by the Lake Carriers' Association, an organization of Lake boat owners. A shipping master is employed by the association. His duties are to supervise the work of all the branch offices, transferring men back and forth from port to port, as they are needed for the service. The "whale-backs," which are mentioned in another connection, are both steamers and barges. They have not been especially successful as ore carriers, in spite of first expectations. The regular ships are growing larger in type. The only handicap is the shallowness of some of the channels, which prevents great depth of hull. A deepening of the various channels is under consideration by both the American and Canadian governments.

The unloading of the ore steamers is a science in itself. Much ore is unloaded at Chicago, within a few yards of the pig-iron furnaces. The greater part of the ore, however, is unloaded at ports on the south shore of Lake Erie, for transportation to the foundries in and near Pittsburg. There are three different methods of handling this raw material. Wheelbarrows and trestles were long ago discarded. "Whirlers," or revolving derricks, are still used to some extent, with buckets carrying more than a ton. By another method a huge bucket travels along a little elevated railroad, dumping into cars on tracks beneath. The direct unloaders simply travel a fixed distance from the boat to a railroad track at the dock. Six or seven thousand tons of ore may be unloaded by this process in nine or ten hours. The latest method of unloading will, however, soon replace all the others. This system makes use of the "automatic unloader." This extraordinary machine weighs many tons. A huge iron arm runs out over the vessel. At its end, as it descends, is a huge clambshell bucket, which opens and scoops out a load of ore. The great bucket is then raised and run back to the waiting railroad cars.

The hardest manual labor in the world is done by the ore shovellers, filling the old-fashioned buckets. They are mostly foreigners. The red ore covers their hair, clothing and skin. They work in gangs of two or three dozen. Although the work is arduous, the pay is good, many workmen earning from five to seven dollars a day, for the season. They are generally thrifty, and live comfortably in little homes of their own.

Lake Carriers' Association

The Lake Carriers' Association is a consolidation of the Cleveland Vessel-Owners' Association with the Old Lake Carriers' Association, founded fifteen or sixteen years ago. Members of the Lake Carriers' Association own about 600 out of the 3,162 Lake vessels, the tonnage they control being more than 1,000,000 tons out of 1,400,000 tons all told, including four-fifths to nine-tenths of the freight carrying tonnage. It is one of the most influential commercial bodies in the United States. The association is active in presenting the needs of the navigation interests to Congress. Channel improvements are striven for, many private lights are maintained, and shipping offices are kept open. In the lower Detroit River, for example, the association has maintained six lights for ten years. Congress always gives consideration to the association's suggestions. The shipping offices of the association, at Chicago, South Chicago, Milwaukee, Cleveland, Toledo, Ashtabula and Buffalo, are of immense advantage both to the men and to the owners. Vessels are not owned by the association, as such, nor does it attempt to control freight rates.

The Mississippi River Fleet

The Mississippi, with its tributaries, extending over 4,000 miles, is the greatest river system in the world, and has a navigation peculiar to itself, its own types of vessels, and crews in many respects different from those to be found elsewhere. It has been asserted that while the traffic by railroad has been rapidly increasing, that by the river is correspondingly decreasing, and it is believed by some that the railroad has already practically displaced the steamboat, but officials of the Steamboat Captains' and Owners' Exchange, of New Orleans, declare that neither of these propositions is correct. It is true that there has been a partial diversion of traffic from localities, while at other places there remain perhaps as much, and maybe more, traffic than ever before, and all this where the railroads parallel and cross the navigable streams. There is a loss of through traffic from such important points as St. Louis, the Ohio River, Memphis and Vicksburg to New Orleans. The Government has contributed liberally for the improvement of Mississippi navigation. Without it the steamboats might vanish from the face of the waters. The appropriations have been honestly and not wastefully spent, but often the results have not been what the steamboat men had hoped for or expected.

It is the difficulties of navigation, the shoals, bars and snags, which interfere with the transportation business on the Missouri and Mississippi more than the competing railroads. The tributary streams are also hampered with bridges, which are a constant peril to floating craft. Such are the dangers of the route that insurance rates are so high as to be almost prohibitive. Whatever decline there may be in the tonnage, these facts are at the bottom of it. And yet Mississippi transportation is a large factor in the commercial life of the country. Steamboats to the number of 189 ran on the river in a recent year with a net tonnage of 62,314 tons, the gross tonnage being 1,590,004 tons. These boats made 6,212 trips. The value of the boats was $4,331,000. There were 1,635 barges, towed by steamers. These barges made 2,470 trips. The value of the barges was $2,003,000. This made a total of 1,824 vessels in a year. Their net tonnage amounted to 1,471,128 tons, while their value reached $6,334,000. The harbor boats, the ferries, the railroad transfer boats, and the Government steamers are excluded from this recapitulation. The total amount of tons from Cairo to New Orleans was 4,708,355, with a valuation of $94,605,762. From New Orleans to the Gulf, via the river, the coastwise and foreign tonnage was 2,985,643 tons, valued at $144,704,136. This makes the grand total of 7,693,998 tons, with a valuation of $239,309,898. Chief among the merchandise carried on the river that year were 612 bales of cotton, 166,049 tons of cotton seed, 153,664 tons of sugar, and 444,539,180 feet of logs and lumber. The cost of a river steamer ranges from $20,000 up to $100,000.

The traffic on the Mississippi has become largely local. Formerly the greater part of the freight was carried straight from St. Louis to New

Orleans, and thence re-distributed back to local points along the river. Now, however, the bulk of the freight going from St. Louis is unloaded at these various points, so that the boat arrives at New Orleans with two-thirds of its load gone. The fine passenger boats, familiar to river travellers years ago, are no longer seen. Local packets operate in conjunction with railroads, from many points along the river, such as Memphis, Vicksburg, Natches, and Baton Rouge, carrying freight up and down the stream. The traffic on the river has thus been changed in its distribution.

The Canal Fleet

The navigable portion of the inland rivers and canals of the United States aggregate 18,000 miles. On the Atlantic seaboard a modern torpedo boat can pass from Newport, Rhode Island to a point one hundred miles south of Cape Hatteras without being obliged to leave the inland passage. The inland coast waterways could be made further navigable by a system of canal connections with rivers and bays so that large steamers and torpedo boats could run all the way from Rhode Island to Texas, from Providence to Galveston, Narragansett Bay to the Rio Grande, without once going "outside."

The greatest and the most wonderful ship canal in the world is the American canal, Sault Ste. Marie, or St. Mary's Falls, often called the "Soo." This is the great gateway between the North and Northwest, and the markets of the East. This canal is open for business only eight months in the year, and yet in that time the tonnage that passes through it is greater than that which traverses the Suez Canal in an entire year. Indeed, the tonnage which enters this canal in its comparatively short season is even in excess of the annual tonnage that enters the port of New York, or the port of London. Through this canal, a thousand miles from the nearest tide-water, passes an average of one hundred and fifty vessels daily, carrying breadstuffs for the world, carrying the ore from the mines of the North-west to the great blast furnaces of Pennsylvania and Ohio.

The vast importance of this canal was illustrated when there was a stoppage of traffic, caused by the sinking of a large steamer in the St. Mary's River at the entrance of the canal. Traffic was blocked for only five days, but the congestion of vessels at that point presented a spectacle never before seen in the marine world. It was said that a man could have walked for miles from steamer to steamer. Vesselmen estimated that that five days' blockade cost them a million dollars. In this canal, too, are the most wonderful locks in the world. In these locks vessels carrying cargoes of 8,000 tons can drop eighteen feet in half an hour. The traffic through Sault Ste. Marie canals (United States and Canadian) in the eight months of navigation season of 1902 was nearly 30,000,000 net tons.

In 1902 it was proposed to enlarge the famous Erie Canal, in New York State. All the canals of this State, indeed, have reached a point where they must either be abandoned or adequately improved. As a factor in through traffic the canals have lost their importance, and while in their present condition they still serve a useful purpose in carrying on local traffic and in regulating to some extent local freight rates, their importance to business in the State is decreasing yearly. The old boats are wearing out, and there is no inducement on the part of their owners or any one else to build new ones. An official of the Merchants' Exchange of Buffalo declares that before 1905 there will be practically no boats left on the Erie Canal capable of carrying grain or other high-class freight. In 1902 one of the principal owners had his canal boats and steam consorts "knocked down"—that is, taken to pieces—and put on board two ocean steamers to be carried to the Philippines. At Manila they were to be put together again and employed in the lighterage business on the Pasig River and Manila Bay.

In marked contrast to the gay pleasure craft in New York Harbor are the villages of canal boats, away to the south, along the shores of the East River. On these boats there is a home life of a modest kind. Clothes flutter from the line on wash-day. Accordions and melodions are heard. The skipper of a canal boat has been known to refer to his daughter's melodion as a "groan-box." Chickens and children are seen and heard, and visits are made from one boat to another, to keep up the social tone of the floating community. The ice gives these boats a long vacation.

The Fleet of Yachts

Of the 454 yachts chartered by the persons mentioned in the directories, 198 are steamers, 187 sloops, and 69 schooners. But the number of yachts mentioned in the blue book does not begin to comprise the number owned by all sorts and conditions of men and women up and down the coast. The number presses close to 2,000—70-footers, 30-footers, 21-footers, as well as steam yachts.

Among the smaller boats, the regular season-in, season-out kind, that has maintained its popularity the longest, showing no sign of falling off in favor, but rather an increase in esteem, is the 30-footer. These boats are all made from the same model, same lines, same sail plans. They are wonderfully well built and have all the properties of the larger racers with more stability. They are extraordinary sail carriers. So popular are they with their owners that they are raced almost daily for sweepstakes or valuable cups offered by various members of the Newport summer colony. They are, too, the seamen's favorites, for prize money is given in every race. A successful skipper can show more for his skill, at the end of the season, and actually does get a higher aggregate of pay, than some of those connected directly with the great Cup racers.

The yachting world offers countless opportunities for young sailors and seamen. These young men receive for their four months' or season's service more than a man receives for a year's voyages in the regular merchant marine. Persons pay for their pleasure, it seems, much more than they would think of paying when the boat must earn dollars and cents.

Pleasure boats have no profits, no losses, to be considered, no dividends to be yielded to their owners, and the fo'castle benefits thereby.

Besides the 30-footer sloops, there are various classes known as 70-footers, 43-footers, and 21-footers. These boats are for racing only. Seventy-footers carry a crew of nineteen, and every season a number of skippers have to be brought over from England, the supply of American skippers not being equal to the demand. The competent American skipper can usually secure employment by applying at any yacht club station on the coast.

Yachts play so great a part in national marine life, that the Government has passed special laws for their control. Every yacht of over five tons' burden, for instance, must be licensed. If an American purchases a foreign-built yacht that has been wrecked in United States waters, and expends upon her in repairs three times as much as he paid for her as a wreck, she can then be documented as an American yacht. The name and port of a yacht on her stern are there because of law, not simply because of owner's choice. And the letters of the names must be at least three inches in length. On steam yachts, the name must be also on each side of her pilot-house, in letters not less than six inches long. No steam yacht, large or small, is permitted to be navigated without a licensed pilot and engineer, under penalty of a fine of one hundred dollars. Yachts belonging to any regularly organized foreign yacht club can come into any port of the United States without entering or clearing at the Custom House, providing that the country from which the yacht hails reciprocates in kind. This rule, however, does not apply to boats built outside of the United States, or to foreign boats chartered or used by an American citizen.

Harbor Craft

The harbor facilities of nearly all American ports are unequalled by those of any European city. New York Harbor is perhaps the greatest, in many respects, in the world. The bay, East River, the Hudson, or, as New Yorkers call it, the North River, here is water enough to float the navies of the world. And the argosies of commerce that visit these waters, the flotillas of trade, continually calling at this hospitable port, include the ships of all nations, manned by men of all races. All sorts of craft abound. There are deep-sea ships from every quarter of the globe, with varied cargoes. There are coasters, generally sailing vessels. There are fruit steamers, and oil boats, and river craft making ready for their little trips. Above them all tower the great Atlantic liners. These leviathans are distinguished by special bands of color around the smoke stack. Tiny, beside these monsters, seem the oyster and ice boats, the brick or cotton barges, the lumber schooners, and the dashing little tugs. There are several channels by which the New York Harbor may be entered. Gedney Channel is lighted by electricity from double rows of spar buoys. The Sandy Hook and Scotland light ships and the beacons of the Jersey and Staten Island coast guide the ships in their entrance into the Narrows. In spite of the constant passing of ships at the Battery, there are almost no accidents in the way of collisions.

In the summer season the excursion boats are very prominent features of harbor life. Some of them are of enormous size, and carry thousands of people. The great Sound steamers are larger still. They run through Hell Gate to the Sound, all glass, and brass, and lights, and music. They even approach the stately liner in size. Less beautiful but fully as useful are the city fireboats. These boats are thoroughly equipped for fire-fighting. Standpipes and nozzles, fire-plugs, hose and pumps and an unearthly steam siren, make up their outfit. Fires along the river front are their especial prey, and they are almost immediately at the scene of danger.

The Harlem River, north of the city, is the home of boat clubs and oarsmen. The "racing shells" are watched with great interest from the bridges and the shore. The dainty and cranky "single sculls," and bigger "shells," are numerous upon a holiday. There are police boats to look after river thieves. The ferry-boats we have with us always. Some of the new ones, owned by the railroads, are most commodious, and very fast. The railroads also run transfer floats, carrying whole trains of cars at once.

The Fleet of Tug Boats

Among the swiftest boats in our harbors are the tugs. The prices for towing are not so large in New York Harbor as they are in some other ports. Here a schooner will pay from \$50 to \$75 to be towed up the bay in good weather. During periods of very stormy weather the charges are doubled. But at Hampton Roads, for instance, the ordinary charges are very high, running from \$500 to \$1,000. The price is a matter of special agreement, and the oral contract of a tug captain is sufficient evidence to sue on in the admiralty courts. Tugs, as a rule, are built much stronger than they were formerly. Heavy salvage is sometimes paid to tug captains who pick up drifting craft. But the business at present requires a large amount of capital, and most of the tugs are owned by companies. Independent tugs exist, however, and are very alert for business. There have been cases in which a tug has demanded and received relatively enormous sums for mere towing. One instance is recalled where the tug captain brought in a bark with a sick crew and a listed cargo, and received \$2,500 for the work.

CHAPTER VII

THE CONDUCT OF A GREAT STEAMSHIP LINE

Organization of a Steamship Line—Operations When a Ship is in Port—Cargoes of Ocean Steamships—The Navigating Department—Firemen and Stokers Aboard Ship—Ocean Steamships as Hotels—The Steward's Department

Organization of a Steamship Line

THE organization of a steamship company is much the same as that of a railroad. First comes the chief executive officer, the president, who acts for the stockholders and the board of directors. To the president report the treasurer, comptroller, traffic and operating managers. In the traffic department are freight and passenger agents; the freight agent having officers under him in charge, respectively, of East bound and West bound freight; the passenger agent having subordinates, who divide the work of looking after the first and second cabins and steerage. The operating department is naturally the largest in point of numbers, for it includes a superintendent of engineers, who is responsible for the engineering department on shipboard; a marine superintendent, who looks after the deck department on shipboard; a dock superintendent, who sees to the loading and unloading of passengers and cargo; and a port steward, who has charge of the stewards' department on shipboard. At least, these are the principal human wheels in the intricate machinery known as organization, which does the work of the great ocean lines.

The American Line may be cited as an excellent example of the possibilities for earning a livelihood in the steamship world. The line employs an aggregate of about 9,000 men, a number equal to three entire army brigades. Nearly 5,000 of these are employed at sea. The company has five steamers that carry, each, a maximum crew of 400; two carrying 250, eight carrying 200, and six carrying 100. In addition, the company has four new ships, requiring from 200 to 250 men each. The employés on shore are chiefly those who work under stevedores at the terminals in New York, Philadelphia, Southampton and Antwerp—from 300 to 500 in each city. Quite as many more employés in each of these places, too, are kept busy in the company's repair shops.

Two-thirds of all the men on the pay-rolls of this line are Americans—this being the result of the rule not to hire foreigners save when absolutely necessary. Why is it that American lines can not bring the percentage of

Americans in their employ up to the full hundred? The answer is, first, that there is no element in the social make-up of our population that can be called a steward class; and, second, that the American-born citizen refuses to go down into a stoke-hole and work as a fireman. The forty per cent of foreigners in the employ of the American Line, therefore, comprises principally stewards and firemen. The stewards are English, the stokers German. Generations of stewards in England have produced a steward class, and it is from this element that the transatlantic companies must draw waiters.

Operations when a Ship is in Port

The value of organization is demonstrated when a steamer is in port, no less than when she is at sea. Suppose a ship, for example, arrives at ten o'clock Sunday evening. She is scheduled to leave again at ten o'clock on Wednesday morning. All the evening hundreds of the stevedore's men have been waiting near the dock, knowing that within the next fifty hours the steamer must be unloaded and loaded again. For a ship's schedule is like a railroad time-table; it is a promise publicly given, and faith must be kept: moreover, a ship in port is an idle investment, she represents non-earning capital; so the more she is at sea, the better. Hence the moment the ship pokes her nose into the dock, the stevedores pounce upon her cargo, loading and unloading taking place at the same time. This simultaneous manipulation of the incoming and outgoing cargo is very important. Not infrequently a ship will list and sink at a dock, simply because a stevedore unloaded too much in one place without loading a corresponding amount in another place.

Other things besides cargo must be attended to during the sixty hours the steamer is in port. While the stevedores attack the steamer from the dock, barges come in from the river and coal is fed into the capacious jaws of the vessel, thousands of tons in all, enough to carry the ship twice the distance to Southampton. All this part of the work is in charge of the dock department.

At the same time the engineer, deck and steward departments are putting the ship in a condition as perfect as when she first came from the builders. The engines are dissected and vivisected, as it were, and then put together again, every inch of the wonderful mechanism having been inspected down to the last screw-head. "Spares" are at hand for everything; in other words, any part of the machinery that shows the least sign of wear is replaced by a similar part, brand new and faultless.

Meantime the deck department is looking after the appearance of the ship, cleaning, painting, overhauling, and putting in new fittings where the old ones are damaged. Down in the storerooms an inventory is being taken of the amount of food on hand and the amount that will be needed on the voyage; this work, of course, going on under the direction of the chief steward.

The rapidity with which ships are sometimes handled in port leads to the doubt in some minds that such a vessel has not been properly repaired or prepared for a voyage. Experience has shown that it is thoroughly practical to discharge, load, clean, overhaul and repair even the largest of liners in twenty-four hours. Some years ago one of the American Line ships was in constant service for a whole year. She was at sea three hundred out of the three hundred and sixty-five days of that year. She averaged between ten and eleven knots for every hour in the year, including her time in port, and concluded the service without mishap or breakdown of any kind. The point to be emphasized is that frequently during that time the ship discharged and loaded four thousand tons of cargo and coal in twenty-four hours, besides having been overhauled at the same time, and went to sea in a condition as perfect as could have been attained if she had been a week, instead of a day, in port.

Moreover, the underwriters and the governments employ inspectors, whose duty it is to see that no vessel leaves port unless she is in unimpeachable condition; so that, in addition to the natural interest and desire of the companies to have everything right, there is this double check by the representatives of insurance and law. Again, nine ships in every ten are laid up twice a year for general overhauling and repairs. Thus every six months each ship is really born again.

A ship's annual overhaul and repairs in dry-dock usually require about twenty-one days, this being the time in which she would make one round trip to Europe. Her captain is, therefore, allowed one trip, and sometimes two trips off, while his steamer is undergoing her semi-annual renovation—giving him, in other words, three or six weeks' vacation, with pay, each year.

Cargoes of Ocean Steamships

It is a mistake to suppose that the fast boats carry but a mite in the way of cargo. The passenger traffic, of course, is the feature most familiar to the general public; but at the same time freight is of very great importance. Fast boats carry quality in merchandise rather than quantity. Every time the *St. Paul* or the *St. Louis,* for instance, leaves port, the actual value of the cargo of either boat is far in excess of the much larger cargo in one of the regular freight boats in the "accommodation" class, like the *Friesland* or *Vaterland,* which carry a huge cargo as well as a great number of passengers. Stevedores call the cargoes of the fast boats "toothpick cargoes," because of the vast number of small packages, in contradistinction to bulky packages, like cotton bales and hogsheads, which swell the loads in slower ships. Express steamers, like express trains, naturally get what may be called "hurry trade." They get perishable goods, such as dressed beef and provisions, together with manufactured articles of high grade, typewriters, sewing machines, etc., upon which shippers can afford to pay fast freight rates. Specie in gold, silver as well as bullion, constitute a part of the cargo of almost every ship of the "greyhound" class leaving port. So that a ship's captain, outward bound, or inward bound for that matter, with any of the faster boats, may hold in the hollow of his hand, as it were, property to the value of many millions—three or four millions being the value of the ship itself, a million more for the cargo, and still another million in specie.

The Navigating Department

On the great ocean steamships the captain and navigating officers have their quarters on the awning deck adjacent to the bridge. This deck is as high as a church-tower above the keel, and is reserved exclusively for the officers mentioned, so that they may be secluded from every distraction in working the ship, and may have a full view of her from stem to stern in all circumstances. The bridge is equipped with a telegraph system, communicating with every other department of the ship—with the engine-room, with the after wheel-house, with the bows, and with every point to which it may be necessary to send an order.

It is on this bridge, seventy feet above the keel-plates, that the captain spends his most anxious hours—in foggy weather and foul, in sunshine, too, and by starry night as well as when gales are bawling, spray flying, icy seas pounding, when the night is so dark that the lookout can not see a ship-length ahead, when derelicts or towering icebergs may lie in the path just ahead—in middle watch or dog watch, any watch is the captain's—all for the honor of the company he serves and for love of "Molly and the Babies" at home. Nowadays, too, the captain is the host of the ship. He is no longer the gruff, rough sea-dog in the pea-jacket of years gone by. He must observe some of the social amenities. He must talk to the passengers now and then, when the weather is fine. He must take his seat at table when he may. He must be a kind of diplomat, also, and possess wit and tact and a fund of patience. He must see that no jealousies develop among the passengers. The captain has upon his shoulders not only the responsibility of human life—often to the extent of over 2,000 souls: 350 in the first cabin, 200 in the second cabin, and 800 in the steerage, and nearly 400 crew—but he has the fate in his hands, besides, of the several millions of dollars' worth of property represented by the ship and its cargo. With life and property on a wholesale scale, as it were, thus intrusted to his keeping, what does a voyage across the Atlantic mean for the ship's captain? A mental and physical strain from the moment the steamer leaves her dock on one side till she reaches her pier on the ocean's opposite side—a strain of which the passengers have no adequate conception.

Deeper, broader and higher than ever before must be the professional attainments of the modern mariner. It is necessary that a sea captain be not only versed in the science of navigation, but that he understand each integral part of his ship, considered mechanically. He must know everything about her, even to the laying of her keel at the beginning. He must understand exactly how she was constructed. He must know all about her engines and other machinery. On some of the foreign lines, the captains are naval officers, and, in case of war, would retain their commands. On the German steamers the officers must serve a year or so in the Naval Reserve. On the French steamers each member of the crew must have served for a time on a vessel of war. On the majority of ships, however, the officers are men of the sea who have fought their way up, step by step, entirely by merit and not at all by favor.

On ships of the American Line, even after a man has reached the rank of captain, he must pass a rigid examination every five years. He must have a certificate of competency not only from the country in which his ship is registered, but, in the transatlantic service, from the country to which he is regularly taking his vessel; so that the captains in this service must have papers from England (and from Belgium too, if possible) as well as from the United States.

In ships like the *St. Paul* and *St. Louis*, of the American Line, twelve cadets are carried, one for every thousand tons of the ship's measurement. A well behaved class of boys is secured to be turned into good officers, beginning with the rank of quartermaster. It is the opinion of officials of the American Line that American boys do not take to the sea as eagerly as in former years. Promotions, from captains down to office boys, are made in this line by the rule of seniority, as in the navy, providing the candidates pass the examination according to requirements, and have proven to the company's satisfaction not only that they are thorough seamen and disciplinarians, but are courteous to the patrons of the lines. As for pensions, retired officers draw an annuity from the particular seaman's fund to which they have contributed during active service, thus making it unnecessary for steamship companies to assume responsibility in this direction.

Firemen and Stokers Aboard Ship

Americans as firemen, as has been said, can not be secured. Obliged to rely upon Germans, the majority of stokeholes on the Atlantic are so many "Little Germanys." The passenger's idea is that the stoker lives in a kind of purgatory, from the beginning to the end of the voyage. Tourists on steamer decks tell stories of how the poor men down in the bowels of the vessel never make but one voyage, a single trip being sufficient for a lifetime. Further, how firemen oftentimes rush on deck stark mad, and either jump into the sea, preferring the ocean's to the ship's bottom, or plead to be put in irons if in that way they can be saved from the terrors of shovelling coal in the Hades below. The experience of officials of steamship lines does not bear witness to these tales. After every voyage every stoker on the steamers of the American Line is given a certificate of good behavior, if he is entitled to it, and when he can present four of these certificates to the paymaster, showing that he has made four consecutive voyages, he receives extra pay in the shape of a five dollar gold piece. Hardly ever in the history of the company has less than fifty per cent of all the stokers in the company's employ come forward to get the gold piece, first proving, of course, that they have fed furnaces through four consecutive voyages. Moreover, after each voyage, every member of the crew, except the captain, is, according to law, paid off and nominally dismissed from the service. Here would be the fireman's chance to quit. Instead, more than seventy-five per cent, with their pay in the left hand, sign papers for the next voyage with their right hand. If statistics were gathered, they would show that firemen of the sea stick to their jobs just as long as the firemen of locomotives. Except stewards and stokers, then, the rank and file of the crews of American steamers are Yankees.

Ship's Surgeons and Pursers

In the great Atlantic and Pacific fleets the position of surgeon—or "ship's doctor," as he is called—is applied for annually by scores of members of the medical fraternity. These are usually young practitioners with both hospital and private practice, and of first class standing in the profession. In the American Line fleet of twenty-one vessels, positions are open, of course, to only twenty-one surgeons, yet the company has a waiting list of applicants five hundred strong. Many ship's doctors have themselves been ordered to sea for their health, or have chosen to practice on shipboard because of a natural fondness for salt water, for adventure or travel or change. Some of them have contributed to medical science knowledge of a most important character, which they have taken the trouble to acquire, at times at the risk of life, in foreign ports.

Applicants for position of purser are less numerous than for a surgeon's berth, and yet these, too, run into the hundreds. The purser is the clerk of an ocean hotel, and as such he must perform all the duties of a hotel clerk on shore. He is allowed one or more assistants, and these, in turn, may work their way up to the post of purser. The pay is good, excellent board and lodgings are included, the incumbent must be in closer touch with the passengers than any other officer of the ship.

Ocean Steamships as Hotels

Nearly all the great passenger steamers on the Atlantic or the Pacific may be aptly compared to hotels. They are, indeed, the great inns of the sea. For example, in New York you register at one of these great floating hostelries, you are given a room, you live for five, six, seven or ten days, enjoying meantime the comforts of a great inn ashore, and you land in Europe. You have been rocked across the ocean in that modern cradle of the deep—a hotel.

Many of these great inns of the sea are larger, more costly, and accommodate more guests than a Fifth Avenue hotel. A first-class hotel can be built for $1,000,000. But ocean hotels of the first-class cost from $2,500,000 to $4,000,000. Again, many of these hotels of the sea consume more food in six days than the Fifth Avenue hotel uses in six weeks. In a single voyage the ocean hotel serves 36,000 individual meals. Fifteen hundred souls, passengers and crew, are lodged and fed, and to each of these is served an average of four meals a day.

As the guest of an ocean hotel one can have an ordinary room for ten dollars a day, or a suite of apartments with a private bath for one hundred dollars a day. In either room or suite of rooms the bed is just as comfortable—in the room a berth, in the suite a brass bedstead and a little extra fresh air, this is all the difference. The ten-dollar man may push the electric button, summoning the room steward as often as he chooses, and receive the same degree of attention as the hundred-dollar man on the deck above. At table, the same, and so, too, on deck and in the smoking-room. There is a barber shop, a bar, a cigar stand, and the bootblack's chair. Cares the guest for a stroll, he can walk nearly an eighth of a mile without turning as on the piazza of a great hotel at a watering place. For his family and friends there are a library of good books, two pianos, a full-sized church organ, and all sorts of games, deck sports and amusements. An orchestra plays during dinner, there is a concert in the evening, and in fine weather the captain incloses the deck in canvas and bunting, lights it with a hundred lanterns and gives a ball.

The Steward's Department

In some minds, and according to many appetites, the most important official aboard ship is the chief steward. Hungry passengers think the steward quite as important a personage as the captain. The steward can estimate to an egg how many eggs one thousand people will eat in six days. Long experience has taught him that he will use eggs at the rate of two a minute. Hence, whenever the hotel sets out to sea, the steward has a store of not less than 17,000 eggs. With similar nicety he can estimate the exact needs in the way of chickens, ducks, lobsters, crabs, oranges, and so on through the bill of fare.

While in port the chief steward makes out his order for supplies, and more than one caterer is necessary to fill his orders; for here are requisitions for food enough for 1,500 persons for two or three weeks—20,000 to 30,000 pounds of meat, fifty to one hundred barrels of flour, five tons of potatoes, 1,000 quarts of ice cream, etc. Seasonable products and provisions of a perishable nature are purchased in whichever port the vessel happens to be; meats, however, with most groceries and canned goods, are bought on this side, together with many other things to eat, not only because they are cheaper, but far better than on the other side. Wines and cigars, of course, are always bought at the British end of the route. There is a fiction that the track of ocean steamers could easily be traced by the champagne bottles on the bottom of the sea; but, as a matter of fact, every empty bottle is carefully garnered and resold to the dealers for whatever it will bring.

In a given time in a single ocean hotel more crockery and glassware is smashed than in all the hotels on Broadway. The breakage aboard the *Philadelphia,* for example, on a recent run from Southampton to New York, included 1,000 plates, 280 cups, 438 saucers, 1,213 tumblers, 200 wine glasses, 27 decanters, and 63 water bottles—a breakage costing about $600 for the voyage, or $100 a day.

At sea, regardless of weather and wind and wave, the steward remains simply a housekeeper in what is, to him, a rolling, pitching, tossing hotel. His duties do not end with the mere supplying and serving of food and drink. He must look after the comfort of more than a thousand guests—in the first, second and third cabins. A passenger finds his hair mattress too hard and asks for an air mattress, which the steward must supply. He must have ready for a single passage 14,000 napkins and twice that number of towels, as they will be called for. These first-class guests are paying each an average of twenty dollars a day for their room and board, and they must have each day twenty dollars' worth of food, comfort and attendance. To meet the requirements of his position, the steward divides his hotel into departments. He sometimes has a laundry where the towels, sheets, napkins, and so on, are washed and dried by machinery, and ironed in a big machine that looks like a printing-press. He has a printing-office, where are printed the menus, the wine lists, and the programmes for the various concerts. Sometimes one of these ocean hotel printing rooms turns out a neat little newspaper daily, enterprising passengers furnishing the "copy."

The most important department under the steward is, of course, the kitchen, or rather the kitchens. For, besides the main kitchens in the first and second cabins and in the steerage, there are separate distributing kitchens for the smoking-room, the ladies' café, and for meals served in room and on deck. The *chef,* who is directly responsible to the steward, has under him twenty to thirty cooks, two bakers and eight assistants, besides a number of dishwashers and special "hands," who prepare vegetables, open oysters, and look after other minor details.

There is never a time in New York when there is not a dearth of stewards, so far, at least, as ocean-going ships are concerned. New York hotels, in an emergency, can go to a kind of headquarters maintained for the purpose, and engage as many waiters as may be needed. Not so the hotels of the sea. If the latter, at the last moment, carry an unexpected number of guests, they must either borrow stewards from other ships or go to sea short-handed. Occasionally, of course, qualified stewards can be found in New York who have deserted their own ships or have come here, thinking to better themselves. One would suppose that our coastwise steamers would have produced a steward class from which liners could be recruited. But we are cut off in this direction by the fact that the coast steamers employ chiefly colored help, and to mix the crews of ocean passenger steamers would mean the introduction of naval battles, as it were, in the race war. The situation, therefore, compels the companies to see that each ship from the European side of the water brings over enough stewards for the expected number of passengers on the return voyage from New York.

CHAPTER VIII

THE SEAMAN

The Education of the Navigator—Ships' Crews in the Merchant Marine—The Kind of Men Who "Go to Sea"—The Life of a Sea-faring Man—Ships' Officers in the Merchant Marine—Wages on American Vessels—The Sailor's Creature Comforts—Conditions on American and Foreign Ships—The Hours of Labor on the Water—Method of Employing Sailors—The Crimping System—Crews of Coasting Vessels—Crews of Great Lake Vessels—Crews of Mississippi Craft—Seamen's Unions—Seamen's Institutions

The Education of the Navigator

THE life of a sailor has always been peculiar from the fact that the fewest possible opportunities for advancement were available. A man who has shipped before the mast has been doomed hitherto to occupy a subordinate position, so long as he follows the sea; such promotions as were possible to him being dependent rather on his reliability and other good traits than on his knowledge of the theory and practice of navigation. Nor could he obtain the instruction necessary to qualify him for promotion from the forecastle, without interrupting the calling at which he earned his livelihood, and attending some school ashore. Thus it is that many a man having the natural capacities for the highest positions, had he a corresponding degree of education, has remained a common seaman his life through, and ended his days in the shelter of the Snug Harbor. Of course, in order to become an officer on shipboard, a man must be educated to a high degree: in other words, he must be a navigator, thoroughly familiar with several branches of the higher mathematics, including astronomy, and an expert in the use of ship's instruments. These subjects, difficult even to trained minds, present an almost hopeless situation to the general run of seamen, whose education has probably been limited to the "three r's" of the common school.

For the seaman, as for toilers in many another sphere, industry alone determines the limits of advancement. No better opportunities were ever offered to an ambitious seaman than are afforded at the present day, when the awakening activity in founding and carrying out an extensive merchant marine, as well as the numerous desirable positions made available by the creation of the National Naval Reserve Corps, have produced a large and constant demand for well-equipped navigators from every branch of the naval service and from merchant vessels. Furthermore, a career in the United States Navy is opened to competent enlisted men by the Act of Congress authorizing the appointment of six ensigns yearly on successful competitive examination. On obtaining such an appointment, the successful candidate is in line for further promotion.

In order to acquire the knowledge essential to promotion, many young men enroll as cadets or apprentices in the merchant marine, hoping to benefit by the instruction of their superior officers in the mysteries of navigation. This method, however, has proved none too rapid in the majority of cases, since, unless specially paid for the work of teaching, few officers are willing to devote the time that would be required for the work. The apprentice is thus little better advantaged, except for occasional suggestions and explanations, than the man who essays to struggle single-handed with the mysteries of logarithms, trigonometry and nautical astronomy. Few books, moreover, are calculated to enable the novice to pursue his studies alone, and without the supervision of a competent instructor. The same conditions apply to men in the lake and coast service, in the navy and in the employ of the Lighthouse Board. In the last year or two, however, excellent courses in navigation, to be pursued and conducted by correspondence, as the student-sailor moves around the world, have been offered by reliable institutions, which guarantee to lead the learner from the most rudimentary principles to their most advanced applications, and at the same time give him a thorough acquaintance with the most recent signal codes and practical details of sailing. A sailor's life would seem to afford the leisure necessary for the prosecution of such a line of study, and its inauguration opens up new possibilities for the ambitious and earnest worker.

Ship's Crews in the Merchant Marine

One person out of every 750 of the earth's population earns a living from the water. And those who earn a living thus range from an "admiral of the blue," with thousands of fighting men under his command, to the barefooted boy who drives along the towpath of the Erie Canal the patient mule. If numbers alone counted, the population of any one of the states of Georgia, Iowa, or Wisconsin would suffice to man all the vessels afloat. Switzerland has more souls than trust themselves to Providence to labor on the surface or in the depth of all the waters of the globe, and the island of Manhattan could at one time comfortably accommodate the population of the oceans, lakes and rivers, if the present tenants of its dwellings would make way for the motley crews of earth.

Great Britain's navy is manned by about 90,000 men, and her merchant fleets by about 250,000 men. Her merchant shipping at sea is about half of the world's tonnage, and it is her aim to keep her navy equal to that of three other powers in possible combination. At the same time all forms of water transportation in the United States give employment to about 130,000 men.

But while only one person out of about every 750 of the world's population is employed on the water, the men who go to sea are a picked corps, standing for more in the way of physical strength and endurance, courage, and the venturesome spirit which produces great results, than many times this number who are content to remain on the solid ground.

First, those who go to sea are all men. The life seems to have little temptations for women. Occasionally one reads of a Grace Darling, and, in 1902, France was agitated over the project to secure a pension for a brave old pilot-woman of St. Malo, a *matelotte en jupon*. Sometimes the master of an American schooner takes his wife on a voyage, and on the two-years' cruise of American whalers, it is not unusual for the master to take his wife and daughter to give them a glimpse of the world. All the passenger liners carry stewardesses, and especially on the great English and German lines to Asia and Australia these positions are eagerly sought by women of good education and breeding. Nevertheless, the water population of the world is a male population.

Furthermore it is made up of men and boys in their physical prime. Apprentices may be taken at twelve years of age on American merchant ships, but the apprentice system is practically extinct. The boys who go to sea are from fourteen to sixteen years, seeking this employment on their own responsibility. From this age up to the period between twenty-five and thirty, the number of those who live the sailor's life shows an unbroken increase for each year of age.

Then begins a sharp decline. In a given number of seamen the number who are between thirty-five and forty is very much less than those between thirty and thirty-five. Over forty-five comparatively few remain in the service except those who have attained officer's rank, and over fifty the number shrinks to small proportions. The great majority of those who man the world's ships are between twenty and thirty-five years of age, and the average age of all is barely thirty years.

The causes are not recondite, though various. They are not to be found in the dangers or physical discomforts of sea-faring, considerable as these are. From the necessities of his employment, the man who goes to sea is almost wholly barred from the comforts of domestic life. He may have a "sweetheart in every port," but a wife and a home with children are not usually the important interests of the seaman as of the landsman. The rapid substitution of steamers for sail vessels, the absorption of tramp steamers into lines, and the regularity with which steamers now ply between fixed terminals have, however, worked great changes in this respect. His stay from home will be longer, his intervals "about the house" less frequent, with the sailor than with the railroad employé, but it is beginning to be possible for the engineer or fireman on an ocean steamer to say that he will be back in two weeks or three weeks, almost naming the hour of his return. A very large proportion of the crews on British steamers which leave Southampton for the United States or Africa are married men with little homes in the suburbs, and the same domestic transition is in progress in the crews of American coasting steamers. We have so few American steamers in foreign trade that the change is not yet appreciable.

Broadly speaking, however, a man must choose between a wife and home or the sea, and at about the time of life at which he chooses the former, he gives up the latter and turns his hand to some other method of earning a living. With an officer this is not usually possible or indeed necessary. His special training in navigation does not avail him in other pursuits and he accordingly sticks to the sea. The men in the firerooms, who constitute the majority of those who man the world's vessels can, however, readily obtain employment and establish for themselves homes ashore. It is an undoubted fact that labor on steamers is, as a rule, more grinding and monotonous, though less perilous than on a sail vessel, yet there is relatively little complaint of conditions on the former as compared with the latter. One reason for this peculiar fact is undoubtedly the restraining and cheering influence which domestic relations exert on the crews of steamers—an influence almost wholly wanting on the crews of square-rigged vessels.

The Kind of Men Who "Go to Sea"

About half of those who go to sea are between twenty and thirty years of age, and this is true of foreign as well as American vessels. The reason lies close to the surface of things. At that time of life the spirit of restlessness, the desire to change, to see the world, is strongest, and the ocean offers the point of least resistance to these impulses. It is an interesting sociological fact that in proportion there are more boys and young men under twenty-five on square-rigged ships which visit remote ports than on the schooners which sail up and down our coasts, and a greater proportion still in the deck force of ocean steamers. The desire to move about, so strong in young manhood, naturally yields in time to the more settled purposes of life. By the time a seaman is thirty-five, one of three things has occurred. He has proved his aptitude for the sea and is standing, it may be at the foot, in the line of promotion of a permanent career; he has exhausted its novelties and is ready to adopt the gregarious life of the multitude of men ashore, or he has worn out ambition by the dissipations to which sea life is subject, and remains afloat hopeless and discontented. The last named class is fortunately as small in proportion to the total at sea as it is in any occupation ashore. These observations apply especially to the deck force or sailors in the old-fashioned meaning of the word.

Fully one-half of the world's crews of ocean vessels do their daily work deep in the hold of the ship—in the engine-room, before the furnaces or at the coal bunkers—and the percentage steadily increases. This great body of men is the product, of course, of different influences, and works under different conditions from those which create and environ the force of sailors proper. It is quite closely assimilated in the nature of its work with the large bodies of men employed in heavy manufacturing processes such as the cruder forms of iron and steel.

The Life of a Sea-faring Man

The secretary of the Seamen's Union of the Pacific is Mr. Andrew Furuseth, of San Francisco. In his youth he was an able seaman on sailing vessels of various foreign nations, and also worked at times on American vessels. About ten years ago he became the leader of the sailors' organization at San Francisco. His views of sea life, accordingly, may be accepted as representing the thoughts of many men on the sailing fleets of the world. In the course of his testimony before the Industrial Commission at Washington, Mr. Furuseth said:

Now a boy may go to sea out of romance; he may read Captain Marrayat and the rest of the writers, and get into his head that he wants to be a sailor; and he goes to sea and makes one or two trips, and he finds out what the sea is, what kind of a life it is, what kind of work he has to do, what kind of wages he is likely to receive when is a grown man, and he says: "There is nothing in this for me," and he quits and looks around for something else to do. And it is the same not only in the United States, but in other countries.

Norway used to furnish an enormous amount of seamen. When I first went to sea the wages of the seamen in purchasing power were such that he was really better off than the ordinary mechanic on shore. Ninety per cent of the men were married, and had little homes of their own in the little gullies along the seacoast, or wherever they might happen to be, and their homes were neater and usually a little better furnished than those of the ordinary mechanic. Now, the condition of shore employment has increased in that country to such an extent that the standard of living of the shore mechanic has risen vastly above that of the seaman, and the boy does not go to sea any more as he used to. The Norwegian vessels are now very largely filled with Swedes and Finns.

A man can make more wages and be at home with his family, if he has one; or he can afford to furnish himself with one and stay home and get better wages by working at something ashore. The boy who has the stuff in him to be a sailor must be healthy physically, and must have a fair average intelligence, or else he is no good at sea; and in order that he may remain at sea, or be willing to go to sea, the conditions of sea life must be such as to give him the inducement, or at least give him the ability to live in the same way as his neighbors do. Now sea life will not do it.

There is much less drunkenness among sailors than is commonly supposed. People ashore are inclined to say that any man they see drunk around the water front of a seaport city is a sailor. In a majority of cases he is not. The sailor goes ashore and looks around; he goes into the employment offices and other places to find out whether there is anything else to do, and if there is any work on shore he is glad to quit the sea. He becomes a bridge builder; he becomes an architectural iron worker. I suppose that seventy-five per cent of the architectural iron workers in New York, Philadelphia, Boston and Chicago were sailors. Or the sailor becomes a bridge builder on the railways; or a gripman on the street cars. Going to sea, he learns certain things; he learns to keep his head cool and his feet warm, as we call it at sea; to have his presence of mind with him. He works with both hands; or he steadies himself with one hand, works with the other, and balances his body with his feet. And all the time he thinks. If he cannot do that he is no good at sea; he is a burden on the vessel instead of a really efficient man.

Well, a man who becomes accustomed to that—to think and work at the same time—receives a certain training that makes him a valuable man in other employments, particularly in such employment as street cars. It is very much like the steering of a vessel; very much like it. And so it is with all kinds of work in a vessel, where you must use your hands and your brain and meet new conditions all the time. The real training of the sailor consists in these things, and that makes him capable of doing other work. He comes ashore in New York and he finds that architectural iron workers get $3.50 a day, and he gets employment among them, and he says, "Good-by, Sea; I am done with you."

An "able seaman" is a healthy man in his active years, who has received the peculiar training that makes it possible for him to apply his wits to conditions as they come. The Seaman's Union desires a law providing that an able seaman must be more than eighteen years of age, and must have three years' experience at sea.

Ship's Officers in the Merchant Marine

With the sudden and rapid increase in the number of great ocean greyhounds, the steamship companies have not found it easy to secure a sufficient number of "ready-made" deck officers. The American line began training cadets on the *New York,* the *Philadelphia,* the *St. Paul,* and the *St. Louis,* and its other regular steamers, and from the ranks of these fifty young men, always on duty, officers will probably be chosen for the company's new ships.

Meanwhile, the North German Lloyd Company hit upon a plan of training its own cadets on a ship devoted to this special purpose. The management selected a large sailing ship, and fitted her as a training school for deck officers of the line. From this ship, therefore, will graduate the future commanders of the Bremen fleet.

In selecting a sailing vessel as a cadet school-ship, the argument was the same as that put forward by the Navy Department of the United States, namely: that on a sail vessel a youth acquires courage, quickness of perception, rapidity of execution, and bodily vigor to a greater degree than on a steam practice-ship. The company further determined to combine the commercial with the educational, thrift with science; therefore the vessel selected was one with a carrying capacity sufficient to pay her own way about the world—the *Herzogin Sophie Charlotte,* four-masted bark, of steel, 276 feet long and 43 feet beam; her depth 25 feet and her gross tonnage 2,395.

"To gain admission to the ship," says an official of the company," the youth must have attended school in Germany and have graduated with a diploma giving him the privilege of serving only one year in the German army. About fifty cadets are admitted each year, and the course lasts three years. During the first year the cadet is classed as a boy, the following year he is graded as a seaman, and after two years of satisfactory service becomes an able seaman. At the close of the third year the cadet is transferred to one of the steamships of the company, and there performs the duty of quartermaster. At the close of this period afloat the cadet is admitted to the school of navigation at Bremen for a four-months' course of study. He is then eligible for the examination for mate, and if successful is appointed a fourth officer on one of the North German Lloyd steamships. It has been the experience of the company, that a more desirable class of officers is secured in this way than could be had by the old haphazard process of selection from apprentices of the regular merchant marine."

The source of supply of officers for the American merchant fleets of the future is a serious problem. On our square-rigged merchant ships less than 5,000 men are now employed. More than half of these are foreigners, who, under our laws, are not eligible to be captains or watch officers of American vessels. By co-operation of the Federal and State Governments several school ships have been maintained for some years with varying degrees of success. It is probable that in a few years several of the principal American steamship companies will find it to their interest to follow the example of the North German Lloyd, and buy and maintain a large square-rigged ship as a training school for their future officers.

Wages on American Vessels

To compensate for its perils the seafaring life offers a regularity and continuity of employment such as is afforded by few other occupations. It is to a great extent the seaman's own fault if he does not obtain full ten months' steady employment out of every twelve. His pay begins from the time he appears on board and is continuous until the vessel has returned home from a foreign port and he is discharged. Pay and provisions continue while the ship is in a foreign port. On the return home at the end of the voyage the seaman is usually discharged, and remains without pay until the ship is again ready to sail. Some steamers remain at the home port only three or four days, so that during a year from five to six weeks' labor is thus necessarily lost. Again, every well-managed vessel has its annual overhaul and repairs, which may take two or three weeks more, when the services of the crew are not required.

The average pay on American vessels, including men in all the many ratings is a trifle over $36 a month, or for ten months, $360—a dollar a day the year round. Out of this pay the sailor must clothe himself, but his needs in this respect are modest, though requiring the best of materials. The charitably inclined in this and other countries have devised various and successful plans for the improvement of the sailor's conditions. Singularly enough, however, this matter of clothing has not received the attention it deserves. Some of the large steamship companies in this and other countries require uniforms, which are made of good materials and may be bought at fixed prices at regular establishments. Often, however, the seaman's "tailor" sells him shoddy at exorbitant prices, or makes a pretended sale of clothing the occasion for plunder. The law of the United States undertakes to protect the sailor by requiring the master of every vessel to carry a supply of clothing which is to be sold to seamen on board at a profit of not over ten per cent on the wholesale price of the articles.

Besides his clothing, the sailorman, out of his $360 a year, must meet his expenses ashore during the intervals, aggregating about two months, when he is not employed. He may, of course, during these periods obtain odd jobs ashore, if he so desires, but such work is not usual. The incidental expenses for tobacco, for visits ashore in foreign parts, for charity—a considerable item—will draw upon the total of $360, according to the tastes of the individual.

The Sailor's Creature Comforts

From the time he goes on board until he is discharged at the home port, the sailor receives his meals at the expense of the ship. In the American merchant marine a bill of fare is fixed by law, and for any deviation from this bill, without the sailor's consent, the owner becomes liable to a heavy penalty. This bill of fare was prepared by a body of Marine Hospital surgeons in 1898, and besides the staple articles of sea food, includes fresh bread instead of hard-tack, canned fruits and vegetables, coffee, tea and sugar; in short, it is designed to satisfy amply all the cravings of a healthy appetite. In this respect, as in many others, seamen on American vessels are much better cared for than on foreign vessels. In the quantity of food alone, the American bill of fare is double the British bill of fare, and in variety it surpasses both the British and German *menus*.

Of course, the workingman on shipboard has no rent to pay. His quarters are not spacious, but they are regulated by law. They must be "securely constructed, properly lighted, drained, heated and ventilated, properly protected from weather and sea, and, as far as practicable, shut off from the effluvium of cargo or bilge water."

If the sailor is injured or taken ill in the performance of his duty, the ship is legally bound to take care of him during the voyage. If, from these causes it becomes necessary to discharge him in a foreign port, the Treasury of the United States pays to bring him home, and in our own country Marine Hospitals, maintained at an annual cost of nearly $1,000,000, undertake to restore him to health.

Out of his $360 a year on the average, the seaman can save $250, and that amount is more than whole families have to show for a year's work after meeting necessary expenses.

All the maritime nations have a law under which contracts between a master of a vessel and the crew for service on shipboard must be made in the presence of an officer of that Government—a shipping commissioner. It is thus possible to keep an official record in the various ports of wages paid to men in the various ratings on board of ships of different countries.

Conditions on American and Foreign Ships

The most interesting phase of the wage question in the merchant marine is that the rate of pay on American vessels is considerably higher than on foreign vessels. The most important labor factor in modern ocean navigation is the force in the stokehole. The usual rate of pay for a fireman on an American vessel is from $30 to $45 a month. On a British steamer of exactly the same size and for exactly the same work, the firemen receive only $19 to $24. It should be emphasized that for twice the amount of pay the fireman on an American vessel does not do twice the amount of work performed by his brother in the stokehole of a British vessel. Each handles substantially the same amount of coal under substantially the same conditions. Physical endurance is the quality most required in this form of labor, and there is little or no chance for the display of mental qualities.

These general statements regarding firemen do not hold good where steamers remain for a long time in tropical waters. Ships plying between Europe or the United States and Hong Kong and other ports in southern

Asia, for instance, do not employ Caucasians as firemen. The white man has not the physical endurance necessary to shovel coal for hours at a time in the firerooms of a steamer making voyages covering a period of many weeks in the tropics. Regardless of nationality, regardless of the flag that flies from their stern, merchant steamers in the southern Asiatic service employ either Chinese or Lascars as stokers. About 700 Chinese are thus employed on American steamers, while the trade of Great Britain with the Orient is so great that her ships employ 36,000 Lascars and Chinese alone.

The pay of engineers in merchant vessels varies according to the degree of responsibility, the size and power of the engines, the number of engineers, and oftentimes with the length of service of the engineer himself. Individual efficiency, too, is an important consideration in determining pay. Engineers hold their berths, therefore, on a kind of merit system. It is generally agreed that American and English engineers on shipboard are of equal efficiency. And yet, for precisely the same qualities, same intelligence and same service, American engineers are paid a much higher rate of wages than their British cousins. A first engineer of a merchant vessel under the Stars and Stripes receives $125 per month, while a first engineer in the British merchant marine is paid only $87 a month. The same with the second engineers, the pay on Yankee vessels being $75 a month, on an English ship only $60 a month.

In the case of mates and able seamen on steamers, here again far better wages are paid in the American service than in the British. The usual pay of a first mate on board an American steamer is $75 a month. The same officer on an English steamer is paid $55. Second mates, American, $50; second mates, English, $38; able seamen American, $25, the same in English ships, $21.

Even in sailing vessels the American owner is much more liberal on pay day than the master of an English ship. First mates on American sailers get $45 a month; on English sailers, only $34; second mates, American, $35; the same on English sailing vessels only $23; able seamen, American, $25; able seamen, British, only $14. So while the average American, taking into account all ratings, may hope to earn about $360 a year, the average seaman on a British vessel will not earn over $250, and the man who serves on a German vessel is fortunate if his wages for the year reach $200. Norwegian, Italian and Dutch vessels pay about the same wages as the Germans.

The difference in wages becomes all the more noticeable by a glance at the complete pay rolls of three transatlantic mail steamers of different nationalities, but nearly equal size and speed. Take for example such steamers as the American *St. Paul,* the British *Oceanic* and the German *Kaiser Wilhelm der Grosse*. It must be pointed out, first that the *St. Paul* is smaller than the two foreign ships and that her engines are of only two-thirds the horsepower of the others. Hence the *St. Paul* burns less coal and requires a smaller crew than either of the foreigners. Excluding masters and their salaries the *St. Paul* carries a pay roll of 380 men, with total wages amounting to $11,300; the *Oceanic* carries 427 men, total wages, $9,900; and the *Kaiser Wilhelm der Grosse,* 500 men, with total wages of $7,700. If these three steamers were exactly alike, were three *Oceanics,* for instance, carrying the same number of men performing identically the same service, the one flying the English flag would have a monthly pay roll as now of $9,900; and the pay roll of the one flying the flag of Germany would amount to only $6,800, while the paymaster on board the American ship would divide $12,500 among the crew. The moral is that of all the jack tars in the merchant marine of the earth, sailing under whatever flag, the officers and seamen serving under the Stars and Stripes are the best paid.

The Hours of Labor on the Water

At sea, the day's work is divided into watches, of four hours each, except the hours between 4 P. M. and 8 P. M., divided into two dog watches of two hours each. The day's labor thus consists of twelve hours, four hours of watchfulness and work, alternating with four hours of rest. The dog watches, of course, serve to shift the actual hours of work on alternate days. Without them, for example, the same man would always be on duty from 4 A. M. until 8 A. M., and so on. By means of the dog watch one day he works those hours, the next day rests. The rule before the furnaces for firemen and trimmers or coal passers is different. Their work is the most arduous and monotonous on shipboard. While the work on deck is of almost infinite variety, is performed in the fresh air, and usually with the stimulus of sunshine and the motion of the ship, in the fireroom the unchanging task is to dump coal and deliver it over the grates, performed, too, in a high temperature in spite of the best appliances for supplying fresh air. Here the rule is four hours on duty and eight hours' rest, so that the day's labor consists of eight hours. In this time, however, each fireman or trimmer handles on the average about three tons of coal. In voyages to equatorial climates the average is about two and a half tons.

Method of Employing Sailors

The conditions surrounding the employment of seamen have always been subject to exceptional laws and peculiar customs. Even during the Napoleonic wars the sailors for His Majesty's Navy were recruited by "press gangs" who seized sailors and some who were not and carried them bodily aboard the fleets which fought Aboukir, Copenhagen and Trafalgar. The United States went to war with England in 1812 to resent the practice followed by British men-of-war of boarding American merchantmen and forcibly removing seamen claimed to be British subjects, and the treaty of peace left unsettled the matter of impressment. By France and Germany service at sea is accepted as a substitute for compulsory military service.

Out of the "press gang" grew the so-called "crimping system" in the world's merchant navies. In the days of sailing ships, seamen were ashore so long that they usually ran more or less in debt in the intervals between voyages, and boarding-house keepers, seeking to make the most from this temporary sojourn, resorted to every device to swell this debt. The sailor thus went to sea with a large part of his future wages mortgaged, for the boarding-house keeper would prevent his departure until the money to pay the debt had been advanced by the ship on which he was to serve. So general was this practice in both the navy and the merchant marine that until a few years ago the salary of a British naval officer, though paid after it had been fully earned, was still called his "advance."

Between the boarding-house keeper on the one hand and the ship desiring a crew, on the other, grew up a class of intermediaries in all maritime countries, whose profit was made out of supplying seamen from boarding-houses to vessels.

The Crimping System

The crimp has been broadly defined as a trafficker in seamen. When the business is conducted respectably the crimp or shipping agent undertakes to supply a crew or part of a crew to the master of a vessel, and charges the master a stated sum for his services in bringing the men to the vessel. In practice the crimp usually undertakes to obtain from the seaman himself as large a sum as possible for obtaining him employment, taking his pay in the form of an allotment note to be almost immediately cashed, payable out of the wages which the seaman is yet to earn.

The maximum allotment now allowed in the United States is one month's wages on very long voyages—as from the Atlantic to the Pacific, or vice versa—while for shorter voyages the allotment is graded on a diminishing scale, according to week's and day's wages. The crimps have resorted to two devices in attempting to evade this provision of law. In some instances they have endeavored to bring about a nominal increase in seamen's wages and in others to bring about a reduction in those wages in order to extract from seamen sums as great as formerly. The former method was abandoned after short and unsuccessful trials, and the latter method is employed at present where evasion is attempted. In its original form the plan adopted by the crimps was substantially as follows:

The monthly wages of the seaman for this example may be taken at $20, and the voyage from the Atlantic coast to Europe, for which the allotment can not exceed fifteen days' wages, or ten dollars. The crimp, desiring to obtain more than this sum, induces the seaman to ship for the first month at $1 or $2, and for each month after the first at the regular wages of $20, the voyage in fact being ended in the first month. The difference between the full month's wages of twenty dollars and the nominal wages, one dollar or two dollars, is pocketed by the crimp. The scheme would require the connivance of the seaman himself, the master or owner, and the officer of the government, United States shipping commissioner or foreign consul, before whom articles are signed. It was, of course, promptly checked as soon as attempted in the case of American vessels. It was continued for some time, however, in the case of British vessels, but instructions were issued by the British Foreign Office which put an end to the practice where it was likely to become most prevalent.

What has thus far been accomplished has been done gradually and without any disturbance of trade, so far as is known. Testimony as to the improved conditions under the new law is general, and no complaints have been received from the owners or masters of vessels, who seem, as a rule, disposed to promote the enforcement of the allotment law. There have been complaints in the mercantile-marine press of Great Britain as to the operations of the law on the Pacific Coast in the case of British vessels. It has been alleged, and is probably true, that crimps on the Pacific Coast have charged British shipmasters sixty and seventy dollars a man to furnish crews for British vessels. Wages in the United States and on American vessels are so much higher than on British vessels that there is a temptation for the British seaman to desert in the United States.

More potent than any law in checking the evils of the crimping system has been the change from sail vessels to steamers and the regularity which it has introduced into all forms of maritime life. The great majority of men employed on ocean liners ship for another voyage as soon as one has been completed, and thus remain in the constant service of the same employer throughout the year. The crimp's opportunity depended chiefly on the long and irregular sojourn in port of sail vessels. But since 1890 the tonnage of the world's seagoing sail craft has decreased from 9,000,000 to about 6,000,000 tons, while the tonnage of steamers has increased from 13,000,000 to 26,000,000 tons.

Crews of Coasting Vessels

While, generally speaking, more than 60 per cent of the crews of American vessels are foreigners, in the coasting trade American citizens are probably in a majority. This is probably due to the fact that coasting voyages as a rule are short and do not interfere so much with domestic life. Then, too, coasting voyages are often to ports of the Southern States where colored men perform the bulk of the labor. They make up a considerable portion of the crews of schooners, and on steamers they often serve as stewards, firemen and coal passers. In the early days of the Republic, when the law required the greater part of the crews of American vessels to be citizens, an exception was made in favor of the negro, and some of that race served with credit under John Paul Jones and in the naval battles of the War of 1812. The race, however, does not endure very cold weather, and its employment is accordingly restricted, though not by law. The British law forbids the employment of Lascars, who are accustomed to the mild climate of India, north of the thirty-fifth parallel of north latitude. Within the last few years a considerable Spanish element has served as firemen on American coasting steamers. Many of these were Spanish miners who were thrown out of employment by the closing of the Cuban iron mines during the years of trouble in that island, and others have from time to time left Spanish steamers, which American steamers are supplanting in the trade of the West Indies and the Gulf of Mexico.

In the coasting trade men are employed by the month. The shipping articles, however, stipulate that they are engaged for the voyage. They have the right to leave at any port. With the sailor's right to leave at any port is attached the company's right of dismissal. The seaman must quit immediately on the arrival of the vessel at a port, if he wishes to leave the boat there. If he continues working till the ship is about to sail, he is deemed to have shipped for the next voyage.

In the way of discipline there is, in case of wrong-doing, first a warning, next a suspension, and, lastly, dismissal. There is a method of appeal in case the seaman thinks himself unjustly treated. He is furnished with a copy of the entry made in the log book. His defence is then entered in the book, and complete record of the affair is thus secured. Masters are required by the companies to see that the dismissal power is not used without good cause, and that the offender shall have a reasonable chance to return to the port from which he sailed.

Crews of Lake Vessels

The officers and crews of steamers on the Great Lakes are a very superior class of men. As to the commanders, they are nearly all American-born. With hardly an exception they have worked their way up from the lower ranks of the service. They have comfortable homes in the Lake cities, in which they spend their three months' vacation, when navigation is interrupted by ice. A few passengers are carried, and occasionally the commander will take his wife with him on his trips. These commanders are fortunate in their employers. Several of the large fleet owners were masters of Lake vessels. They know every phase of the service, and can appreciate good work. Prizes are offered by some of the ship-operating companies for captains who are the most free from accidents, and who show the most economy and proficiency in the service. Handsome uniforms are usually provided for the officers. The Lake service is benefited by the prevailing custom of engaging or "shipping" sailors. These men do not contract for a single voyage, but rather for the whole season, on good conduct.

Crews of Mississippi River Craft

Although the officers of Mississippi boats are all white men, the labor is all negro. White men do not stand the roustabout's work very well. The negroes are paid good wages. There are mixed crews on the upper rivers, or even crews made up altogether of white men. But not on the lower river. The men making up the crews get from $30 to $40 a month.

In the packet trade, the conditions are different, and the crews earn from

$40 to $110 a month. There is a difference in nomenclature between the upper and lower rivers. The men are called "deck-hands" in the North, and roustabouts in the South. The roustabout is a happy-go-lucky individual, with strong objections to saving money. He changes his boat at every chance. Petty gambling, called craps, is his favorite occupation. This game is prohibited in Louisiana, without much effect on the practice. Three or four men will have all the money of the whole crew shortly after the wages are paid, as they are entering port. The roustabouts include in their number no old men nor weaklings. The steamboat men try to better the conditions of the hands with little avail. The men will not use the mess-room tables, for instance, with knives and forks, tin plates and cups. But they prefer to have the food served in a dishpan on the deck, and to help themselves with their fingers, which recalls the old saying that "fingers were made before forks." Neither will the roustabouts make use of the proper sleeping quarters. They like to dodge work when a landing is to be made, so they will hide among the freight and sleep there, or even beneath the boilers, where a white man would roast. As these men are an absolute necessity their peculiarities are overlooked.

Seamen's Unions

There have been organizations of the seamen on the Lakes with short intermissions, since 1868; on the Pacific Coast since 1885; and on the Atlantic Coast since 1890. In 1892 the local unions were organized into an international union, and were affiliated with the American Federation of Labor. The membership is nearly 5,000. The general objects are to improve the condition of the seamen, industrially and socially, and to improve the maritime law. There is a funeral benefit for the burial of dead members, and in case of shipwreck and loss of clothing the organization pays a sum not exceeding $50 to buy a new outfit. The three local organizations, on the Lakes, on the Atlantic and on the Pacific, deal with matters of wages each for itself. There is a national card transferrable from one local union to another, and men engaged in the Lake trade can pass to either of the ocean organizations, and vice versa. There is no travelling benefit. There are no rules as to apprenticeship. The national body has had four conventions. The convention formulates a legislative programme, and gives instructions to the legislative committees; but there is full co-operation between the legislative committees and the executive committees.

Seamen's Institutions

The sailor's separation from religious life is almost as complete as from domestic life. While on many of the great passenger liners religious exercises at which the crew may attend are held on Sunday, still the seaman has little acquaintance with the "sky-pilot," as the clergyman or priest is dubbed at sea. In all the great ports of the world religious organizations maintain missions for seamen which, as a rule, perform practical work. Government enterprise and private philanthropy were never more active than at present for the good of seamen. The Government of the United States in this respect especially is an example to civilized nations. Though our sea-interests are relatively small, the United States spends more money to promote safety of life on the water than does any other Power. The annual expenditure of about $1,000,000 for maintaining Marine Hospitals has been mentioned. Besides that, about $1,500,000 is devoted annually to the Life Saving Service, which every year rescues hundreds of lives and millions of property from destruction, and warns hundreds of vessels away from threatening perils. The coasts of the United States are lighted at an annual cost of about $4,000,000. For river and harbor improvements on alternate years the appropriations of Congress range from $20,000,000 to $40,000,000, and promise soon to reach $60,000,000. All these great annual expenditures are met by the American people directly, for the only national charges on shipping are the tonnage taxes, which amount to less than a million dollars annually. Private and religious beneficence assumes manifold forms both here and abroad in the sailor's interest. The Sailor's Snug Harbor, at New York, is one of the best-known institutions of its kind in the world.

CHAPTER IX

PILOTS, DIVERS, LONGSHOREMEN, AND EXPRESS SERVICE

Pilots and Their Organization—The Pilot at Sea—The Pilot's Power and His Fees—Divers—Equipment and Methods of Divers—Pearl Divers—Stevedores and Longshoremen—Longshoremen on the Great Lakes—The Express Service—Employment as Express Agents—Expressing Money and Perishable Goods

Pilots and Their Organization

TO BE a pilot a man must serve, first, two years before the mast, then six years as an apprentice on a pilot-boat, then one or two years as a pilot with an eighteen-foot license, allowing him to pilot boats of a draught not exceeding eighteen feet; then one or two years with a twenty-two-foot license. Usually twelve years pass before a pilot gets a full license.

Two or three rooms on an upper floor of a State Street office building—sitting-room, dining-room, library—this is the clubhouse of New York's one hundred and six pilots. A telephone wire connects it with the Pilot Commissioners' office upstairs, where a big blackboard is covered with the names of pilots. In the morning the pilot looks at the board. If his name is far down the list he knows he can safely return to his home, as he will not have to go to sea that day. If his name is half-way down the board, he does not go more than one hour from the building—his turn may come before the day is over. If his name is near the top of the board, he may be called any minute. He may possibly get as far away from the board as the clubroom downstairs, but even here he keeps an ear on the telephone. So the Pilots' Club is a sort of greenroom, where the pilots await their turn on the marine stage. The club is, of course, only to promote social welfare. The business end of the pilots' co-operative scheme is the United New York and Sandy Hook Pilots' Benevolent Organization, incorporated in 1896. This association works under the Pilot Commissioners, as a body, just as the pilots used to, individually. The five commissioners are officers of the State of New York. Three are members of the Chamber of Commerce, and two are officials of the marine insurance companies.

In the old days it was each pilot for himself and poverty for the hindmost. In those days, on shore or at sea, the pilot, like an actor or a free lance reporter, had to hustle for an engagement or assignment. At sea, he who first sighted a ship got the job. When a very big steamer was expected, he thought nothing of going as far as the Banks of Newfoundland in order to be the first to sight the greyhound. Sometimes two pilot-boats sighted a vessel at the same time, and then—what a race! On shore, the pilot had to go from captain to captain, office to office, till he got a vessel to take out. And when at last he did go out, his coming in was a matter of any time from a day to a month or more.

To-day, pilots are not competitors. That he will get a boat is no longer a pilot's chance, but a certainty. Every one of the one hundred and six New York pilots, in turn, gets an "out" boat, and then an "in" boat. Instead of each pilot pocketing the entire fee, as in the old days, the fees are pooled and, after expenses are paid, the profits are divided among all. It no longer matters whether a pilot gets a large steamer or a small one, a liner or a tramp—he makes just as much for himself.

The Pilot at Sea

Now with these friends of Neptune let us go to sea. Off a point of Staten Island, not far from Quarantine, we board our ninety-foot pilot boat. Up goes the mainsail, out spreads the figure 1. The wind fills the sail, and Number One, with six pilots aboard, starts east'ard toward the Sandy Hook Lightship.

Now we pass the "station boat," the *New York,* first and only steamer owned by Sandy Hook pilots, stationed there permanently to take off pilots from outgoing vessels. We arrive at our station, just east of Sandy Hook Lightship. We are now one of a string of pilot-boats—three east'ard along the Long Island shore, three south'ard along the Jersey shore.

In addition to the one hundred and six Sandy Hook pilots, there are forty Jersey pilots. The Jersey boats—which hail all vessels from Southern ports—are stationed, one off Scotland Lightship, one off Barnegat, twenty miles away, and one half-way between the two. The Long Island boats—which pick up European vessels—are stationed, one off Sandy Hook Lightship, one off Fire Island, twenty miles away, and one half-way between the two. And between the two lightships, which are perhaps twenty miles apart, is the steam pilot-boat *New York.* Draw a line from Fire Island on the east to Barnegat on the south, and you have a crescent sixty miles long patrolled by seven pilot-boats, one of them the steamer at the mouth of the harbor, the other six being sailers. The vessel that tries to pass this cordon of boats must be very cunning and very swift. But even if a vessel gets by the pilot-boats, and comes into the harbor, her commander or owner will have to pay the pilotage just the same. For the only vessels which, by law, are not obliged to take a pilot or to pay pilot fees are private yachts, coastwise vessels from American ports, and United States ships of war.

The three boats on stations between Sandy Hook and Fire Island work this way: The Fire Island boat puts out all her pilots first. When empty of pilots she starts for New York for a fresh load, notifying the boat half-way between Fire Island and Sandy Hook that the Fire Island station is vacant. The boat so notified moves out to Fire Island, the Sandy Hook boat sails up to the midway station, and a new boat comes on at Sandy Hook. The operation is like a class of boys at school, the Fire Island boat being at the head of the class, and the Sandy Hook boat at the foot: when the head boy goes away, the others move up. So we are now at the foot of the class, at Sandy Hook.

As night approaches, a passing pilot-boat signals that she is empty of pilots, that she is on her way to New York, and our boat must move on to the midway station.

All night long our boat cruises up and down the midway station like a sentinel on his beat. Every fifteen minutes we burn a huge torch, for whom it might concern—somewhat for the same reason that a night watchman records his rounds by pushing a button of an electric indicator.

The next morning we move on to our third and last station. Here the real work begins. With spyglass to eye, one captain or another—all pilots are captains—scan the horizon. We have not long to wait, for ships arrive at the port of New York at the rate of one hundred a week, or fourteen or fifteen a day.

The Pilot's Power and His Fees

Aboard ship a pilot is in supreme power, unless a captain happens to choose to take his ship in himself. On such rare occasions, instead of retaining his post by force and coming to blows, the pilot steps to one side, and then the whole responsibility rests upon the captain, just as at sea. Only with the captain instead of the pilot in command, if an accident happens, the owners will not get one cent of insurance. The pilot, on the other hand, is the representative of the marine insurance companies and acts for them. When a ship comes to grief with a pilot at the helm, the insurance holds good.

As a rule, ship captains sigh with relief when the pilot steps on the bridge. He has brought his ship through a hurricane, perhaps, but the placid waters of a harbor, which to the passenger seem so harmless, are full of menace and terrors for the captain. The passenger finds it hard to realize the presence of dangers he can not see; but the captain knows there are rocks and bars unseen beneath those waters. The pilot knows the geography of that unseen harbor bed, knows it as if he had traversed every inch of it in a diver's suit. That's what he was learning during those twelve years of probation, and that's why his services are worth something like from thirty to forty dollars an hour. The charge for pilotage is according to the vessel's draught. The *Deutschland*, of the Hamburg-American Line, for example, draws thirty feet, at $4.88 a foot. In winter, four dollars extra is added to the total charge. It should be added that the outward rate is less than the inward; the *Deutschland,* for instance, going out is charged only $106.80, or at the rate of only $3.56 per foot of draught, while the total charge for bringing her in is $146.40.

Sometimes on outgoing vessels the pilot misses the take-off boat, and he is carried to sea, willy-nilly, and has to make the voyage to Europe and back, the owner of the vessel carrying him having to pay $100 per month for the time he is away from New York. Again, when a vessel is detained, with a pilot, at Quarantine, or by ice, the owners must pay the pilot three dollars a day during detention.

Divers

There is something weird and fascinating, if not uncanny, to the average person in the work of the submarine diver. Probing the mysteries of sunken ships, rescuing property, and often establishing the identity of the dead, the diver is clothed with a certain attraction and interest. His work is, of course, very hazardous. Yet the applications for employment in this industry are always numerous. There are plenty of men who are willing to risk their lives for money. The main difficulty is to select those who may develop skill in the business. When the Brooklyn Bridge caissons were sunk, several workmen lost their lives. This did not deter men from applying for work in sinking the caissons of the second East River bridge. These men had to work in air-tight chambers for about $1.75 to $2.75 a day. The working day was eight hours at the start, and six when a depth of over fifty-five feet was reached. These men, digging dirt or shovelling concrete at a depth of from seventy-five to one hundred feet, must have cool heads and good judgment. The submarine worker is greatly assisted by modern improvements. Electric lights are a great advantage in caisson work, and telephonic communication is of great use. The ventilation system has been vastly improved.

Of course, the diver considers himself a peg above a caisson worker. Unlike the caisson worker, the diver must be a skilled mechanic. Besides his pluck and courage and iron nerve, he must be enough of a mechanic to take apart and rescue a ship's fittings, and to raise the ship, if required. The diver can work safely at a depth of 120 feet, but the pressure is enormous. The average depth of the waters in New York Harbor is sixty feet, although work has been done in Hell Gate at a depth of one hundred feet. The diver's work day is about one-half as long as that of the caisson workman; but the diver works alone, with no companionship. If divers worked together there would be danger of the entanglement of the air and signal tubes. Under present conditions the work has been rendered comparatively safe, when its nature is considered. There are very few losses of life. Probably there are one hundred divers in New York, and of these many have been at work at their trade for twenty-five years.

The deep-sea divers, again, consider themselves of a higher class than those who work in rivers or along the coast. Their pay is much higher. They receive great shocks by coming into contact with dead bodies, but even to this horror they become inured in time. Divers state that as a rule corpses of drowned people are found floating against the ceiling, and not sitting or standing in natural attitudes. There is danger, in some latitudes, from sharks. If a school of these man-eaters arrives on the scene, the diver is in a dilemma whether to stay below or to come to the surface. If he stays below the sharks may snap the air-hose. If he comes up, he may arrive in time to get killed or wounded by one of them.

A narrow escape was that of a diver who was employed to put some copper plates on the bottom of a steamer which lay in tide-water. After he had passed beneath the bottom of the ship, the tide changed, and the vessel was left almost on the ground, shutting off the supply of air by pressing against the hose. The ship rose almost instantly, but for an instant the diver was in deadly peril. Several weeks' illness and a partial deafness followed this experience. Some divers are superstitious, and refuse to handle dead bodies. It has been said by divers, especially those working in tropical waters, that the bottom of the sea is often beautiful. There are forests of kelp and seaweed, waving with the tide. There are bright colored fish, inquisitively examining the diver, as if to ask the reason of his presence in those depths.

Equipment and Methods of Divers

A glance at the equipment and methods which make submarine diving safe may be of interest. There have been devised from time to time in the past all sorts of diving bells and pumps. But the Augustus Siebe apparatus is the foundation of the present diving suit. This equipment is in two parts. There is, first, the metal helmet. The rest of the body is covered by a dress in one piece. The helmet is made of tinned copper. It is firmly attached to the breastplate, which, in turn, is secured by twelve screws to the collar of the water-proof covering of the whole body. In the helmet are two little oval side windows. They are fitted in brass frames, with guards. There is another little window in front. These windows can not become dimmed by the diver's breath, because they are in a current of air from the "inlet valve," from which the fresh air is admitted at the back of the helmet. This diver's dress weighs about 170 pounds. In detail, it includes the heavy weight of the helmet, thirty-five pounds. At the breast and back are weights amounting to eighty pounds. The boots have heavy leaden soles and brass heel and toe guards, and weigh thirty-two pounds. The water-proof all-in-one-piece dress weighs fourteen pounds. The stockings, guernsey and other underclothing make up an additional weight of eight and a half pounds. All this is rather expensive, costing about $500. An electric lamp and telephone have been added to complete the outfit. There is another equipment, designed for very deep-sea diving. This dress is made in two parts, the upper part consisting of the helmet and body, and made of copper. The arms and lower half consist of metallic rings, covered with a water-proof material. An exception is made of the section of the dress about the thighs, which is also of copper. This construction is needed for the resistance to the great pressure of the water at extreme depths. The maximum depth for safe working is 150 feet, although work has been done at a depth of 204 feet. The pressure at that depth is about 88½ pounds to the square inch.

Among the varied duties of a diver may be mentioned scraping ship bottoms of incrustations, to increase the speed of the vessel, or "salving" a wreck, or working in land tunnels, or delving in a flooded mine.

The various navies of the world are now considered incomplete in equipment if their warships are not provided with divers.

One method of raising a sunken ship is as follows: Two old wooden ships with a superior percentage of buoyancy when combined, are moored over the wreck. A tackle of steel hausers is arranged, with powerful winches. The vessel is lifted off the bottom as the tide rises, and hulks, submerged burden and all are towed toward the shore. At every high tide this is repeated, and the wreck is finally beached. Another way of salvage is to make air-tight the sunken craft, and pump her out. Cargoes are often "salved" when the sunken ships are abandoned. Treasure is frequently rescued, a diver receiving as his commission for such work the sum of $22,500 not many years ago. In many cases specie has been thus recovered by the efforts of divers. Cargoes also have been saved. Invoices of wool, silk, indigo, quicksilver, wine, silver, lead and other precious stuff have been rescued in good condition. There is much sunken treasure which can not be rescued because it lies at too great a depth.

Much work is done by divers in making harbors and piers. The diving bell is sometimes used for this purpose. A very large diving bell in present use measures 13 feet, by 11 feet, by 11½ feet in size. It weighs twenty-six tons. A huge wire rope is attached to it. The bell's equipment includes a telephone and electric lighting. But the diving apparatus is generally preferred.

In submarine blasting there is an immense amount of work done by divers. One rock recently blown up had been pierced by the boring of 16,000 holes. The amount of dynamite used amounted to 76,000 pounds, the cost of the operations being about $350,000.

Pearl Divers

The specialty of pearl diving is an interesting feature of the occupation. The pearl diver must eat sparingly before his work begins. The length of time he may remain under water depends on various contingencies, such as the nature of the work, the speed of the tide, and the depth of the water. The exertion varies with the depth at which the diver works. He can with impunity remain under water for several hours at a depth of from three to five fathoms. At a depth of twenty fathoms, however, a stay below water of only ten minutes can be endured. When the water is clear, a diver can see forty or fifty feet. But if the water is "roiled," he can hardly see at all. There are many risks incidental to the pearl diver's work. The unscrewing of the face-glass is fatal. Sharp rocks or corals may tear his dress. The air-pump may develop some defect, and become uncoupled, or burst. The pearl diver may get entangled at the bottom of the sea, in the sponge growths or coral-cups. The air-pipe may get fouled beneath some jutting rock or coral cup.

Presence of mind is an absolutely necessary quality for a diver. Pearl divers catch enough turtles to keep them in food. Fishing under water is also one of their sports.

In northern waters the sea bed is unattractive, whereas in tropical seas there are sea-flowers, ferns, palms, shells, corals and sponges to vary the monotony. The pearl diver's dangers do not lie wholly beneath the sea. Hurricanes occasionally wreck an entire fleet, and the cyclone proves a more formidable enemy than the depths of the ocean.

Stevedores and Longshoremen

The modern cargo steamer represents a large investment of capital, often over $1,000,000. It earns money only when it is under way. Every unnecessary hour spent at the dock means a loss of interest on capital and depreciation of property, without any compensating gain. Any profit from the safe transportation of cargo from port to port thus depends on the speed with which that cargo has first been put aboard and then has been discharged. While on the smaller sailing vessels, as a rule, the crew still takes a part in loading and unloading cargo, with steamers that work nowadays is almost wholly performed by longshoremen and stevedores. The system promotes the efficiency of the crew, whose work is thus done only while the vessel is under way, and also secures the prompter despatch of the ship. This division of labor is one of the economies of modern ocean transportation which have effected such reduction in freights and made possible the enormous development of the agricultural West, which is so dependent on export trade. In nearly all countries the stevedores and marine freight handlers are well organized into labor unions. In the United States, at the beginning, in 1892, the organization was made up of locals of lumber handlers only; but in 1897 the International Longshoremen's Association was formed, and included every dock worker on the chain of Lakes, Atlantic and Pacific Coasts, and rivers, and the ports of Canada. The present membership is estimated at 40,000, including the Lakes, Atlantic, Pacific, the Gulf, Canada and Costa Rica.

The testimony given before the Industrial Commission shows that the situation with regard to stevedores and longshoremen is somewhat as follows: The organization includes lumber loaders and unloaders; also the coal shovellers and trimmers, unloaders and loaders. Then there are the ore shovellers and trimmers, loaders and unloaders in general, and package freight handlers; loaders and unloaders of salt and grain, trimmers and scoopers, dock hoisters, and engineers, millmen, and all men employed in lumber yards; dock firemen and marine firemen, and all other men that are engaged in working along and around docks on the Great Lakes, the coasts and rivers.

Some of the men work in two shifts. Hoisters and engineers are paid, from May 1 to December 15, $80 and $85 per month. The average wage for coal handlers is sixty cents per hour; that is, in the unloading ports. The average wage for lumber loaders per hour is fifty cents. In some ports it is forty cents, some forty-five, some fifty, some sixty; but the average is fifty cents for a ten-hour work day. There are cases where men work over ten hours. Average wage per hour for lumber handlers—that is, at the unloading ports—is fifty cents per hour.

The average wage of grain scoopers per hour is sixty cents. The average wages per hour for grain trimmers is sixty cents and upward. There are a few cases where they make more. The average wage per hour for marine package freight handlers is thirty cents per hour. They work ten and twelve hours, and as high as twenty-four hours at a stretch, with no shifts. Ore trimmers get sixty cents per hour, and they work all hours. At some ports they regulate their gangs and take their turns about, but they work pretty much all the time; they have no certain hours.

Longshoremen on the Great Lakes

The organization of longshoremen on the Great Lakes is one of the most striking instances of the way in which organization overcomes the disadvantages of race competition. Formerly, under a system which was substantially that of subcontracting or sweating, a man received very low pay for very irregular work, but since the organization of their international union, in which they became their own contractors, their year's earnings have doubled. Their local branches are often organized by races, each with its own representation in the central council, which conducts business in English, and has jurisdiction over the several branches. The same arrangement exists at Newport News between the white and colored races.

"Our organization has effected a complete revolution in the condition that existed on the chain of Lakes for a great many years," says the Secretary of the International Longshoremen's Association. "Instead of the drunken, poor, dissipated fellow that used to work on the docks, to-day the good sober man is prominent. We have many places where they own their homes and have built their own meeting halls and have temperance societies. There is one place in Ohio where there are Finns who organized a temperance society, built a hall, and then gave a deed of the hall to the organization. At another port our men built a hall and paid cash for it. There they meet and have entertainments. I know of one instance where our men got together, had a banquet, and invited all the leading business men, the mayor of the city, their employers, master mechanics, and superintendents of the docks, and they enjoyed themselves very much."

The Express Service

The express companies of the United States were the pioneers in opening the great West. They established their stage lines and mail service. They started banks, and were among the very first agencies to develop the country. Their competition has perfected the mail service of to-day, and the post-office has been forced by their system of issuing money-orders to pay more attention to that function of business. From their activity in being middlemen in the matter of transportation, they have enlarged their scope until all sorts of middleman's work is within their range. They act as agents in purchases and sales, and have their attorneys for all kinds of law work pertaining to business, cuch as searching a title or collecting a debt. Stores make use of their C.O.D. department in delivering goods to customers. The usefulness of express companies have not been curtailed by the fast freights, or by the parcel-post.

The organization of the express companies is at the same time complex and simple. Their huge business is so systematized that it works with perfect smoothness. Their contracts with the railroads give them great facilities. The steamships and long trolley lines are also pressed into their service. The cable, telephone and telegraph are in frequent use by them. They have their own piers and terminals. Duties on importations may be paid in their own brokerage offices. They are continually on the lookout for new inventions in transportation, and quick to take advantage of every improvement. Looking, for a moment, at the methods by which the express business is conducted, we find that in small towns their agents take orders which are forwarded to the large centres for fulfilment. In the great cities the office will have a dozen different departments. Among these may be enumerated the C.O.D. department, the money-order department, the commission department, the custom brokerage department, and the insurance department. Each department has its manager and staff of clerks. The companies now have special refrigerator cars for perishable goods, such as meats and fruits. Their special cars for carrying horses and stock are largely patronized. The heavy safes in their cars protect bullion and jewelry from robbery. The combination of the safe is known only to the transferring agents at great centres. Robberies are rare. The express employés are well armed, good shots, and shoot to kill when attacked.

The methods by which express companies collect merchandise and parcels are familiar. Regular patrons are called upon by the wagons at regular intervals. Wagons have regular routes. In the great cities the companies distribute large cards on which their names appear, and these cards are displayed at the door or window when an express wagon is needed. It would be a low estimate to say that there are seven hundred express wagons on the streets of New York at all hours of the day.

At present there are sixteen large express companies in the United States. There are also two in Canada and the same number in Mexico. Their capitalization amounts to one hundred millions of dollars and more. The question has been agitated of a reduction by the government of express charges. The companies claim, however, that their margin of profit is very narrow, it being only 5.46 per cent. Be this as it may, they certainly are an enormous convenience to the public.

Employment as Expressmen and Express Agents

Sixty thousand persons are employed by the express companies the year round. They earn all the way from $2 a day for the driver of a one-horse wagon to $5,000 or $6,000 a year for general superintendents, and more for presidents and other officials. The highest wages paid to the "expressman"—the man who calls at your house and receives your packages, and likewise the man who ships the packages, and the man who delivers it at its destination—varies in different States. In New York, Pennsylvania and Illinois the expressman's highest wage is $3.33; in Kansas $1.33; in Maryland $1.67; in Ohio $1.50. The American Express Company alone employs about 14,000 persons, very nearly one-fourth of the number employed by all the companies. The total number of drivers employed is about 7,000, as about that number of wagons are in use. Thousands of men find employment in the stables of the various companies, caring for a total of nearly 20,000 horses.

If all the routes covered by the express companies, by rail, boat and stage, could be extended in a continuous line, they would wind nine times around the earth, a total distance of 225,000 miles. To refer again to the data concerning one particular company, the American, as a basis of knowledge of the express business in general—this one concern covers 42,000 miles of railroad, or one-fifth of the total distance covered by all the companies. The territory reached by this single company extends from Halifax, Nova Scotia, in the East, to Wyoming in the West. Over 30,000 stations are on the railroad routes thus covered, which means that this one company can take packages destined for 30,000 different places in the United States and Canada. There are about 50,000 express offices, or agencies, throughout the country, a figure which in itself conveys the story of the thorough organization of the express business. The American Company alone has 7,500 fully equipped agencies in 6,000 cities and towns.

Expressing Money and Perishable Goods

The fact that the express has so many agencies is of great importance to shippers of money or valuables. The banks of the United States are located at only 8,000 points, while the express has agencies at nearly six times that number of points. Hence the express is able to offer banking accommodations to a much larger extent than the banks themselves. To clinch this statement with actual figures, the amount carried by the express the country over, in a single year, aggregates $4,000,000,000. This stupendous figure would not be raised by so much as one dollar, if in the course of a year every man, woman and child in the United States were to transmit $5.00 by express.

Thus, by means of the express money-order system, the express reaches localities remote from banks. It is even superior in this respect to the postal system, for postal money-orders can be cashed only at large, important offices, while an express money-order is good at any express office. About 7,000,000 express money-orders are issued annually. Of the $4,000,000,000 which changed hands through the medium of the express in a recent year, the shippers lost not one cent, notwithstanding the fact that the archives of the Pinkerton Detective Agency for the same year would probably show that there had been several great express robberies, including perhaps the murder of express messengers, each case having been a nine-day wonder. Of the total of $4,000,000,000 shipped by express, the government shipped $1,500,000,000, and the general public, banks and railroads $2,500,000,000. Besides acting as banker, by means of money-orders, besides acting as carrier and transporting the actual cash, the express companies also act as collectors of money. That is, a merchant can send goods by express C.O.D., and the express company will collect the amount of the merchant's bill from the consignee, and forward the money back to the shipper; or, in the event of the consignee refusing to pay, the express will bring the goods back to the shipper's very door.

To speak of an "express train" nowadays means literally a special train for the rapid transportation of express packages. All the companies—and it should be stated that all the companies, by agreement on important points practically operate as one system—have special cars, and oftentimes special trains travelling at a high rate of speed, between the principal centres of trade, in order to give the most efficient service. Because of rapid transportation by express, perishable foods can be safely sent between points distant from one another. Tons of fresh vegetables, oysters, fish, game, poultry and fruit are thus shipped annually to places which otherwise would be denied such luxuries. Such is the story of the express, a story that begins in the days of the stage-coach and the "Pony Express" of Wells, Fargo & Co., to the modern service by trains rushing at lightning speed, carrying annually 150,000,000 packages of merchandise and 25,000,000 packages of money.

PART II

MINING, AGRICULTURE, AND THE FISHERIES

CHAPTER I

THE MINING INDUSTRIES

The Mines of the United States—Summary of Gold, Silver and Copper Production—Summary of Iron and Coal Production—Summary of Petroleum and Aluminium Production—American Miners—Mine Superintendents—The Company Store System at Mines—The Company Tenement System at Mines—Child Labor in Mines—Accidents in Mines—Profits in Mining Industries—The Largest Mining Exchange

The Mines of the United States

THE pages that follow show the unparalleled advances which have been made in the United States in the development of its mineral wealth. It must be borne in mind that the annual product of all kinds of minerals in the United States aggregates more than $1,700,000,000. That is a matter of vital interest to show the phenomenal skill by which our mineral resources have been so developed and mining methods perfected as to make this great product possible. And more interesting still to the people at large are the statements given as to the men who mine these minerals and the conditions under which they live and work.

From the mines of the United States, ninety-two different products are obtained, including sixty ores and minerals, sixteen metals, and sixteen secondary mineral and chemical products. The total value of this entire mineral product during 1902 amounted to the enormous sum of $1,700,000,000. In addition to this must be mentioned $125,000,000, produced by our smelting and refining works from gold, silver, copper and lead ores, imported from Mexico, British Columbia and other countries.

Summary of Gold, Silver and Copper Production

The statistics show that the United States possesses its full share of minerals. We produce twenty-nine per cent of the world's coal, beating Great Britain by two per cent. We contribute forty-three per cent of the petroleum, Russia producing more than one-half. We may boast of producing thirty-one per cent of the gold and thirty-three per cent of silver, leading the nations in these metals. Our production of copper is fifty-six per cent, Spain coming next. Our output of quicksilver forms twenty-nine per cent of the world's product, Spain yielding nearly forty per cent. One-fourth of the zinc comes from our country. Of tin we do not supply much. Taken all together, we produce about thirty-nine per cent of the mining products of the earth, leading all the other nations in the grand total.

Of all our productions, gold, which has for ages been a symbol and a synonym for wealth, is most attractive to the popular mind. In real economic importance it ranks below several of the more prosaic metals. Our output of gold in 1902 reached a total of about $85,000,000, showing a considerable increase over the $79,171,000 produced in 1900. The chief contributors to this product were the mines of Cripple Creek and other camps in Colorado, those of South Dakota, California, Idaho, Montana, Oregon, Arizona, and New Mexico and the mines of the far north. After the mines of Cripple Creek the most productive treasure-troves within our jurisdiction are those of Cape Nome, the American Yukon, and Douglas Island, off the coast of Alaska.

Although silver has ceased to be a metal of absorbing political interest, it is still a metal of vast commercial importance. It is, therefore, interesting to note that our mines produced, in 1902, some 60,000,000 ounces of the white metal, although few mines are worked now for silver alone. Two-thirds of the output of silver in the United States is obtained as a by-product from mines that would be worked regardless of the price of silver. In addition to the amount of silver actually produced at home, our smelters reduced about 45,000,000 ounces from Mexican and Canadian ores. By far the greater part of this was used in the arts and manufactures, while nearly all the rest was absorbed by the Far East, where China and India still show undiminished preference for silver coin.

The United States has long led the world in the production of copper, its mines supplying from forty-five to sixty per cent of the total output. The production of 1902 rose to more than 610,000,000 pounds. That the production will be largely increased in 1903 is probable from the fact that many old copper properties have been opened and new properties developed in the last two years that are sure to add to the sum total of next year's production. The chief contributors for 1902 were the old mines of Michigan and the newer ones of Montana and Arizona, while the mines of Utah, Colorado, California and Vermont did well their part. The mines of the Lake Superior region outdid themselves, producing no less than 170,000,000 pounds of copper, an amount heretofore beyond the dreams of avarice.

Whether or not the production of copper may come to exceed the demand beyond the point of profit to the producer is a question. Owing to the rapid increase in the number of electrical plants all over the civilized world, a sudden demand for copper arose, a few years ago, which sent the price from less than twelve cents a pound in 1897 and 1898 up to nearly eighteen cents. These inflated prices, which culminated in 1900, lasted long enough to stimulate the working of copper mines all over the world, and bring the total production of the metal in that year up to more than 1,000,000,000 pounds.

The mines and smelters of the United States turned out more than

280,000 tons of lead in 1902, and 130,000 tons of zinc. Of minor metals there were 27,000 flasks (each holding 76 pounds) of quicksilver, 8,000,000 pounds of aluminium, 3,200,000 pounds of antimony, and a long list of smaller products.

Summary of Iron and Coal Production

The most important metal produced by the United States is iron, which went far ahead of all its previous records in 1902, scoring a total of fully 16,000,000 tons of pig iron. This is nearly 2,000,000 tons more than in 1900, and as much as the combined product of Great Britain and Germany. To make this required the mining of 30,000,000 tons of iron ore and the quarrying of 5,000,000 tons of limestone for flux. The value of the pig iron at the furnaces was about $190,000,000; its ultimate value, when worked up into steel in all its varied forms, and the many finished products of the iron trade, was nearly ten times as great.

Our most important mineral product, upon which all the rest really depend, is coal. In the production of this useful commodity the United States bettered in 1901 all previous records. Over 300,000,000 tons of coal were mined, of which 60,000,000 tons were anthracite and over 240,000,000 tons bituminous. The production in 1902 fell far below the figure just given, on account of the great strike. "Carrying coals to Newcastle" was once considered synonymous for the height of folly, but the Westmoreland Coal Company boasts of having done so as a proud distinction. Great Britain was, for many years, considered the greatest producer of coal in the world, but four years ago the United States exceeded Great Britain's production, and since then has easily held first place. As said before, an American company has even exported coal to Newcastle.

Summary of Petroleum and Aluminium Production

Fully 70,000,000 barrels of petroleum were produced in 1902. To the oil fields of the East are now added the oil wells of Texas and California, the product of which is destined to make important industrial changes in the Southwest and on the Pacific Coast. The base of this oil is asphalt rather than petroleum, so that it promises to be of greater value as a fuel than as an illuminant, a fact that would seem to be almost providential in a region where the absence of coal and timber has prevented the development of manufacturing industries.

The increasing demand for alumina makes the mining of aluminium ore a profitable business. The State of Georgia was the first in the market in supplying the demand for bauxite, and the product of the empire State of the South has won a first place as to quality and quantity. In fact, Georgia ore is preferred to that imported from France. Alabama also holds a leading place, and these States are supplying the home market with bauxite. The value of bauxite is regulated by the price of the imported ore, which can be delivered in Philadelphia or New York at about $6.50 per ton. But the Georgia-Alabama bauxite commands a higher price on account of its easier solubility compared with French ores. It has been sought for shipment to Germany. As much as $8.50 to $13 per ton have been paid for Georgia bauxite in Pittsburg, Pennsylvania, and Syracuse, New York. The deposits of ore on the Southern Railway are located in Floyd County, Georgia, and near Piedmont and Rock Run Station, Alabama. With the increasing demand a largely augmented business is assured in the near future.

American Miners

Figures alone can not tell the whole story. The conditions of mining in America are the wonder of the industrial world. The captains of industry in Europe regard the achievements and the relations of American operators and miners with undisguised amazement. They marvel at the apparently irreconcilable facts that, although miners are paid higher wages in America than in any other country, the American minerals and metals are produced at a lower cost per ton or measure than in any country in Europe. To the genius of American engineering is due this happy combination of results. The American miner is indeed more fortunate than his fellow workers of other lands, and the American operator is apparently more successful than others in the same field of endeavor.

The total number of men employed in all the coal mines of the United States at the present time is over 450,000. They work, on an average, 212 days in a year. The total number of iron miners is about 200,000. The number of men working in all the other mines of the country is easily 350,000, making the total number of miners equal to the total number of railway employés—about one million.

The law regarding coal miners' duties provides that every miner must examine his working place before beginning work and must take down all dangerous slate, or otherwise make it safe by properly timbering the same before commencing to dig or load coal. In mines where fire bosses are employed, he must examine his place to see whether the fire boss has left the proper marks, indicating his examination, and he must at all times be very careful to keep his working place in a safe condition during the working hours. Should he at any time find his place becoming dangerous, either from gas or roof, or from any unusual condition which may have arisen, he must at once cease working, and inform the mine foreman or his assistant of the danger, and before leaving he must place some plain warning at the entrance of the place to warn others from entering into the danger.

It is the duty of every miner to mine his coal properly, and to set sprags under the coal while undermining the roof. When places are liable to generate sudden volumes of fire-damp, or where locked safety lamps are used, no miner is allowed to fire shots except under the supervision and with the consent of the mine foreman, or his assistant, or some other competent person, designated by the mine foreman for that purpose.

Mine Superintendents

The profits of a mine depend largely on the character of the man who superintends it. With a man of ability in charge a poor mine may yield more to its owners than a rich mine in the hands of an incompetent. One State labor official reports that many mines have been abandoned because their owners have been unable to secure managers of sufficient intelligence and training to economically develop the property. A technical education is not the only qualification indispensable to a successful mine superintendent. His practical experience must include a thorough knowledge of ventilation, drainage, explosive gases, illuminating oils, dangerous damps, safety lamps, timbering, brattices and doors. The manager who would command the highest salary must know how to turn an entry safely and economically, and yet in such a way as to cause the mine to yield the largest output with the least expense. It is essential that his knowledge of the mining laws of his State be accurate and up to date, and it is eminently desirable that he be enough of a technologist to understand and adopt the newest mining devices and the most improved methods of mine management. It is especially worthy of note that only a man who is just, generous, self-controlled, watchful and brave can attain the highest measure of success in this profession, for it is through the possession of these qualities that he wins the confidence of his subordinates on whom the actual development of the mine must depend. A little technical training, assimilated with considerable intelligence, a certain amount of practical experience, and a well-developed moral nature, are the essential qualifications for a satisfactory mine superintendent. A man thus endowed is always sure of a remunerative position in any of the States where mining is a prominent industry.

The Company Store System at Mines

The rise and fall of the company store system is an interesting incident in the history of mining in the United States. It is a system that has been decidedly unpopular in the majority of places where it has been tried. Time and again it has caused dissension between operators and miners, and both parties are probably to be congratulated on the fact that it is no longer in general vogue. The reasons given for its decline are the growth of population and the consequent increase of trading facilities, together with the determined opposition of the labor organizations.

At the time of the coal strike in Pennsylvania in 1900, company stores had an absolute monopoly of the coal miners' trade, which they conducted entirely for their own unreasonable and unholy profit. Miners of the anthracite coal regions were compelled, for instance, to buy all their powder at company stores, and to pay for it $2.75 a keg, although it was commonly known that the operators themselves only paid $1.50 a keg for the same commodity. The miners arose en masse in righteous wrath at the imposition put upon them, and as a result of their organized protest, otherwise called "a strike," the retail price of powder has since corresponded to the cost price of $1.50 a keg. The reduction in the price of this single item was soon followed by a sweeping reduction in the price of provisions and general merchandise. This meant a steep and speedy decline in the profit of the company stores, which naturally led to the operators' ultimate rejection of the whole system. Company stores still exist, however, but their prices are not now more than twenty or twenty-five per cent in advance over those of other stores. In West Virginia, where the organization of miners is not so well developed, the company store system still holds unassaulted sway.

The operators contend that company stores are necessary for the reason that mines are usually opened in out-of-the-way places, where supplies can not be obtained from other sources. This is true in exceptional cases, but the necessity is seldom more than temporary. The company store system has been enthusiastically maintained for the simple reason that it was profitable to the operators. By barring outside dealers and by compelling the miners, on pain of dismissal, to trade at their stores, many companies succeeded in building up an exclusive monopoly for their own sole aggrandizement. Miners declare that even when outsiders were permitted to open a store in a mining town, the company was sure to demand a percentage of their sales. It is known that, in at least one instance, even pedlers and delivery wagons have been prohibited from approaching the miners' houses.

The Company Tenement System at Mines

The days of the company store are numbered, but the company tenement house is still found in the land. Operators say that it is necessary for them to build these houses, as otherwise the miners would be homeless. The mines are usually remote from human habitations, and unless the company provided homes for their workmen it would be unable to secure their services.

The miners, on their part, seldom object to the company ownership of dwellings. They confine their criticisms to the kind of dwelling furnished. It is usually characterized by a pitiful absence of all the charms and comforts belonging to an ideal home. As a rule, company houses are not only mean and small, but are usually built of the cheapest possible materials, and their absolute lack of all conveniences is primitive in the extreme. Frequently the water supply of the little settlement is poor, and unsanitary conditions often prevail that are a menace to the health of the community. Rude and inadequate as these houses are, the rental charged for them is usually out of all proportion to the accommodations furnished. At one mine in Ohio, houses which cost only $95 each, rent for five or six dollars a month. The rental at most mines in West Virginia is two dollars a room. In some mining centres, conditions are somewhat improved by the fact that a six dollar rental includes a monthly ton of coal. Operators usually declare that their houses are the best that can be furnished for the rents paid, and that the only reason private individuals build better ones is because they charge higher rentals.

Among the companies that have taken the initiative in improving the condition of their employés, the Philadelphia and Reading Coal and Iron Company has been especially conspicuous. Although this company owns many houses at its mines, it encourages the men to live in towns and villages, and transports them to and from their homes, sometimes a distance of ten or fifteen miles, at a merely nominal charge. This liberal treatment is, however, quite exceptional, as it is a general complaint among miners that they are compelled to occupy the company's tenements or look elsewhere for work, and that in time of strike they are dispossessed.

Judging from all reports, the company tenement system shows greatest improvement in the anthracite region where the miners' organizations are strongest. With the company store, its worst features are most in evidence in the dark coal valleys of West Virginia, where the miners have not yet fully appreciated the force of that ancient saying that "in union there is strength."

Child Labor in Mines

The number of children at work in mines in the United States has greatly decreased since the passage of beneficent laws which compel all children to attend school until fifteen years of age. In some States, the employment of children under sixteen years of age is forbidden. It is even proposed now to pass laws which will close the mine shafts, and especially the doors of breakers in coal regions, against all persons under eighteen years of age. Unfortunately, the laws already on the statute books are too often evaded. Even in Pennsylvania, where the number of children employed has been greatly lessened by the sixteen-year limit, there are nevertheless many hundreds of boys still working in the mines. It is the highly specialized character of the latest machinery that makes possible the effective use of child labor in coal mines. So simple are the duties of the person attendant on one of the new machines in the breakers of the anthracite coal region that a child can discharge them as satisfactorily as a grown man.

There is nothing to be said in favor of the employment of child labor in any mining industry. The competition of children with men in any field undoubtedly depresses wages and increases the number of the unemployed. Saddest of all, it blights the lives of the children themselves, checking their physical growth and retarding their mental development. Those responsible for this hideous wrong to childhood make short-sighted calculations, for they only gain the abnormal profits of the present by heavily discounting the future usefulness of their fellow-citizens, a policy that is conceded to be a bad commercial transaction for the whole community.

The general law pertaining to the employment of children in mines states that no boy under the age of twelve years, and no woman or girl of any age, shall be employed or permitted to be in the workings of any bituminous coal mine for the purpose of employment. No boy under the age of fifteen is permitted to mine or load coal in any room, entry, or other working place, unless in company with a person over sixteen years of age. If the mine inspector or mine foreman has reason to doubt the fact of any particular boy being as old as the law requires for the service which the boy is performing in the mine, it is his duty to report the fact to the superintendent, and the superintendent must at once discharge the boy.

Great numbers of such children are employed in the anthracite region. They are deprived of schooling, and greatly overworked. This abuse has become flagrant. The toil of these little lads is appallingly monotonous and hard. Although they are all supposed to be at least twelve, most of them are under that age. After the coal is blasted or hewn, it is hoisted in large lumps from the bottom of the shaft in cars, from which it is dumped into the crushing machines, and thence emerges in the various marketable sizes. The broken coal falls from the top of the "breaker" into large revolving sieves beneath the crusher, then passing through chutes, circuitously descending to the ground floor, ready for transportation. With all this vast mass of coal there is mixed much slate, dirt, and rock. As the coal slides through the chutes, boys and men pick out these undesired substances. They sit in little seats from morning till night—that is, from seven o'clock till six, with half an hour at noon. The children begin with forty cents a day, and may earn finally as much as eighty cents. For this pittance their fathers, generally foreigners, who are getting good wages, permit them to toil in this fashion, giving false affidavits of their age, and breaking the laws of the State, which require children to be sent to school.

The breakers are cold in winter, having no heating facilities, save sometimes a few steam pipes, generally without steam. The clouds of coal dust are incessant and very irritating to the eyes and throat. These able-bodied and wage-earning fathers are not content with working their small boys in the breakers, but, with the same disregard of American laws and institutions, they compel their ten and eleven-year-old daughters to work in the stocking factories, in or near mining towns, for from $1.50 to $3 a week, in their cases also not hesitating at perjury in the age affidavits. If the children's wages were put in a saving's bank and allowed to accumulate for the benefit of the young folks, there might be the shadow of an excuse for compelling them to work at such a tender age. But the able-bodied, wage-earning father appropriates their earnings for the general use.

Accidents in Mines

Despite all precautionary measures, accidents will inevitably occur in mining operations, so long as human nature remains what it is. To the carelessness of the employés themselves may be attributed the majority of mining disasters. Among them are numerous men of limited intelligence or stolid indifference to danger, who seem unable to realize the importance of heeding warnings and instructions, and they are without doubt directly responsible for a large percentage of the accidents which occur.

The Minnesota Bureau of Labor Statistics reports that in 1898 there were 226 more or less serious accidents reported from nineteen mines which employed 3,587 men. Eighteen of these accidents were fatal. How many resulted in death at a later period is not known, but some of them certainly did. This record shows one killed to every 193 employed, and one injured, more or less seriously, out of every fifteen. In 1899, 421 accidents were reported from twenty-eight mines which employed a total of 6,486 men. The number killed outright was thirty-four, or one out of each 190, while the proportion of injured was one to every fifteen employés. Reports for the year 1900 show that during the first nine months of the year there were forty-six accidents, of which twenty-nine were fatal. Forty per cent of these accidents were due to the falling or caving of earth, rock or ore; twenty-five per cent were caused by premature or accidental explosions; twenty per cent resulted from falls into chutes or from ladders; nine per cent from collisions or accidents to tramway cars; and six per cent from miscellaneous causes.

Profits in Mining Industries

To the rapid development of its mineral resources is undoubtedly due the marvellous progress of the great West in the last half of the nineteenth century. Ever since the famous California discovery of '49, poor men have been giving their accumulated savings as well as their energy and brains to the exploitation of a country which has in return enriched them with its wealth. Out of small investments in mines many great fortunes have been made. It is a matter of record that most of the large consolidations have been started by small investors. The stock is usually put upon the market, where it is purchased by hundreds of individuals, each of whom receives his profits from the investment according to the proportion of stock which he holds. It has happened not once, but many times, that small investments in mining stock has made millionaires of people who had previously been struggling along on only a meagre competence.

It is true that not all who invest in mining stock make money, for there is always more or less doubt about the success of any business enterprise. Where the management of a mining company is, however, in the hands of experienced men of affairs of recognized ability and integrity, who invest their own money along with that of other people, there is no business which pays so well on the investment. The average results show immense gains to offset the comparatively few losses; certainly, there is no business which offers to people of limited means opportunities for such large returns on their money as does mining.

The promotion of mining interests is generally conducted to-day in an entirely honorable and business-like manner, and the men who are making a marked success in that field of activity are necessarily distinguished for their practical abilities and incorruptible honesty. Mining companies do exist which have nothing more substantial to their credit than fraudulent or worthless stocks and a weak or dishonest management, but these are exceptions to the general rule. It is easy enough for the careful investor to learn the past history and present standing of those who manage any mining enterprise in which he is tempted to become interested.

From the Comstock lode, for example, more than $300,000,000 in silver has been produced. Some of the African mines pay five hundred per cent dividends. With aluminium at from thirty-five to fifty cents a pound, there is much wealth in this product. Suitable machinery and proper methods would turn the mica dikes of North Carolina to profit. There are many undeveloped zinc mines. From one acre in Galena, Kansas, $250,000 was taken. The clay deposits of Missouri are valuable for the making of sewer pipes, several companies now working to great advantage. In North Carolina and in Oregon are large deposits of nickel, for which there is a constant demand. There are vast iron mines in Mexico, near Durango, entirely unworked. In Tennessee there is a vast extent of limestone rock. As a fertilizer, pulverized limestone is worth eighteen dollars a ton. About half the world's copper is in the United States and Canada. Material containing even one per cent of copper pays for working, under proper conditions, and many mines pay fifty per cent. Sapphires are found in Georgia, at Laurel Creek, Rylang County, some worth twenty-five dollars each. Asbestos ought to be found in the serpentine rocks of North Carolina, California and Oregon. Oil fields will constantly be discovered, and oil is the coming fuel. Gold deposits are discovered all the time. Near the Yukon River are a hundred creeks, all of which perhaps contain gold in their beds. It may easily be seen that there are millions still lying in undeveloped mines of various metals.

The Largest Mining Exchange

Of the numerous mining stock exchanges in the United States, that at Colorado Springs is the largest, wealthiest, and most active. This association, which was founded by former members of the New York Stock Exchange, follows very closely the rules of the latter well-known institution. Its listing regulations are particularly strict. Although Cripple Creek stocks naturally receive special prominence in this Exchange, the best known stocks of other districts, including even those of Old Mexico, are here listed. It is the aim of the Exchange to cover the entire Western mining field, giving particular preference to gold and silver properties. Since February, 1902, the Exchange has been installed in a handsome new home, which is probably the finest building of its kind in the country.

CHAPTER II

THE COAL MINING INDUSTRY

Coal Production—Anthracite *vs.* Bituminous Coal Mining—The Total Number of Coal Miners—The Miner's Life—Foreigners in American Coal Mines--The Coal Miner's Training—The United Mine Workers of America—Conditions in the Anthracite Coal Fields—The Great Coal Strike of 1902

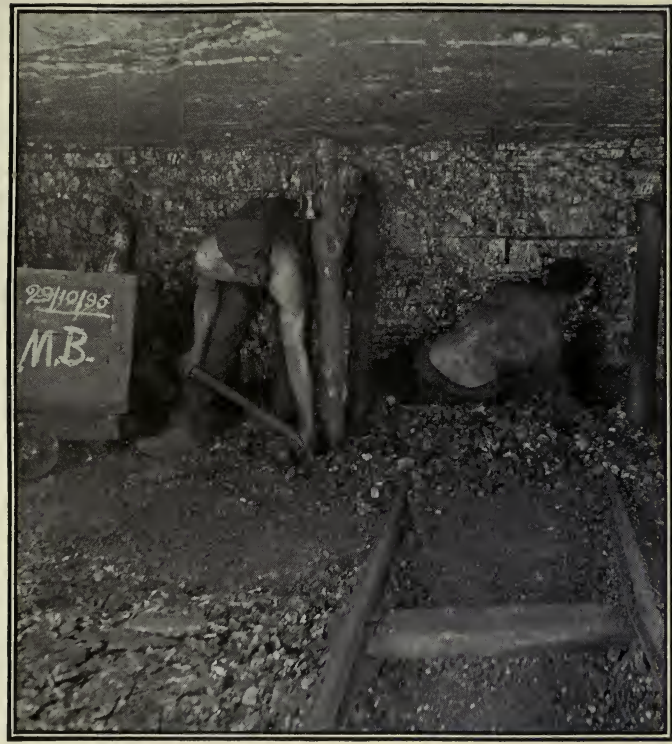
Coal Production

IN 1895 a mining expert predicted that in 1900 the United States, with an annual production of 200,000,000 tons of coal, would "pass Great Britain and hold from that time forward the first place as the producer of this foundation of modern civilization." The production of 200,000,000 tons of coal became a fact not only a year sooner than was prophesied—1899—but the figure was exceeded by fully a quarter of a million.

The production of coal in the United States as far back as 1889 placed this country in unquestioned supremacy at the head of the coal-producing countries of the world. In 1900, according to the United States Geological Survey, the production of the United States exceeded that of Great Britain by more than 17,500,000 short tons. In this connection, it is interesting to know that practically all of the coal produced in the United States is consumed in this country for domestic, transportation, or manufacturing purposes. The exports of coal from the United States in 1900 were less than 9,000,000 short tons, only a little more than three per cent of the total product.

During the year 1901, the marketed output of American coal, anthracite and bituminous, aggregated over 300,000,000 short tons of 2,000 pounds each. This represented from 33 per cent to 35 per cent of the entire product of the world. The production in 1902 fell far below the figures just given because of the great strike. Because of excessive competition and frequent strikes, coal mining in the East, especially in Pennsylvania and Illinois has not been very profitable during the last ten years. Most of the mines in Illinois, Ohio, and Pennsylvania are now owned by railroads.

Pennsylvania, of course, ranks as the first in the list of coal States. Illinois second. West Virginia is third in amount of coal produced, but fourth in value of product, while Ohio, which is fourth in production, takes precedence of West Virginia in value of its product. Alabama ranks fifth both in amount and value. Indiana holds sixth place in amount of production, but is displaced in value by Iowa, which ranks eighth in point of pro-



COAL MINERS AT THE BOTTOM OF A PIT

"HYDRAULICKING" ON THE YUBA RIVER

Vol. II., pp. 628, 659

duction. Colorado advanced from ninth place in 1899 to seventh place in 1901, but also falls behind Iowa in value of product. Changes in the standing of each of the other States have occurred nearly every year, without, however, exercising much effect upon the total or altering materially the percentage contributed by each.

A large part of the coal used for steam and domestic purposes in the Rocky Mountain States, comes from the mines of Utah and Colorado. Thick veins of coal underlie large areas in these two States, but the coal is of an inferior grade. One of the principal firms operating the coal mines in Colorado is the Colorado Fuel and Iron Company, which has a capital of $13,000,000. It owns or controls eleven coal mines and four iron mines. It employs 6,000 men and produces yearly over 2,500,000 tons of coal. The coal fields in the State of Washington are a boon to the people of the Pacific Coast, and represent a large proportion of the developed mineral wealth of the Pacific Coast States.

Anthracite *vs.* Bituminous Coal Mining

The estimated tonnage of anthracite coal mined and sent to market during the year 1901 made it the banner year for this great industry. The estimate was that about 60,000,000 tons were produced, which was not only an increase of about 8,400,000 tons over 1900, but also the largest annual production of the trade. The product was valued at about $90,000,000. Practically all the anthracite coal produced in the United States comes from the rich deposits in the State of Pennsylvania lying in the hills and valleys of the Blue Ridge Mountains, from the headwaters of the Schuylkill and the Lehigh rivers northward and westward to the Susquehanna. These deposits occupy in area of a little less than 500 square miles, chiefly in the counties of Schuylkill, Carbon, Luzerne, Lackawanna and Northumberland. Originally one vast bed of coal, the area has been broken by geological action into three distinct fields, known in trade circles as the southern Schuylkill field, the middle or Lehigh field, and the northern or Wyoming field.

The total product of bituminous coal, which included lignite or brown coal, cannel, splint, semi-anthracite, and semi-bituminous, and the small anthracite product of Colorado and New Mexico, amounted in 1901 to fully 240,000,000 tons, which had a value of hundreds of millions of dollars. A feature in connection with the coal mining industry in the United States is the continued increase in the percentage of bituminous coal mined by mechanical methods. During 1901 there were under-cut by the use of machines, 53,000,000 short tons, or 24 per cent of the total bituminous product. The total product of bituminous coal in 1901 increased a little less than 10 per cent over the preceding year, while the machine-mined product increased over 20 per cent.

Basing their calculation on the present rate of consumption, experts believe that the eastern bituminous coal supply will not last longer than seventy-five years, while estimates of the duration of the anthracite supply vary from eighty to two hundred years. This matter is, however, in the minds of the operator and the miner, one for speculation rather than anxiety.

The Total Number of Coal Miners

The whole number of coal miners in the bituminous and anthracite fields is estimated at 400,000, divided nearly equally between the two fields. Conservative official estimates, however, place the number of men actually employed in the anthracite fields at only 144,000. Of these over 94,000 are inside employés, including about 37,000 miners, nearly 25,000 miners' laborers, and over 10,000 drivers and runners. Of the outside employés, numbering not quite 50,000, there are over 20,000 slate-pickers, 4,500 engineers and firemen, 2,250 blacksmiths and carpenters. In the inside work there are over 500 foremen and over 800 fire bosses, who have more or less supervision of the employés already mentioned, in addition to over 3,000 door boys and helpers and 18,000 other workers of various descriptions. In the outside work there are nearly 400 foremen; nearly 800 department superintendents, clerks, etc., and over 21,000 unclassified workers.

The Coal Miner's Life

As a hazardous occupation that of the coal miner ranks with that of the railway employé. Only those familiar with statistics of coal mining are aware of the fact that of every 450 men employed in the mines one is killed and five are injured each year. A total of nearly 1,000 miners lose their lives each year, and nearly 5,000 are seriously injured. It is obvious that the total number of fatalities, in proportion to the total number of employés, exceeds the record for any other industry in this country.

All these fatalities each year give ample chance for a display of heroism among the miners, for among the 400,000 men, one-third of whose life is spent in darkness in the bowels of the earth, are found heroes as worthy of medals of honor as those whose heroism is displayed on the battle field in the face of the enemy. In the case of the miner the enemy is falling rock, coal, or slate, and the explosion of gas; and this enemy the miner must fight in a place that teems with dampness and other subtle dangers, where not a single day in the year passes without seeing the death of at least one miner. The average number of deaths for each day is thirty. Often the accidents are such as to appall a nation, accidents in which humble homes are bereft of their supporting head, in which wives are made widows and children suddenly become orphans.

Mr. John Mitchell, President of the United Mine Workers, says:

"In my own experience I have many times witnessed acts of such heroism and self-sacrifice among the coal miners as to make the valorous deeds of our soldiers at home and abroad pale into insignificance by comparison. There are innumerable instances that can be cited in which mine workers, in the cave-ins which every now and then befall, have knowingly and willingly surrendered their lives in an effort to rescue their entombed fellow-workmen."

"If there is any man in existence," says Wm. B. Wilson, Secretary of the United Mine Workers, "who is entitled to all the necessaries of life and as many of the luxuries as he cares to partake of, it is the miner, who, taking his life in the one hand and his dinner pail in the other, kisses his wife and little ones good-by in the morning and goes forth with a strong heart to meet the dangers of a most dangerous occupation, with the chances great that he may never meet his loved ones again. Not only does he meet the dangers that come to himself in the regular pursuit of his labor, but no man ever heard of a miner shrinking from the danger of rescuing his fellow-men in distress. When accident has befallen any of their number, when a caving in of the roof, a flooding of the mines, or an explosion of firedamp, has cut off all avenues of escape, the courage of the miner asserts itself, and he will dare any danger, take any risk to reach the entombed men or recover their bodies, if dead."

One feature of the mining industry which seriously affects the interests of every coal miner, and one which all would like to see eliminated, is the fact that more than 150,000 men are employed in excess of the number required to produce all the coal which the nation can consume. As the total consumption of coal in this country, together with the export trade, amounts to only 300,000,000 tons annually, and as the miners employed in the country could produce 125,000,000 tons of coal more than would be needed, if kept at work all the year round, it is evident that all the miners must be laid off part of the year. As a matter of fact, therefore, the coal miner works an average of only two-thirds of the time, or about 200 days in the year; hence he only earns two-thirds of the amount of wages that would accrue to him if he were steadily employed. Mining communities, moreover, are, as a rule, located in remote sections where it is impossible for a man to find work to do when his labors in the mine cease; the coal miner has, therefore, no opportunity to make his one hundred days of enforced idleness yield him a profit.

Such being the conditions, no wonder the stranger often finds the average mining town, especially in the anthracite region, a place where his eyes are confronted with sights that give rise to pity. It sometimes consists merely of rows of unpainted houses, each comprising only two or three rooms, and all so exactly alike in external appearance that the only mark to distinguish one from the other is the number over the front door. These houses are usually blackened by coal dust and rains, though within they are usually as clean as one would expect them to be made by neat, hard-working housekeepers. Most of these houses are built on a level with the sidewalk, leaving a space in the rear which the miners dignify with the name of vegetable garden. In some instances, however, as in Wilkes Barre, the houses are set back from the sidewalk, giving the miner an opportunity to display his taste in making a garden in front of his home and of trimming his porch with vines and otherwise improving his surroundings. In other towns double houses are set down in utterly barren regions, desolate to the last degree. These houses are often built two or three feet from the ground, the space underneath being utilized as a shelter for the family cow or goat. In the anthracite region, indeed, most of the people keep goats instead of cows; for the ground is extremely uneven and therefore perilous for animals running at large. The nimble goat, however, is able to avoid these dangerous places.

Oftentimes the miner's face is written over with stoicism, or rather with hopelessness, for in his life there is no incentive to ambition. He knows that he is destined never to rise to a place of eminence or wealth. Only two miners in every thousand can be given the position of foreman or superintendent. He starts upon his career as a mine worker when still a boy of tender age, and after forty or fifty years of toil, he ends his life in exactly the same place and at precisely the same employment in which he started when a lad. Only those who have lived among coal miners can appreciate the tragedy that fills the life of some of these workers.

President Mitchell, of the United Mine Workers, sums up the story of the anthracite miner's life in these few words:

> First, the boy of eight or ten is sent to the breaker to pick the slate and other impurities from the coal which has been brought up from the mine; from there he is promoted and becomes a door-boy, working in the mine; as he grows older and stronger, he is advanced to the position and the pay of a laborer; there he gains the experience which secures him a place as a miner's helper; and as he acquires skill and strength he becomes a full-fledged miner. If he is fortunate enough to escape the falls of rock and coal, he may retain this position as a miner for a number of years; but as age creeps on and he is attacked by some of the many diseases incident to work in the mines, he makes way for those younger and more vigorous following him up the ladder whose summit he has reached. He then starts on the descent, going back to become a miner's helper, then a mine laborer, now door-boy; and when old and decrepit, he finally returns to the breaker where he started as a child, earning the same wages as are received by the little urchins who work at his side.

Foreigners in American Coal Mines

The coal mining industry of the United States, as reported by the Industrial Commission, is a field peculiarly affected by the influx of fresh immigrants. In the earlier days they were mainly from the British Isles—Englishmen, Scotchmen, Welshmen, and Irishmen. Within the past twenty years these earlier nationalities have been displaced by immigrants from Austria-Hungary, Italy and Russia. According to the census of 1890 the foreign-born miners constituted 58.1 per cent of the total in Pennsylvania, 57.4 per cent in Illinois, and 59 per cent in Ohio. In the mines of the Philadelphia and Reading Coal and Iron Company, in 1896, one-fourth were Polish, one-fifth were Irish, one-fifth Americans, and one-tenth were, respectively, Germans and Hungarians. In the mines of Illinois in 1899 the foreign-born miners in the order of precedence were Germans, English, Italians, Polish, Irish, Scotch, Austrians, Bohemians, and Hungarians. The principal complaint arising from the presence of foreigners is the alleged over-supply of labor. This is shown in the diminished number of days for which employment is obtainable in the course of the year.

The Coal Miner's Training

A certain notable person, commenting on the strike of 1902 in the anthracite coal region, remarked that the "labor unions of the present day represent an immense power largely going to waste, because misdirected by insufficient intelligence." In this eminently true statement he really touched the very root of all labor troubles and furnished a virtual solution of the difficulty. What is true in every branch of industry applies with particular emphasis to the coal miner: the struggle between muscle and brain is a hopeless one, the brain being the greater power that must inevitably achieve ascendency. If the worker in any line could devote his energies to the acquisition of superior intelligence and technical information, he could cope with his employer on his own ground, and also fulfil the foremost requirement in bettering his own condition. This is true because that in every branch of industry at the present day, the unskilled worker must compete with cheap foreign labor and with improved machinery, both of which seem to be practical fixtures. On the other hand, the man who will improve his spare time in acquiring an intelligent idea of the theories and conditions involved in his calling will find his possibilities of advancement limited only by his own industry and capability. The solution of the so-called "labor problem," both for the individual and the mass, lies only in raising the standard of trained intelligence in the worker.

Business life at the present day is a struggle for existence, in which the "fittest," which is to say the most resourceful, alone survive. The coal operator, under stress of competition, must cut down the price of coal, and, as a consequence, must exercise numerous economies in running his mine. Such a course naturally affects the worker, whose demand for advanced wages, and other desirable conditions, must ever be met with the now famous rejoinder that "the business of coal mining is not a benevolent or charitable enterprise." If, however, he is a thoroughly skilled and well-informed worker, he can make his labor tell to better advantage, and command better wages on his deserts alone. This is true because mining is a science, as surely as is machine designing and construction, and the better it is understood, the more profitable it becomes. Furthermore, the miner, who will devote his leisure to mastering his calling, stands in line for promotion to the posts of "boss" or "foreman," and later to that of superintendent or inspector, all of which are awarded to candidates successfully passing the examinations prescribed by law. He may devote himself to studying coal mining alone, or to mastering the requirements for a fully-equipped mining engineer, even acquiring the scientific knowledge essential to the work of locating and surveying a mine; determining the extent and value of the mineral or metal deposit, and preparing the ore. In any such position he possesses the advantages of practical experience, while pursuing his studies, a thing which the average graduate of a college or technical school usually lacks wofully. Such advantages for educational improvement are offered by the modern method of correspondence instruction that has proved so helpful to workers in nearly every branch of industry. The fact that one of the foremost correspondence schools in the United States was started as an institution to train miners is a sufficient answer to the query, "How shall I obtain my education?"

The United Mine Workers of America

The strongest labor organization among coal miners is the United Mine Workers, which started in 1890, with only a few thousand members. Its growth within the last few years has been phenomenal. As late as January, 1897, it had only 11,000 members, but a year later the membership had grown to 25,000. In January, 1901, it had 189,000 members, and in January, 1902, no less than 250,000. Its remarkable development since 1897 is due to the impulse it received from the interest which was so thoroughly aroused by the great strike in 1897 of workers in the bituminous mines. The strike of the anthracite miners in 1900 brought still more thousands into the fold, while the strike of 1902 is said to have reduced the membership.

Miners and operators both agree that the United Mine Workers have been wonderfully successful as an organization, in advancing wages. In Illinois the increased wages of the miner in 1900 caused the price of coal to rise 22 1-2 cents. In all the Central States, where the Union is strongest, wages increased forty per cent between the years 1897 and 1901. Operators themselves admit that this organization is managed by capable, conservative men, in a way that has proven as satisfactory to owners as employés. It is not their policy to make membership a prerequisite of employment, and only just and legitimate means are employed to bring in non-union men. Colored miners are admitted as freely as white men; colored men, indeed, are even permitted to hold office in the local unions.

The desirability of formal agreements between organizations of employers and organizations of employés, determining wages and hours and other conditions of labor for fixed periods, was generally conceded by all the witnesses who testified on this subject before the Industrial Commission. The United Mine Workers promotes the formation of such agreements whenever they can, and has been successful in establishing them in most places where they have influence. The most notable of the joint conferences at which such agreements are periodically made is the interstate conference of the so-called competitive district, including Illinois, Indiana, Ohio and the western region of Pennsylvania, which settles the conditions of labor of perhaps 100,000 workers. These conferences are attended by many operators and by representatives of each local union of the United Mine Workers. Each side and each State, however, has the same number of votes—the miners of each State four, and the operators of each State four. Every important decision must be reached by a unanimous vote—not by a mere majority. The actual formation of the scale of wages is referred, after general discussion, to a committee consisting of four miners and four operators from each State. If an agreement is not reached, questions in dispute are referred to a sub-committee.

In Illinois and Indiana the operators have State organizations each of which employs a paid executive officer called a commissioner, whose chief duty is to deal with the officers of the miner's organization. Whenever a dispute arises, the "pit" committee of the men and the "pit" boss meet and try to settle the difficulty. If they cannot agree, the matter is appealed to successively higher authorities on each side until the State officials of the United Mine Workers and the commissioner of the operators' association are called in. The national officers of the United Mine Workers are not often asked to help. State agreements have been formed and State conferences established between the operators and the miners in Alabama, Kentucky, Tennessee, Missouri, Kansas, Iowa and Michigan.

Conditions in the Anthracite Coal Fields

One of the greatest difficulties in the way of reaching a uniform wage scale for the miners in the anthracite region lies in the diversity of conditions met in mining coal. No two veins are alike in thickness, purity of coal and other features; hence to adopt a time or load scale, irrespective of the difficulties encountered in the day's work, would be manifestly unjust and impracticable. On the other hand, such a uniform scale would be inequitable, since experienced and inexperienced men frequently work in neighboring chambers, each being an independent contractor with the company for the sale of his labor. While such conditions may not cover all the points complained of by the miners, it is evident that no adjustment can be reached apart from careful and intelligent review of the situation. The operators, without exception, state that the demands for shorter hours are unreasonable, because few, if any, of the miners now work for the full period of a working day; the majority of them, according to accounts kept at the mines, being underground only about one-half breaker time. Thus, to shorten the period per day during which the breaker is working would involve the employment of additional men, miners, laborers, drivers, runners, etc., and to open up new chambers at considerable expense. To briefly state the position from the operators' point of view, the miners work by contract for as many hours in the working day as their industry and ambition determines them.

In the majority of cases a miner's duties consist simply in drilling and blowing down his coal, leaving his laborer to clean and load it. This work occupies, at most, but a few hours of his time, after which he generally takes an airing above ground. In this respect the mining of anthracite coal differs from work in bituminous mines, where the miner has generally thinner veins to dig, frequently working, with a pick, on his side or back, then blowing down his coal, cleaning and loading it himself: he thus spends more time inside at much harder work.

Although the anthracite miner pays his laborer for his services, generally at a rate of one-third his own earnings, he receives from 35 cents to 90 cents per hour, according to skill and work accomplished. The averages vary in the several districts between 45 cents and 65 cents per hour. According to these figures, as has been pointed out, an anthracite miner receives on the average a higher compensation than many responsible employés of the railroads carrying the coal. Thus, the wages of locomotive engineers working around the mines is given as 27.5 cents per hour, or $3.25 per day of twelve hours, which shows that four or five hours of work frequently yields a miner as much in a day as the locomotive engineer receives for full time. Accepting the estimated average of 50 cents per hour for the industrious miner, we find that his condition compares favorably with that of the plumber at 37.5 cents; with the carpenter at 30 cents; with the molder at 27.5 cents, and with the blacksmith at 25 cents. A representative mining and railroad company operating in the anthracite fields reports for 1901 an average of 1,985 working hours, which is equivalent to 198½ ten-hour days, or 248 eight-hour days, although the actual average per day was 7.83 hours. These figures are quoted as disposing of the "long-hour argument," and probably do so, unless that be regarded as a plea for more steady work.

The miner's high hour-rate of pay may be considered in the light of compensation for the difficulties and dangers necessarily encountered in his calling, although these are so immensely reduced by modern appliances for pumping, ventilating and hoisting that, as a rule, serious accidents are to be attributed to the fault of the victim himself. Another probable reason for valuing his time at a higher figure than that of others is that the laws of the State of Pennsylvania allow only men with a specified period of experience to work as miners, thus keeping the number of available workers within fixed limits. The irregularity of the work may be another explanation. However, according to the figures of the operators, many of the other colliery employés are paid at a higher rate of wages than railroad workers. Thus the driver boys receive from 13 to 18 cents per hour; laborers, from 18 to 22 cents; pumpmen, track-layers and helpers, from 19 to 22 cents; timbermen from 21 to 24.5 cents; and trackmen, 24.5 cents. These figures compare favorably with those representing the wages of men employed by the railroads in similar capacities, their pay averaging between $1.25 and $1.50 per day. Firemen employed at the colliery receive, on the average 14.5 cents per hour, or $1.72 per day of twelve hours, and when obliged to work in the night during every other week, are paid full-day rates on either of two seven-hour shifts. Hoisting engineers receive between $75 and $78 per month, working twelve hours daily, with alternate seven-hour night shifts every other week.

All coal miners are desirous of a change in the methods of payment. The change they most desire is one which will cause pay-day to come around once a week. It seems, however, that the law is unable to meet the demands of miners. A weekly-payment law was passed in Illinois, but was later declared unconstitutional as interfering with the liberty of contract. In West Virginia, the law requiring semi-monthly payments is not enforced. In Pennsylvania, the law requires semi-monthly payments "on demand," and as the operators of that State do not favor the law, it is said that many a miner has been dismissed for seeking to take advantage of the words "on demand." In Ohio, the semi-monthly payment law is observed.

To maintain the standard of their production, and to prevent carelessness and dishonesty among miners, operators in both the bituminous and anthracite regions are obliged to resort to the practice of docking wages when impurities are found in the coal. Otherwise, the miner working on contract, could throw in many pounds of slate or dirt and receive payment for it as if it were "honest" coal. The workers at some mines have been docked 7½ cars out of 57 mined, and as many as 144 out of 1,750. One operator declares that he has seen car after car come out of the mine with from 1,200 to 2,200 pounds or rock topped off with coal. This particular operator, however, has found a method of punishing this form of dishonesty, more effective than docking. He gives the miner two notices that his coal must be cleaner. If the man pays no heed, and continues to send up large quantities of dirt, rock or slate, he is discharged.

The Great Coal Strike of 1902

In order to get a clear idea of the situation involved in the memorable strike of 1902 in the anthracite coal region, it will be necessary to outline the conditions of the miners. These work and receive pay on either one of two bases; for time work, by the hour, and for piece work, by the ton, as delivered on cars at the mouth of the mine. About forty per cent of all the miners are in the latter class, and a large part of the complaint issued by the Union authorities relates to the question of weighing the coal and estimating the waste and impurities. The conditions of work in the mines certainly seem hard in a number of particulars, and much sympathy has been expressed, but, if the statements of the operators and mine-owners be accepted, many of the hardships seem unavoidable; others quite incapable of being remedied by the measures proposed by the Union. The miners, however, demanded an increase of 20 per cent in the rates paid for coal mined by the ton; a decrease of the working day for time workers from ten to eight hours, without increase in the rates per day; that all coal mined be weighed, 2,240 pounds always constituting a ton, as the basis of the miner's pay. The allegations upon which these demands were based were that miners working by the ton produced were deprived of a good part of their just dues by the practice of deducting a certain percentage, to cover impurities, stone and foreign substances, inevitably finding their way into the coal cars. This rate of deduction, they claimed, was excessive, and was frequently fixed on a load arbitrarily by the accountants. It was also claimed that the size and capacity of the cars supposed to contain a ton were constantly being increased. According to their estimates all these abuses could be rectified by weighing all loads of coal and increasing the miner's dues by 20 per cent, or practically dividing the loss, usually estimated at a figure between 20 and 30 per cent. Regarding the decrease of the working day, it was claimed that the proposed changes would benefit the miners by giving them 240 or 250 days of work per year at 8 hours, instead of only 200 days at 10 hours, while not materially increasing the output of the operators.

These demands were rejected by the operators for several reasons: In the first place, they claimed, that the question of miner's wage rates had already been adjusted, acceding to demands in September, 1900, and that there had been no just occasion for dissatisfaction since that date. In the second place, they argued that the weighing of loads from the mines was not always practicable, and that, in any case, it would add materially to the running expenses to install and maintain the proper plants. Regarding the allegations as to the increase in the size of cars used, it was stated that the system was to pay for loads in accordance with the labor necessary to mine the coal in particular veins; hence, where there is a large thick vein a larger car may be used, the cubic capacity of the car being gauged by the nature of the working in each case. Thus, in order to figure the returns properly, in accordance with the miners' suggestions, different car rates must necessarily be adopted, with little, if any, benefit to the miners. On the basis of these facts, the operators refused to concede the claim that if coal is sold by the ton the miner should be paid by the ton; since, properly speaking, the coal is not purchased from the miners, they being merely paid for their labor, on as carefully adjusted a scale as possible, while the product coming from the mines must necessarily be cleaned of impurities before fitted for market, with a varying percentage of clear loss by weight and the involved necessity of employing slate pickers to handle it. According to estimates of the operators, the cost per ton of mining coal was in 1900 about $1.67, out of which $1.12 was credited to labor; in 1901, about $1.82, with $1.26 to labor; and to April 30, 1902, about $1.99, with $1.38 credited to labor. The wage accounts of one of the largest companies shows that the average earnings of miners and assistants of all grades runs from $2.08 to $3.01, while the slate pickers receive $1.20; the several classes of laborers from about $1.30 to $1.60. An authoritative estimate gives the total of annual wages in the anthracite region at about $66,000,000, while the president of one of the largest operating companies claims a total of $10,500,000 for "wages of all kinds," and only $1,750,000 to be distributed as dividends among the stockholders. Another large company divides its total annual receipts as follows: For wages, 58 per cent; for supplies, repairs, etc., over 12 per cent; for taxes, insurance and royalty nearly 9 per cent; for general expenses, not quite 1 per cent, and for "fixed charges," over 21 per cent, which showing involves, of course, that no dividends were paid.

It would seem from these figures that the business of coal mining must be conducted with reference to conditions of demand and supply, like all other enterprises. At one time the demand falls so far that it is not profitable to work the mines, while at another, the full force must be employed. Thus, the proposition to reduce the working day to eight hours and operate the mines more days in the year was met by the answer that, as only about 60 per cent of the capacity of the mines is required to fill market orders, and that, as expenses continue throughout the year, the fixed rate of wages must be maintained, or the advances be deducted from the total for general expenses, or by reduction of the output. The increase of 20 per cent in wages would amount to about 46 cents per ton increase on the average, which, with the increased cost through reduction of output would make a total of 60 cents per ton over the present market price. Several of the operators conceded that the men had substantial grievances during 1900, on account of the necessarily frequent stoppages of work, but they added that, an extra demand for labor found many of the men unwilling to respond, while constant picnics, excursions and the like still further interrupted the work on numerous occasions. Furthermore, several operators claimed that time-contract miners do not work for the full period of one working day, many miners working only five hours daily, few, if any of them working as long as the breaker runs, which is seven and a half hours daily. On the basis of these facts it was claimed that the demand for shorter hours was very ill-founded.

The refusal of the operators to accede to the demands of the strikers brought forth a compromise proposition of 10 per cent increase in pay per ton and 10 per cent decrease in the working day, which, also being refused, resulted in a proposition to arbitrate. The operators' position was that there was "nothing to arbitrate;" hence the strike was declared, which seriously affected the fuel supply of the country for several months. The difficulty of settling the dispute on any basis was very largely increased by the unwillingness of the operators to recognize the Miners' Union, although, according to their own statements, the fundamental difficulty was that the organization was founded in the bituminous coal fields, and officered by men from thence, and that they were unwilling to deal with strangers. Although this position was bitterly criticised in many quarters, the operators insisted that they would favor a union among the anthracite men alone, if its officers could be depended on not to interfere with discipline. They further complained that, while this "bituminous body" could combine to force up running expenses, the operators were restrained by law from combining to raise the price of coal, in order to meet the greater expenditure.

In November, 1902, a Strike Commission was appointed by President Roosevelt to receive testimony and settle the strike "by arbitration."

CHAPTER III

THE IRON MINING INDUSTRY

The Iron Age—Iron Ore Production—Methods of Iron Mining—The Magnetic Process of Iron Ore Reduction—Machinery in Iron Ore Reducing Works—The Iron Miner's Life—Labor Conditions in Iron Mines—Lake Superior Iron Mining Region

The Iron Age

THE nineteenth century has, with justice, been called the Iron Age of the world's history. The discovery of vast bodies of iron ore and mineral fuel, together with the invention of many mechanical devices, and also certain improved processes for the manufacture of steel, were the beginning of the complicated civilization in which we now live. In the early part of the last century there was little demand for iron and steel, and only a trifling production of either in any country. The railroad era began at the close of the first quarter of the century, and the consumption of iron and steel at once increased. The general use of iron and steel bridges and iron and steel steamships came later. Steel in the construction of large buildings, especially those of great height, was next introduced. Steel cars for general freight purposes became popular. Inventions in the line of agricultural machinery, textile machinery, mining machinery, electrical machinery and machine tools rapidly increased the demand for iron and steel.

The invention of the Bessemer process for making steel, and its companion, the Siemens open-hearth process, would have availed comparatively little to enrich mankind had not an abundance of iron ore and coal been obtainable to make practicable the merits of these inventions. In the United States, Nature has been particularly lavish in her supply of the raw materials needed in the manufacture of steel. The anthracite coal of Pennsylvania, the bituminous coal of numerous other States, and the Connellsville and Pocahontas coke afford all the fuel necessary for our blast furnaces. Iron ore was early found in many States, but the discovery, in the second quarter of the century, of immense bodies of iron ore in the Lake Superior region, which are particularly adapted to the manufacture of steel by the Bessemer process, eventually put this country at the head of the list in the world's production of iron and steel. The rapid manufacture of iron and steel rails made possible the miraculous extension of railroads, the discovery and development of our mineral and agricultural resources, and the new homes all over the country.

Iron Ore Production

The history of iron mining in the United States is one of the wonder tales of the century. This statement applies particularly to the State of Minnesota, where ore shipments began from the Vermilion Range in 1884, with a consignment of 62,124 tons. The first shipment of the Mesabi Range was only a matter of 4,245 tons in 1892. The ore shipments from both ranges in 1900 amounted to no less than 10,000,000 tons. Had that ore been loaded into twenty-ton cars, it could have filled a train that would have reached from the Atlantic to the Pacific, and from Canada to Mexico. Since 1894, Minnesota has ranked second among the iron-producing States, finally passing in 1901 and 1902 above Michigan, her only rival, to the place at the head of the line. The total number of mines in Minnesota is fifty-six, nearly all in St. Louis County. Four of the mines are owned by the State, but only one of these is worked at present. Seventy-five hundred men are employed in the iron ore industry in this single State. About five per cent of these may be classed as "skilled labor"; they are engineers, carpenters, blacksmiths, machinists, pump and pipe men, skip tenders, loaders and oilers. Thirty per cent are the regular miners, twelve per cent the trammers, sixteen per cent the underground common laborers, and thirty-seven per cent the surface common laborers.

The Labor Commissioner of Minnesota states that while a few iron mines operate very nearly the whole year, a large number of them are idle during part of the time. Thus, although five mines were operated more than three hundred days each during a recent year, yet, because of the idleness of the rest, the average working time for all was but a trifle over eight months. In another year the average for all reached ten months. As the average daily wages for all mine workers in the same year was $1.89, or $49.14 per month, and the average time worked was ten months, it will be seen that the yearly earnings of all the men averaged only $491.40 each.

In the first year of the present century the Lake Superior region, embracing iron ore mines in the States of Michigan, Minnesota, and Wisconsin, produced nearly 21,000,000 long tons, or more ore than was mined in the United States in any one year previously, with the exception of 1899, and more than has been reported as produced in any year by a foreign country.

After Minnesota and Michigan, as reported by the Geological Survey, comes Alabama, third in the list of iron-producing States. The large installation of basic open-hearth furnaces promises a still greater utilization of Alabama's iron-ore resources in the future. Virginia ranked fourth, Pennsylvania fifth, Wisconsin sixth, and Tennessee seventh in the iron-producing States for 1901. New York, which stood eighth in the general production, shared with Pennsylvania the unique distinction among the States of producing, in 1900, all four general classes of iron ore; that is, magnetite, brown hematite, red hematite, and carbonate ores. Colorado, which ranks sixth among the iron-producing States, obtained a considerable amount of brown hematite from its silver mines, and much of it, carrying manganese, was used in blast furnaces in Colorado and Illinois to produce spiegeleisen. The Rocky Mountain States, which are low in actual production of iron, possess, however, some deposits which may properly be considered important iron ore reserves.

The total value at the mines of the 27,553,161 long tons of iron ore produced in the calendar year 1900 was $66,590,504, an average of $2.42 per long ton. The lowest average value reported per ton was eight-two cents in the State of Texas, where convict labor is employed in some of the mining operations. The highest value was $3.71 per ton in Colorado. The production for 1900, as for 1898 and 1899, was a record-breaker, not only for this country, but the outputs of iron ores during these years have never been equalled by any other country, the nearest approach to our output being in 1900 by the German empire, when 18,667,950 long tons were produced.

Methods of Iron Mining

There are several distinct methods of iron mining in vogue, the use of any one of which is determined by the nature and conditions of the particular formation. Where the deposit of iron ore is superficial, being found just below the surface soil, it may be readily worked by the "open-pit" method, by which steam shovels dig down the ore and load it into cars, until a large open pit is excavated, after the manner familiar in stone quarries. The working of the mine is easy in such formations in the middle Northwest iron region, since the ore is loose, having a consistency resembling that of earth or bank sand, and may be readily taken out by the steam shovel. Where the ore is situated far beneath the surface, or in the interior of a mountain formation, it is necessary to dig long tunnels, or shafts, and to extract the ore by either one of the three methods, known, respectively, as "overhead stopping," "caving," or "milling." The first method consists in sinking a timber-lined shaft about 2,000 feet or more into the earth, and driving tunnels horizontally through the deposit of ore, which is mined out, and conveyed through, to the central shaft, being thence hoisted to the surface. The caving method is much like this in many respects, also using a central shaft and side tunnels; the principal difference being that, as the ore is taken out to the shaft, the ground is allowed to cave in, forming an immense pit. The "milling" method is used where the deposits of ore occur in a high hill, gravity being employed to bring down the ore. The essential feature is a tunnel, usually twelve or fifteen feet square, the roof of which is connected to shafts sunk down from the summit of the hill, so that, when the ore is blown down into any of them, it falls into cars waiting in the tunnel to receive it. This method saves timber for roofing and propping. The open pit is preferred wherever the deposit is sufficiently near the surface, or where the ore can be conveniently reached by the steam shovel, since it permits the greatest quantity to be taken out with the least trouble, danger and expense.

The "Magnetic" Process of Iron Ore Reduction

One of the most important and significant innovations in the domain of iron mining and manufacture is the process of extracting the ore from the magnetic rock of New Jersey and other places in the Eastern and Middle States. This process, which was devised and carried to practical perfection by the genius of Thomas A. Edison, has made available to trade vast deposits of iron, quite inaccessible by older methods of mining and smelting, and has given a new lease of life to the Bessemer steel industry in the

East. Although it has long been known that iron was plentiful in New Jersey, Connecticut and several other Atlantic States, the ore is of such a "low grade" as to render its profitable treatment almost impossible. Mr. Edison, however, conceived the brilliant idea that this rock could be crushed and pulverized, and the iron extracted by magnetism. This method, which had already proved successful in treating ferruginous sea sand, consists essentially in allowing the ground rock to fall from a hopper before a series of electro-magnets, which attract the particles of iron, causing them to be deflected into the receptacle prepared for them, but leaving the sand and other mineral grains unaffected. Although apparently an extremely simple matter to crush the rock and extract the ore, there were a large number of practical difficulties in the way, particularly such as applied to the crushing process and the preparation of the ore for the blast furnace. All of these problems Mr. Edison met and solved most effectively.

The deposits of iron in the mountains of New Jersey are located by the use of a delicately adjusted magnetic needle; the course of the veins being carefully mapped out and the surface soil cleared away with a steam shovel. The iron-bearing rock is then drilled and blasted with dynamite, the fragments being conveyed in five-ton skips on cars to the crushing mill. Here the largest rocks blown down in the quarry may be reduced to powder in a remarkably short period, with the smallest percentage of friction and lost power ever realized in any manufacturing machinery. The crushers consist of a series of double rollers, or revolving cylinders, or immense weight, the peripheries of which are set with great teeth. In the construction of these machines a troublesome problem is overcome in the fact that, when engaged in crushing the ore, an automatic clutch disconnects the engine, leaving the crushing process to be performed solely by the momentum of the vast rotating weights, thus saving the powerful engine from the great strains that must, otherwise, be encountered. This clutch is thrown as soon as the resistance of a rock tends to impede the motion of the rolls, although their weight alone, about seventy tons, is amply sufficient at high momentum to batter the obstacle to pieces between the protruding teeth. The first pair of rollers are set about eighteen inches apart, another pair below them being somewhat closer together, so that the masses of rock, emerging from between their serrated surfaces, are reduced to about the size of a man's head. These fragments are then caught in steel baskets on an endless belt conveyer, which carries them to another part of the building, to pass through other sets of rolls, until, at the last stage, nothing but a fine powder remains.

The powdered ore is conveyed by an automatic carrier to the refining house, where it is elevated to the sixth story and allowed to fall, under the force of gravity, through a series of screens and sieves, and past three sets, or in all about 480, magnets of regular increasing strength, or "pull," until practically all the iron particles are deflected into the hoppers reserved for them. The sand is then conveyed to the sand tower, from which an endless belt of buckets carries it to a great craneway and deposits it in piles outside. It is a valuable commodity for masons, builders and others, who consider it superior to sea or bank sand, as being composed of sharp points that give better adhesion to cement, mortar, etc. The iron powder, on the other hand, is carried by a belt-conveyer to the blower-house, where foreign substances are separated from it by a blast of air, after which another belt-conveyer carries it to the mixing house, to be mingled with a special adhesive substance, formed into "briquettes," or round lumps, baked and loaded into cars for shipment to the founder and steel manufacturer.

The object of forming the iron into briquettes is to render it available for commercial use, since, in the form of powder, a large part of it would be blown out in the powerful furnace blast, while the remainder would prevent the gases of combustion from circulating freely in the process of smelting. The adhesive mixture used is another contribution of Mr. Edison's genius, being of such a character as to give the briquettes the very essential qualities of porosity, hardness, resistance to temperatures below the fusing point, thus preventing premature disintegration, while, at the same time, being inexpensive and sufficiently powerful to allow of the smallest quantities being used. In mixing with the adhesive material the iron powder is drawn on endless belt-conveyers through long cylinders, in which revolve constantly a series of curved iron paddles or dashers. Another belt-conveyer carries the sticky mass of ore to the briquetting machines, which, briefly described, consist of a plunger that forces a portion at each stroke into a small round chamber, thus forming it, under enormous pressure, into a smooth, regularly shaped lump, either two and a half or three and a half inches in diameter. From these machines the briquettes are conveyed on another belt through a series of ovens, in which they are heated to a sufficiently high temperature to make them hard enough to withstand moisture, jolting and other disintegrating influences met in transportation. They are also able to retain their solidity up to the melting point of iron, and, although porous, will not absorb moisture. By the process thus described about 6,000 tons of rock are daily reduced to sand and briquettes, the output of iron being about 1,500 tons, or twenty-five per cent of the total weight of the virgin rock.

Machinery in Iron Ore Reducing Works

Apart from perfecting a process which is of the greatest importance in the industrial and commercial world, Mr. Edison has, in this plant, produced several marvels of mechanical skill. Among these may be mentioned the lubricating device used on all bearings, which not only protects the moving parts from the abrasion of the sand and dust, but actually depends for its proper action on the presence of dust and grit. The method of crushing large masses of rock by the momentum of heavy, rapidly-moving rollers is another improvement worthy of mention, since it is a complete departure from previous styles of crushing machinery, and will doubtless prove valuable in sugar refining and other branches of manufacture. In the process of pulverizing the iron-bearing rock, the atmosphere of all buildings is, of course, filled with fine dust. This would prove extremely injurious to the lungs and eyes of the workmen, were it not for the patent breathing masks and goggles all of them are obliged to wear. As it is, their clothing is so covered with the dust that they resemble millers.

The Iron Miner's Life

The average lot of an iron miner is a great improvement over that of his brother in the coal region. Iron miners are probably the hardiest and thriftiest, as well as the most inedependent, set of men employed in the mines of this country. This is especially true of the iron miners of the Lake Superior region. Many of them own their own pretty homes, and some of them have small sums of money to their credit in the savings banks.

The conditions under which they work are such as to stimulate them to their best endeavors. Owing to the peculiar condition of the labor market in this region, they are able, through their labor organizations, to regulate somewhat the amount of their wages and the number of hours they shall work each day. In the great iron mines of Minnesota and Michigan, the ore is generally worked in the "Chamber system," a form of quarrying rather than mining, so that iron miners escape the close confinement underground that is the curse of the coal miners' existence. Although their duties are arduous, the conditions under which they are performed are healthful. Finally, if not satisfied with their surroundings, the iron miners know that they can always get work on the nearest farm.

Between 350,000 and 400,000 men are engaged in the mining and transportation of iron ore. This great army of workers handles yearly about one hundred million dollars' worth of raw material, receiving for their labor an aggregate annual wage of fifty million dollars.

Labor Conditions in Iron Mines

Methods of work in the great iron mines have greatly altered in the course of recent years. The efficiency of the miner has been so wonderfully increased by the introduction of labor-saving and time-saving devices that a single miner in an underground mine, by the use of machinery, can now turn out five or six tons of ore a day, while at the open mines, which are immense basins hollowed out of the earth, the output has often been as high as eighty tons for each man employed. An authority cites the case of the Tower Mine in Minnesota, one of the most wonderful iron-producing properties in the world. In the caverns of this great mine, less than ten years ago, 1,800 men produced daily an average of only one ton of ore for each man, at a cost of about one dollar and a half. To-day, by the use of machinery, it requires only half as many men, namely, 750, to produce the same quantity of ore. That is to say, each miner now sends to the surface two tons of ore a day, reducing the cost of production one-half.

So vast are these great iron mines that a whole day is required to travel through a single one of them with a mine foreman as pilot. Such a journey reveals the wonderful extent to which machinery has replaced the hand of the miner. Hammer and drill in the hands of the primitive miner have been entirely superseded by machine drills driven by compressed air. Monster steam shovels take the place of the hand shovel and wheelbarrow of the original miner. A single one of these steam shovels loads two hundred cars a day from the stock piles, doing the work which formerly required the labor of two hundred men.

The greatest danger to the iron miner comes from the constant use of explosives. Ahead of the shovels the ore is shaken up by the use of powder. The men whose duty it is to do the blasting use pointed steel bars, with which they drive holes many feet deep and several inches in diameter. Into this hole a dynamite stick is dropped, and thus a cavity is made sufficient to hold five or six kegs of black powder. By exploding this powder the ore is loosened in sufficient quantities to feed the ever-industrious shovels. From the fact that even the smallest mine consumes an average of thirty-five or forty kegs a day, it is apparent that there is a constant upheaval of earth in these localities.

Lake Superior Iron Mining Region

The Lake Superior mining region might be called the Promised Land of organized labor. There the labor unions are able to enforce any reasonable demand relating to wages and hours. The secret of their power lies in the fact that labor here is scarce and high-priced, and operators will make almost any concession rather than cease work altogether. No matter what the industrial conditions in other parts of the country may have been, the labor supply in the iron region has always been inadequate. This is explained by the fact that the iron mines are in the centre of a great agricultural region, where the miner can always secure work if he cares to leave the mines.

In their endeavor to secure miners, operators of iron mines have frequently offered monetary premiums in the form of a bonus given as a reward after a certain period of service. When they hire men from distant sections of the country, it is always understood that they shall pay their railroad fare to the mines. In order to hold them permanently, the mine owners use every opportunity to encourage their men to save their money and build their own homes. Therein they show shrewd business judgment, for no matter how humble the habitation, it serves as an anchor for the miner and holds him fast to his first allegiance. As the ownership of the homes increases, the danger of the miners deserting the mines for the wheat fields decreases.

Even the unskilled laborer in the iron mines is paid at the rate of two dollars a day. The principal nationalities represented among these workers are the German, the Hun, the Irishman, and the Italian, who form a Babel-like aggregation of energies.

CHAPTER IV

COPPER, LEAD AND ZINC MINING INDUSTRIES

The Copper Mining Industry—Butte, the World's Greatest Copper Camp—The Lead Mining Industry—The Zinc Mining Industry—Marketing the Product of Zinc Mines—Labor Conditions at Western Ore Mines—Copper, Lead and Zinc Smelting and Refining

The Copper Mining Industry

THE United States now leads the world in the production of copper, and regulates the copper market. Europe depends upon the copper mines of Montana and Michigan for the bulk of her copper. American mines produced, in 1900, 270,588 tons of copper, an amount that is more than equal to the combined production of all other similar mines in the world, as shown by the fact that the world's production of copper in 1900 only amounted to 487,331 tons.

The deepest copper mines in the world and the oldest in this country are in Michigan, where shafts like that of the Calumet and Hecla pierce the earth to the depth of nearly a mile. This same mine, the Calumet and Hecla, has more than once paid one hundred and fifty per cent on the investment. The Quincy copper mine in the same district has paid annual dividends of one hundred per cent.

An unusual increase in the copper output of the Lake Superior region characterized the production of 1901. It is estimated that the output of that year reached the unparalleled figure of 170,000,000 pounds. The total returns for the same region, in 1900, were 145,461,498 pounds. The Calumet and Hecla, and also the Quincy, produced more in 1901 than in any previous year, whereas in 1900 the Calumet and Hecla output was less than normal, owing to the fact that that mine was then developing the Osceola lode. The production of the Lake mines, in 1902, nearly reached the enormous sum of 200,000,000 pounds, which is twice their output in 1890, and four times that of 1880.

The copper mines of Montana alone, "The Treasure State," yield over one quarter of the world's supply of that useful metal. The number of persons who find there direct employment in mining and reducing copper ores, reaches into the tens of thousands. An equal number of persons are indirectly benefited by the manufacture and sale of the necessary supplies for those employed in the mines. The towns of Butte, Anaconda, and Great Falls, which have a combined population of more than eighty-five thousand people, exist largely to minister to the mining and smelting industries connected with copper mining.

The mines of this State have, through their output of copper, made possible the expansion of the electrical industry. Especially have they assisted the manufacture of installations for power transmissions, and contributed to the development of shipbuilding and of marine engineering, besides many other industries, among which are the manufacture of structural materials and conveniences for domestic and public use.

Butte, the World's Greatest Copper Camp

Because of its apparently inexhaustible copper mines, Silverbow, the smallest county in the State of Montana, is one of the richest mineral districts in the world. In this little county is the City of Butte, the City of Great Future, founded on a mountain of copper, and rightly called the greatest copper camp on earth. Within the little area described by a radius of two miles from the centre of Butte, more mineral wealth is produced every twelve months than is yielded by the whole State of Colorado in the same length of time. Under this remarkable town, at once a noisy, bustling mining camp and a splendid metropolitan city, exists the very core of one of the most remarkable copper deposits ever discovered. Upon this copper foundation Butte is built.

The Butte copper mines are, indeed, the wonder of the world. During twenty years of development their production has increased to such an enormous extent that the district now furnishes more than twenty-five per cent of the world's entire supply of copper. Should the copper mines of the Butte district shut down for three months, there would be a copper famine in Europe and America, and every industrial centre on the globe would be affected thereby to an almost revolutionary extent.

The report of the Montana Bureau of Industry tells how millions upon millions of dollars have been invested in the copper industry in the Butte district. The bureau further shows how millions of dollars are paid out each year in wages to the men employed in the mines, while millions more go into the pockets of the Eastern capitalists. Mammoth hoisting plants, splendidly equipped with the latest and most improved machinery, dot the hillsides about the city. Reduction plants of amazing size, supplied with everything that the genius of two continents could devise for the economical treatment of ore, are located within convenient distances of the mines; while every appliance that would tend to lessen the cost of mineral production without diminishing the wages of the workers, can be found in successful operation here. Copper will be the chief production of the Butte district for the next quarter of a century. That is the judgment of geologists and mining experts, founded on a thorough examination of the ore deposits of the district. The State Labor Commissioner reports that the deepest shafts have only reached a depth of two thousand two hundred feet. It has been demonstrated at every copper mine in the district that the ore improves and is enriched with depth. In not a single copper mine in the district is there the slightest indication to show that the bottom of the ore deposit has been reached. The annual production of copper in this district is valued at $50,000,000.

Butte disburses more money to the men and women employed in its various industrial interests than any town of twice its size in the country, chiefly because labor here receives the highest rates of wages in the United States. Each of the various mining companies pays more than a million dollars in wages to the men employed at the mines. Add to this the amount paid by the smelters and the various mercantile and manufacturing houses, and the total is not far from $2,000,000 per month.

The Chief of the Montana Labor Bureau reports that the money on deposit in the banks of Butte amounts to more than twelve millions of dollars. By far the greater portion of this belongs to the men who go down into the mines, who work in the mills and smelters, and who assist in turning into the channels of the world the constant stream of wealth that flows from the hills.

The Lead Mining Industry

The lead industry of the United States is chiefly in the hands of the National Lead Company and the American Smelting and Refining Company. The National Lead Company, a combination of the majority of the principal lead companies, was organized in 1891 with a capital of $30,000,000, and now controls seventeen plants. In the production of more than 300,000 tons of metallic lead in 1902, about nine thousand men were employed. Throughout the whole of the year 1900 the lead markets in the United States were practically under the control of the American Smelting and Refining Company. During 1900, negotiations were begun which culminated in the spring of 1901, in the fusion of the interests of this company with that of M. Guggenheim's Sons.

As indicated by the report of the United States Geological Survey, the lead that comes into the market is drawn from various sources. From southeastern Missouri come lead ores, the bulk of which are treated in smelting works controlled and owned by the mining companies themselves. A part of these ores and some furnace material are purchased by outside smelters, chiefly those of the St. Louis district. Eastern desilverizers have also, at times, drawn upon this district for smelting material. Lead ores are obtained from the zinc lead mines of southwestern Missouri and southeastern Kansas, which is known as the Joplin-Galena district. Some of these are smelted in local works.

In Iowa a small quantity of lead ore, which is the product of the Dubuque district, is also smelted locally. This lead, being practically free from silver, is directly marketable. It is known as "soft lead." The same kind of product is also mined, in small quantities, in Virginia and Tennessee. A growing percentage of lead ores from Missouri, Kansas, Wisconsin, Iowa, and Illinois, is purchased by desilverizers, who use it in connection with the production of hard lead. Leal smelters also employ it as a carrier for silver. The "soft lead" does not, therefore, represent the entire output to be credited to the Mississippi valley.

By far the greatest quantity of lead, however, is obtained by the smelting of argentiferous lead ores mined in the Rocky Mountain region in mixture with ores of the precious metals free from lead. These are called "dry ores," and can be handled more economically by lead smelters than they can be treated locally by amalgamation or by other processes used for the extraction of gold and silver. Practically, the lead in these ores has become the carrier for the precious metals in the "dry" ores, and, generally speaking, it may be stated that the offerings of "dry" ores have been so heavy for many years that suitable lead ores always find eager buyers.

The census reports show a steady increase during the last few years in the quantity of lead produced in the United States. The net American product for 1900 is calculated to have been 270,824 short tons. The "Metallgesellschaft" of Frankfort on the Main estimates the total production of the world for that year to have been 826,070 metric tons, of which the United States produced 244,770 tons or more than twenty-five per cent.

The practice of using lead as the carrier for the precious metals and thus extracting them more cheaply than by the olden methods, has largely increased the quantity of the precious metal products. The value of the gold and silver, both smelted and refined, included in the $175,466,304 shown in the census as products, amounted to $130,205,375, or seventy-four per cent of the total. The value of fine gold and silver included in the total value of products is $94,153,824, the difference of $36,051,551 being the value of gold and silver in base bullion of smelters in which refining and desilverizing is not a part of the process.

The Zinc Mining Industry

The United States produced, during the year 1900, 23.5 per cent of the zinc mined in the world, or 110,612 long tons out of a total of 470,937. The record is not equal to that of the previous year, a falling off that is largely the result of labor strikes in Illinois during the second half of the year. The home consumption of spelter was small in 1900, and for the first time the United States became an important contributor to the world's market of zinc, exporting both metal and ore.

The great zinc mining region of the United States, situated in a district at the junction of Kansas with Missouri, and of Missouri with Arkansas, and including several counties in each State, produces annually nearly one-quarter of the world's supply of this metal. So far as the production is concerned, the other zinc districts of the country are practically insignificant. The zinc is found almost always near to the formations of lead ore, or galena, and occurs as sulphide, silicate and carbonate, the first named being the most plentiful. In most cases the lead ore is found near the surface, generally very near to the soil, and seldom more than ten feet down; while the zinc occurs at depths varying from fifty to two hundred feet. This fact is probably accountable for a curious incident connected with the history of this region. It was formerly considered a particularly rich lead district, and the mining of this metal was its leading industry. The zinc ore taken from the mines was for years discarded as worthless, the miners being ignorant of its real character, which was discovered only by accident.

When, however, the extent and value of the zinc deposits were determined, the character of the local industry was changed so greatly that lead is regarded as a kind of by-product, while the zinc yields an annual profit of about $15,000,000. Furthermore, so great has the demand become in recent years, that the value per ton has frequently risen above $30. The lands occupied by the zinc mines are leased by the owners for a ten per cent share in the profits, while the contractors or companies so securing them sublet small tracts on a twenty per cent basis, thus clearing ten cents on each dollar realized. Large fortunes have been accumulated in a few years by these methods, and virtually every one in the vicinity, who has an available capital, invests in it to some extent. Persons taking sub-leases sink shafts and work the ore, selling their product direct to the agents of American or foreign smelters who are ready to purchase all "jack," as the zinc ore is called. This is found in the mines in the form of thin sheets in crevices of limestone, in chambers or in breccia rock, which must be blasted down. Occasionally, also, it occurs in clay deposits in the form of loose material that may be loosened with pick and shovel. It also runs in all grades to nearly pure zinc sulphide, consisting of between sixty-two and sixty-six per cent metal. This compound is also known as "sphalerite," and, according to its general qualities, is popularly called "jack," "rosin jack," and "black jack." The average cost of mining and preparing the ore for market is about $14 per ton, although it has been done as cheaply as $10 per ton. The price is constantly rising on account of the various new uses for the metal, also from the large and constant foreign demand for the ore. This has led to the installation of improved machinery that greatly facilitates the process of mining, and, within the last two years, has nearly doubled the output.

Novel Features of Zinc Mining

Zinc mining presents some features wholly different from those that characterize mining in the ordinary gold, silver, or copper region of the West. In the localities where the latter metals are found, the country is mountainous, with here and there a mine extending several hundred feet into the mountain side. In the zinc country, however, the land is as level as farming land, and the mines are mere holes in the ground. In the principal zinc section of the United States, which, as before stated, is in southwestern Missouri, the man who digs out lead or zinc is usually a farmer or farm hand, and seldom follows mining as a permanent profession.

Formerly, when zinc was discovered on a farm, the owner and his family worked the find, in a primitive way, selling the ore as best they could. Latterly, however, Eastern capitalists have interested themselves in this region, and mining operations are now conducted not only on a larger scale, but in a more systematic and business-like manner. The region now produces, at surprisingly small cost, more than a million dollars' worth of ore each month, and hence southwestern Missouri seems destined to become, in a very short time, one of the greatest mining centres of the world. This centre is called the Joplin district, taking its name, probably, from the town of Joplin, which is the trade centre of the mineral belt.

Immense profits are made in the Joplin district in zinc mining, as the conditions are such that a ton of ore can be mined, cleaned, and made ready for sale at a cost of only $10 or $14 a ton. Again, more than one zinc mine, with a plant that cost less than $5,000, has been sold for $100,000, and in one instance for $200,000. Many of the owners of zinc-producing land prefer to lease it, accepting in payment a royalty of ten per cent of the ore the land produces. Owners of leased land, therefore, have refused prices as high as $10,000 an acre.

Marketing the Product of Zinc Mines

The method in which the product of the mines is disposed of and paid for is the most novel characteristic of this district. Instead of shipping the zinc ore to smelters, the mine owner sells his "jack," as it is called, to "jack" buyers who represent American and European smelters. One week's output comprises the extent of the ordinary transaction between buyer and seller. The buyers come to the mines in person and make their bids. If one mine owner declines the bid for his week's output, the buyer drives to the next mine and makes a similar bid. Of course his offer is a certain price per ton. As soon as he meets with an acceptance of his proposition, the "jack" buyer sends his wagons to the mines and hauls the ore to the nearest railroad for shipment to the smelters which he represents.

All settlements are made Saturday night, and miners, mine owners, and ore buyers gather in town for this purpose. Hence each mining town on Saturday evening is a scene of gayety and even revelry. Tradesmen do a lively business, for thousands of men, women and children throng the streets. Even the banks open their doors on Saturday evening for the accommodation of the mining men. Money, or its equivalent, is then passed from hand to hand in novel fashion. The check is made payable to the landowner upon whose property the ore was mined. He takes out his ten per cent royalty, and passes the balance to the original leaseholder, who takes out his ten per cent royalty and gives what remains to the mine operator, who pays his operating expenses out of the eighty per cent he receives. In paying the miners themselves, the prevailing custom is to settle in town, and every available place is used for that purpose. The mine operators gather in the hotel corridors and the back rooms of saloons, and every place where chairs and tables are convenient, and employés come there to receive their pay.

Labor Conditions at a Western Ore Mine

In the practical conduct of the various kinds of ore mines, tin, lead and zinc, in the Far West and Northwest, there are numerous points of resemblance to a lumber camp, in so far as concern the housing and boarding of the workers. This is necessarily true, since many of the richest mining districts are situated in wild and mountainous regions, far from civilization. In such mining camps a wide variety of workers is rerpresented; miners, blacksmiths, tool repairers, timbermen, carpenters, cooks and assayers. The men are lodged and boarded by the companies at cost, and are provided with good food and the best available living accommodations. Necessary supplies, such as shoes, clothing, tobacco, etc., are also furnished at the company warehouse, which is a veritable department store on a small scale. Labor under such conditions is, of course, well paid, the miner receiving, on an average, $3.50 per day, the greater part of which he saves, on account of the lack of opportunities for spending. Cooks receive about $90 per month, while their helpers, popularly known as "flunkies" and "slingers," are paid between $50 and $60. Living and boarding accommodations are provided in a building known as the "bunk house," at the average rate of $1 per day, although when a profit is made in one month the men get the advantage of a reduction of charges in the next. It is, in fact, to the interest of companies operating ore mines in sequestered regions, that the men be as well housed and fed as possible, since they are liable to change their working place as often as possible, simply for the sake of variety, and the aim is to keep them contented as long as possible.

Copper, Lead and Zinc Smelting and Refining

In former times the high cost of transportation made local metallurgical treatment a necessity. The mining of ores and the working of them were often carried on by the same firm or corporation. The crushing and milling of quartz, the separation of gold and silver from the ore, in concentrating and separating plants, under the cyanide or other processes, are allied with the mining industry. Copper and lead ores frequently contain paying quantities of gold and silver. A large amount of the dry ores of gold and silver free from base metals is smelted with the lead and copper ores, the base metals being merely "carriers." In a number of cases of smelting and refining the value of the precious metals exceeded the value of the base metals. In others the smelting of lead is only incidental to the extraction of the precious metals and the subsequent operations. The copper and lead smelters and refiners, in a recent year, produced 83,650,828 fine ounces of silver and 2,739,188 fine ounces of gold. During the same year there were 54,764,500 ounces of silver and 3,437,210 ounces of gold produced, not including the product of foreign ores and furnace materials treated in bond. The gold reported by the smelters does not, on the other hand, include the products of placer mining or products that do not pass through the smelter.

Lead smelting and refining is carried on in thirty-nine establishments, the greater number of which are located in Missouri, Colorado and Montana. Smelters and refineries are, ordinarily, conducted independently; just as, in the copper industry, the products of the smelters reach the refineries as raw material. The majority of the establishments in operation are engaged in smelting only; one is devoted exclusively to refining and desilverizing; a few engage in both branches of the industry. Ten thousand wage-earners are employed.

There are a few lead smelting plants, relatively unimportant, in Idaho, Montana, New Mexico, and California, built to reduce the ores locally mined. The great mass of the ores are hauled often great distances to meet the fuel and to encounter ores carrying the precious metals. The principal large plants are in Colorado, Utah, and Montana. An excellent illustration of this movement is afforded by the famous Cœur d'Alene district in Idaho, which yields over one-quarter of the lead mined in the United States. Not a pound is smelted locally, the concentrates and ore being shipped for reduction to the smelters in Colorado, Montana, Utah, Nebraska, Illinois and Puget Sound.

A large expenditure is necessary for the establishment of a fully equipped plant for the smelting and refining of lead, and this, combined with the location and character of the raw materials, has resulted in confining the industry to a few huge establishments. Of the thirty-nine establishments reported, fifteen are owned by one company, which thus controls a large percentage of the product.

In zinc smelting and refining thirty-one establishments are in operation, located principally in Kansas, Missouri, Illinois, Indiana and Pennsylvania, and employing altogether about five thousand wage earners. Kansas is the leading State in the production of spelter.

A significant movement is reported by the Census as having taken place in recent years in the districts close to the famous Joplin-Galena ore fields. Before the discovery of the Kansas natural gas belt, the ores were worked at plants located either in the immediate vicinity of the ore mines, or in the Kansas coal field, or close to coal in the Chicago district, or finally at the principal primary market for the metal, St. Louis. But very rapid change followed the successful drilling for natural gas at Iola, Cherryvale, and adjacent points in Kansas, large works being located in this district to take advantage of the cheap and metallurgically advantageous fuel.

The latest Census returns show a capital of no less than $139,354,138 invested in one hundred and seventeen establishments for the reduction of copper, lead, and zinc ores. This sum represents the value of land, buildings, machinery, tools, and implements, and the live capital utilized, but does not include the capital stock of any of the corporations. The value of the ores when reduced, in 1900, was $358,786,472. To secure this value involved an outlay of $2,150,018 for the salaries of officials and clerks, $15,973,626 for wages, $3,088,007 for miscellaneous expenses, including rent and taxes; and $279,655,350 for materials used for mill supplies, freight and fuel.

CHAPTER V

GOLD AND SILVER MINING INDUSTRIES

Production and Consumption of Gold and Silver—Gold and Silver Mining in Rocky Mountain States—Mining in the Cripple Creek Region—Mining in the Klondike—Cape Nome "Diggings"—Processes of Extracting Precious Metals—Methods of Placer Mining—Hydraulic Mining—Gold Mine Prospectors and Speculators

Production and Consumption of Gold and Silver

THE value of the world's production of gold and silver amounts annually to about $400,000,000, of which the United States produces about one-quarter. Of gold alone the world's production in 1900 amounted to 12,457,287 ounces, with a value of $257,514,700. This showed a loss in value from the previous year of $49,070,200, a loss ascribed to the war in the Transvaal, one of the world's most productive gold fields. The extent to which the war there had influenced the production of gold is shown by a comparison of the figures of production for 1899 and 1900. From a value of $73,277,100 it fell off to only $9,671,000. The principal gains in production were made by the United States and Canada, the former showing an increase in production of $8,118,000, the latter an increase of $6,600,000. The United States headed the list of gold-producing countries. The gains in production made by Alaska, Arizona, Colorado and Utah were chiefly instrumental in securing that supremacy for this country.

The world's silver output in 1900 amounted to 178,796,796 fine ounces, the high-water mark of production. The United States again led all other producers, with Mexico following close behind.

The total gold produced from ores mined in the United States in 1900 was 3,829,897 fine ounces, which had a value of $79,171,000. This amount is an increase of 392,687 ounces over the production of the previous year. The gold output of the United States has been steadily increasing for a number of years. The production of gold in 1902 was valued at $78,-666,000.

The total production of silver in 1900 from ores mined in the United States was 57,647,000 fine ounces, which had a commercial value of $35,-741,000. This was the largest output noted for several years, exceeding that of 1899 by 2,434,963 ounces. It was the first time in four years when any considerable change has been shown. Notwithstanding the fact that the price of silver has fallen from ninety to sixty cents within the last thirty years, the silver mines of Utah, thanks to the improved methods of extraction, are making larger profits than ever before.

The industrial consumption of gold in the United States in 1900 is estimated to have been $16,667,500, and in the world, approximately $75,-000,000. Although the United States leads the world in the production of gold, our imports of that metal exceed our exports by the sum of $12,866,-010. The stock of gold coin in the country, including bullion in the mints, at the beginning of the twentieth century, was estimated at $1,124,652,-818, and the stock of silver coin at $610,447,025.

Gold and Silver Mining in Rocky Mountain States

Considerably more than one-third of all the gold and silver mined in the United States is produced by the mines of Colorado. The value of silver produced in the United States in 1899 was, for example, $34,000,000, of which Colorado claimed $13,000,000. The total value of the gold output for the whole United States in the same year was $71,053,400, of which Colorado produced $25,982,800.

In a State which boasts of an annual mineral production of nearly $50,-000,000, in addition to its gold and silver, the occupation of mining is properly among the more highly paid classes of labor. The Colorado State Bureau of Labor Statistics reports that the wages of miners vary according to locality and circumstance, but run from $2.50 to $4 per day, $3 being considered fair wages for a miner in most mining camps. The number of miners in the State working for less than $3 per day is probably greater than the number of those receiving more than that amount. The average wage paid, if all the miners in the State be considered, is slightly less than $3 per day. At some of the more isolated mines, the men are paid as high as $4.50 a day. The number of hours' work for a shift is from eight to ten, by far the greater majority of men working ten hours. Engineers, firemen, pumpmen, and sometimes others, frequently have twelve-hour shifts. Trammers receive from $2.50 to $2.75; cagers, from $2.50 to $3,25; nippers, from $1 to $2; timbermen, from $3 to $4; topmen, from $2 to $3; laborers, from $2 to $2.50; engineers, from $3 to $4.50; pumpmen, from $3.50 to $4.50; ore sorters, from $2 to $3; blacksmiths, from $3 to $5 per day.

In many mines a system of compulsory insurance obtains. Men working in and around mines are insured upon such terms and under such conditions as the management may make with the insurance company assuming the risk. The consent of the workman is neither requested nor required. He becomes insured by reason of his becoming an employé of the company.

The miners of Utah seldom receive more than $2.50 a day, but living is cheaper in Utah than it is in Colorado. The mines are drier and the expense of rubber clothing is saved. In Montana and Idaho, the average daily earnings of the miners amount to $3.25. The miners of Colorado, Montana, Utah, and Idaho are employed about 250 days in the year.

The Leadville district in Colorado showed in 1900 a gain of $504,280 in gold over the production of 1899. The notable feature of this camp is the enormous outlay necessary for pumping water. It is done under an agreement by which the several companies divide the cost on the basis of the value of their output. The cost in 1900 was $1.14 for each ton of ore raised. Over twenty-eight tons of water was raised for each ton of ore.

Mining in the Cripple Creek Region

Since the discovery of gold at Cripple Creek, in 1891, that district has developed as under the touch of a magician's wand. Towns have literally sprung up there in a night. The camp now covers more than one hundred and thirty square miles, and in it are numerous towns, besides the cities of Cripple Creek and Victor, which have populations of twenty thousand and eight thousand, respectively. The smaller towns are Altman, Anaconda, Elkton, Lawrence, Goldfield, Gillett, Mound City, Cameron and Requa. With each development of a new part of the camp another town has sprung up, meeting some special need. These are now closely connected by straggling lines of cabins and dwellings, and the larger towns are joined by steam railroads and electric street car lines.

The visitor to Cripple Creek who counts upon seeing a camp of the "rip-roaring" type, made familiar by Bret Harte, will be thoroughly disappointed. It can not be denied that he will behold many features characteristic of the life of "boom" places in the West, but he will also see a very sober, earnest population, engaged in the business of extracting precious metals from the mountains. He will find the names of eight thousand miners on the pay-rolls of companies that altogether disburse each month the sum of nearly $1,000,000. He will also find that the estimated total investment of $50,000,000 in the camp is represented by valuable real estate, railroads, business blocks, and magnificent mine equipments. That all this has been a wise and paying investment is sufficiently attested by the figures in the case. During the year 1901 Cripple Creek produced $25,500,000 in gold, bringing the total gold production up to a sum exceeding $100,000,000. In that one year the mines paid nearly $5,000,000 in dividends.

Development work in this district, as reported by the Geological Survey, has been heavy during the past few years, but the area of good gold-bearing territory has not been materially widened. Nearly all gold producers keep development work ahead of production; and the reserves in sight are enormous. Twelve shafts, on as many different properties, are down over twelve hundred feet, and the ore bodies at this depth are very promising.

Perhaps the most significant feature of progress is the tendency to consolidate small properties by the organization of large companies and by the outright purchase of single claims on the part of heavy investors. A large amount of valuable territory has by this means passed into strong hands, and extensive development operations are certain to result. The new mills and reduction works constructed during recent years, with the additions made to old works, give an increased capacity of about 1,200 tons of ore a day.

Mining in the Klondike

Though experienced miners declare that it will take until 1910, at least, at the present rate of production, to work out the gold creeks of the Klondike, yet certain it is that the boom period is at an end. Gone are the days of abnormally high wages and of exorbitant prices. The mining industry in this region, like all ordinary business, is now conducted on a normal basis. The one thing that may cause a half-hearted revival of old times in the Klondike is the discovery of gold in the hillsides above the beds of the creeks. It is believed that, in nearly all cases, when the pay streak gives out in the creek, it can be found again in the hillside bordering the creek. It is estimated that the number of men still engaged in mining in the Dawson regions of Alaska is about fifteen thousand. One-half of this number are working for wages. The others are engaged on "lays" ore, working individual claims, or prospecting.

The wages paid during 1902 cut the old rate in half: that is, from $1.50 an hour in 1898 to seventy cents an hour in 1902, or five dollars a day with board. The old rate of $1.50 an hour, however, is still observed in paying for mechanical labor, such as woodworking and blacksmithing. Cooks are still paid as much as ten dollars a day, and waiters receive from twenty-five to forty dollars a week, with board.

Cape Nome "Diggings"

Gold was discovered in the beach sands of Cape Nome in 1898, and the yield from beach and tundra in that locality was $2,400,000 for that season. A shovel, a pick, and a rocker were all that was required to equip an able-bodied man for profitable operations, and the handsome results gained by hundreds caused a tremendous influx of gold hunters in the spring of 1899. By the time the outsiders arrived, however, the beach was practically worked out, and those who did not abandon the territory scattered over the interior and up and down the peninsula, searching the creek beds and tundra. Valuable claims were developed in a number of localities, as shown by the fact that the total yield credited to this territory, which is about three hundred and fifty miles long by one hundred miles wide, for the year 1900 was $5,100,000.

The output of the creeks alone has amounted to more than $1,000,000 annually ever since the discovery of gold in the Nome district. With the remarkable developments of beach diggings, since 1899, however, the output for the next few years promises to come nearer to $3,000,000. Four men working eight days with one rocker have taken from a space twenty-four by thirty feet, and three feet deep, $5,200, or more than $162 a day for each man.

The beach claims are found where streams empty into the ocean, bringing gold from the placers above. The gold, black sand, and garnets are concentrated in layers, or "pay streaks," from one-fourth of an inch to two inches in thickness. In spots they are very rich, as at the mouth of Daniels Creek, where the action of the waves has concentrated values to such an extent that miners in the spring of 1900 took out from $10,000 to $15,000 with a single rocker. It has been commonly thought that the black sand which is associated with the gold is itself gold-bearing, but careful investigation determines that this is not the case. The high specific gravity of the sand has caused it to be deposited by action of the water with the gold.

The tundra claims are of value only where they are located upon the bed of an old stream. These claims might properly be called beach claims, as they are commonly above the present water level of adjacent streams. The most productive claims are located on Anvil Creek, Glacier and Snow Gulches, Dexter Creek, Dry Creek, Nikola Gulch, Topkak and Daniels Creeks, Gold Run, Crooked Creek, Ophir Creek, and Sweetcake Creek.

While pay dirt is widely distributed, and, in many places exceedingly rich, yet the depth, when compared with the gravel banks of California and other fields in the United States, is small. The average depth of pay dirt in the Cape Nome district is only about two feet. This gravel thaws out on exposure to the sun, and can be very easily handled with the shovel. The country is flat, and there is practically no dump, which would be a serious drawback to hydraulic mining, even if there was sufficient dirt to handle.

Processes of Extracting Precious Metals

Three processes are used in extracting precious metals from ores: first, the process of crushing the ore in stamping mills and washing out the metal; second, what is known as the cyanide process; third, the process of melting the ore at smelting works.

The melting process is the newest and most in favor. In 1899, the seven principal smelting works in Colorado, and others in Salt Lake City, were consolidated under the general title of the American Smelting and Refining Company. This company, which now controls eighteen plants, and has a capital of $65,000,000, does most of the melting of ores from the mines in the States of Idaho, Colorado and Utah. Improved methods in the manner of extracting metals from ores are generally responsible for the present healthy condition of the precious metal mining industry. In works of this character wages vary with the skill of the workmen. In Colorado and Utah, laborers receive on an average $1.40, furnacemen $2, and crushermen $2.40 for a working day of eight hours.

Methods of Placer Mining

In many gold bearing regions the methods of mining most in vogue are various forms of placer working. The word placer originally meant the washing of gold from the surface sand of stream beds, but as the evolution of placer mining grew from the use of pan and rocker to that of the river flume and the hydraulic apparatus, the word has been extended to cover mining operations of all kinds except that on ores in veins or deposits.

That primitive utensil for the separation of gold from sand, the pan, is still in use. It is a strong round iron vessel, holding about half a peck. The miner fills this pan with the supposed gold-bearing earth, and, taking it to the creek and holding it level, sinks it gently under the surface of the water. He then shakes the pan from side to side until all the sand and mud have spilled over the rim and only a tablespoonful of the contents remains. If there is any gold in that particular pan, it can now easily be found. The pan, indeed, is still the principal instrument used for testing the value of dirt in placer mining, and as long as that form of mining continues, it is likely to remain an indispensable tool.

The instrument next in importance to the pan is the rocker, which consists of a wooden box on a pair of rockers with a hopper at one end. The difference between the rocker and the pan is that the pan is sunk beneath the surface of the water and the miner fills the rocker with water by the use of a hand dipper.

After the rocker comes the sluice-box. This is a board affair, twelve feet long and four feet wide, with a riffle bar attached to its bottom to catch the gold. A large number of these boxes are joined together until a line perhaps three hundred feet long has been formed. Into the head of this sluice the dirt is shovelled, a stream of water is turned upon it, and while the dross is thus washed down, the gold is caught behind the riffle bars. The newer sluices, it should be added, are paved with rocks instead of riffle bars. Each sluice-box does the work of five men. Thus, by estimating the miner's wages at $3 a day, the relative cost of treating a ton of material by each of the three methods just named is as follows: Pan, $6 to $8; rocker, $2 to $3; sluice-box, 75 cents to $1; hydraulic method, one-half cent to eight cents per ton.

Another method of mining low-grade placer ground—not so picturesque but very effective—consists in submerging the placer ground under water and excavating the gravel by a dredge. This has proved effective where the bed rock is soft, as at Oroville, California.

Of all the modes of extracting gold from the earth the most extraordinary is that called river mining. By this process a river is lifted bodily out of its bed and carried in pipes for thousands of feet, when it again enters its natural channel. By means of a diverting dam the water is raised high enough to turn it into a flume, from which it is conveyed the desired distance. Wonderful stories are told of great fortunes which have been made by this system of mining. Though the mining season under these conditions lasts but a very short time, the period being from a few weeks to a few months, it is not unusual for the miners to take out from $500 to $5,000 in gold in a single day. It is related that a company mining in the Feather River, in California, in 1857, flumed that stream for thirty-two hundred feet at an expense of $120,000. Only fifty days were available for work before high water came and shut down the mine, yet in that time $680,000 was taken out, a single day's product reaching as high as $21,000.

Hydraulic Mining

The wholesale method of working placers is by means of the hydraulic monitor or "giant." By this method water is brought in pipes from streams which have their source in more or less distant mountains. The pipe delivers the water into the iron "giant," which in turn directs the stream against the bank. From the nozzle the water is ejected with terrific force, tearing away the gravel banks against which it is driven, and thus accomplishing the process of disintegration. This "hydraulicking" process, as it is called in mining parlance, permits gravel which contains only a few cents' worth of gold in a cubic yard to be worked with profit.

Hydraulic mining is the cheapest and most profitable method of extracting gold from auriferous soils. Large bodies of gold-bearing earth are washed away, and, in the process, the gold is saved. The "tailings" or refuse dirt sometimes may cause trouble, in filling up river beds, impeding navigation, and causing overflows. In fact, so destructive was hydraulic mining to many other interests that it was forbidden by statute, except along certain streams. The hydraulic elevator saved the hydraulic process from disappearance. The debris is lifted out of the way by this device, and deposited as desired. This simple process has added probably ten million dollars' worth of gold a year to the California output. Experts class all mining as either "quartz" or "gravel," subdividing the latter into shallow, or modern, placer mining, and deep, or ancient, placer mining. The former process was largely in vogue from 1848 to 1860, including the handling of deposits of existing streams. The latter method is adapted to the beds of ancient rivers of a prehistoric age. In these beds auriferous gravel was accumulated in vast quantities. Some of the deposits of this gravel are as much as six hundred feet in thickness. Over these deposits are layers of clay, alluvium, or basaltic rock. Tunnels are driven into this deposit, and the gravel is removed to the surface for sluicing. The "hydraulicking" process is sometimes used to remove this superincumbent material. There are more than four hundred miles of these ancient river beds in California. From their gravels the average yield of gold is about $3,000,000 per mile. The total amount still available is enormous, equal, in fact, to the entire output of California from 1848 to 1890.

The cost of mining varies, of course, with the process. Quartz mining, for example, costs from $3 to $10 per ton of material. The drift mining method costs from 75 cents to $4 a ton. Cheapest of all is "hydraulicking," which costs from one and one-half cents to eight cents per ton of material.

A single "hydraulicking" plant may cost a million dollars, as it involves so many things. First, there is the purchase of gold-bearing land. Then there are water rights to be acquired. Often great storage reservoirs must be constructed with perhaps miles of flumes. Iron pipes and heavy machinery must frequently be hauled by wagons over almost impassable roads. An electric system may have to be installed. And the many workmen themselves require a large fund. Abandoned mines have been profitably worked by this method. The North Bloomfield Mine has been made valuable by this method of working. This mine includes the bed of a pliocene river in Nevada County. The auriferous gravel here lies buried beneath three hundred feet of rock and soil. The huge "monitors" tear away the earth at the rate of 2,500,000 cubic yards a year. The yield of this mine is about $1,000 a day. The huge granite dam built by this company forms a reservoir, holding 930,000,000 cubic feet of water, which is conducted by a little canal or by box flumes forty-five miles to North Bloomfield. Here is the distributing reservoir. From this the water is led in sheet-iron pipes, from fifteen to twenty-seven inches in diameter. The annual cost of keeping this water system in good order amounts to about $15,000. The first cost of introducing the water was $716,000. The "monitor" is a cast-iron nozzle about nine feet long, with a heavy breach on a universal joint, so that it has a free movement in all directions. Its rifled grooves give a twist to the water, which has a pressure head of five hundred feet. An ingenious "deflector" lowers or raises the nozzle.

Night work is made possible by a great electric searchlight. The material is washed into sluice boxes, five feet by eighteen inches. These are paved with "riffles" or blocks of wood. Quicksilver is thrown into the sluices every little while. This quicksilver forms an amalgam with the gold particles. As it sinks between the "riffles" it is easily removed by hand. At this mine the main sluice is nearly a quarter of a mile long. Most of the gold is of course saved in the first part of the sluice.

It is interesting to note that in the case of a large mine in Trinity County, California, a profit was made by "hydraulicking" a high hill which yielded only five cents per cubic yard of dirt, and the costs included keeping up repairs on a long tunnel and forty miles of ditching to bring the water to the mine. The record for cheap hydraulic mining was made in the last year of the century, when a mine in Trinity County paid all expenses on earth yielding only three cents per cubic yard.

Gold Mine Prospectors and Speculators

The uncertainty and high speculative character of mining claims have made necessary the services of expert metallurgists. The buyer is thus protected from the many attempts at fraud which seem almost inseparable from the business. The duty of the expert mining engineer is to examine the quantity and quality of the ore and pick up general information concerning the mine. He ought to be enough of a lawyer also to see that the formalities of "registration of claims" have been complied with. He must assure himself that the requisite one hundred dollars' worth of work a year has been done on the claim, as this perfects the title. Neglected claims may be "jumped" by others. Mining claims vary in size from a parallelogram fifteen hundred feet by one hundred and fifty feet to those of six hundred feet in width, the length remaining the same. Until a recent Supreme Court decision, extralateral rights were allowed. By this decision, however, no extralateral rights exist unless the outcrop crosses both end lines of the claim. Much litigation has been incident to mining, owing to this vexed question. In Canada the claims are fifteen hundred feet square with no extralateral rights whatever. In South Africa the claims are also square. Inquiry must be made as to dowry rights also. Fortunes have been lost because the wife of the grantor did not sign the deed. The expert engineer must likewise look carefully into the question of the natural facilities of the location. Wood and water and some sort of transportation are absolutely necessary. Without these the gold mine may be practically worthless.

The fraudulent treatment, or "salting," of a mine, in order to deceive the purchaser, is a matter of much reprehensible ingenuity. The "salting" must not be overdone, lest the tentative fire-assay indicate gold in preposterous quantities. One old trick was to shoot flakes of gold from a gun into the ore vein. A solution of chloride of gold may be injected by syringes into the ore, even after it has been sealed up in bags. The surfaces of the standing ore may be painted with a solution of auric chloride. Gold in various mediums may be smuggled into the assayer's laboratory, the use of which is offered to the buyer's agent. Even in blasting there may be deception. Gold is sometimes put into the tamping. The dynamite cartridge is inserted properly, but the hole is tamped with mud which has been "doctored" with gold. The explosion scatters the gold particles, drives them into the rock, and the deception is almost impossible to detect.

Fictitious and fraudulent records are also manufactured, the same bar of precious metal being brought back from the government assay office, remelted, and added to the next month's record. By continuing this process for some time the United States assay certificates will indicate an enormous monthly output, nearly all of which is fraudulent.

The only way for a purchaser's expert agent to eliminate fraud on the part of the seller is to have the whole mine turned over to him and his picked assistants. Four or five hundred tons should be taken for a sample. The nature of the ore and the percentage of gold can be thus obtained. Some ores which contain gold, even to the extent of forty or fifty dollars a ton, can not, from their chemical composition, be worked, as the expense of the treatment is greater than the value of the resultant gold. Here is where the judgment of the expert comes in. His position is a most responsible one. Upon his decision millions of dollars may be won or lost. He must therefore take absolutely nothing for granted, but must, by "mill-runs" and all other means possible, make actual personal observations and tests, and know whereof he speaks.

CHAPTER VI

PETROLEUM AND MISCELLANEOUS MINING INDUSTRIES

The Petroleum Industry—The Production of Petroleum—Petroleum Refineries—The Standard Oil Company—The Coke Industry—The Natural Gas Industry—Natural Gas Industry in Kansas—Mica Mining—Diamond Mining—The Precious Stone Industry—The Asphalt Industry—The Man Who Gave Asphalt to Commerce—Production of Asphaltum

The Petroleum Industry

IT has been said of American petroleum: "It is carried wherever a wheel can roll or a camel's foot be planted. The caravans on the Desert of Sahara go laden with astral oil, and the elephants in India carry cases of 'standard white.' In many a distant land the heathen sat in darkness until the oil merchants came. The light the latter brought was more welcome than any missionary's message. There is many a place in the far interior of China where a case of 'standard oil' is a familiar sight to men who never heard the name of America. It is one of the chief objects of interest among the traders at treaty ports."

The transportation of American petroleum to the far corners of the earth keeps an enormous fleet moving the year round. Over seventy steamers and also a great number of sailing vessels carry the fluid in bulk, and a third great fleet transports oil in barrels and cases. In carrying the oil from the wells to the markets here at home, over 25,000 miles of pipe line are used—"a bracelet for the Equator"—and nearly ten thousand tank cars, which, if coupled in one train, would reach from New York to Philadelphia.

The first pipe line was built in the oil region by Sam Van Syckle of Titusville, Pennsylvania. He thus sent oil through the earth, as it were, from Pithole to Miller's Farm, a distance of four miles. Drivers of oil wagons thereupon set up a wail as great as that raised by workmen in other occupations when machinery was first introduced. But the pipe line was an invention of inestimable value to the petroleum industry. The entire oil region is to-day a huge grill formed of pipe lines. From the Pennsylvania fields oil is forced through the pipes to the great refineries in Cleveland, Buffalo, New York, Baltimore, and Philadelphia; and from the Ohio fields to Chicago and Cleveland.

The recent tendency to substitute oil for coal in supplying the motive power for passenger locomotives on many railroads is certain to create an increased market for petroleum within four or five years. The Beaumont

(Texas) field is likely to supply this growing demand. On the Santa Fe and Southern Pacific lines, which are already burning oil in their locomotives, the freedom from dust and smoke is said to give great satisfaction, while other conditions are hardly less satisfactory. For railroad systems convenient to the new oil areas, petroleum will probably supply the motive power in the immediate future.

The Production of Petroleum

Over 63,000,000 barrels of petroleum, with a value of more than $73,-000,000 were produced in the United States during the year 1900. This is the largest production for any year in our history, but it is not likely to remain so. New oil wells are being discovered every year and the production is steadily increasing. Owing to the flattering promises of the new oil fields in Texas and California, which are expected to develop materially in area and productive capacity, large gains are looked for in the country's annual rate of production. It is prophesied that, before the close of 1903, tanks, pipe lines, and other storage and transportation facilities now wholly inadequate, will have been so perfected as to utilize the wealth of these newly-discovered areas of petroleum.

Corresponding to the steady growth in production, there is a continual and gradual increase in the consumption of American petroleum, as shown by statistics given in a report of the Pittsburg Chamber of Commerce. In 1861 and 1862 the exports from the United States amounted to only about 80,000 gallons. So rapidly did the export trade increase, however, that ten years later over 461,000,000 gallons of kerosene were shipped across the ocean. The report of the United States Geological Survey places the figure at 514,561,719 gallons for the year 1881, and estimates that the revenue from this source amounted to $48,556,103. The same authority gives the amount of exported petroleum during 1900 as no less than 975,123,476 gallons, having a value of $73,276,282. New markets and new uses for petroleum are appearing in every nation, and the demand for "more light" from Brother Jonathan's storehouses grows with the advance of civilization. The raw material has, in the last forty-five years, sold from forty-one cents to twenty dollars a barrel, with about two dollars and a half as the average.

The centre of the oil industry in the United States has, for a number of years, been Pittsburg, but so vast is that city's output of manufactured products, that this interesting fact is frequently overlooked. It is, nevertheless, through its trade in oil, that western Pennsylvania is best known throughout the world. The Pittsburg district supplied in a recent year more than 34,-000,000 barrels of the world's supply of petroleum. The district includes eight refineries.

Petroleum Refineries

To produce refined petroleum to the value of $123,929,384, during 1900, materials to the value of $102,859,341 were consumed, showing a difference in value between the raw material and the finished product much smaller than is common in industries of a more complicated character. The Census returns show that the value of the products of the establishments engaged in this industry increased forty-five per cent during the last decade. Notwithstanding the fact that there has been a decrease in the number of refineries, there has been an increase of seven per cent in the number of wage-earners, and of fourteen per cent in the amount of wages paid. Twelve thousand wage-earners were employed by the sixty-seven establishments operating the seventy-five refineries, making an average of one hundred and sixty-three employés to each refinery. There is an invested capital of $95,327,892, which represents the value of lands, buildings, machinery, tools and the live capital required to carry on the business, but does not include the capital stock of any of the corporations. The petroleum refining industry is confined to twelve States, in seven of which there are only one or two refineries. The number of refineries in some of the States is as follows: California, four; New Jersey, six; New York, nine; Ohio, nine; and Pennsylvania, thirty-nine. Colorado has two refineries, while Texas, West Virginia, Indiana, Kansas, Maryland and Michigan each have one. The total number of refineries in the United States during the census decade is shown to have decreased from one hundred and six to seventy-five, a loss of thirty-one. Part of this decrease has been due to the consolidation of two or more refineries under one management. The figures show a large relative increase in the number of women employed, and a decrease of sixty-one per cent in the number of children. There appears to have been comparatively little change in the number of men employed in the administrative or clerical force, while in the wage-earners the number increased nine per cent and the total wages fifteen per cent. Crude petroleum is measured by barrels of forty-two Winchester gallons; refined petroleum, by barrels of fifty gallons.

The Standard Oil Company

The Standard Oil Company, organized in 1882, is the most conspicuous of the world's oil refiners. It controls twenty-six plants, has an authorized capital of $110,000,000, owns property in every civilized country, operates a large fleet of oil steamers and thousands of miles of pipe lines, employs 10,000 wage-earners in its refineries and thousands of other persons in the auxilliary branches of its business. The company frequently has been criticised as an unjust monopoly. In this connection, the testimony of John D. Archbold before the Industrial Commission is interesting. He said:

"It is true beyond all question that the result to the public of the operations of the Standard Oil Company has been highly beneficial and not hurtful, as its enemies claim. It has given the public goods of vastly improved quality at greatly reduced prices. It has, by its effective system of distribution, supplied this most necessary article for domestic consumption promptly and cheaply to the most remote sections of our country, and, indeed, to the world. Beyond all this, however, it has given to the community at large an opportunity for investment in the business itself which it could never have had under the old system. Thus there are to-day partners in the Standard Oil Company as shareholders to the number of fully thirty-five hundred, where less than one-twentieth of that number would have been interested under the old system.

It has been most beneficial in its effect on labor. There could be no stronger evidence that the labor involved in its vast operations has been well paid and contented than lies in the statement that for more than a quarter of a century, since the Standard Oil Company began its operations, it has scarcely had a serious strike of any kind among any branch of its employés—one or two temporary strikes among some special classes of workmen in sympathy with other labor organizations who were striking, constituting the sole disturbance. Indeed, it is not too much to say that to the loyalty, zeal, and intelligence of its vast army of about thirty-five thousand employés, the company is largely indebted for its strength and efficiency.

I unhesitatingly express the opinion that when the history of our time is written, it will appear that the marvellous commercial and industrial evolution which we are experiencing in this great country marks one of the most important steps of progress in our country's history. It will prove to be of immense value to all classes of our population. The investor, the consumer, and the laborer will all be benefited by it; the investor by the better security which arises through amplitude of capital for the business contemplated, and the combination of talent in the various departments of administration; the consumer, through improved processes resulting in better products at lower prices, and more efficient distribution; the laborer, by steadier employment at better wages and a better opportunity for improvement in condition, if special talent is shown.

The Coke Industry

The coking industry is generally carried on in direct connection with the mining of coal. In many cases the whole product of the mines, except the coal used at the works or consumed by the workmen, is charged into ovens. In a few instances the coal is transported to a distant point before being made into coke. There is a case of this sort in the State of Wisconsin, where the coke is made from coal mined in Pennsylvania. The major portion of the coke manufactured in the United States is made in the ordinary type of beehive oven. The principal item of expense is the cost of the coal, this being the only raw material employed. Coke is produced in twenty-two States. Pennsylvania leads in the industry, making about sixty-seven per cent of the whole output. The other coke manufacturing States may be mentioned in the order of their prominence, West Virginia, Alabama, Virginia, Colorado, Tennessee, and Massachusetts. In the latter State coal is imported from Nova Scotia, for the plant at Everett, near Boston, and gas for domestic consumption is made the primary product.

Hardly any coke is now made in pits or mounds, for a vast improvement has been made in the process of manufacture. The newest process is by the retort or by-product coke-oven, wherein the volatile constituents of the coal, other than the gases, consumed in the distillation process are recovered, these constituents being wasted in the ordinary beehive oven. Among the successful by-product ovens used in this country are the Semet-Solvay, the Otto-Hoffman, and the Newton-Chambers. Of these the first and second are retort ovens. The coal is distilled in a chamber heated from flues in which the gas obtained from the coal is burned, the process of coking being a distillation rather than a combustion of the coal. The Newton-Chambers ovens are of a different type. They are beehive ovens with apparatus for recovering the tar and ammonia contained in the coal, but consuming the gas in the process. Gases are sometimes made the primary product of these by-product ovens. But even when coke is a secondary product, it is suitable for metallurgical purposes. The first ovens of the by-product class in the United States were built at Syracuse, New York, in 1893. There are more than a thousand of them now in operation, producing annually about 907,000 short tons.

The Connellsville district, in Pennsylvania, is the most famous coke region not only of the United States, but of the world. The total production of this region has at times exceeded fifty per cent of the total coke product of the United States. The total number of coke ovens in operation in this district is 22,000, with a weekly production of 240,000 tons. The demand for Connellsville coke is far in excess of what the region is able to produce, even if every oven were kept hot night and day throughout the year. The H. C. Frick Coke Company owns almost all the largest plants. Another company in the region has nearly one thousand ovens, supplied by ninety mines.

Nearly 1,800 new ovens were added to the Connellsville district in 1900, and 686 were in course of construction at the close of the year; the production during that year amounting to 10,000,000 short tons, valued at $22,000,000. The value of the product in 1900 was nearly double that of 1898. The average price per ton realized ($2,234) was the highest ever recorded.

The Natural Gas Industry

No other fuel, natural or artificial, has the value and convenience of natural gas. This statement is contained in the reports of the United States Geological Survey. All other fuels require a large amount of labor to fit them for combustion, and most of them must be converted into gaseous form before they can be consumed. Natural gas, however, has reached that form, and is in condition to take to itself the amount of oxygen necessary for combustion. The great natural reservoirs require only to be pierced by the drill when the gas may be brought to the surface, where it is at once ready to be used as fuel, or to become a direct source of power in the gas engine. No preparation is necessary for its combustion and no residue is left. It is easily distributed in pipes to points of consumption many miles distant, and no known method for the distribution of power equals in economy that of the transportation of a gaseous fuel in pipes.

The great natural reservoirs of this ideal fuel, so far as known, are found in the northwestern flank of the Appalachian Mountains, extending from northern-central New York to central Tennessee, and on the summit of the great Cincinnati arch in northwestern Ohio and northern Indiana. It is more or less associated with the pools of petroleum found within these areas. These two fields furnish about ninety-seven per cent of all the natural gas produced in the United States. Outside of these fields there are smaller fields of natural gas in Kansas, Colorado, California, Illinois, Missouri, Texas, and South Dakota. The original pools have all suffered great depletion, as a vast quantity of gas has been allowed to escape into the air in the earlier development; and when first used it was consumed in the most extravagant manner. Only after the visible supply had been greatly lessened was it realized that the proportion already taken out of the reservoirs was a large percentage of the original volume. The introduction of the meter and other appliances for the more careful manipulation of gas wells and pipe lines has brought about a large saving in the amount of gas required to produce the same heating effect.

The value of natural gas sold in the United States in 1900 exceeded that for any previous year, although the quantity was less than was sold several years after it was introduced, when the price was very low. The lowest values recorded were in the years 1895, 1896, and 1897, when it was slightly over $13,000,000 a year. Since 1897 the price and quantity have both increased. The value of natural gas consumed in 1900 was $23,606,463, as compared with $20,074,873 in 1899, a gain of $3,531,590. Allowing eighteen and one-half cents per thousand as the average price at which it was sold in 1900 the amount sold would represent, in round numbers, 127,602,500,000 cubic feet. This quantity would fill a vessel having an area of one square mile to a height of 4,580 feet, if it were possible to have the same density throughout. If this amount of gas were burned in an economical way, it would replace 6,380,000 tons of coal. The total number of wells producing at the close of 1900 was 10,506, as compared with 9,738 producing wells at the close of 1899, a gain of 768 wells. There were 991 wells abandoned and 359 dry holes or non-producing wells drilled in 1900. There were 11,570,204 feet of pipe line two inches and larger, amounting to 2,191 miles, completed in 1900. The total length of all natural gas mains of two inches and larger reported in the United States at the close of 1900 was 21,048 miles. The largest-sized pipe in use is thirty-six inches in diameter.

Natural gas has been tapped voluminously from newly discovered sources, notably in the Texas oil fields and in the Iola and Neosho oil fields of Kansas. Though the natural life of some of the largest present sources of supply is now limited by scientists to forty or fifty years, it is reasonable to suppose that new sources, such as those mentioned, will continue to be discovered.

Natural Gas Industry in Kansas

Probably no part of Kansas has grown more rapidly or experienced a "boom" of a more substantial nature than has the gas belt comprising the southeastern part of the State. This is chiefly due to the natural gas which is found in this district in almost inexhaustible quantities. A report of the Labor Bureau of the State says that the area of the oil and gas fields is estimated at about eight hundred and fifty square miles. More than one hundred wells have been drilled, which yield either oil or gas. Of this number, Allen County has about thirty-six, the average depth of which is nine hundred feet, the estimated output ranging from two to twelve million cubic feet every twenty-four hours. The pressure averages from three hundred to three hundred and fifty pounds per square inch. The great value of natural gas as a fuel in manufacturing has become a matter of concern to coal-producing counties, a comparison of heat units in gas as compared with coal showing that 20,000 cubic feet of gas are equal to one ton of the best bituminous coal. It is estimated that the capacity constantly on tap for commercial consumption equals one hundred million cubic feet every twenty-four hours. The city of Iola, in Allen County, Kansas, is the centre of this gas district. Many manufacturing enterprises have moved from other States to this part of Kansas to take advantage of the cheap fuel. Cement is one of the articles of manufacture produced with this cheap fuel. One factory alone in the city of Iola employs over four hundred men every year. The output of this factory amounts to three thousand barrels a day, or 1,095,000 barrels a year. This does not seem large at first thought; but it means a train load of thirty cars every day, or a solid train seventy-two miles in length for the year. Many other manufacturing industries may be enumerated, such as brick plants, planing-mills, carriage factories, and bottling works, all of which are using the natural gas of Kansas.

Mica Mining

The principal agency of the large mica interests of New York, Chicago and Boston is at Spruce Pine, a hamlet in North Carolina. Every one knows that mica is a very valuable mineral. A man can easily carry on his arm a parcel of it worth several hundred dollars. The blocks from the mines are split into sheets, and these, in turn, are cut into squares or rectangles. The sizes vary from 2 x 2 to 8 x 10 inches, although this is not the maximum. The merchants carry 183 different sizes. The selling prices run from 60 cents a pound, for the smallest size, up to $13 a pound for the size measuring 8 x 10 inches. The majority of the mines are cut or tunnelled into a hillside, a very few being reached by deep vertical shafts. Water sometimes causes trouble, even compelling the abandonment of some small mines. The mica-bearing vein of quartz is followed by the miners. Very little timbering is necessary as a rule. Waste material is carelessly disposed of at random, without regard for future complications. The mining of mica is free from many of the disagreeable and expensive features incident to the mining of other minerals. Upon locating a vein of mica-bearing quartz, the cap rock is blasted away. The black mica is disclosed in the white quartz. To get a block of mica out whole, resort is had either to a very light blast locally termed a "pop-shoot," or a big blast which tears away the rock in large masses. In the former case the rock is merely loosened, and the small irregular block of mica is removed. The block of mica, generally about 10 inches long by 4 inches deep, is usually split open with a knife, to determine the quality of its cleavage. A defective block is called "gummy," and may be sent to the grinding mill. When a big blast is used it often splits the block of mica into two parts, and the "cleavage" is at once perceptible. The mica product of each day's work is stored temporarily in the little "mica-house," adjoining the mine.

The process of splitting the mica for the market is often the work of boys and women, and is done with a simple pocket-knife. Spots mar the value of mica, reducing it to the Number 2 grade. Simple as the process of mica cutting is, it nevertheless requires especial skill. After it is split the cutters take it in hand. They use large shears, one part of which is fastened to the bench, and follow sets of patterns. These patterns are of all sizes, being made of heavy pasteboard. Out of the complete set, about forty standard sizes are the most frequently cut. The cutting is done evenly, along the edges of the pattern, and the mica sheet is placed on the table beneath its pattern, for several later inspections, cracks and spots reducing the grade to Number 2, as has been stated. Mica mining might be greatly developed in this section, as the present processes are on a rather small scale.

Diamond Mining

Chief of the modern diamond fields are those of South Africa, which date from 1867, in which year stones were first noticed there. A diamond, bought for a song, was sold in London for twenty-five hundred dollars. The famous "Star of the South," valued at sixty thousand dollars, was found in 1869, and the Stewart gem, more than three times as valuable, in 1872. Kimberley, the capital of diamond-land, was founded in 1871. The four great companies were consolidated by Cecil Rhodes in 1890, and the De Beers Company controlled the mines. Their product, since the consolidation, has been more than two million five hundred thousand carats, valued at more than seventeen million five hundred thousand dollars, or 98 per cent of the world's supply. Brazil and the East Indies are responsible for the rest. The diamonds of Africa are found in blue rock, more than seven hundred thousand loads of which have been removed and examined. This blue rock extends in veins, or "pipes," to a great depth below the surface. The first two shafts are at least four hundred and fifty feet deep, tapping more than thirteen acres. Later the "blue ground," as it is locally called, was reached by transverse drivings from five hundred to fifteen hundred feet below the surface. At the surface are "floors," or spaces, of about six hundred acres in extent, to which the "blue ground' is brought in trucks. This material is split and crumbled, by the effect of the sun and moisture, in from three to six months, the process being hastened by harrowing. After crumbling, the "blue ground" is "washed" by running water. From one hundred truck-loads of "blue ground" is produced a single load of diamondiferous material, which is then treated first by the "pulsator," and later by the "assorters." The assorters separate the pebbles, first while wet and afterward when dry. They use a trowel for this purpose, white men being employed for the wet assorting, and blacks for the dry assorting. After the assorting process is finished the gems are taken on trucks, guarded by armed men, to the general office. Here they are washed in sulphuric and nitric acids. On a counter, covered with white paper, they are placed, to be valued and sold in parcels to local agents at all sorts of prices, the little parcels bringing, in some cases, many hundred thousand dollars. A single parcel has been sold for a million and a quarter dollars. At the De Beers mines there is a little village, called Kenilworth, for the whites, with every modern convenience. A library, billiard tables, and other luxuries are provided, with the view of keeping the men contented while banished so far from home.

The Precious Stone Industry

The principal features of the production of precious stones in the United States at the present time are summarized for the year 1900 by the United States Geological Survey as follows:

The continued mining of the fine blue sapphires in Fergus County, Montana; the development of the fancy-colored sapphires in Granite County, Montana; the systematic working of the beryl deposits in Mitchell County, Montana; the increased output of the turquoise from Nevada and from Grant and Santa Fe Counties, New Mexico; the great sale of the turquoise cut with the rock under the name of "turquoise matrix" from all localities; the cutting and selling of the western North Carolina emerald under the name of "emerald matrix"; the mining of the purple-pink garnets in Macon County, North Carolina; the discovery of colored tourmaline at a new locality in California; the further advance in the price of diamonds; the continued popularity and demand for pearls, emeralds, and rubies; the importation of nearly $4,000,000 worth of rough diamonds, that were all cut in this country; the stability of the diamond-cutting industry in the United States, even with the limited output of the South African mines; and the continued importation and sale of the Queensland and New South Wales opals, and their cutting from the rough in the United States. The total value of the gems and precious stones found in the United States was nearly $250,000.

Diamonds are found in the United States in three distinct regions, as follows: In Wisconsin, Michigan, Indiana, and Ohio, in the vicinity of the Green Bay lobe of the continental glacier; in Georgia, North Carolina, South Carolina, Tennessee, and Kentucky; and in California, adjacent to the watersheds of the San Joaquin and Sacramento rivers, where they were first found in the United States. Repeated reports of diamonds in Alaska have been made, but the stones have always turned out to be worthless quartz. Nevertheless, many dikes have been found which are so similar to the South African diamond rocks that great discoveries of diamonds in the United States are possible at any time.

Reports from the Fergus County, Montana, sapphire mines in Yogo Gulch indicate active and successful working. The gems occur in a vertical "lead," or "vein," of clay, inclosed between walls of rock. This foreign material is taken out and washed, and the stones are then sorted. The company that is operating the mines has worked down some fifty or sixty feet, but exploration has been made for two hundred feet, with the same occurrence of sapphires. Different portions along the dike vary widely in their yield of gems. At last report five "blocks" were reported as worked. One of these yielded 10,000 carats, the other four only 8,000, one of them furnishing but 74.

The Granite County deposits of rubies, at Rock Creek, were worked for a while, and an attempt was made to trace some of the gems to their original source in the rock. As to the success of this search, no positive results have yet been reported. A large number of gems were obtained from the beds and were cut at Helena. The proportion of rubies was greater than heretofore, but none were found possessing the deep color of the true oriental ruby. There were light shades of red which were beautiful and extremely brilliant, but not so dark as desired. At least sixty occurrences of rubies were located on several miles of gulches. At no known locality, however, has there ever been found so great a variety of rich colors in rubies as here. At the Paris Exposition of 1900, there was exhibited a brooch of over two hundred of these stones, ranging from one and a quarter to three carats each, every one of a different tint or shade. Although the deep-red ruby and the "velvet blue" or "cornflower" sapphire were lacking, yet the richness and variety of the other kinds were unequalled. They included pale rubies, pink, salmon passing into yellow, pure yellow, yellow-brown and deep brown, pale blues and greens, blue-green. Often a single stone showed two or three distinct shades of one color. Many of the colors have never been observed at any other locality. All were of unusual brilliancy, and improved greatly in artificial light. The butterflies and other rich jewels made from these stones possess almost the beauty of natural insects.

The emerald mine at Stony Point, Alexander County, North Carolina, formerly so well known, has been involved in litigation for several years past, and during this time nothing has been done there, or, at least, no discoveries have been reported or published. Few gem emeralds have been found here, but remarkable crystals, very finely formed and richly colored, some of them fully ten inches long, translucent to semi-opaque, were taken out when the mine was first worked about twenty years ago. A novel and attractive stone has recently been brought forward under the name of "emerald matrix." The emerald deposit at Big Crabtree Mountain, Mitchell County, North Carolina, has been lately worked by a New York company, and, although no transparent gems have yet been obtained, a beautiful ornamental stone has been developed. The crystals vary from one-eightieth of an inch to one and a quarter inches in diameter, and are rarely over one inch in length.

So many precious gems are found in North Carolina that it has acquired the name "Gem State." Even very valuable diamonds have been among its treasures. The list of precious stones, besides the emerald, includes topaz, sapphire, amethyst, garnet, ruby, and quartz crystals. Besides these, in both North Carolina and Tennessee, valuable and beautiful pearls are found in certain varieties of fresh water mussels living in the larger streams. Experts have said there is money in prosecuting the gem industry in the "Gem State," providing it is conducted along the technical lines practiced in Europe.

The Asphalt Industry

The most important of all paving materials for cities is asphalt. The first pavement of the kind in this country for public use was laid in front of the City Hall, in Newark, New Jersey, in 1870. Three years later part of Fifth Avenue, New York, opposite the Worth Monument, between Twenty-fourth and Twenty-fifth streets, was paved with asphalt, and for some years was the only public asphalt pavement in that city. In 1876, under the direction of a special commission appointed by Congress, Pennsylvania Avenue, in Washington, was paved with asphalt. All these streets were paved with asphalt from the island of Trinidad. The first street paved with Bermudez asphalt was Woodward Avenue, Detroit.

The longest asphalt street in the world is Broad Street, Philadelphia. This street is eleven miles long, seven miles out of the eleven being asphalted. Washington was, until three or four years ago, the city par excellence in the matter of asphalt. Until that time it had more square yards of asphalt pavement than any other city in the United States. To-day, however, New York is not only the largest purchaser of asphalt in the country, but it has more miles of asphalted streets than any of our other cities. Within the last fourteen years New York has spent more than $12,000,000 on this kind of pavement.

In 1883 the Bermudez Asphalt Company, of New York, obtained from the Government of Venezuela a concession to develop all the natural resources of the free lands of the State of Bermudez, which cover an area of about forty thousand square miles, nearly as large as the State of New York. Guzman Blanco, who was President at the time, granted this concession for the term of twenty-five years. It was stipulated that the company was to explore the territory, found colonies, open highways, and establish means of communication. The company has complied with these stipulations.

The Man Who Gave Asphalt to Commerce

Not knowing in the beginning whether the concession contained natural resources of any kind, the company sent Mr. A. H. Carner, a civil engineer, to explore the wilderness in question. Mr. Carner examined almost every square mile of the wild country, giving a year and a half to this pioneer task. In the course of his work he found the pitch lake, which, until he cut his way through the jungle to its borders, had never been seen by a white man. The Indians used the pitch in calking their canoes, but had never thought of employing it for other purposes. Mr. Carner perceived that here was a mine which could be worked on an extensive scale and ultimately made of great value. With accurate foresight, as events have proved, he determined to purchase the mine outright, knowing that most of the twenty-five years of the concession would be required to establish a plant large enough to carry on extensive operations. Had he not bought the property outright, the company's plant would, under the terms of the concession, revert to the Government of Venezuela in 1908. Therefore, in 1888, he surveyed a tract of land, a quadrangle about five miles long by three and a half miles wide, in the centre of which lay the pitch lake, and, after submitting to all the required formalities, purchased the tract in fee simple from the Venezuelan Government. He opened a new road southwest from the lake, to a point on the San Juan River, where he established the town of Guanoco, the present headquarters of the plant, and the seat of the trouble. This town owes its existence entirely to the efforts of Mr. Carner and the development of the asphalt industry. He built a railroad about five miles long, over which the asphalt is brought from the lake on box cars to Guanoco, where it is loaded on the company's steamers, for New York. The tides in the San Juan River are high, and large steamers can load at the wharf.

The lake is a vast deposit of asphalt, 95 per cent pure, in some places liquid, in other parts hard and brittle. The latter form is known to the trade as "glance pitch," from which varnishes and paints are made. The larger portion of the lake is intersected with pools of water, and in some places with great gas-bubbles as large as a small-sized hut. There have been found the remains of tigers that had stuck in the soft pitch, and held as in a trap had starved to death. The lake is about two miles across in its widest part. In appearance it resembles a deep sea of black putty. The asphalt is dug out with broad-bladed mattocks, and the excavations fill up as fast as the laborers leave them. Here is an inexhaustible supply that will last until the coming of the crash of worlds.

This great enterprise is primarily the work of Mr. Carner, who, backed by the money of the company, persevered in fighting all the physical and political difficulties, enduring the severest hardships in these jungle fastnesses, but bringing out of chaos a well-established industry.

Production of Asphaltum

The facts concerning the production of asphaltum, or what is commonly known to the inhabitants of well-paved cities as asphalt, are given as follows in a report of the United States Geological Survey:

Bituminous rock is usually sold and shipped without having been previously treated and refined. It is used principally for street paving, and is mixed with other ingredients at the locality where it is to be used. In some cases the asphaltum, or bitumen, is extracted from the bituminous rock and sold as refined or gum asphaltum. The United States draws its chief supply of foreign asphaltum from the island of Trinidad, off the coast of Venezuela. In addition to the Trinidad asphaltum, we import also great quantities from Bermudez, in Venezuela, bituminous limestone from Neuchatel and Val de Travers in Switzerland, Seysel in France, some from Germany, Cuba, Mexico, and scattering lots from other countries.

The island of Trinidad, off the coast of Venezuela, South America, one of the British West Indian possessions, is, next to France, the largest producer of asphaltum in the world. The deposits are operated by an American corporation under a concession from the British Government, and, independently, from land not belonging to the Crown, which was acquired by purchase.

The chief source of supply is a lake of pitch filling the crater of an extinct volcano. This lake lies 138 feet above sea level, and has an area of one hundred and fourteen acres. The supply is being partly renewed by a constant flow of soft pitch into the centre of the lake from a subterranean source. The shipments of lake pitch for the last ten years have averaged over 80,000 tons a year, so that the renewal of supply is less than one-fourth the amount taken out. The depth of the lake, however, is about one hundred and thirty-five feet at the centre, and, considering the extent of the deposit, there need be little apprehension of the early exhaustion of supply of Trinidad asphaltum. The material from this lake is known as "lake pitch." Different from this is what is known as "land pitch," the overflow in past times of pitch from the lake and deposits of similar nature but different origin. The overflow pitch mingled with the soil, and while it, with the other land deposits, forms another source of supply, the amount of mineral matter it contains is greater than the lake pitch, and the latter is in consequence preferred.

Outside of Trinidad and the United States, the more important asphaltum-producing countries are Germany, France, Switzerland, and Spain. Small quantities of asphaltum are also produced in Russia, Mexico, Turkey in Asia, Great Britain, the United States of Colombia, Canada, and the Netherlands.

CHAPTER VII

QUARRYING, AND SALT AND ICE INDUSTRIES

The Quarries of the United States—Marble Quarries—Marble Quarry Employés—Granite Quarries—Slate Quarries—Quarriers at Work—Organization of Granite Cutters—Stone Monuments—The Salt Industry—The Salt Combination—Salt Deposits and Production—Processes of Salt Manufacture—The New York State Salt Reservation—The Ice Industry—The Manufacture of Ice—Mechanical Refrigeration as a Trade

The Quarries of the United States

THERE are about 4,500 quarries in this country, which yield annually a total production valued at more than $60,000,000. In 1902 nearly half of this value was in limestone. The chief of the other quarry products were granite, valued at $11,000,000, sandstone at $5,200,-000, marble and slate each at $4,000,000 and trap rock and bluestone each at over $1,000,000. It is obvious from these figures that this is the real Stone Age in America, so far as buildings and pavements are concerned, for the greater portion of all the stone quarried goes into buildings or roads. The capital invested in American quarries aggregates about $90,000,000.

The total number of persons employed in this industry is about 90,000, to whom in the neighborhood of $36,000,000 are paid annually in wages, giving them the distinction of being the best paid quarrymen in the world. In Italy, the same class of workers receive only thirty-five cents a day. There, too, practically every scrap of stone is hacked out by hand, while here all kinds of stone are wrenched from mother earth by machinery.

Pennsylvania leads all the States, with a production of stone of many kinds, at a value nearly twice that of Vermont and New York. The quarries of the Keystone State yielded in 1900 stone valued at over $8,000,000. The New York and Vermont product was worth more than $4,000,000. Ohio came next with a product valued at over $3,000,000. Massachusetts and Indiana produced stone worth $2,000,000. California, Georgia, Illinois, Maryland, Missouri, New Jersey and Wisconsin had a product of stone worth $1,000,000, to their credit. There was not a State in the Union which did not quarry within its own confines part of the stone used in the construction of its buildings and bridges, the improvement of its country roads and city pavements, and the adornment of its cemeteries.

There was a great increase during the year 1902 of marble produced for use in cemetery work, with a marked decrease in the value of stone used for ornamental purposes. The value of marble used for outside building decreased from $1,176,208 in 1899 to $1,100,000 in 1902.

Quarries have recently been opened up in Alabama, Arizona, Idaho, Missouri, Montana and New Mexico. Although deposits of marble have long been known in these States, they have not been worked commercially to any great extent. Marble quarries have also been reported in Alaska, but they have as yet no great commercial importance.

The value of the marble production in California and Massachusetts has more than doubled in recent years. In Pennsylvania there has been a small increase, but Georgia's product and New York's show a slight falling off. The production in Tennessee has advanced in value, as has that of Vermont and Washington.

Marble Quarries

A tract of land containing perhaps the richest deposit of marble in the world was once exchanged for an old mare. This happened about 1830, and the tract of land was an area half a mile square in Rutland County, Vermont. The man who gave up the animal and took the land noticed, one day, that a rock on his new hillside was of peculiar and dazzling whiteness. It proved on examination to be marble of a very fine quality. Other marble deposits were afterward found in Vermont, extending in a belt from Manchester to Swanton; but, although a quarry was opened in Dorset in 1785, and another in Middleburg in 1805, the discovery did not prove a source of appreciable wealth to the people until about the time of the War of the Rebellion. In the year 1902, however, the marble quarries of Vermont produced $2,500,000 worth of marble, the most of it and the best of it from that historical half-mile deposit in Rutland County. The largest producing quarries are on Otter Creek, Proctor and West Rutland being the principal quarrying towns. Quarries are operated at different points in the western part of the State, extending from Isle La Motte, where the beautiful black marble is found, to Bennington County.

No other name is so closely identified with the marble industry in this country as that of United States Senator Redfield Proctor. When the Senator went into the marble business in 1870, he began operating one quarry and a small mill of ten gangs of saws, employing altogether not more than seventy-five men. Now the immense mills of his company contain over three hundred gangs of saws, besides its extensive shops for cutting and polishing marble. It is operating at present twelve quarries, which produce five thousand carloads of marble annually, and employs about 2,000 men, whose annual wages amount to $1,000,000. From a small beginning, the company has grown to be many times the largest producer and manufacturer of marble in the world. Its mills and shops are located at Proctor, Centre Rutland and West Rutland, and its principal quarries are at Proctor, West Rutland and Pittsford, although it possesses marble properties in many other towns. These various mills and quarries are connected by a steam railroad, twelve miles in length, called the Clarendon and Pittsford, owned by the company.

Marble Quarry Employes

For the convenience of its employés Senator Proctor's company owns a large number of tenements at all its different points of business. They are as largely as possible single houses, and include some most attractive residences. But it has never been the policy of the company to acquire or to retain ownership of residence and other property within the village not immediately connected with the business, as is done at Pullman and some other towns largely dependent upon or related to a single industry.

The company has always encouraged its employés to build and own their own houses, and has assisted those who desired to acquire them. It has been in the habit of making advances and carrying loans for that purpose until the debt is reduced to such a sum that the owner can legally procure it at a savings bank. In no case so far, when the company has thus assisted one of its employés to build, has it been necessary to take the house back either upon the debt or by foreclosure proceedings. A large number of the employés own their own homes. Some of the most desirable residence property, indeed, belongs to the marble workers. The company carries a general accident policy for the benefit of its employés, which entitles each to one-half wages when off duty on account of accident, or the family to one year's wages, not to exceed $500, in case of death by accident.

Granite Quarries

Vermont and New Hampshire are both rich in quarries of granite, some of which were opened there in 1812. During the past twenty-five years, quarries have been opened in Vermont at Barre, Hardwick, Williamstown, Dummerston, Berlin, Woodbury, and Ryegate. The city of Barre showed the largest percentage of increase in population of any place in the State in the last decade, due almost entirely to the development of these quarries and the manufactures allied to them. Another city in which the quarrying of granite is an important industry is Concord, New Hampshire. According to a State Bureau of Labor Report, twenty-six different sheds are now in active operation there. With but one exception, when its granite workers were furnishing stone for the new Congressional Library at Washington, has this industry ever been more active than it is to-day. Concord granite is famous the country over, and it is quarried here in immense quantities, and fashioned into monuments and other articles by skilled hands. New veins of the finest stone are constantly being uncovered and worked, and the business is steadily on the increase.

Slate Quarries

Slate quarrying is comparatively a new industry. The rough stone, as it is taken from the quarry in large or small sheets, is worked up in the mill by saw and planer into such variety of size and thickness as economy demands, and finds a ready market at remunerative rates. The Maine

Labor Commissioner reports that the annual output of roofing slate in a single county in his State is now about thirty-seven thousand squares. Wages do not vary much in the different Maine quarries, being $1.50 a day for common laborers, and $2 for skilled labor. A crew will average $1.75 a day. The average number of men employed at a quarry aggregates three hundred and twenty-five. The work of making slate into articles of utility other than roofing slate was begun at Monson, Maine, in a small way some twelve years ago, inkstands and a few other articles being made and sold to summer visitors. The demand for the goods increased year by year, until now the volume of business resulting from the mill stock produced at the Monson quarries approximates, in its manufactured state, $100,000. The capital invested is $75,000. An average crew of thirteen men is employed throughout the year, and wages average $9 per week. The work is practically all done by machinery, so that a few men can turn out a very large product. One of the leading specialties of this plant is switchboards for electrical plants, this slate being very desirable for the purpose on account of its freedom from iron and other metallic substances. Probably not less than a thousand different varieties of useful articles are here manufactured.

Slate is largely taking the place of marble, for it has one great advantage; it never stains. It is not only used in its natural color, but can be marbleized so as to have any shade of color or style of figure desired. The use of wood for interior finish and for the manufacture of many utensils for furnishing public buildings and private residences is being displaced by slate, and although the first cost may be a little higher than wood in some instances, the durability and beauty of finish of the slate make it preferable for permanent work.

Among other leading articles here made of slate may be mentioned table tops, laundry and kitchen tubs and sinks, tanks of all kinds, counter tops, floor tiling, school blackboards, mantels and wainscoting. Hundreds of other articles are working their way into the markets of the country, and building up a permanent business for the promoters of this enterprise.

Quarriers at Work

With the exception of marble, the quarrying of all kinds of stone is an operation of comparative simplicity and economy. The operations of a marble quarry are, however, more elaborate and costly. The finest marble quarries are in Vermont; and the best of those are in Rutland County. Out of these marble hills and holes, so glaring in the sunlight, from 15,000 to 20,000 blocks are taken annually and reduced to marketable shape.

A veritable army of men is at work there, tunnelling, drilling, blasting, sawing, cutting, chipping. During the summer all these activities are going at once. In winter there is no tunnelling, that is, no new openings are being made, because winter work of this kind is more expensive and the result less satisfactory. Quarrying proper, however, that is, cutting and preparing the blocks for market, is continued the year round. There are fifteen quarries in this region, or, to speak more properly, fifteen different layers have been uncovered. These layers are from two to ten feet thick, running through the ground like a layer of cocoanut in a cake.

Besides the fifteen layers uncovered, there are a number of abandoned quarries, sights as sorrowful as the abandoned farms to be seen elsewhere in New England. It cost thousands of dollars to make these quarry openings, but the product was not worth continuing the operations. It seldom happens that marble worth quarrying is found until a depth of at least twenty feet has been reached. By means of small blasts, the top rock of a quarry is stripped off, this being one of the rare occasions on which powder is used in marble quarrying. In cutting the layers into strips of the required size, channelling machines are used. After removing a certain portion of the strip called a key block, it is possible to get at the bottom of the layers that have been cut. With steam drills, holes are bored into the beds of the layer about eight or ten inches apart; steel wedges are driven into these holes, and thus a strip fifty feet or more in length can be lifted. This strip, by the same use of more machines, is then cut into blocks "as per order." In all other quarries, operations need not be conducted with such care as in the case of marble. Thin beds of sandstone are worked after somewhat the same manner, but all other stones are removed in huge blocks, by blasting, and the large blocks are then split up into smaller ones of the required dimensions by wedges driven into small holes.

Organization of Granite Cutters

The number of granite cutters of the United States employed at the trade is about twelve thousand. The conditions of labor, owing to the utility of the trade organization—the Granite Cutters' National Union—are reasonably good. Since the spring of 1900 the members of this union, from Maine to California, have worked an eight-hour day for a wage rate varying from about $3 to $5 per day; the lower rate is not as distinctly defined as the higher, owing to the fact that the piece-work system is sometimes followed. The company-store system is now almost unknown, and, excepting in a few instances, granite cutters are paid every week or every fortnight, and payment in cash or its equivalent is required, which means checks redeemable for their face value.

On March 10, 1901, the union celebrated its twenty-fifth anniversary. Twenty-five years ago the members were working ten hours a day for $2 a day on an average, as they are now working eight hours a day for an average of over $3 per day. With their employers, the granite cutters make two-yearly or three-yearly agreements, an arrangement which does away with a great many strikes or suspensions of lesser magnitude. In most of their agreements they have an arbitration clause, providing that, should disputed points arise under the agreement, they shall be arbitrated without strikes or lockouts. Difficulties of the kind seldom arise, and peace usually reigns in the trade during the life of an agreement. Occasionally they have a conflict to secure a new agreement, but that generally takes place when some radical change is contemplated, and then only because of the refusal of employers to meet the local committees of the granite cutters in a fair spirit.

These established conditions place the granite cutters in an encouraging position; the members of this union, indeed, think more deeply of the value of trade unionism than legislative enactments, for the latter may fluctuate with a change of party politics, while the former, when once thoroughly instituted, are a sure step in progressive advancement. One illustration will suffice: For over thirty years the granite cutters, with the members of other trade unions, waited for action by Congress, which should place all Federal work on an eight hour basis. The best they got was a law providing that direct employment by the Government (except in cases of emergency, should be on an eight hour day, but if the Government gave out any of its work by contract, lawyers officially, from the Attorney-General down and the courts, construed the Congressional enactment not to apply. As a matter of course, nine-tenths of Government work is done by contract, so the law they passed for an eight hour day was more shadow than reality. Many members of the union are at all times employed cutting granite for great government buildings. They had in some instances an eight hour work day prior to 1897, but in that year they notified all employers in the trade that, on and after the spring of 1900, the members of the union, who comprised a little over ninety-five per cent of the men employed at the trade, would not work more than eight hours a day. They continued a lively campaign in the trade, especially through their monthly journal, in favor of the advanced position set forth in the '97 declaration, and by determined action their trade was placed upon an eight hour basis in something like a three years' campaign. It was through trade unionism pure and simple, that the members gained in three years' time what they had failed to get through a thirty years' agitation by legislative enactment.

Stone Monuments

One of the first uses to which Vermont marble was applied was to the manufacture of monuments and tombstones. In that lively industry Vermont ranks third. During the last census decade, the number of establishments erected for that purpose has grown from 96 to 268, the number of wage-earners from 1,095 to 2,974, the value of products from $1,492,384 to $4,045,611. The manufacture of marble monuments as an important industry dates from 1808. The stock was first taken from the top or outer edge of the layers, where the strata could readily be split into sheets of suitable thickness. These sheets were cut down with a chisel into the desired shape. Marble was first sawed in South Dorset in 1818, and found a market in Boston, New York, Philadelphia, Cleveland, and intermediate points.

The success of a retail monument dealer, according to the editor of "Monument News," depends wholly upon the man. The average dealer is a man who has grown up in the business, first serving as an apprentice, then as a journeyman. When opportunity offered, he embarked in business for himself, on such small capital as he had, by economical and frugal habits, managed to save from his earnings. He is made of sound stock and shows superior marks of distinction. By instinct his judgment on the merits of a piece of rough stone or marble is quick; his taste assists him to readily sketch such an artistic design as will please a fastidious customer; his skill enables him to carve inscriptions and beautiful designs; his tact gives him an ability to show and sell goods to patrons; his struggle in carrying his business through a panic or a "silver deadlock in the Senate," has taught him to be cautious in money matters and not to carry long accounts, and his general experience in the varied rôle he plays, and his wide scope of training has developed methods that have had a tendency to make a man of extraordinary executive ability, and of sterling business qualifications. A successful retail dealer is, therefore, a draughtsman, skilled mechanic, salesman, financier, and an all-round business man, and to continue his prosperous career and keep abreast of the times, he now must keep in the march of progress. In his trade, as in others nowadays, he will find that he has to deal with strong competition and close margins. He must constantly study what styles of monuments the public desire, and the means of production at a popular price.

The demand for improvement in the design and general details of cemetery monuments is rapidly inaugurating reform in this line of work, not only in its artistic effects, but in its business methods as well. It follows, as a result, that there is a growing need for better qualified men in the several branches of the marble and granite industry, with improving conditions and possibilities for those who are qualified or will qualify themselves for the openings now presenting themselves in many directions. Mechanical skill, artistic ability, and business knowledge are the principal lines of development certain of recognition and reward in this trade. Many positions of trust await applicants of due proficiency.

The Salt Industry

Salt is the only mineral product which is used as a food, although others are employed as drugs.

While the profits in the sugar industry are mountains high, the salt industry yields only mole hills in the way of dividends. The salt of the earth, and of the sea, is about the cheapest of all the staple products. A whole ton can be bought for a two-dollar bill. Yet salt was once the unit of value, once a medium of exchange. The causes of these discouraging conditions are: (1) over-production and (2) excessive importation. Any one of our great salt States—New York, Ohio, Michigan or Kansas—could supply the whole Union with this saline product for an indefinite period. Until recent years, when a salt combination was formed under the name of the National Salt Company, the manufacturers in each State tried to supply the entire nation, and therefore worked their plants to the utmost capacity. The results were low prices, low wages, and low profits. Moreover, despite the over-production, salt still pours into the country duty free. The salt workers of England and southern Europe, and the blacks of the West Indies are thereby benefited, but the manufacturers of salt at home suffer from this unrestricted competition.

The kitchen range and the dinner-table are not the only places where the need of salt is felt. It is important in many industries. It is used to cure hides, to pack beef and pork, to preserve foods, to make butter and cheese, to fertilize fields for oats, wheat, potatoes, and mushrooms, to remove rust, to prevent the decay of wooden vessels, to preserve timber, and to drive away insects from the garden. Is it a wonder, then, that the people in the United States need, not millions of bushels, but millions of tons of salt to make them healthy, happy, and prosperous?

The Salt Combination

The National Salt Company was organized in March, 1899, and acquired at that time thirteen plants in New York State. The basis of purchase was an appraisal of the tangible assets and an issue therefore of preferred stock. An issue of common stock was also made to the owners of these properties for their good-will, earning capacity, trade-marks, brands, etc., on a basis of five times their average annual earnings for the two preceding years. Subsequently, properties in Ohio, Michigan, Kansas and Texas were purchased on the best terms possible, payments being made sometimes in stock of the National Salt Company and sometimes in cash. It is the aim of this company to recognize individual effort in every case. Even the president's salary is contingent on results. This policy of reward according to merit is said to be carried out all along the line, even to the common laborer.

Economic conditions demanded the formation of the organization. It was organized by salt manufacturers for their self-preservation. Competition was severe, not only as to prices, but as to quality. As the prices were reduced, it was the tendency to make cheaper and poorer salt, and to place it on the market in cheap, inferior packages. All salt is sold delivered at the point of consumption, not at the point of production. Of that delivered, from thirty per cent to sixty per cent of the price constitutes freight: therefore, each producing section should naturally supply the nearest territory.

This was not always the case, however, as salt manufactured in some localities was not acceptable in quality to purchasers. As a result, salt was shipped to distant and unnatural markets, paying freight equal, and sometimes exceeding, the value of the salt at the point of production. For instance, much salt was shipped from New York State fields to Western markets at a freight rate of from forty-five cents to seventy cents per barrel, while the market price of the same salt at the point of production was much less than seventy cents per barrel. Reforms have been made by producing a uniform quality of salt of a standard grade manufacture in each of the several producing districts, and economy has been effected by supplying markets from the nearest point of production at the lowest prevailing freight rate, thus doing away with the extravagance of cross shipping of freight. Competition in many sections was intense and vicious. For instance, the average price received by many manufacturers in Michigan in July of 1899 was twenty-eight cents a barrel for granulated salt. This price included the cost of the barrel, which is estimated to be twenty cents; the remaining eight cents did not cover the labor and other costs of producing the salt.

Much Michigan salt was sold in territory naturally tributary to the Ohio and Kansas fields, which was an unnatural market. These sales were effected, primarily, because the Ohio and Kansas producers were shipping their salt into territory which Michigan producers considered was theirs because of its geographical position.

The company is now established along well-defined lines, such as are followed in the organization of the army, or in the conduct of a political campaign. The producing districts, New York, Ohio, Michigan, Kansas and Texas, are divided into departments, each with its head, and each stands on its own feet, and conducts its business in its own way, receiving general instructions from the executive officers. The purpose of the organization is to keep the various branches in close contact with the trade. Requirements are studied, and no attempt is made by any branch to deal with conditions a thousand miles away. The results are said to be very satisfactory to both producers and consumers.

Salt Deposits and Production

In New York State, the rock-salt deposit extends from a point thirty-five miles east of Buffalo in a southeasterly direction to a point a few miles north of Binghamton. The average length of this territory is about one hundred and fifty to two hundred miles, the average width about thirty miles, and the average depth from twenty feet at the extreme northwestern end to two hundred and eighty-five feet at Ithaca. There is enough salt in New York State alone to supply the world for a million years. In Ohio, the deposit seems to surround Cleveland, about fifteen or twenty miles east and west, and fifty miles south. In Michigan, a deposit of rock-salt is found along the St. Claire and Detroit Rivers, and in the western part of the State, at Ludington and Manistee. There is brine in the Saginaw valley which is presumed to be the filtration through the earth from these rock-salt deposits to the east and west. Rock-salt is found in Kansas in the central and western part of the State, at from three to five hundred feet below the surface. In Louisiana there is a deposit of rock-salt at Avery Island, and at another island, known as Belle Isle, on the Gulf. There is also some rock-salt found in the southwestern corner of Virginia. It is a very peculiar formation, however, and occurs in pockets only. Salt usually occurs in well-defined strata. There is some little rock-salt in Wyoming and in Utah, but it is not available, because remote from transportation facilities.

In a general summary of the facts and figures concerning salt production, it may be stated that fully ninety per cent of the total salt product of the United States comes from the four States of New York, Michigan, Kansas, and Ohio. Since 1893 New York has held first place as a producer of salt, having wrested that honor from Michigan. New York manufactures thirty-eight per cent, Michigan thirty-five per cent, Kansas eleven per cent, and Ohio seven per cent of the whole product. Oklahoma, California, Texas, West Virginia, Utah, Pennsylvania, and other States contribute varying amounts to the grand total of 21,000,000 barrels, value $7,000,000, produced annually.

Processes of Salt Manufacture

To supply the demand the United States produces annually over twenty million barrels of salt, most of which is manufactured under the supervision of the National Salt Company. An official of that company gave the Industrial Commission some interesting information concerning the salt industry, and part of the matter in these pages is taken from his testimony on that occasion.

There are three sources of salt supply. They are sea water, natural brine springs, and mineral rock-salt deposits, which are found below the surface of the earth, varying from three hundred to three thousand feet in different localities. The production of salt from sea water is usually carried on in a tropical climate, where sea water is collected in a pond, and subsequently evaporates by solar heat and wind. No salt is made from natural salt water in the United States, except on the Pacific Coast in California, and along the Great Salt Lake, Utah. Salt is made from brine springs at Syracuse, New York, by solar evaporation and by evaporation by artificial heat, the brine being contained in kettles set in masonry over a furnace.

The principal source of production of salt in the United States is from brine, which is procured by bringing fresh water in contact with the mineral rock-salt contained in the earth. This brine is then pumped to the surface, purified, and evaporated. Three methods of evaporation are most popular. The English, or open-pan system, consists in the use of a steel pan twenty feet wide by one hundred feet long, filled with brine to a depth of about two feet and situated over a furnace. Fuel is burned on grates under one end of the pan, the heat passing along the entire pan length, with the gases of combustion escaping out of the stack at the end of the pan, opposite the grate. The second, or grainer, system consists in the use of wooden or steel vats about one hundred and twenty-five feet long, eleven feet wide, and two feet deep, which are filled with brine. In these are immersed pipes, through which steam passes from the boilers. Evaporation of brine results, and the salt is precipitated by gravity to the bottom of the grainer, whence it is lifted out by rakes operated by machinery or by labor. The third system is known as the vacuum process. The brine is boiled in a closed vessel by application of steam heat under a vacuum.

The industry employs four different units of measure. The bushel of fifty-six pounds is used at Syracuse and along the Ohio River, in Ohio and West Virginia. The long ton of 2,240 pounds is the unit of measure at the rock-salt mines in New York State and at the Avery Island rock-salt mines in Louisiana. At the rock-salt mines of Kansas, and at the solar works along the shores of San Francisco Bay and Great Salt Lake, the short ton of 2,000 pounds is the unit. With the foregoing exceptions the barrel of 280 pounds is adopted.

In California, along the shores of San Francisco Bay, ponds are used for receiving and settling the sea water so as to precipitate the gypsum and other impurities. The land is cleared and diked with a levee three or four feet high, and partitioned into reservoirs for receiving and evaporating the water. Crystallizing ponds are excavated, and platforms are constructed for stocking the salt. There are usually seven evaporating reservoirs to a plant. The brine is retained in the seventh reservoir until it reaches a density of 25° Baume. When this strength of brine is attained, the crystallizing ponds are filled to a depth of ten or twelve inches, and the brine is evaporated until 29° by the hydrometer is reached. The completion of the solar process consists in drawing off the mother-liquor; gathering up the salt and conveying it into warehouses to drain. It is either sold at the warehouses, after drying, or taken to refining works in San Francisco to be further prepared for different uses. The industry has suffered from overproduction. Small quantities of salt are produced in other places in the State.

In Kansas more than 1,600,000 barrels of salt are produced, the greater part of the output being made in grainers and open pans. More than 460,000 barrels of rock-salt is produced, there being large salt mines in the State near Lyons. There are salt beds along the coast of Louisiana on various islands. Shaft mining prevents the danger from surface waters. The production is about 209,000 barrels.

In Utah there is a harvest of about 236,000 barrels, nearly all made by solar evaporation. Crude salt is of great value in silver mining, and much of the Utah output is used for that purpose, being shipped to the silver mills.

The salt marshes and numerous salt springs of Oklahoma will in time be the source of a great salt industry. In Woods and Grant Counties are miles of glistening plains of white salt. In northern Blaine County is Salt Creek, the source of which is the sweating from enormous deposits of rock-salt ninety-nine per cent pure. Much salt is manufactured in a primitive way along this stream, but so strong is its flow that from thirty to fifty cars of salt daily are carried away in its waters, entering the Cimarron River and making its waters as salt as the ocean.

The New York State Salt Reservation

"Uncle Sam" requires New York State to furnish all salt for the army and navy. The State, as already inferred, is equal to the demand. Just outside of Syracuse, at Onondaga Lake, it has a reservation of twenty thousand acres where salt is sun-made. The annual output at Syracuse is about ten million bushels. Each person eats perhaps an ounce of salt every week, or about three pounds a year. The seven million people of New York, therefore, eat about twenty-one million pounds, or not quite four hundred thousand bushels a year. Therefore, after salt has been supplied to all the people of the State, and also to all departments of the army and navy, there is a vast quantity left here for other purposes, principally preservative. The most important salt springs in the United States are those which supply the wonderful wells at Syracuse. Wells from one-eighth to half a mile deep are sunk to meet these springs. The source of this great and constant brine supply was long a puzzle to geologists. The theory was that rock-salt was hidden away somewhere under the hills surrounding the Onondaga Valley. Experiments have proved that a rock-salt deposit, fifty feet deep, underlies all the southern part of Onondaga County; and it is these inexhaustible beds that are the unfailing source of brine supply on the Salt Reservation.

Over each of the fifty wells a house is built to protect the pumping machinery. The pumps draw the brine up into reservoirs, and from the reservoirs the brine is carried through pipes to the salt fields. These distributing pipes, if laid in one line, would extend thirty-two miles. To pay for this pipe-system the State has signed more than one check of six figures. Some of the pipes are iron, but the greater number are made of logs, through which holes, three or four inches in diameter, are bored from end to end. These are joined together by enlarging the hole in one end of a log and fitting the sharpened end of the next one into it. These salt logs last a wonderfully long time, for the preservative quality of saline matter is as effective on wood as on the tissues of beef. From the springs to the wells, then to the reservoirs and through the distributing pipes to the salt yards, goes the brine. Collected there in huge trays, it is exposed to the sun, which begins its work of extracting the salt from the brine. The brine is readily warmed by the sun's rays, and the rising watery vapors are carried off by the ever-moving air. The trays or salt vats are the most expensive part of the salt plant. These cost fifty dollars each, and as there are forty-five thousand of them on the reservation, they are worth to the State the sum of two million plus a quarter million of dollars. The vats, rather shallow, and all of wood, are twenty feet square and are built on stilts at various heights from the ground. Each vat is provided with a movable wooden cover for rainy weather. The level of each division of vats is so graded that the brine can be let from one tier to another by gravitation, which is done in order to save labor and grade the quality of the salt. The receptacles which hold the brine during the first stages of evaporation are called "pickling vats," and when the liquid reaches so many salometer degrees of strength, it is transferred to the neighboring vats, where the evaporation is completed and the salt crystals are gathered up. In sun evaporations, where heat is supplied only to the surface of the brine, each tiny crystal continues to grow in rapidity according to the strength of the sun's rays, until its weight becomes too great for the mother brine to hold it any longer on the surface, when it sinks to join its predecessors at the bottom of the vat. This process continues until the salt sediment is sufficient in quantity to justify harvesting.

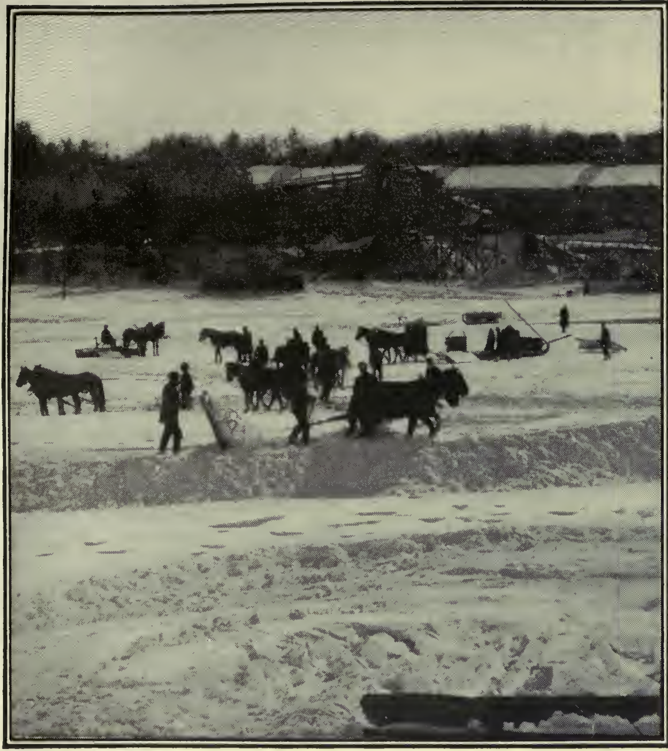
The harvesting is accomplished by means of a scraper drawn by a horse. The scraper works back and forth through the vat until the crystallized salt lies in great heaps in the front of the vat. Then the men come through with their hand scoops and fill the tubs, through the perforated bottoms of which the brine drains out and leaves the crystals to dry. When these are dry, carts are driven down the streets between the vats, the salt is emptied into them and drawn to the mills to be ground, graded, and packed for the market. The Dairy Salt building, where fine salt is made by the kettle process, is a long, low and narrow building, through the whole length of which a furnace is built. This furnace is surmounted by rows of kettles. Great flues extend through the furnace, bringing the heat in contact with the kettles. By means of the log lying above the furnace, the brine is supplied to the kettle at will. The salt made by this process is fine in proportion to the intensity of the heat used in the evaporation of the water. On either side of the furnace are large bins, where the salt is stored away.

The Ice Industry

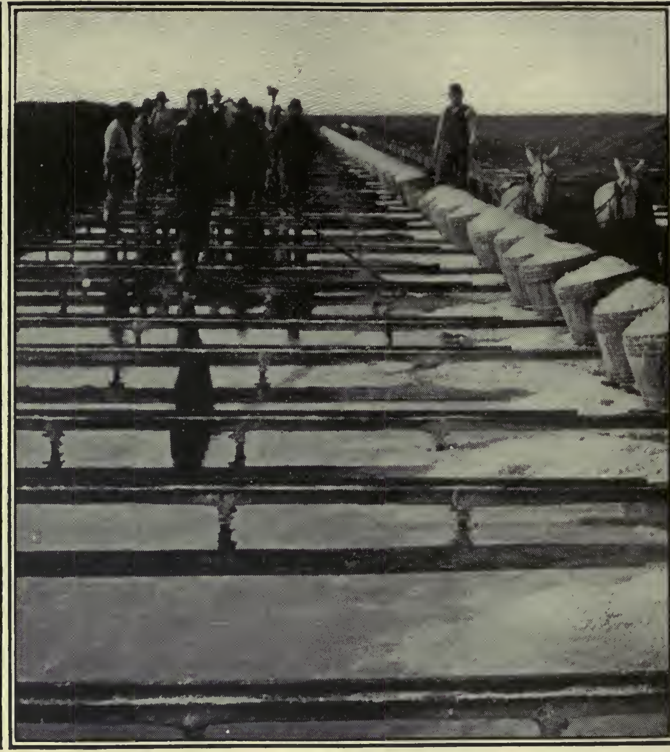
America is the mother of the ice industry. The "ice-man" the world over now comes to America to learn our methods of harvesting, storing, manufacturing and shipping ice. The Norwegians, especially, have learned their lesson so well that in seasons of scarcity they send ice across the seas to New York. The capital invested in the ice business in the United States, including that invested in manufacturing ice, is nearly $40,000,000. One-half of the annual crop of the country reaches the consumer, the remainder going to waste by melting and chipping between the river or lake and the consumer's ice-box. There is always an enormous quantity of natural ice for mercantile use in storage—about 10,000,000 tons. Some of the largest of these storage houses are on the Hudson River between Rondout and Coxsackie.

The transportation of ice requires a large fleet, consisting of sailing vessels for export, and ice barges and other boats for domestic trade. The bulk of the ice for Eastern markets is thus carried by water, but in the West the mode of transportation is by railroad. During the harvesting season on the Hudson, alone, employment is given to about 20,000 men. The distribution of the ice in Greater New York gives employment to more than 5,000 men, using 1,500 wagons and over 3,000 horses. The pay-rolls of the principal ice companies in New York City and Brooklyn, in summer, amount, in the aggregate, to $25,000 a week.

The course of the ice industry has been marked by a rapid rise and a gradual decline, the competition of ice artificially produced being too much for the natural product, at least in the matter of exportation, which may be considered practically extinct. And yet in 1870 the value of the exports of natural ice was $267,702. Natural ice was used in New York as early as 1825. Later the Civil War gave great impetus to the industry, ice being used in the hospital service. The present increasing demand for ice is largely due to the growth of industries dependent upon this commodity. The great ice harvesting regions are the State of Maine and the Hudson River, and



ICE HARVESTING ON THE HUDSON RIVER



THE SALT INDUSTRY—NEW YORK STATE RESERVATION

Vol. II., pp. 682, 686

yet their annual yield is probably less than one-half of the total harvest in the United States.

The United States Patent Office has granted 4,337 patents for various processes of refrigeration, 681 being for ice-machines.

The annual consumption of natural ice in New York City is about 5,000,000 tons, the manufactured article forming only 8.2 per cent of the whole consumption. Manufactured ice costs about $1.50 per ton, and sells at wholesale for about $2, retailing for the average price of fifteen to thirty cents per one hundred pounds, according to the season. In Philadelphia the annual consumption of ice is between 1,000,000 and 1,600,000 tons, the locally manufactured ice representing 342,602 tons of this total amount. The average cost of production is about $2 per ton. At wholesale it brings the average price of $2.25 per ton, and at retail the price is from twenty to forty cents per one hundred pounds, according to the season. For use in San Francisco, from 10,000 to 15,000 tons are annually brought from the Sierra Nevada Mountains, the general consumption of ice being much smaller in that city. In most of the Southern States the entire ice industry is solely in connection with the manufactured product, no natural ice being used. The cost of production has been reduced to about $2 per ton in the large Southern cities, and even in the smaller towns it is so low as to exclude the natural ice. So we have three ice-trade zones. In the southern zone manufactured ice has a monopoly. In the middle division both natural and manufactured ice are sold. In the northern zone the climate gives the monopoly to the natural product. All the States south of a line drawn through the northern boundary of North Carolina form the southern division.

The Manufacture of Ice

The manufacture of ice—artificial ice, as it is called—has become an important branch of the ice industry. Ice machines have proved a great boon, also, to the tropical countries.

Ice produced by mechanical or chemical means is commonly, but not very appropriately, designated as "artificial," to distinguish it from ice produced by nature. Artificial refrigeration, as defined by the census experts, consists simply in the removal of heat, and is accomplished by the use of ammonia, either aqua of anhydrous, or some other volatile liquid, such as sulphurous dioxide or ether, which absorbs heat upon evaporation.

The value of a product, natural or manufactured, depends largely on the nearness to the market. In some cases mere transportation facilities alone will not suffice. In a long transit the merchandise might spoil, and become unfit for use. The ice industry steps in here, and makes possible long shipments of perishable goods. It has thus aided greatly in the development of the natural resources of the country, and is a very important factor in the progress of business. The refrigerator cars carry the most delicate fruits, delivering them in distant marts, in a perfectly fresh condition. Meats can also be transported in them, untainted and uninjured. Cold-storage warehouses serve to keep these classes of goods in prime order as long as desired, either before or after shipment. Advantage may thus be taken of the prices quoted from week to week. Great has been the stimulation of such industries as the cultivation of fruit, berries, and vegetables. The raising of strawberries, particularly, has increased. In the South and on the Pacific Coast this influence has been largely felt. In the case of dressed meats, the ice industry has caused a revolution, widening the market almost indefinitely, and, furthermore, enabling the operations of this trade to be carried on throughout the entire year, abolishing the winter limitation. It is an odd feature of the ice industry that the only materials affecting the cost are those which form no part of the product, being used only in the generation of the temperature necessary for the production of ice. The chief item of expense is the cost of fuel for the machinery. As has been elsewhere mentioned, the principal material used as a refrigerant is ammonia, anhydrous and aqua-ammonia.

The two methods of ice manufacture are called the can system and the plate system. In the former or can system use is made of distilled water, giving a clear, transparent product. Distilled water is procured by condensing "exhaust" or "live" steam. In the plate system, however, a transparent ice is made without distilling the water. By the employment of the can system ice may be formed either in stationary cells or removable cans. At present the latter method is more generally employed. In the case of the use of the stationary cells, the necessity arises of emptying all the cells at the same time, thus compelling the use of more than one tank in order to made the operation continuous. Where the can method is employed the water is placed in cans which are immersed in iron or wooden tanks of cold brine. This process may be called continuous, for the cans are taken out singly, and, after the ice is removed, they may be refilled and replaced. The method of removing the ice is either by dropping the can into tepid water, or merely sprinkling with it. The formation of ice requires a lapse of time varying from twenty to sixty-six hours. The difference in time depends on the thickness of the mold and the temperature of the brine. The plate system differs from this in detail. A hollow iron plate is immersed in a tank containing the water to be frozen. The plate contains coils for the freezing medium or for the brine, and the ice is formed on the two outer surfaces. This process is much slower than the can system, and the use of several plates is necessary for a continuous process. The standard thickness of the ice-cake is sixteen feet in length, eight feet in width, and eleven inches in thickness. Electric power is used in this process when available.

Mechanical Refrigeration as a Trade

The progress in all branches of mechanical and industrial science constantly gives rise to new trades and professions, and also subdivides the older ones into numerous branches. Among the most important of the new industrial sciences that has arisen within a very few years is that of refrigeration. Formerly, on a large as well as small scale, artificial refrigeration was a simple matter, consisting only in placing the food products, or other articles to be treated, below a box filled with natural ice, which, in melting, absorbed the heat rising from beneath—just as a tea kettle absorbs heat from the stove, causing the water to boil. Latterly, however, the numerous methods of making artificial ice, as well as of reducing the temperature of store-rooms and factory apartments by the use of ammonia gas, carbonic acid or atmospheric air, has introduced entirely new elements, which have a daily increasing significance. Thus, ice-making and refrigerating machinery is used on shipboard, in factories, breweries, hotels, apartment houses, warehouses, cold-storage vaults, and in numerous other places, so that a knowledge of the general conditions involved is rapidly becoming a necessity for many classes of practical men. These include steam and marine engineers, employés and managers of breweries, meat-dressing establishments, dairymen, hotel employés and janitors. The simple theory of extracting heat from a body, in order to produce complete refrigeration, involves numerous theoretical and practical situations that must be mastered in order to attain the requisite knowledge in this increasingly important branch of industry. To meet the demand for the practical student several excellent treatises on the subject have been prepared, while prominent correspondence and technical schools offer complete courses.

CHAPTER VIII

THE FARMER

Agriculture in the United States—The Status of the Farmer—Modern Agricultural Pursuits—General Statistics of Farms—Farming as a Business Enterprise—Organization and Co-operation Among Farmers—The Farmer and the Commission Merchant—Mortgages on Farms and Crops—Farmers as Tenants—Farm Labor—Chinese and Negroes as Farm Hands—Prosperity of "Hired Help" on Farms—Earnings of Farm Hands—Agricultural Education—Agricultural Colleges—Government Employment for Agricultural Students and Experts—Home Study for Farmers—Farmers' Reading Courses.

Agriculture in the United States

OVER 10,000,000 persons, or fully one-eighth of the total population of the United States, are engaged in agriculture, despite the constant heavy drafts on the rural districts to supply the demands for workers in railroading, manufactures, and other industries. Thus, from the point of numbers, agriculture is still the chief industry of the country, as it is also the one most nearly fundamental. Its commercial importance is shown by the fact that out of our total annual exports, amounting in value to $1,330,000,000, very nearly $850,000,000 are represented by agricultural products. The immense scale on which agriculture is conducted in this country is shown by the fact that the annual corn crop covers 80,000,000 acres, a total area equal to the whole of Italy, with 10,000 square miles to spare; the hay crop covers 42,000,000 acres, and the wheat crop, 41,000,000, an area larger than the whole of England and European Turkey combined; oats cover nearly 26,500,000 acres, an area four times as large as Holland; cotton, 23,000,000 acres, equal to over half the useful lands of Egypt; potatoes and barley, nearly 3,000,000 acres each, an area equal to nearly the whole of Belgium; rye, 1,700,000 acres, and buckwheat and tobacco, about 750,000 acres each, giving a combined area between them equal to the whole of Wales. The grand total of nearly 222,000,000 acres of land, carrying these ten important products, thus represents a total larger than the whole of France and the British Isles combined.

In this division of the present work are presented the most striking features of American agriculture during the last century and up to the present date. Immense progress is shown in the use of machinery, in the development of businesslike farming so that great ranches and bonanza farms are conducted with all the organization, bookkeeping, division of labor, and minute attention to the details of preparation for operation that characterizes the great manufacturing plant or the railway system. New farming industries have been developed that bring more money into the country than did the whole of agricultural exports at the beginning of the 1800s. Such is the growing and shipping of fruits. On the other hand the production of wheat and corn and cotton and live stock have multiplied by the hundredfold not only to keep pace with the growth of population, but far to outrun it.

New methods of sowing and reaping and cleaning the grains and of ginning the cotton have enormously increased the productive power of each man, so that while the prices have greatly declined, the returns to the farmer have very greatly increased.

It is shown that in the first third of the Nineteenth Century students of economics even began to despair of the bread supply of the United States, and to look for danger of famines such as have brought untold distress on India and other part of the earth; but the American farmer and his sons, the inventors, came to the rescue, and America not only feeds herself but almost the rest of the world beside.

The Status of the Farmer

The position of the American farmer is unique. A plain citizen in his own country, he would oftenest perhaps be a country gentleman in Europe; sometimes a lord, a count, an earl. Practically he never occupies the position of the peasant of other countries. He may be poor, but he is always freeborn, with all the political rights and duties of his most powerful neighbor, and has the same standing theoretically, and, indeed, for the most part, practically, before the courts of justice. When he is overborne in any dispute by the wealth of his opponent, it is merely due to the power of money to procure a better presentation of the other side, to make the worse appear the better reason, not to any criminal purchase of opinion.

Jefferson and Washington were farmers, as were the Lees, both of the Revolution and of the Civil War, and as have been a long line of strong, useful and noted men through the last century to the present day, when the President of the Republic is perhaps as much a ranchman as anything else outside of politics. A lawyer who has written books of history, a colonel of volunteers who has spent more time probably hunting game than hunting men, he has given many days to running a western farm business. And it is this sort of farmer that the son of any American farmer is likely to turn out, as witness the roll of the names of the Presidents.

But again the position of the American farmer is weak in this day of immense development of community of interests and combinations to control business. It is next to impossible for any class numbering over ten millions to form any sort of association or league which will, including any considerable minority of them, not go to pieces before the object in view is fairly understood by most of them, to say nothing of accomplished. How difficult is it then for the farmers who produce any large crop to agree and set limits to production, prices, or methods of operation of any kind?

Still the freedom from restraint, the feeling of equality, the knowledge of opportunity which thousands of examples show lies before every farmer's boy is an inspiration and a spur to efforts such as have wrought the marvellous progress in farming told by the story of agriculture during the Nineteenth Century. The field lay open to all in the early eighteen hundreds, but it was only the American farmer who found out, accepted and successfully used new ways, new implements and machines, and new forces so that he quadrupled his producing power for wheat, corn, hay, cotton until he meets and overmatches in the markets of the world the cheap labor of Europe and India and Egypt, ryots and fellaheen, all the while living well at home and giving his children good schools and other opportunities for culture and refinement.

Modern Agricultural Pursuits

Farming, like any other calling, may be either a business or a mere occupation, and, as it is considered in the one or the other light, it will be found a profitable undertaking or a simple failure. At the present time it is one of the most highly specialized of all industries; being concerned principally with cotton in the South, with corn in the Northwest, with fruit in California and other Southwestern States and Territories, and with wheat or cattle in the middle and far West. Tobacco and sugar beets are other specialties that represent a wide range of territory, while general market truck, staple vegetables and fruits are raised in the immediate neighborhood of all large cities. In purposing to adopt farming as a life-work, therefore, a man's first concern is to carefully determine what particular kind of crop can be most advantageously raised and most readily marketed in his section; then proceeding to cultivate it with regard to economy, soil capacity and the ascertained conditions of growth. According to the advice of several experienced authorities, such business methods as keeping rigid account of successes and failures of crops in each year, with full notes as to conditions in either case, are of the utmost value for reference in after-time; since the rule is that we learn most often by our own failures.

As is hardly necessary to say to most people, the day of the unintelligent farmer, with his slipshod methods, is nearly past. The farmer of to-day must be something of a chemist, botanist and entomologist, at least to the extent of understanding the requirements of soil and crop in his own particular specialty. Soil treatment is an important item of information with which no farmer can afford to dispense. He must know, in some measure, what necessary elements are lacking in the soil he has to cultivate, also how to supply the deficiency by artificial means—what elements of dressing or fertilizer are required to make the soil generally productive, or to assist the growth of some particular kind of crop. He must also have a good general idea, at least, of the requirements as to drainage, in order to obtain the best advantage from his land. Furthermore, and equally important, he must understand what elements of its food a plant derives from the atmosphere, and what are the requirements in this particular, as also in the others, of each variety. Thus, many persons who make no claim to the character of a farmer, understand that grapes grow best on a hillside exposed to the sun's rays during a good part of the day, a rule that applies in some particulars to melons and other fruits. A few such rudimentary facts understood and applied would have rendered many an abandoned farm still productive and profitable.

The deficient intelligence that has led to the outright abandoning of many farms has caused some fruit-growers to turn to some other branch, simply because they did not understand the physiology and pathology of plants, and were unable to cope with and overcome insect and fungous pests, or because work in this direction requires too much labor and vigilance. While some fruit and tree scourges, especially the new and unfamiliar types, are exceedingly difficult to treat and eradicate, to destroy the majority of them requires only moderate knowledge of their nature and the same watchful attention that any business man devotes to his calling. In that such annoyances have actually necessitated these qualities in the farmer, we see that they have proved themselves of positive benefit to the industry. In precisely similar fashion a dairyman should understand the chemistry and bacteriology of milk, the causes and nature of the "ripening" of cheese, together with the kind of feed best calculated to produce good milk, butter and cheese qualities. He should also have an intelligent understanding of the "points" of cattle and their common disorders, or else not complain that "there is nothing in farming."

Indeed, apart from the great and constant profits to be derived from farming, in any and all its branches, by intelligent and careful management, there is no industry that is more thoroughly encouraged and assisted. The United States Government publishes numerous books and pamphlets for the benefit of the wide-awake farmer, and employs a regular corps of experts to investigate and report on all the conditions of the industry, including soil treatment, the eradication of pests and the methods of procedure with nearly every important variety of crop. Congress has also endowed numerous land-grant colleges of agriculture throughout the country, where both the theory and practice of the science are exhaustively treated. Could these beneficent influences be permitted to penetrate the stygian gloom of traditional rural conservatism, and lead young men to see the vast possibilities of profit lying at their very doorsteps, there would be fewer migrations to the city, in quest of fortunes that few earn, and agriculture would be restored to its former primacy among industries

General Statistics of Farms

Judging by values reported, the North and South Central States lead in importance as a farming centre. The North Central States lead in acreage and in value of land, improvements, and products, and also reports the largest sum paid for labor; while the South Central States report an expenditure for fertilizers between twice and three times greater. The average value of land, live stock and products is greatest in the West, while the value of buildings and the returns on products per acre are greatest in the North Atlantic and North Central States. The most important agricultural States of the Union are, in order, Missouri, Iowa, Illinois, Indiana, Ohio, Pennsylvania and New York, representing nearly 45 per cent of farm values and nearly 40 per cent of product values of the entire country.

The industry of farming has, of course, increased regularly in the United States, in point of the areas covered by its operations, with the constantly-progressing cultivation of the vast tracts of the far West. In 1850 the total acreage included in farm lands was not quite 294,000,000, of which over 113,000,000 was improved and about 180,500,000 unimproved. At the present time the total acreage of farming lands is about 850,000,000, with about 415,000,000 improved, and a little over 426,000,000 unimproved. A large percentage of the unimproved land is included in the vast grazing tracts of the West, which fact largely explains the increase in the percentage as compared with the "improved" acreage, or that under regular cultivation for the harvesting of vegetable crops and the growing of fruit.

According to recent estimates the total value of farm properties in the United States has increased from about $3,970,000,000 in 1850 to nearly $21,000,000,000 at the present time, or over 500 per cent. These figures include an increase of over $13,000,000,000 in the value of land improvements and buildings; of over $600,000,000 in the value of farm implements and machinery, and of nearly $3,000,000,000 in the value of live stock. In the meantime, the annual value of farm products is nearly $5,000,000,000, or about twenty per cent of the actual value of the property constantly employed in the work of production.

At the present time farms in the United States are operated by three classes of people: owners; cash tenants, who pay a stipulated rental, and share tenants, who give an agreed share of products to the owners. Out of a total of about 5,740,000 farms, over 3,700,000 are operated by owners; about 1,275,000 by share tenants, and something over 750,000 by cash tenants. Under the head of farms operated by owners, we have also those operated by part owners; those operated by owners and tenants together, and those operated by managers, who act for the owners and receive a stipulated remuneration for their services. The last-named class is rapidly increasing, particularly in regions where "syndicate farming" is progressing; the total number of farms operated by this method at the present time being nearly 60,000. Over 4,970,000 farms are operated by white farmers, about 747,000 by negroes, and the remaining 2,900 by Indians, Chinese, Japanese and Hawaiians. About 21 per cent of the negro farms are operated by owners, and about 90 per cent of the Indian farms, most of these being held by grants from the Government. Over 78 per cent of the Chinese farms are worked by cash tenants, and only 7 per cent by owners, while Japanese cash tenants are 85 per cent of the total of 570 farms, and Hawaiian owners, nearly 59 per cent of 489 farms.

Farming a Business Enterprise

It is a common experience to hear complaints to the effect that "farming does not pay nowadays," and that "no one can succeed as a farmer, unless, like the average run of Germans and Poles, who come to this country, he and his entire family work the land day and night, etc., etc." As with all falsehoods, there is some truth in both these statements—the average old-line farmer does well if he makes a living from the best farm land, while the industrious foreigner lays by a comfortable property in a few years by "keeping everlastingly at it." Thus, a constantly-increasing army of farmers' boys go to the cities, in order to seek employment in stores and offices, where they frequently do little better than their fathers on the farms. To the economist and general observer this condition of affairs has long been a fertile source of "problems," but some achievements of late years in systematic business farming have given a clew to the facts in the case: the average farmer lacks system, executive ability and the faculty of profiting by simple exercise of intelligent management. According to the statements of authorities on the subject, which may be readily verified, there is no reason whatever why farming should not be made to pay on either a large or a small scale.

Armed with this conviction, and with some little practical experience in farming, several enterprising business men have purchased extensive tracts in several States and systematically farmed them from their offices in the city. At least two notable examples of this order of enterprise are conducted in the vicinity of Chicago. Briefly described, the working of this "long-range" plan consists in dividing the land into separate farms, each of which is under the direction of its own foreman, who is paid a stated salary for carrying out the directions of his chief, and is allowed to make such outside profit as he can from the sale of milk, eggs and poultry of his own raising. By means of a long-distance telephone directions may be given, conditions discussed, and shipments of particular kinds of produce arranged, whenever the state of the market promises a profit. As has also proved to be the case, information regarding the probabilities of weather changes may be transmitted in time to prevent losses in harvesting or putting in a crop. In addition to making it possible to conduct the farm and ship produce, with reference to the latest information on the condition of the market and of the weather, the syndicate farmer can afford to use railroad freight facilities on a scale and with a degree of despatch quite beyond the reach of the average old-time agriculturist.

Perhaps the foremost advantage of the plan is that it allows a thoroughly competent and scientific manager to direct the kind and quantity of the crops to be planted; the particular live stock to be raised; also, to systematically control the rotation of crops, in a manner seldom followed by small independent farmers. Thus, by having at disposal several thousand acres of land, it is possible to maintain the average yearly output of any kind of crops, while allowing each field or tract to rest and lie idle for pasturage at least once in every three or four years. By an intelligent and systematic system of rotation on these lines, it is asserted, any average good American farm may be made to yield at least seventy-five bushels of corn or oats to the acre, and other cereals in proportion. One of the most successful syndicate farmers in the United States gives as a paying division of crops for a farm of 160 acres: 10 acres for buildings and garden patch and a field of beets for feeding sheep and hogs; 60 acres for pasture; 60 acres for corn; 30 acres for oats. This allows of a shifting of cereal and pasture lands every second year. As profits from an intelligently conducted farm of this size, he figures: From sale of wool, $100; from sale of lambs, at $5 each, $500; from sale of hogs, at $10 each, $500; from sale of corn, at 30 cents per bushel, $900; from sale of oats, $200. Deducting from the gross receipts about $700 for running expenses, corn fed to animals, etc., he figures a clear profit of $1,500. In proof of these statements, a syndicated tract of 3,600 acres may be mentioned, in which 1,800 acres is planted in corn, 900 in rye or oats, 900 in pasture, which supports 350 head of cattle and yields an annual income of from $8,000 to $10,000 from the sale of hogs alone.

These figures furnish an excellent object lesson on the application of present-day tendencies toward organization and combination to the business of farming. If the advertised advantages of co-operation are ever to be made available, the farming industry seems an eminently appropriate field to inaugurate it practically. The foremen on syndicate farms, working under the direction of a thoroughly competent head, can live as well as any of the neighboring independent farmers, and clear considerable profits on garden and dairy produce allowed them by contract. It is also asserted that the subordinate employés are well housed, well fed and well paid, and that, contrary to the rule with most farm hands, are eager to retain their positions and avoid all changes. In the meantime, the business head of the whole concern realizes large profits, proving that well-organized farming is one of the most lucrative of investments.

Organization and Co-operation among Farmers

The conditions of agriculture render efforts at organization or co-operation seldom perfectly successful, although, as experience shows, there is no industry in which combination would be more advantageous. The union and co-operative ideas are gradually spreading among farmers, however, and have given rise to many societies and associations for business advantage or for social and educational purposes. Such organizations, of which there are over 5,000 in the United States, exclusive of irrigation societies, conduct co-operative buying and selling; operate small shops and factories, especially for the manufacture of butter and cheese; conduct cotton gins, grain elevators, telephone lines, etc. Co-operative creameries, as conducted in several of the Western States, give the most eminent examples of successful agricultural associations, as yet uninjured by incompetent or dishonest management. Social or mutual improvement societies, of which there are several thousand, were formerly important political factors, but this sort of activity has been strongly discouraged since the second Cleveland administration. Nearly the strongest and most far-reaching of such organizations is that known as the Patrons of Husbandry, which maintains numerous lodges among well-to-do and progressive farmers. Col. J. H. Brigham, Assistant Secretary of Agriculture, is a Past Grand Master of this order.

A recent report of the United States Industrial Commission devotes much space to demonstrating the advantage of business methods in marketing of crops in improving the condition of farmers, who, on account of the perishable nature of their goods, are at the mercy of the middlemen and compelled to accept any prices offered, irrespective of the conditions of demand. The farmers' organizations in Norfolk, and other cities, have largely remedied this evil by keeping constant returns on market conditions. The Milk Producers' Union, of Boston is another example of successful co-operation in which the profits of the farmers are assured by authoritative agreements on the price of milk. Attempts have been made to follow the methods of this organization in other cities. The California Fruit Exchange is an eminent example of successful co-operation, receiving consignments of citrous fruits from all points in the State and marketing them through its salaried agents throughout the country, maintaining the profits to the producer, without materially advancing the price to the consumer. Similar organizations deal in California cured fruits, such as prunes and raisins, although guaranteeing to sell at certain rates, free on board, in California, instead of maintaining agencies at all important market points.

The Farmer and the Commission Merchant

The commission merchant is a necessary feature of the farm produce trade, as of every other branch of commerce. His method is to receive goods on consignment and to sell them to retail merchants, making his profits by charging a fixed percentage on money thus received. Because he has a regularly established trade with certain customers, he can transact business far more readily and economically than would be possible for the producer acting for himself, and can obtain better profits. Thus commission merchants fall into four classes, according to the nature of the goods they handle: Butter and cheese handlers, fruit and vegetable dealers, poultry and game dealers and specialists in other lines. Although many of them will handle any class of farm products consigned to them, they generally prefer to confine their efforts to some special line, in which they have an established name and trade.

Many farmers object to commission merchants, fearing to fall into the clutches of swindlers, who are supposed to seek victims mostly in farming districts. It is well to remember, however, that such men, if well known, have a business reputation to maintain, and cannot afford to stoop to small cheating. If a man is not well known, and sends lists of prominent names as reference, it is well to write to the persons mentioned before dealing with him. On the other hand, the law protects the shipper of goods to a commission merchant, enacting in most States that he is the farmer's agent, and that any attempt to defraud his principal will involve a heavy fine and imprisonment, or both. If the merchant agrees to buy the goods at a certain price, the farmer has no recourse, except to sue for the sum, if it is not paid. But even this may result only in a judgment that can not be collected. It is for this reason that dishonest merchants most often offer to buy goods outright. In order to protect himself, when dealing with strangers, the farmer's safest procedure is to consign the goods to his own order, making a draft through a bank or express company and attaching it to the bill of lading received from the railroad company, properly endorsed. The bank or express company will then present the draft to the merchant, and will not deliver the goods until the money is received.

Mortgages on Farms and Crops

Mortgages in farm districts are supposed to be a kind of plague. The mortgage is thought to be the farmer's bane, too often his ruin. Novels and plays are written around the hero or heroine who, by the performance of some herculean task, lifts the mortgage on the farm and saves the whole family from the poorhouse. In the East, the mortgage may be a curse in fact, as well as in fiction. But in the West, the mortgages are proving a blessing to farmers, rather than a crushing burden. In the Dakotas, for instance, many farmers last year could have paid off their mortgages. Instead, they preferred to pay only the interest, and with the surplus money to purchase additional acres. They claim that this method of financing the farm pays better. Again, in the West, the "crop-payment" plan of paying off mortgages is proving a general success. By this plan, the farmer reduces the amount of the mortgage in yearly installments represented by one-half of all the grain he raises. To the Western farmer, the mortgage is a blessing principally in that it enables him to buy his farm on credit. As this same reasoning applies to Eastern farmers, mortgages on farms, generally considered, should not be counted as an evidence of adversity. Taking the country as a whole, the mortgage indebtedness of farmers during the last few years has been considerably reduced. Farmers who were obliged to forfeit their property, either emigrated to cities, or became tenants on the land of which they were formerly the lords and masters.

The scarcity of money in the South at the close of the Civil War rendered it plainly necessary to make some provision for a credit system, and nearly all the Southern legislatures passed crop lien laws. While something of this kind may have been a real necessity at the time, it is generally agreed that the continuance of the crop lien system has been detrimental to Southern agriculture. The merchants who loan money or make advances of supplies on crop liens protect themselves by requiring the borrowers to plant a specific acreage of cotton, the principal money crop, and this interferes with diversification of crops. Again, the tenant farmers are tempted by the credit system to buy more freely than they would if paying cash, and if they succeed in getting out of debt at the end of the crop year they become involved again almost immediately. The risk of the merchant who sells on credit is so great that a high rate of profit is charged on these credit sales. Many witnesses complained to the Industrial Commission of the scarcity of money and the high rates of interest prevailing in the South as among the Southern farmer's most serious disadvantages. Not only are the nominal interest rates higher than in the North, but in many cases money lenders exact additional payments in indirect ways: For example, a planter may borrow from a cotton factor nominally at eight per cent, but is also obliged to agree to send the factor a certain amount of cotton and to pay him a commission of $1.50 a bale for disposing of it, and this commission must be paid even if the planter fails to raise the prescribed amount of cotton. In some parts of the South money lenders have gradually come into possession of many of the plantations. The establishment of numerous new banks in some parts of the South during recent years, however, has relieved this stringency of the money market to some extent.

Farmers as Tenants

Tenant farmers are principally of two classes; those who were formerly farm owners and have stepped downward, and those who were formerly farm laborers and have taken a step upward. The latter class of farm tenants are more numerous than the former.

Farmers in some sections of the country declare that it is impossible for a young man to start life with nothing, become the possessor of a farm, and clean his slate of debts all within the period of his natural life. The new Census report does not support this theory. During the last decade the total number of farms in the United States increased nearly twenty-seven per cent, from 4,500,000 in 1892, to 5,700,000 in 1902. And the total number of farms worked by their owners is half a million more than it was ten years ago, an increase of eighteen per cent. In the same time, the number of farms worked by tenants has increased forty per cent. These figures show that the number of farm laborers who took a step upward to become tenants is greater than the number of farm owners who took the step downward and became tenants. It is clear that the farm hand can rise in the world, if he wills. And in the Middle and Eastern States, where the increase in tenant farms is greatest—here the farm hand will find the best opportunity of rising to an independent position in agriculture.

A farm may be rented under two kinds of tenancy, the one known as cash rental, the other, crop-sharing. The matter depends upon the custom in the State where the farm lies, or on the kind of crop raised. The cash rental system prevails in the North and East, the share system in the South, and both the cash and the share plans in the West. On the share system, the share of the crop paid to the landlord varies from one-fifth to two-thirds. It all depends on what is furnished by the landlord. If he furnishes the tenant with live stock, seeds, implements and fertilizer, as well as the land itself, the owner's share of course is greater than when he furnishes only a part or none of the utensils and supplies. But in all cases the landlord is supposed to furnish a house, an acre of ground for garden purposes, and firewood.

In Georgia, the tenant must allow the landlord the value of one-fourth of the cotton, one-third of the corn, and one-half of the small grain. In the Carolinas, the cash system has largely supplanted the share plan, but the tenants who still work farms on the share system must pay the landlord one-fourth of the corn and one-fifth of the cotton. In Kentucky, the owner receives one-half the corn, and one-half the net proceeds of tobacco crops. Cotton land is sometimes rented for a fixed amount of cotton. In Georgia, a tenant pays from 500 to 1,000 pounds of cotton for as much land as he can work with one mule. In Tennessee, for ten acres of land, the tenant pays one bale of cotton. In Louisiana, the usual plan is for the tenant and owner to share and share the cotton crop equally, the owner furnishing the mules and their feed. In most instances, the share system is more profitable to the landlord than renting for cash or a stipulated amount of cotton.

Farm Labor

Of all classes of hired help, the most difficult to find and to keep is the farm hand. So scarce is such labor in certain States, that a system of importations has been practiced for years. In Kansas, for instance, every year when the wheat is ready for harvest, thousands of men are imported into the State from all parts of the country. During the harvesting season of 1902, every train coming into Kansas was filled with would-be harvest hands. Would-be, because many of them never before saw a wheat field. They were simply emergency helpers. The fact that such employment is only temporary—a few weeks at the most—is the cause of the dearth of laborers. In 1902, the wheat crop was so large, and the labor supply so scarce, that tramps were pressed into service, and at the end the farmers had to employ all available young girls and women. In the sugar States the same scarcity of labor exists.

In manufacturing States, especially in New England, farm laborers are even harder to secure, and still harder to retain. The brawn of the population prefers to sell its service to the factories, where work is permanent, where exposure is not an element to be reckoned with, and where the hours are fixed, and much shorter than on the farms. From all over the country the report comes that manufacturing establishments are taking the best men from the farms. In the West, in sections where railroads are being built—here again laborers are forsaking the farms and engaging with contractors. And in sections where public works are in course of construction, the same.

Employment agencies are everywhere doing a thriving business supplying farm laborers, making a specialty of securing this class of help. Farmers of Vermont and other New England States secure immigrants from the immigration offices at New York and Boston. In the Western cities, employment bureaus are sending out immigrants to the surrounding farms, a whole regiment at a time, all the arrivals by a particular ship often being forwarded from an Eastern port in a bunch.

Chinese and Negroes as Farm Hands

In California, either because of the lack of white helpers, or because Asiatics are cheaper, farmers are giving employment to hordes of Chinese. These Chinese laborers are supplied either by the Six Companies or by Chinese labor bureaus in San Francisco.

In the South, white laborers are scarce, and negroes are either incompetent or will not work regularly. Negroes drift from one plantation to another, for the sake of a few miles ride on a railroad, enjoying such journeys like children. Many Southern farmers supply tenements for their negro help so that the men can be found and hired when wanted. Some even maintain a commissary and furnish supplies on credit, like the company store plan common in the manufacturing and mining centres. In Tennessee the dairy farmers are unable to achieve the best results because of the lack of white men as helpers. In dairy work, negroes are careless and generally incompetent.

Prosperity of "Hired Help" on Farms

Throughout the country to-day, however, farm laborers own more property than ever before, and their general condition shows a marked improvement over ten years ago. In some New England States, farm hands are as well off as their employers, and in some instances, owing to the decline in prices of farm properties, they are even better off than the farmers. Machinery has reduced the drudgery, while wages have advanced.

But, despite improved conditions and higher wages, the "hired man" is almost as much a problem to the farmer as domestic help is to the housewife. As already inferred, the younger field workers succumb to the attractions of cities, and the older hands will not accustom themselves to the use of machinery. The solution of the hired help problem, many intelligent farmers believe, lies in encouraging the married laborer. The married man usually desires to remain permanently, or as long as the farmer will furnish him with a house, a garden, and perhaps a horse and a cow.

Even the hours of labor are more regular and average a little shorter than formerly. Because of the chores, morning and evening in addition to the regular field work, a farm laborer's hours are proverbially uncertain, but as a result of the movement for a shorter day in the cities his work is better defined and his time shorter. The average for all sections and all seasons is about ten hours; in summer often considerably more. In the Northwest and the South men are required to work from sunrise to sunset, but they are usually allowed an hour to an hour and a half "nooning." In the South also

Saturday is generally either a half-holiday or a full holiday. In New England many farmers allow their help a half-holiday on Saturday, excepting during harvest. For one reason and another, however, this holiday is frequently appropriated by the farmer for some emergency job.

In respect to the duration of employment, farm hands are divided into two general classes: Those who can not find work in winter, and those who don't want to work in winter. The Northern helper is of the first class, the Southern of the second. In either case the result is, of course, the same. In the South there is naturally more chance for winter work than in the North. On the sugar plantations in Louisiana and the tobacco farms of Kentucky there is work for nearly all the hands the year round. In the North there is employment for farm hands during eight months of the year. On dairy farms there is as much work in winter as in summer, for the business goes on with clockwork regularity night and day the year round. Also wherever diversified crops are raised there is less irregularity of employment than where there is only one crop, as in the cotton region of the South or the grain fields of the Northwest.

Earnings of Farm Hands

Of all the great groups of occupations, agricultural labor is apparently the lowest paid. The average yearly earnings in cash of the farm laborer, taking the country as a whole, is placed at $215 to $456. These figures, of course, do not include board and lodging, which are free to the farm hand; and for this reason a comparison with city labor is apt to be misleading. There are certain positions to be secured on farms, however, which pay much larger wages, or salaries. Plantation managers receive from $1,500 to $2,000 a year, and where scientific skill is required, the pay is still higher, sometimes reaching $7,000 to $10,000 a year.

Computations have been made at various times by investigators for the Government of the annual earnings of agricultural laborers, but the task is difficult and the results are stated with great caution because of the complex nature of the problem. First, while the number of agricultural laborers employed at one time or another in the year is great, the number having full six months' employment is much smaller; the number employed eight months is disproportionately lower than those having six months' work; and the number at work regularly the year round is relatively very small indeed.

Again, farm labor must be differentiated from other employment of the person, most of whose time is devoted to farming. A thrifty laborer, whose principal employment is agricultural, may lose little time in the whole year, and yet his employment in agriculture may not cover three-fourths of his time. For example, near the lumber districts the same person, by change of labor between farm and forest, can earn wages with little intermission, but as a farm laborer he would not be employed more than half his time.

Finally, the personal element produces more difficulty in determining wages in agriculture than in manufactures. In manufactures a clearly definite product is the standard of efficiency, and a group of laborers and a series of products become adjusted to each other, in wages and in results, with fines and discharges for damages and neglect on one hand, and promotions and better pay for higher skill and economical tact on the other. Fidelity and skill are as valuable on the farm as in the factory, but their effect is not under such constant test.

As there are no labor unions in agricultural industries, the rate of pay varies even in the same locality, according to the individual contract, the amount depending largely upon the character of the work to be done. Florists and market gardeners, for instance, require hands of special training for shorter seasons and longer hours, and they therefore pay their men more than the general farming wages.

To sum up, the average monthly wage on the farm, without board, is $30 in the Eastern States, $25 in the Middle States, $13 in the Southern States, $30 in the Western mountain States, and as high as $37 in the Pacific States. Wages are highest on the Pacific Coast, because that is the section of the greatest scarcity of farm labor, taking the year together; lowest in the Southern States, because there farm labor is most plentiful. In the South, however, it should be remembered that planters make no charge for the tenant houses provided for the negroes. The understanding is that the negro shall work on the plantation when called upon; to refuse to work, and that, too, for the current wages, would be to have to move.

In the beet-sugar and fruit-packing States, where a large number of laborers are employed at certain seasons, a camp is established, tents are furnished free and meals at cost; and with all this wages are exceptionally satisfactory.

An important advantage of the farm hand is his greater opportunity to save, as compared with workingmen in other vocations. The hired man —girls, too, for that matter—on the farm has few occasions to spend his wages. What is perhaps of more consequence, he has very few temptations to waste his money on drink or foolish extravagances. He is very infrequently at the store, very coarse clothing suits his work; two or three pieces, with shoes and hat, completing his summer outfit, when he makes most of his money. His board and lodging are usually allowed him in addition to his money, if he is single, and a house and garden if married. In either case food and lodging are to be left out of the account. Accordingly, the farm laborer will usually have more cash at the end of a stated period of service than his city cotemporary, whose pay is much higher. The only question in his problem of laying aside a permanent fund is his self-control when he reaches town; and he always has time to think twice and resolve once before temptation to throw his money away is upon him. It frequently happens that the farm hand with a little turn toward thrift becomes first a tenant farmer and then a prosperous land owner. This is almost independent of the actual cash wages he gets as a farm hand, whether it be $13 a month in Georgia or $37 in California; for prices are higher where wages are higher, and after all it is the disposition to save that makes the opportunity to save useful.

Agricultural Education

To the uninformed mind the expression, "college-bred farmer," suggests something of a contradiction in terms. It may be supposed to connote some sort of amateur agriculturist or "gentleman farmer," to use an absurdly offensive term, but why in the world this kind of farmer should be distinguished from others some find it difficult to understand. In expressing this commonly held opinion one would be only repeating the assertion of sundry authorities that a college training is not of direct benefit to any other business career—why, then, to farming? This is the very point that it is extremely desirable to elucidate. The kind of college training that has been found often a serious incapacitation, and seldom a direct advantage, in ordinary financial and commercial business life, is the traditional classical and literary training, properly intended as a preparation for law, divinity, medicine or pedagogy. Of late years, however, the college has become increasingly a school of technical preparation for various modern professions, subsumed under the general term, "scientific callings." The conditions of modern life, science and industry have raised the calling of chemist, engineer or of mining or manufacturing expert from the condition of being a somewhat enlarged variety of trade to a true professional dignity, for which four full years of careful training must be the preparation. Just as the advance of science in all these various branches have created so many new learned professions, so in the domain of practical agriculture there is a similar demand for scientific and accurate knowledge. Indeed, it is quite as essential that we have our graduates in what may be called "agricultural engineering," as that we have our carefully-trained mining engineers, to locate, survey and direct the operations of a mine of any description. That the demand is a real one is shown by the statistics of the several colleges of agriculture in the United States.

According to the statements of a well-known agricultural educator, a certain State university counts among its recent graduates twenty men engaged as professors or instructors in various other colleges, of whom seven, or over one-third, are from the agricultural department. He also mentions that one agricultural college has graduated 399 students since 1892, of whom 261, or 65 per cent, are engaged in agricultural pursuits, 19 are students in other institutions, 59 are in other occupations, and 60 not heard from. Out of the total number 28 are employed in other agricultural colleges or stations, or by the United States Department of Agriculture. Among the opportunities offered to graduates of such institutions may be mentioned the more than ordinary assurance of success as independent farmers, coupled with such pre-eminence in the social, business and political affairs as is always attained by intelligence. Such ends are frequently called "sordid" by persons who find them difficult of attainment;

but the fact still remains that any training or influence that can help toward them is eagerly sought after by the great majority. It is quite evident that farming is by no means a stepping-stone to political preferment, but the fact remains that farmers frequently enter politics and attain high legislative and congressional distinction. It is interesting, furthermore, to record that in one legislature in the State of Illinois there were three representatives of agricultural districts who were graduates of the Illinois University School of Agriculture. Since success, not only in his chosen profession, but also in the general affairs of life, comes as the direct result of the most careful and thorough training, we find that the graduates of the full course have a distinct advantage over those who have taken only partial courses, under the mistaken assumption that farming demands no greater preparation. Furthermore, just as a lawyer, a physician or an engineer is trained by a regular course of study that he may be fitted to take full advantage of the opportunities offered by his profession, so a thoroughly-trained agriculturalist can "make the desert blossom" and bring fertility out of the most unpromising tract of land that one less skilled and worse trained would abandon as worthless.

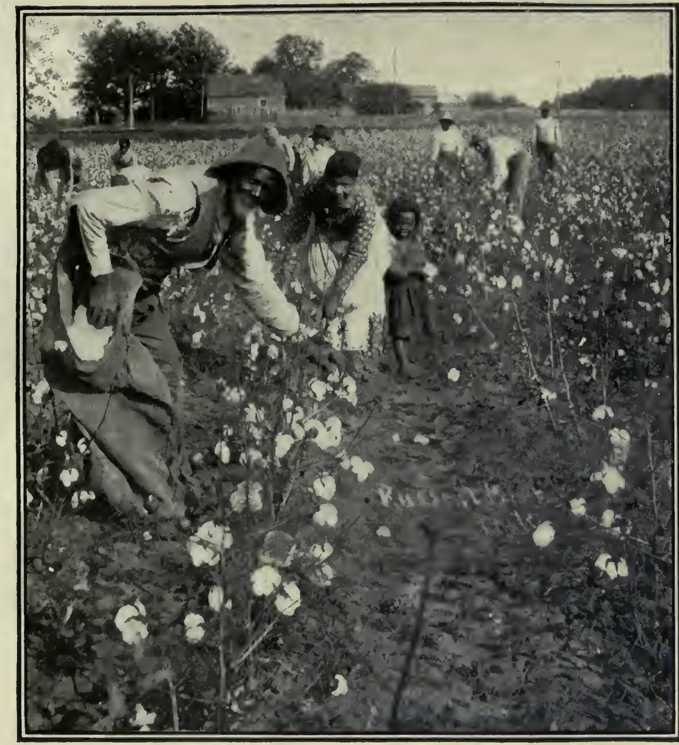
Another fact of great significance to the agricultural graduate, and also to the public at large, is that capitalists, seeing the possibilities of farming by modern methods, are already investing extensively in lands in all parts of the country. Nor do they contemplate raising the piteous wail, so often heard in the past, that a man with too much land is "land-poor;" such a person to-day is generally an imbecile or one devoid of energy. This movement not only opens up a large vista of opportunities for competent men to obtain profitable positions as syndicate farm managers and superintendents, but it puts the strongest possible emphasis on the necessity for the small farmer to have a high professional equipment, in order to be able to compete at all with the wholesale producers. The situation is aptly expressed by Prof. Thomas F. Hunt, Dean of the Agricultural School of Ohio State University, who says: "If you can not afford to prepare yourself to be a farmer, do not farm. Enter some other business, where the business itself will teach you success. Far better be a corner grocer or a street-car conductor." In support of his statement of the profitable openings for the graduate agriculturist, he gives examples of thirty-six men graduated in his school during six years, stating that seventeen of them are occupying high-salaried positions in their professional field.

To sum up the educational outlook for the practical farmer, it may be stated that the man proposing to enter on agricultural study should consider the future possibilities quite as much as the present opportunity. Within the next forty years the agricultural graduate will be an important and prosperous person. The broad dissemination of these facts will prove a most effective influence in checking the present exodus of boys and young men from the country, to become clerks and subordinates in city stores and offices, instead of independent and prosperous farmers on the modern plan.

Agricultural Colleges

A number of agricultural schools and colleges were founded in the United States during the Nineteenth Century, a few of them making agriculture a specialty, but most of them offering it with other industrial branches and trades. The desirability of providing systematic instruction in this subject seems to have been felt as long ago as 1825, when the Massachusetts Legislature discussed a plan for a State college of agriculture. In 1826 a successful school of this kind was established at Derby, Conn., and between that time and 1850 numerous schools of "manual labor" and farming sprang up in New York, Connecticut and other States. A professorship of agricultural chemistry and vegetable and animal physiology was established at Yale College in 1846, and within two years several systematic courses were offered for training teachers of agriculture. The first State agricultural and industrial school was founded by the New York Legislature in 1853, although it was never firmly established. Efforts in the same direction in Michigan in 1857; in Iowa and Minnesota in 1858, and in Pennsylvania and Maryland in 1859, proved eminently successful. At the opening of 1860 there were agricultural colleges under State or special board control also in New York, Massachusetts, Connecticut, Georgia, Ohio, Illinois, Wisconsin, Indiana and Maine.

The first movement to induce the National Government to patronize agricultural education was made by Justin L. Morrill, of Vermont, who in December, 1857, introduced in the House of Representatives a bill "donating public lands to the several States and territories, which may provide colleges for the benefit of agriculture and mechanic arts." This bill proposed to grant 2,000 acres to each Congressman for this purpose. It was reported adversely by the Committee on Public Lands, but was passed by both houses of Congress, and vetoed by President Buchanan. The measure was finally passed in amended form in June, 1862; thus founding the famous Government land-grant colleges that have proved of such immense benefit in all parts of the Union. Their usefulness was still further enlarged by the Morrill Act of 1890, authorizing the increase in their endowments from the funds derived from sale of public lands. At the present time there are sixty-four such institutions in several States and Territories, of which sixty maintain full courses in agriculture. Among these are colleges teaching agriculture exclusively, those including it among other technical subjects, such as mining and mechanical industries, and those that are departments of universities. In most of them the agricultural course occupies four years, and leads to the degree of Bachelor of Agricultural Science, which indicates courses completed in such general subjects as agricultural chemistry and methods, horticulture, vegetable pathology, economic entomology, veterinary science and dairying. The last-named subject is made a particularly strong feature in several institutions. In several instances short elementary and practical courses are given, which may extend over a period of two years



PICKING COTTON IN MISSISSIPPI

AN AMERICAN TEA PLANTATION

Vol. II., pp. 716, 728

or be limited to the winter months, according to the requirements of students.

Probably the most extensive and active of the several university departments of agriculture is the one connected with Cornell University. It offers graded courses of two, three and four years for all students passing examinations, also short winter courses for men regularly engaged in farming. There is also a graduate department for advanced students, in which from twelve to twenty men are annually enrolled. University extension and correspondence methods are used with non-resident students, of which there are large numbers in all parts of the country. These are instructed by lesson papers regularly sent out and returned for correction, while several hundred farmers are constantly being directed in conducting advanced experiments in nearly every branch of their calling. Regular courses of lectures are arranged and delivered before farmers' associations, and a special correspondence bureau is maintained for answering the thousands of letters of inquiry annually received on every question relating to agriculture. The department also provides regular reading courses for farmers and farmers' wives, as well as in the study of natural history, the last-named being conducted by the Junior Naturalists' Club, with about 30,000 members, organized into 1,700 branches or chapters. The regular reading courses reach 30,000 farmers and about 8,000 farmers' wives. Another useful branch of the work is the experiment station, which performs the beneficent function of providing specialists to investigate insect or fungous scourges; to discover remedies, if possible, and render full reports. These reports are embodied in the bulletins, which are periodically issued, over two hundred having already appeared in editions of about 20,000 each. During its existence the school has given instruction to nearly 2,000 regular students.

Among other well-known university departments of agriculture may be mentioned the Bussey Institution of Harvard University and the School of Agriculture of Ohio State University. One of the most widely-known is the Hampton Normal and Agricultural Institute, of Virginia, founded soon after the Civil War for the education of negroes and Indians.

Government Employment for Agricultural Students and Experts

In addition to the numerous inducements to farmers and others to make a systematic study of agriculture, the encouragement directly offered by the United States Government has done much in recent years to enhance the possibilities of the profession. According to provisions of Congressional Acts within the last few years, the Department of Agriculture has undertaken to provide most excellent post-graduate training for graduates, both male and female, of agricultural colleges throughout the country. Fifty of these are chosen each year from lists of applicants, and are given an unprecedented opportunity to pursue studies along special lines. In the meantime, they are designated by the dignified title of "scientific aids," and are allowed a stipend of forty dollars monthly, until their chosen or assigned course of special training is complete. At this point they are appointed to the graded service of the government, and are in line for promotion to the highest and most profitable salaried positions. In the regular employ of the Department, these aids are assigned to conduct special experiments in subjects related to any branch of agriculture, or are sent to various points to make investigations or render desired assistance. In commenting on the brilliant opportunities offered under this educational system of the Government, a well-known agricultural educator stated a year or two since:

"As indicative of the rapidity of promotion, it is stated that ten recent graduates, who entered the Department last year and this year at $480 per annum, are soon to be advanced to $1,000, while within the year an equal number of similar promotions will follow. . . . The Department has just sent graduates of agricultural colleges thus trained to Hawaii and Porto Rico to take charge of experiment stations there at a salary of $3,000 each."

The young men and women, thus trained under Government supervision, frequently obtain excellent positions as instructors in agricultural colleges, both at home and abroad; while, by virtue of the unparalleled opportunities for exhaustive special research, they are well equipped to accept positions as experts in certain lines under foreign governments or extensive corporations. Thus, one man who was sent by the Department to Hawaii, as special expert on sugar making, very soon afterward received and accepted an offer of a similar position at $15,000 per year to go to New Zealand. Another, who had attained particular proficiency in the study of the growth and physiology of tobacco, was engaged by the Japanese Government, as special expert, on a salary of $6,000 per year. According to published statements, a wealthy corporation in South Africa requested the Department to recommend some person capable of supervising the cultivation and administration of an extensive tract of land, at any salary he might name. As the result of this wide and constant demand for agricultural experts and specialists, Congress has recently been requested to raise the salaries available to competent persons in Government employ, so as to increase the inducements to remain in the service of the Department.

In order to secure appointment as "scientific aid" in the Department of Agriculture, a graduate needs only to forward a sworn statement of the number of years spent in study, and where, together with a statement of the special course he desires to enter, with statement of qualifications, and a written or printed essay on some subject connected with his work. At the end of two years' study under Government supervision, he is examined on his qualifications and admitted to the classified service at a salary of $1,000 per year. There are still more openings in this work than there are available men and women to fill them—such is the constant draft made by other governments and large corporations that offer superior inducements—and it is probable that, within a few years, it will be quite the most desirable line of Government employment.

Home Study for Farmers

The fact that during the last fifty years the value and quantity of farm products have increased twentyfold, while the number of farm workers in the United States has increased only twofold, indicates an opportunity for successful and profitable farming, of which few seem to be aware. In the meantime the cost of human labor required to produce a bushel of corn has been decreased from 35¾ to 10½ cents, and that required to produce a bushel of wheat from 17¾ to 3½ on the average. Of course, the advent and development of improved farm machinery of various kinds have had considerable influence in bringing about these results, but these are, at best, only labor-savers, enabling work to be done expeditiously on a large scale, and always to be considered of secondary importance to improved methods and more adequate understanding of the nature and conditions involved in raising both vegetable and animal products. The motto, "To earn more, learn more," applies, then, to the farmer as truly as to any other business man or primary producer: he is faced with the same necessity of competing with trained intelligence and the scientific methods that have brought about the great results in his calling.

As we have already seen, there are numerous and various methods at the present time by which the farmer may obtain the information necessary to give him a truly up-to-date equipment in his line. The agricultural college can lead him through a thorough course of study, and graduate him a fully prepared bachelor of agriculture. The experiment stations, such as are maintained by Cornell University or by the public funds of the State of Massachusetts, will give him the benefit of their investigations at any time, or furnish him with expert information on any perplexity that may arise in his work. The United States Department of Agriculture is also carrying on a large variety of activities for the farmer's benefit: how and in what lines it will assist him may be learned for the price of a two-cent stamp.

Farmers' Reading Courses

Probably the most practical work undertaken for the benefit of the busy farmer, however, is to be found in the reading courses, of which something has already been said. These courses are conducted by furnishing the farmer with carefully-prepared treatises on such special lines as he may desire—such, for example, as soils and crops, live-stock breeding and feeding, dairying, fruit-culture, gardening, farm-economics, domestic economy, and the like—all of them written in a simple, direct and lucid manner. Of course, there are several serious obstacles to be encountered at the start, particularly in the traditional conservatism of the farmer himself. It is difficult to persuade him that the old-fashioned methods, while quite suitable in former times, are incapable of bringing success under the conditions of present-day competition. Then, his widely understood contempt for "book learning," which has been largely fostered by the ridiculous exploits of some amateur farmers, of great professed information, as well as by the even more absurd advice and opinions ventilated in some of the alleged agricultural papers, formerly so popular, often renders it difficult to make him see the value of scientific investigations by "college professors." For this reason, some will mention with amused satisfaction the numerous failures recorded in agricultural experiment stations, seemingly quite unconscious of their direct value to every wide-awake farmer.

Again, although the average farmer is a great reader in a general and unsystematic way, and although many have declared that the surroundings of his life are eminently suited to supply the leisure and calm required for intellectual work, he will object to a course of systematic study on the ground that he is "not made for a student;" "never could study," and "would not stick at it." These objections are very ill taken, of course, arising from a complete misunderstanding of the nature and objects of study or systematic reading, and being undoubtedly made in a thoughtless mood. Only a brief trial of the reading and correspondence method suffices to dissipate the error. No expense is attached except for books and a small enrolment fee, generally $1 for the entire course, and no work is required of the reader, except that he should read the books and write intelligent answers to series of questions on their contents, furnished from time to time. The correction of errors in these answers is one of the greatest helps to fixing the facts in the mind. Another help to study, which is constantly encouraged, is the formation of clubs of three or four student-readers, which shall meet regularly to read and discuss the books of the course, and refer such difficulties as arise to the college authorities. In all cases, it is strongly recommended that each reader pursue his course in company with some other farmer, or a member of his own family: this adds the element of association, so essential in every effort of life.

The particular value of these courses of reading is that they give not only the "how" of all essential farming operations, but also the "why." In this way they give the practical farmer an immense advantage over both the inexperienced "book-farmer" and the man that follows the same invariable rule for every variety of soil and every kind of crop. In short, it makes him a practical example of the saying that, "there is an immense difference between knowing how a thing is done and knowing how to do it, while there is an even greater step taken in learning *why* it is done." Of course, it might be unprofitable to supply the busy farmer with intricate discussions of the varieties of fertilizer, for example, and the methods of preparing them by mixing numerous chemicals with long names and unknown properties, but when such a treatise tells him exactly what kind of plant food each variety of soil requires, and how it may be cheaply prepared from materials at hand, or readily obtainable, the farmer has learned something of inestimable value. The same is true of other matters touched on, even to the methods of exterminating common insect pests, or eliminating harmful fungi from trees, or overcoming troublesome plant diseases. Furthermore, the managers of the course request each farmer to furnish them with a rough sketch plan, made according to directions furnished, of his own farm, so that the conditions of his work are understood and his questions may be intelligently answered The farmer thus comes to realize that his farm is somewhat like a mine or a factory, for the production of necessities or luxuries for the public, which may be made to yield the highest profits, if handled by an intelligent and well-informed man. He is made to benefit by the accumulated knowledge and experience of multitudes of farmers, instead of trusting to his own judgment or to that of a few neighbors, and can also profit by the latest discoveries and experiments conducted by men who have made the subject a life study. At the experiment stations, where the writers of the books and the managers of the courses conduct the practical details of the matters treated, there are several hundred acres, under constant intelligent cultivation, both in raising all kinds of vegetable crops, and in pasturing and feeding domestic live stock, horses, cattle, sheep and pigs; every suggested experiment being thoroughly tried, in order that improvements may be made public and errors as widely understood.

CHAPTER IX

THE CROPS

Summary of the Great Crops—The Cotton Crop—Negro Labor in the Cotton Fields—The Cotton Planter—The Cotton Picker—Mechanical Methods of Handling Cotton—Marketing the Cotton Crop—The Sugar and Sorghum Cane Crops—The Sugar Beet Crop—The Tobacco Crop—The Tobacco Planter—Harvesting the Tobacco Crop—Growing Tobacco Under Cover—The Tobacco Market—Raising Tobacco for Export—The Rice Crop—The Rice Planter—Lowland Rice Culture—Harvesting and Marketing the Rice Crop—Upland or Dry Rice Culture—The Hop Crop—Hop Planters and Pickers—Harvesting and Marketing the Hop Crop—The Seed Crop—Tea Culture in America

Summary of the Great Crops

OF THE 290,000,000 acres under constant cultivation in the United States, about 49 per cent represent cereals, about 16 per cent hay and forage, about 12 per cent cotton, not quite 8 per cent garden vegetables, 4.4 per cent fruits, 1.9 per cent tobacco, 1.3 per cent sugar, and the remainder all other products. Corn is the most extensively cultivated cereal, representing about 95,000,000 acres, yielding over 2,600,000,000 bushels. Wheat occupies about 52,600,000 acres, yielding over 658,000,000 bushels; and oats, over 29,500,000 acres, and 943,000,000 bushels. The common table and staple vegetables represent an average of over 7,000,000 acres and over 342,000,000 bushels, including over 273,000,000 bushels of potatoes alone. The fruit crop covers over 6,800,000 acres, and yields over 282,000 centals of grapes and over 6,000,000 bushels of small fruits.

The average acreage devoted to cereals is about 184,000,000, of which 51.5 per cent is devoted to corn, 28.5 per cent to wheat, about 15.7 per cent to oats, and the remainder to barley, rye, buckwheat, rice, kafir corn, etc. The greatest corn-raising region of the country is in the North Central States, which contain over 60 per cent of the total acreage, leaving 24.1 per cent for the South Central States, 12.7 per cent for the South Atlantic, and the remainder for the North Atlantic and Western. Of wheat, 67.5 per cent is grown in the North Central division, 11.3 per cent in the South Central, 10.6 per cent in the Western States, leaving 10.6 per cent for the Atlantic States. The North Central States also lead with 75.1 per cent of the acreage devoted to oats, with 66.5 of that devoted to barley, with 60 per cent of that devoted to rye, and with 74.1 per cent of that devoted to buckwheat, being, in fact, the great cereal country of the Union.

Under the general term, hay, are included numerous varieties of grasses and other plants, used for animal fodder. Among these are the common cultivated grasses, clover, millet, wild, salt and prairie grasses, and the stalks of corn, various grains, alfalfa, etc. The general cultivated grasses represent 50.7 per cent of the total acreage devoted to hay fodder and the various wild grasses, including salt hay, another 21 per cent, with over 6 per cent each for clover and grains cut for hay, and 5.1 per cent for general forage crops. As in the case of cereals, the North Central States contain the greater part of the acreage devoted to hay, containing over 57 per cent of the total, with 21 per cent for the North Atlantic States and over 11 per cent for the Western.

The cultivation of flax has practically ceased in the Eastern States, although it is still one of the important agricultural products of the Union. On the average, about 88,000 farmers raise flax on over 2,100,000 acres, obtaining a yield of nearly 20,000,000 bushels yearly. As with the staple cereals, hay, etc., the North Central States lead in the production of flax, with 98.8 per cent of the total acreage devoted to its cultivation. Minnesota, North Dakota and South Dakota alone contain 77.7 per cent of the flax acreage, while the Western States contain 1 per cent of the area, and the South Central division, mostly in Oklahoma and the Indian Territory, only 0.2 per cent, or about 3,600 acres. In the North Atlantic States less than 250 acres, and in the South Atlantic less than 50 acres, are devoted to flax growing.

Broom corn is another agricultural product most largely cultivated in the North Central States. Its average annual output is nearly 91,000,000 pounds, raised upon over 178,000 acres by about 17,500 farmers. Of the total acreage thus occupied the North Central States represent 84.4 per cent, more than one-half of which is in Illinois alone, leaving 12.4 per cent for the South Central, and the remaining 3.2 per cent for the Western and Atlantic States. The average yield per acre is 509 pounds, and the average value four cents per pound, giving a total value of about $3,600,000 for the country.

The Cotton Crop

The great cotton-growing region of the United States is in the South Atlantic and South Central States, commonly known as the "cotton belt," Missouri, Kansas, Arizona, Nevada and Utah being the only States out of these groups to report its culture to any extent. The total area covered is about 24,300,000 acres, from which about 1,400,000 farmers obtain 4,700,000,000 pounds, or 9,500,000 bales, of cotton, and nearly 4,600,000 tons of cotton seed annually. Texas is the most important cotton State, representing 28.7 per cent of the total area and 27.4 per cent of the total production, followed, in order, by Georgia, Alabama, Mississippi, South Carolina, Arkansas and Louisiana. The variety known as "sea island cotton" has been extensively cultivated on the islands off the coast of South Carolina, Georgia and Florida, and to some extent on the coasts of these States. Experiments in recent years have shown that it can be grown inland to some advantage, which has greatly increased its production. At present the annual output is about 75,000 bales, nearly 317,500 acres being devoted to its culture, and over $5,250,00 being realized from its sale.

The cost of raising cotton varies from three and one-half to twenty cents a pound. When it sells as low as five cents a pound it can not be raised profitably. The cost of production depends very much upon the yield per acre. Thus it is said that when a bale of cotton requires three acres of land for its production the cost is about eight and one-half cents a pound, including expenses of delivery, interest and taxes. When a bale is produced on two acres the cost is said to be about seven and one-half cents, and when a bale is obtained from one acre, about six and one-half cents.

While in commerce and in manufacturing the South is up to date and full of enterprise, the agricultural conditions of that section of the country remain in very much the same state in which they were before the Civil War. It is not that the cotton crop is not large. In the rather poor season of 1899, 10,000,000 bales were produced. Only, if the harvesting methods could be improved, the profits might be many times increased. No such conditions prevail with any other great crop. Again, no other crop demands a similar amount of unskilled labor. For one-quarter of the year, the work of five million negroes is required. Furthermore, it would be considered preposterous in the harvesting of any other crop to permit such waste. The proportion of cotton left in the field to rot is estimated at one million bales. Should a perfect cotton-picker ever be invented, harvesting methods would be so revolutionized that the effect on the negro might be portentous.

Negro Labor in the Cotton Fields

But the negroes are leaving the cotton fields very fast. They are migrating to the cities by the thousand, and it will soon be a serious problem with the planters as to how they will cultivate and gather their crops. The negro loves a life of indolent pleasure, and this he can find in the cities. Those who want to work find plenty of it in the public works that are being erected in all the Southern towns.

There is no laborer on earth better suited to the cotton fields than the Southern darky—he of the black skin and the brawny muscle; but, though the work likes him, he does not like the work. Efforts have been made to supplant him with the Italian immigrant, but he is not the equal of the negro in this work. The negro is possessed of an amount of endurance almost equalling that of a mule. He will stand being driven, and is not in his element unless the overseer is standing over him and heaping invective at him at the rate of a mile a minute. When well fed and properly looked after his endurance will never lapse.

As it is at present, the negro can earn enough money in a week to live in idleness for the remainder of the month. The poor whites, being to a large extent in the cotton mills, do not take his place during his idle days.

The Cotton Planter

The cotton-picking season is a time of rejoicing in the entire South. To the black-skinned cotton pickers it means a certain amount of ready cash to be spent for brilliant-hued calico gowns for the women and pickaninnies, and to enable the men to indulge their appetite for gambling in their favorite game of craps. To the planter it means the reward of nine months of work, worry and uncertainty. To the country storekeeper it means a boom in business and a liquidation of considerable old indebtedness. To the cotton merchant in the large cities and seaports it means the squaring of accounts with the planter and the receipt of his cotton, which will be put on the market, and the merchant will reap the factor's profits. To the banks it means the taking up of notes by the merchant and the payment of the accrued interest. To the whole South it means more money, and consequently more prosperity. With cotton selling at ten cents a pound, and with a 9,000,000-bale crop, that means the distribution of $450,000,000 in the cotton States. It costs about five cents to raise a pound of cotton. That leaves $225,000,000 as clear profit for the planter. Is there any cause for wonder, then, that the whole South experienced an unprecedented thrill when, in the first years of the present century, the price of its main staple jumped from a figure that was below the cost of production to one yielding a profit—or, more properly speaking, a surplus—of one hundred per cent?

The nature of the contract between the negro picker and the planter depends altogether on the planter. It would not be safe to say that no two planters make the same kind of contract, because there are too many planters; but they vary greatly. The price of cotton, present and prospective, wields a great influence in the matter. A planter may have two thousand acres under cultivation. He plants in April and begins to harvest in September, finishing about January 1. But he must work from January to January. In the days of slavery ten acres to the hand was considered reasonable. In these days, with a steady migration of negroes to the large cities, and consequent scarcity on the plantations, they are more independent, and as the negro loves nothing better than idleness, it takes hard driving to make him do seven acres.

Some planters put their negroes on shares. If they are thrifty they assign them so many acres, according to the number of adults in the family, and, furnishing all the implements, mules, etc., needed in cultivation, divide the proceeds of the sale of the crop. That is what is known as a share contract. Others pay their hands fifty cents to a dollar a day. Some apply both methods. Others interject variations.

Some planters pay by the month, some every two weeks, and others every week. The best plan has been to pay by the week, because a negro has a short memory, and it is better to deal with him without disputing. The large plantations are supplied with commissary stores, where provisions and clothing are furnished the "hand" at reasonable rates, and settlement day comes at the end of the picking season, or oftener, according to the rule of the plantation. Where there is a weekly or bi-weekly pay day, and the plantation is near a town, the hand can supply his wants at the country store.

The planter must be a man versed in many things. He must know how to feed his hands, to keep them in good health, and how to treat them when they get sick. He must also be a man possessed of a sense of justice, in order to settle the disputes which arise among them. The planter is a prince in his own domain, and every negro there must look to him as the supreme authority.

The Cotton Picker

The men and women work in the fields hoeing cotton, but when it comes to picking the entire family is kept busy, and then all the extra hands that can be obtained are put to work. And it is just that time of the year when extra hands are hard to get. The steamboats plying up and down the Mississippi River and its tributaries, which have lain idle during the summer, resume their trips, and they need roustabouts. The negro has no equal as a roustabout; therefore he commands eighty and sometimes as high as a hundred dollars a month as such. It has to be paid to him or he will go to the cotton fields, or to the sugar plantations. Cotton pickers are paid all the way from forty cents to a dollar a hundred pounds. A good picker will average one hundred and fifty to one hundred and sixty pounds a day.

When the cotton is ready for picking a cotton field presents a beautiful sight. The green stalks have turned brown, and seem to have given up all of their vitality in producing the fruit which clusters all over them. Viewed from a distance, the field looks as if there had been a gentle snowfall. Here and there are different groups of negroes, who appear to be buried in the depths up to their armpits. A closer inspection shows them at work. The picker has slung to his shoulder a large hemp bag. It drags on the ground behind as he walks from stalk to stalk. He grasps the cotton boll with his left hand and picks the little bunch of cotton from each of its four sides, keeping this up until he has a handful; then he stoops down and puts it into the sack. He begins at the end of a row, and continues down to the other end, where he finds a large basket, into which he empties the contents of his sack. He proceeds down the next row, then back again by another row, and empties his sack into the basket. He keeps this up from daylight until it is too dark to see. Each extra hand, or each family, has one basket, and the contents of this basket are weighed and the pickers paid accordingly.

As the seed is picked with the cotton, and its weight is seventy per cent of the whole, it will be seen that comparatively little cotton is picked by one hand in a day. It is very tedious work, and the women and children are more adept at it than the big, clumsy men. In the first place, the fingers of the former are smaller, and therefore better suited to the work of picking out a small pinch of cotton from a brittle shell. Again, the women and children are possessed of more dexterity in that kind of work. As a cotton stalk averages about four feet in height, the men have to stoop over, while the women, naturally shorter, and the children have the bolls at a more convenient height.

As soon as a field has been picked the hands are started over again at the beginning for a second picking. By this time many of the immature bolls have opened, higher up on the stalk. The same programme is followed. Sometimes there is a third picking; and, if a respectable quantity of cotton shows after this, and the price of the staple makes it worth while, there is a fourth picking.

Mechanical Methods of Handling Cotton

The mechanical process of harvesting cotton not yet having been entirely perfected, a fantastic experiment was tried on some plantations near Natchez, Mississippi. Monkeys were trained to act as pickers. But the great problem can hardly be said to have been solved by them.

There is, however, a machine which does the work of picking, with a certain amount of success. It is the Mason Cotton Picker. This machine runs astride of a cotton row. As it proceeds, two vertical cylinders revolve. There are fingers which go around with the cylinders, revolving at the same time on their own axes, by a mechanical device. The fingers are punched so that little teeth stand up from their surface, "engaging" the cotton. This motion is reversed at a certain point, and the picked cotton is carried to a bag by a "conveyor." To pick the seed-cotton contained in a bale weighing five hundred pounds, costs from seven dollars and one-half to fifteen dollars. An enormous saving might be effected here. Although the Mason machine picks cotton in a remarkable way, yet the cleaning of the cotton after the picking remains, forming a large item of expense.

The moment the seed-cotton reaches the gin, different conditions prevail, the negro no longer being so prominent. The science of ginning, pressing, and marketing the cotton has reached an extraordinary degree of development. Eli Whitney was the best friend the industrial South ever had. The roller compress, turning out the round bale, instead of the square bale produced by the former compresses, is attracting a good deal of attention, something of a war raging between the two interests. By either system, the bale takes up about half the space afforded by the use of the ancient methods, with the advantages of being more easily handled, involving less danger from fire, and greater resistance to the weather. The saving in freight and insurance has been incalculable. And there is less risk from deterioration, in case the farmer desires to retain the baled cotton in his possession.

Marketing the Cotton Crop

The conditions of the cotton market are very complex, and are seldom understood by the cotton growers. To the great cotton cities, such as

Atlanta, Augusta, Columbia, or Charlotte, North Carolina, long strings of wagons converge on every road leading into town. There are great platforms holding ten thousand bales. The farmers, as a general thing, know very little about "sampling." The brokers are usually honest, however. They take a sample from each load, carrying them to their offices, where they classify the cotton, and offer the farmer prices ordered by telegraph from New York or Liverpool.

The Southern cotton planters are making constant efforts along a line which would enable them to hold their cotton as long as they like in bonded warehouses. They could thus borrow money on it to live, while waiting for the prices to go up. This is in the direction of the so-called "trust."

In spite of the great crops of cotton, it remains a fact that much fine land in the South, capable of producing the best cotton in the world, has never been cultivated. As this unused territory is properly developed, the cotton raising industry will advance with rapid strides, and the commercial interests of the South will be greatly benefited.

The Sugar and Sorghum Cane Crops

The average acreage annually devoted to the culture of sugar cane is somewhat less than 390,000, to which must now be added another 66,000 in Hawaii. This area is divided among nearly 181,600 farmers. Excluding the area in Hawaii, we find that 87.8 per cent are in the South Central States, principally Louisiana, 12.2 per cent in the South Atlantic States, over half the area being in Georgia, with about fifty acres in Arizona. Including Hawaii, we find that out of a total acreage of over 450,000, it contains only 14.5 per cent, but contributes 76 per cent of the sugar produced and 39.2 per cent of the molasses.

The annual average product of cane sugar is over 664,000,000 pounds, of molasses over 10,000,000 gallons, and of syrup about 12,300,000 gallons, the total value being nearly $30,000,000. The average value of the product per acre is, on the continent, slightly over $53, while in Hawaii it is nearly four times as great, or about $286.

The sorghum crop of the United States occupies an annual average area of about 293,000 acres, representing the labor of about 446,000 farmers, and a product of not quite 2,000,000 tons of cane. Of this about 14 per cent is sold as cut, the remainder being used in the manufacture of syrup. The sorghum acreage is mostly in the North and South Central States, the former containing 31.4 per cent and the latter 49.7 per cent of the whole, leaving 18.5 per cent for the South Atlantic States. The total value of products is about $6,000,000.

The Sugar Beet Crop

The cultivation of sugar beets is rapidly increasing in the United States, as representing a cheap and economical material for the manufacture of sugar.

About 110,000 acres are devoted to this product, representing the labor of over 14,000 farmers and an annual production of 793,000 tons. Of the total acreage, 50.4 per cent is situated in the Western States, principally in California, and 47.6 per cent in the North Central division, largely in Michigan. New York reports over 2,000 acres, and Texas not quite 200.

The number of men, women and children engaged in the hoeing, thinning and harvesting of the beet crops is very large. A reason for the employment of children is that the hoeing and thinning are accomplished during the summer vacations, not interfering with the schools. The beet sugar factories afford an excellent market for the farmers, the contracts for the beets being made before the crop is planted. There is a good margin of profit in sugar beet cultivation. A record was kept of the history of ten Michigan farmers, establishing the fact that, in a favorable season, their profits amounted to sums varying from $12 to $56 an acre. Thus even a small crop is worth while. There is a greater percentage of sugar in the beet the further north it is grown. The early winters in Canada, however, leave so little time for harvesting that the crop has not been so profitable there as somewhat further south. In the South the beets grow too large, and contain only a small percentage of sugar. The best place for the cultivation of the sugar beet is the arid region, if irrigation has been introduced. The long continued sunshine and the control of the water supply form ideal conditions. Several States offer bounties on sugar made from beets grown within their boundaries. These bounties are, in some instances, made conditional on the payment of a certain price for the beet. In this way the farmer is also benefited, and induced to go into beet culture.

The Tobacco Crop

The average annual tobacco crop is about 870,000,000 pounds, representing the product of over 1,000,000 acres and the labor of 300,000 farmers. Of the entire tobacco area, 42.3 per cent is in the South Atlantic States, North Carolina and Virginia each representing about two-fifths. The South Central States contain another 41.9 per cent, of which over four-fifths, or 384,000 acres, are located in Kentucky. Of the remaining 15.8 per cent, the North Atlantic States, principally Connecticut, contain 4.8 per cent, and the North Central States 10.9 per cent, leaving the remaining 0.1 per cent for the Western States. Tobacco-growing has been introduced into Hawaii in recent years with remarkable promise of success, the yield there averaging nearly 2,200 pounds to the acre, at a value of ten cents per pound, as against the American average of not quite 800 pounds to the acre, at seven cents per pound.

A district six hundred miles long and three hundred miles wide includes what is known as the tobacco belt. In this territory is comprised parts of Maryland, Virginia and Kentucky, the northern counties of North Carolina, the Cumberland Valley in Tennessee, the Miami and Ohio River Valleys in Ohio, with sections of Illinois, Mississippi, Indiana and Missouri. The leaf for cigars is better in States situated further north, so that this section does not produce tobacco for cigars to any large extent. About seven hundred thousand acres are planted with tobacco in the tobacco belt.

The Tobacco Planter

The character of tobacco depends largely on the soil and climate. Thus these conditions must be considered, and regard must be paid to the kinds of tobacco which are in demand. Among the principal kinds of tobacco grown in the United States are the cigar types, the manufacturing types for smoking and chewing, the bright yellow quality for cigarettes, smoking and plug wrappers; white Burley, for smoking and chewing, for the home and foreign market; and the varieties for export only. Tobacco suitable for our domestic cigars is raised in Sumatra, Cuba, and Florida, and grows also in Massachusetts, Connecticut, Pennsylvania, Ohio, Indiana, Illinois, and Wisconsin. In the intervening States our chewing and smoking tobacco is raised, and also the qualities which are exported. This type grows best in the district just below southern Ohio.

The plant bed for tobacco growing is prepared by burning the leaves and brush from a small territory, generally about a quarter of an acre, as early in the spring as practicable. The protection of trees is desirable. The ground must be thoroughly pulverized and mixed with ashes before the seed is sown. When the plants have developed four or five leaves, they are transplanted, as soon as an opportunity or "season" occurs, after a warm rain, to the open field, for cultivation there. In the plant bed they grow very thickly. In the field, however, they are set four feet apart, each way. Should there come no heavy warm rain, watering by hand is necessary before transplanting.

From three to ten acres form the general limit of the tobacco fields, the labor of transplanting usually precluding larger areas of cultivation by single growers. The field into which the tobacco has been transplanted should be plowed two or three times for the purpose of killing the weeds, as soon as the plants have started well. The tobacco worms appear about the plowing time. They are a serious pest, and will kill the leaves unless the worms are removed by hand from each plant. There are several methods recommended by the Department of Agriculture for exterminating these worms that prey upon the tobacco plant, but they seem to be of little avail in certain years. When tobacco is very ragged, from the attack of these worms, it is called "trash" in the market, bringing a low price. When the worms are conquered, the "suckers" must be removed. The buds putting forth in the axils of all the leaves of the plant are called suckers. They would otherwise prevent the growth of broad leaves. As the suckers have to be removed by hand, the work is expensive.

Harvesting the Tobacco Crop

Tobacco raisers do not employ the word harvesting as applied to the crop; they call it "cutting." Men using a very broad, flat knife, cut off all the plants about four inches above the ground. They slit the main stems to six inches from the bottom. The plants are then hung on sticks, which are taken to the barn as soon as the plants have wilted enough to prevent the leaves from breaking off. In the barn they are hung in tiers close together. The sides of the barn are quite open while the tobacco is first curing, being closed later, if desired. "Firing" is sometimes employed to aid the curing. The process of curing is a delicate one, and expert skill is required for it. Upon the success in curing, giving color, texture and "body" to the leaf, largely depends the price of the product.

A day is chosen when the air is moist, after the leaves are well cured, for stripping them from the stem. This operation is performed by hand, and occupies every moist day for several weeks. If the day was not moist, the leaves would be apt to break. The stripped leaves are tied in "hands" of about three pounds each. This is done by skilfully twisting one of the leaves about the thick ends of the midribs. The "hands" are placed in a circle about five feet in diameter, the tied ends inward. The circle is usually three or four feet high. These circles are called "bulks." In them the tobacco is left to "ferment." It must be carefully watched, and when the curing is finished the tobacco, sometimes in bulk, is hauled to the nearest town. It is generally packed in hogsheads with great care, and sometimes pressed down with a screw, something after the fashion of baling cotton. The farmer is often busy with the old crop until about time to get ready for a new one.

Growing Tobacco Under Cover

This method of raising tobacco is referred to elsewhere. In Tariffville, Connecticut, a farmer followed the example set in Florida, and adopted this method of growing tobacco. He inclosed eighteen acres, top and sides, by a covering of cheesecloth, stretched on stringers and galvanized wires, supported by posts nine feet in height, at a cost of $250 per acre. By this method of culture insect pests were eliminated, the temperature was kept uniform, and protection from storms was afforded. The first crop was 700 pounds to the acre, selling for $473, or about 67 cents per pound, instead of the average price of 25 cents per pound for other tobacco. In 1901 the Tariffville fields yielded from 1,600 to 2,000 pounds to the acre, and the prices will be decided by an open auction sale. This method of culture seems destined to eliminate the necessity of importations from Sumatra.

The Tobacco Market

More than any other product, tobacco has the advantages of a public and well-organized market. It may be held back for future prices. In the South the tobacco market is entirely open. The consumers come in person or by agents to the market itself to buy the raw material, while other products have to be shipped to them. Even cotton has not so advantageous a market. In the North, however, the warehouse system does not largely prevail, the raw leaf being sold by sample from the wagon, and stored afterward. From the warehouse the leaf passes to the packing house, where it is prepared for the different varieties of consumption.

Manufacturers have packing houses in each of the leading tobacco-growing districts, one firm maintaining eight packing houses, situated at Lancaster, Pennsylvania; Janesville and Cambridge, Wisconsin; Hatfield, Massachusetts; Brookville, Ohio; Brattleboro, Vermont, and East Hartford and New Milford, Connecticut. The combined storage capacity of these packing houses is more than twenty-eight thousand cases. Speculative dealers are absent as middlemen between the producer and the manufacturer.

Louisville, Kentucky, is the greatest leaf tobacco market in the world. The Ohio-Kentucky White Burley tobacco district puts Cincinnati into the second place. The shipment of the hogsheads of tobacco from the small towns of the interior to these centres begins with early winter, reaching great activity by February. Throughout the whole year, however, there is some trade. Great warehouses receive the hogsheads for storage. Many are sold at auction every day. Sometimes as many as a thousand hogsheads a day are sold at Louisville, a season's sales amounting to a total of from a hundred thousand to a hundred and twenty thousand hogsheads, holding from twelve hundred to fifteen hundred pounds each. According to the state of the trade and the quality of the tobacco, the price varies from three to twenty-five cents a pound.

Raising Tobacco for Export

The export trade is of great importance, the total yield of particular localities being taken for this branch of the business. In Maryland the light tobaccos there grown are air-cured, wood fires being used to cure a similar variety in Ohio. These qualities are used solely for pipe smoking and cigarettes, being made by the packers in the following grades: Fine yellow, medium bright, "good ordinary colory," fine red, fine seconds, and "lugs." The exporters take nearly all of these grades, marketing them in France, Germany, Holland, Austria and Belgium. Maryland and Ohio sell almost all of their yield in Baltimore. Here are five large warehouses, where the goods are inspected by State officers. The sworn inspector takes four samples or "hands" from each hogshead, which are tied together, sealed and labelled. On the label appear the name of the owner, the number, net and gross weight of the hogshead, and the inspector's name. From these samples the agents of foreign markets make their purchases, the samples being shipped with the goods for purposes of comparison. The inspector becomes liable for all differences in quality exceeding ten per cent below the sample.

The Rice Crop

The cultivation of rice in the United States is rapidly assuming importance, its annual yield representing over 350,000 acres, or nearly 285.-

000,000 pounds. The figures in both respects have nearly doubled in the last ten years with the opening up of large irrigable rice lands in Louisiana and Texas, and the adoption of improved machinery. Exclusive of Hawaii, the greatest rice region is in the South Central States, which furnish nearly 63 per cent of the product for the country, while the South Atlantic States furnish the remaining 37 per cent. Practically no attempts have been made to raise it in other parts of the Union.

Some years ago the Cotton Growers' Association advised the planters to reduce the acreage of cotton planting twenty per cent. Rice might well be grown wherever the cotton crop is curtailed. Rice culture is adapted to either lowland or upland ground. It is furthermore a safe and profitable crop. It costs only $20 to $35 per acre to cultivate, and the gross result is $40 to $75 per acre. This country is using more rice every year, the cultivation falling far behind the demand. In eight Southern States there are from seventy to ninety million acres called "waste lands," which are perfectly suitable for rice culture. The acreage of land suitable for rice cultivation is larger in Louisiana than in any other State. If these waste lands were cultivated for the growth of rice, they would yield at least an average of a thousand pounds of clean rice per acre, or from seventy to ninety million pounds a year.

The Rice Planter

The culture of rice is, as stated before, both lowland and upland. On the lowlands the main crop is grown. These fields can be overflowed or drained at will. The yield is very heavy under this system, many large tracts of land being redeemed for this crop. The cultivation on the uplands is increasing, and can be no longer ignored. Upland rice is very handsome, flinty, susceptible of a very high polish, and is extremely remunerative.

In the Atlantic States the two chief varieties of lowland rice cultivated are the "gold seed" and the "white rice," the latter being the original quality introduced in 1694, and resembling the Chinese crop. The "gold seed" rice stands among the first qualities in the world, having superseded, to a large extent, the white rice formerly popular. The white rice, however, matures earlier. In Louisiana the "Honduras" is the chief variety, the grain being slightly larger and the straw stiffer than in the Carolina rice. There is a variety called the Kiushu, or Japanese rice, with a short thick kernel and a thin hull, of which the yield is very large. This quality is now being introduced into this country.

The yield of rice is dependent upon the soil, climate, and culture. Forty-five pounds to the bushel is the commercial standard weight of rough rice. Rice is sold in sacks or barrels of one hundred and sixty-two pounds each. The average yield of rice in South Carolina or Georgia is from eight to twelve barrels, good lands giving a larger crop.

In the lowlands along the Mississippi the product per acre has reached thirty barrels, or 4,860 pounds of rough rice. This land had previously been in peas, and had been plowed with six-mule teams. Along the lower banks of the same river twelve barrels per acre is deemed a good crop, the average not being more than eight barrels per acre. In southwestern Louisiana the crop per acre ranges from eight to eighteen barrels. The average yield to the acre is thirty-two bushels, with the cost of production $24, so that the cost in the Atlantic States of raising one hundred pounds of rough rice is $1.66 or $2.29 for a 162-pound sack.

Machinery in the rice fields is revolutionizing cultivation. The cost is thus greatly reduced. These machines will counteract the high price of labor, and enable the rice grower in the United States to beat the world, with the least cost and the greatest profit. The highest prices can also be secured if new and prolific varieties of rice are introduced for cultivation. In Louisiana the rice-growing district is two hundred miles long by about fifty miles wide. A single crop of rice has often paid for the land used in its raising. There are more miles of irrigation canals which have recently been built in Louisiana and Texas, and likewise more pumping plants established, than in any of the arid States.

Lowland Rice Culture

Flat lands, easily irrigated and drained, such as swamps, are the best for rice cultivation. The inland swamps will not produce quite as much as those near rivers, because the water can not be so easily controlled. The crop, however, is of a very good quality. The land is generally laid off in parallelograms of 100 feet by 150 feet, embankments eighteen to twenty-four inches high being constructed. These embankments are called "check banks," and serve to hold the water when needed, when the land is not level. There are "flumes," or flood-gates, with cut-offs at each end. These are in connection with the river or reservoir. In order to hold the water during the growing season, and for drainage purposes, there are main ditches. The land must be carefully cleared of grasses, weeds and foul seeds. The plowing must be done as early as possible, and should be from four to five inches deep the first year, and deeper for later seasons. Before planting, the ground should be thoroughly harrowed. The soil should be well pulverized, so that the grasses and weeds may be killed.

The planting of rice may take place at any time from February to July, according to location. Of all the many varieties of seed the best is the White Seed Carolina, which is very hardy, and is a standard grade in the trade. The seed may be sown either broadcast or in drills about a foot apart. Weeding is much easier with the latter method of sowing. From eighty to one hundred pounds of seed per acre is required. The seed is covered lightly, and the ground is flooded just enough to submerge it, until the seeds are sprouted, this flooding being called the "point flow." Now the water is drawn off, and is turned on again when the plants are from six to eight inches high. This second flooding, called the "stretch flow," kills the grass and weeds, and is held for four or five weeks. The absolute rule is never to permit the water to rise above the first "barrel" of the stalk. The "harvest flow" comes last. This begins when the stalk is about eighteen inches high. It is kept on until the "heading" of the rice. The water must be drawn off about a week or ten days before harvest. The harvesting should begin when the upper half of the head is ripe, and must proceed as quickly as practicable. Every day of over-ripeness reduces the cleaned rice in value. The presence of a green grain occasionally is a proof that the rice was cut at the right time, in the testing of rough rice.

Harvesting and Marketing the Rice Crop

There are machines in use for the harvesting of rice, but it is generally done with the sickle, by which the rice is cut about two feet and a half from the top. The "hands" of rice are laid down on the stubble to dry, permitting a circulation of air entirely around it. In good weather it should be sufficiently cured for binding in twenty-four hours. This should never be done while the straw is in a damp condition. The rice should be cut in the morning, and the previous day's cutting should be bound in the afternoon. The bundles should be taken to the barnyard as soon as dry. There they should be stacked, with the bottom of the stacks raised a foot from the ground. This affords a circulation of air. Before threshing the rice, it should be left a month in the stack to cure. The temperature of the stack must be obtained by running in a stake every day or two. If the stake discloses heat inside the stack, it must be pulled down and aired before restacking. Flails or threshing machines are used for separating the grain from the straw, after curing. A thorough fanning and screening should take place, to remove from the rice all straw, sticks, foul seeds and rubbish. In fact, before it goes to be threshed, every bundle of rice ought to be examined, and all extraneous substances removed.

There are two ways of selling the rice crop, either in the "rough," or after milling. It may be milled on toll, and the cleaned product sold by an agent of the producer. In the order of their commercial status in the rice business are the following milling centres: New Orleans, Charleston, Savannah, New York and Wilmington. They all have mills of the first class, and, as they are great trade centres, the highest prices are obtained for the cleaned product. Rice must be packed in strong double bags, for shipping. The bags, which should be sewed, not tied, ought to hold from 170 to 180 pounds each.

Upland or Dry Rice Culture

Flooding is not used in growing this kind of rice. It is planted in hills or rows. The rows must be wide enough to allow a horse-cultivator to pass. The output of this kind of culture, although not equal in quantity per acre to that grown under the flooding system, is yet greatly superior to that of other grains and much more valuable. The use of fertilizers is obligatory. Without it the rice is of such a quality as to break while undergoing the process of milling. A more careful cultivation is attainable under this method of culture.

The Hop Crop

The annual average production of hops is something over 49,000,000 pounds. Over 7,600 farmers employ 55,600 acres in its cultivation, each acre producing, on an average, 880 pounds, valued at 8.3 cents per pound. Hop growing represents another increasing industry, especially in the Western States, Oregon, California and Washington, which represent 49.8 per cent of the acreage of the country. Another 49.6 per cent is represented in the North Atlantic States, all of which, save thirty-two acres, is situated in New York. The remaining 0.6 per cent is divided among all other parts of the Union, 342 acres being in Wisconsin.

The leading States in hop culture are California, Oregon, Washington and New York, the industry having declined in Wisconsin, in which it was formerly prominent. As the crop demands a certain kind of soil, and special skill in handling, only small areas are planted by single hop growers, as a rule. The capital required is relatively large, the poles alone being a large item of expense.

Hop Planters and Pickers

The harvesting season for hops begins in California about August 20, and a little later than this in Oregon and Washington. The beginning of the picking should take place as early as possible. Speed is necessary in picking. The process should be completed in four weeks. The hops will turn red, and dry on the vines if left too long. The pickers would, in that case, demand such an increase in wages as to interfere with the profitable handling of the crop. On account of the different nature of the soils, according to the reports of the Department of Agriculture, some parts of the field will ripen before others. For this reason the pickers must be moved around the hop yard, choosing the spots where the crop is the ripest.

Most of the picking on the Pacific Coast is done by the hundredweight of green hops, and not by the box, the general custom of the market being to measure by the hundredweight. The picker starts to work with a knife and a sack, and there is on the ground a basket, barrel, box or cloth, to receive the hops. The cloth is preferred by the Indian pickers. Each picker, taking a row of hops, cuts the vine, two or three feet from the ground, and pulls it down from the top, breaking the string on which it grows, close up to the wire.

The picking now begins, and the object is to get the hops without the leaves. Very small leaves are not noticed, but the presence of larger ones injures the value of the crop. The hops must be picked as fast as the vines are cut, or they will wilt. They are then much harder to pick. There must be no crowding nor pressing of the hops in the basket or sack. Each picker has a number on his sack, so that poor work can be traced, and the picker paid less money for his labor. Twice a day, at noon and at six o'clock, the hops are placed in burlap sacks holding from fifty to ninety pounds. The sacks are taken to the kiln and weighed. They are then lifted by crane or by elevator to a platform level with the drying floor of the kiln.

In California the pickers, Chinese, Japanese, Indians and whites, come to the field in their camp wagons, receiving gratis wood, water, cabins, tents and horse pasture. With some exceptions, the wages are not paid until the end of the picking. Contracts should be made with the heads of the working parties.

Harvesting and Marketing the Hop Crop

Prices have been very fluctuating on the Pacific Coast. To make a fair living and something over, the hop grower must get from fifteen to twenty cents a pound. The high price of $1.10 per pound, in 1882, led to such overproduction in later seasons as greatly to injure the business, causing many failures.

The pay of pickers is from fifty cents to $1.10 per hundred pounds of green hops. Seventy-five cents is a fair average. Good hop driers earn from $2.50 to $5 per day and board. Helpers, doing night work, get $1.25 and board. Field foremen are paid $1.50 to $2 a day and board. The contract price for growing hops, ready for picking, is from $10 to $15 per acre. If the contract includes all work, embracing use of teams in cultivating, the grower gets $14 or $15 an acre, supplying teams, tools, and making repairs, with monthly payments from February to September.

Two thousand roots, needed for planting an acre, cost $20, besides $2 for planting. The wires cost from $80 to $90 an acre, and the string will be an annual charge of $3.

More than three and a half pounds of green hops are required to make one pound of dry hops. The cost of picking is about three cents to the pound of dry hops. From $3,000 to $4,000 must be paid for a kiln capable of curing a fifty-acre crop. For drying, every one thousand pounds of hops require about three-quarters of a cord of willow wood at $4 to $5 a cord. From thirty to forty pounds of crude sulphur, at two cents a pound, are needed for every one thousand pounds of dry hops. Five yards of baling cloth, at eight to ten cents a yard, must be had for each bale. The item of sewing twine, at thirty-two cents a pound, must not be omitted. When the crop is shipped to England the cost of shipment is about $1.50 per hundredweight.

In the manufacture of ale, beer, and porter, in 1900, the brewers used 23,000,000 pounds of hops. The quantities of hops consumed vary with the kinds and brands of the malt product. Larger quantities are needed for ale and porter than for lager beer. Stock ale requires more than ale for "present use."

The Seed Crop

Seeds are generally grown by farmers under the contract system. Firms often contract to produce thirteen or fourteen thousand acres of vegetable seeds. The Congressional Seed Distribution causes a demand for large quantities of seed, which are sent to various parts of the country by the United States Department of Agriculture, to the extent of many million packages, after samples have been tested.

Dishonest dealers have sold bad seed to such an extent that efforts have been made toward legislation on the subject. A check upon this fraud could be made by the consumers, if they would insist upon guarantees of quality, paying a fair price for the seed. The purchaser, if in doubt, should send a sample to a testing station. The testing may be secured at many of the State experiment stations, or at the laboratory of the United Sates Department of Agriculture. Except grasses, all seeds can be tested by the farmers at home, if they will take the trouble. With two ordinary plates and a piece of flannel cloth, a serviceable germinating apparatus can be made. The cloth must be folded and laid in one plate, with the seeds between the folds. The cloth should be moist, but not dripping. The other plate, inverted, should be placed over this, as a cover, and the apparatus should be deposited in a warm place. The temperature should not be allowed to fall much below fifty degrees Fahrenheit at night, nor below about sixty-five degrees by day.

Tea Culture in America

Tea plants may be successfully grown in the United States, as is proved by the initial experiment at Pinehurst, near Summerville, South Carolina, and by others. This South Carolina tea plantation has produced a crop of several thousand pounds. The plants on that plantation average a product greater than the same number in China, and rivalling those of India and Ceylon, while the quality has been pronounced by experts to equal any Oriental teas sent to this country. Even a small-sized garden must have a factory, with a proper equipment.

The first step in the process of manufacture of black teas, such as were first raised at Pinehurst, is the withering of the fresh leaf by thinly spreading it on floors or trays, giving ten square feet to every pound. Each pound of tea represents four and one-fifth pounds of fresh leaf. Thus a product of one hundred pounds of dry tea a day demands about four thousand square feet of withering surface. By the process of withering, the fresh leaf is made susceptible of being rolled without breaking. A light, airy room is required for withering, with the direct rays of sunlight shut out. A day's exposure is generally the rule.

In the fresh leaf there is neither taste nor odor, while there is a faint odor from the finished leaf. A continued rolling causes an oxidation, and the flavor is thus partly developed. A man can roll thirty pounds a day.

A rolling machine, with one mulepower, can equal this work in half an hour. The full flavor is brought out by the firing or drying process.

Fifteen hundred to two thousand dollars will pay for a factory capable of producing fifty pounds of dried tea daily. In the importation of seed from China there is a loss of seventy-five per cent of the quantity. The expert labor necessary for tea culture is also a large item of expense. High grades only can be made to pay, in the face of Oriental competition. Black and green teas have been produced here, bringing a dollar and more a pound at retail. Efforts are constantly directed toward the production of very high-priced qualities, which do not stand the sea voyage.

On the South Carolina plantation, the tea is picked by crowds of negro children of both sexes. The contents of each picker's basket is weighed as it is brought in, filled with leaves, and the weight, generally about two pounds, is registered opposite the child's name on the list. Payment is by the pound, and the pickers earn from fifty cents to seventy-five cents per day. They are also provided with a luncheon, gratis, at the plantation. The fresh shoots and the first two leaves are picked for the first quality of tea, called "Pekoe tips." The next two leaves, called the "Souchong leaves," are also gathered. The quality of the tea is lowered if they are mixed with the others.

The production of several kinds of tea in the United States, according to a report of the Secretary of Agriculture, is now an assured fact, and in addition to this it is encouraging to be able to announce that experts of the Department who have examined the tea produced in South Carolina pronounce it eqaul in flavor and aroma to the best imported teas. The profit from this crop averages from $30 to $40 per acre net.

Capital is always timid of investment in new enterprises of this kind, and there is still much to be done to demonstrate the possibilities of the work in other parts of the South. The labor problem is an important one, but the expert of the Department has shown his ability to handle it, and with his aid the Department is now training a few young men in the technique of the work. There are thousands of acres of land and thousands of idle hands that might be made available for this work, and our possibilities in this field should not be neglected.

The United States imports from $10,000,000 to $12,000,000 worth of tea every year, and, although it may be a long time before anything like that amount can be produced in this country, the industry should be encouraged in every possible way.

CHAPTER X

MACHINE FARMING AND THE CONDUCT OF GREAT FARMS

Development of Machine Farming—How Machinery Increased the Size and Value of Farms—The Farmer's Dependence on Machinery—How Machinery Reduced the Cost of Farming—Summary of Results of Machine Farming—The Western Farms—Farms on the Pacific Coast—Conduct of a Great Wheat Farm—Management of a "Bonanza" Farm—How a Wheat Crop is Raised—Labor on a Great Farm—The Training of Machine Farm Hands

Development of Machine Farming

IN THE beginning of the century just past but three per cent of the people of America lived in cities. The rest lived in the small towns and on the farms, and were dependent upon agriculture for food. There was little manufacturing—the country being still dependent on the mother-country for almost everything except the products of the soil. It will, therefore, seem a surprising statement when it is said that the people in 1849 did not raise enough wheat for their bread. At that time only 4.33 bushels of wheat per person were raised. Production per capita was decreasing, and economists were alarmed at the failure of the food supply to keep pace with the rapid increase of the human race. The limit of food production with the sickle had been reached.

This does not mean that no wheat was exported during these years, but it does mean that the people of this country were obliged to use corn and other grains for bread to eke out the supply; so that since then corn bread has been considered the bread of the poor. With the advent of the reaping machine, however, the number of bushels of wheat per acre increased decade by decade. It was 5.51 bushels in 1859, 7.46 bushels in 1869, and 10 bushels per person in 1891. It is estimated that the home consumption of wheat per person at the present time is five and one-half bushels, thus leaving nearly one half of the production for export.

Surprising as these statements are, however, they tell only half the story. From the ninety-seven per cent of people on the farms in 1800, the number decreased year by year until there are now only thirty-three country people in each one hundred of population. There has been a constant flow of young men from country to city, and, contrary to common opinion, foreigners have not taken their places on the farms. Only twenty per cent of foreigners are farming. Yet the farms of to-day produce with one-third of the labor in the country sufficient not only to feed themselves, but also the two-thirds that live in the cities; and the exports of the farm, the food and food products, during 1900, made up the immense volume of $850,000,000 out of the total of $1,400,000,000 sent to foreign countries.

This showing is marvellous. It has been made possible only by the genius of the American inventor and the intelligence and energy of the American farmer. In all the history of the world, the like of this achievement has never been known. Much, of course, has been due to the fertile soil of the great plains and valleys in which we live; much to the beneficent government that has given security to property, and by its patent system encouraged invention; much to the great railroads that have transported our products across the continent; but more is due to that body of inventors who recognized the necessity of improved methods on the farm and who have provided that intelligent, progressive, and energetic body, the farmers of America, with tools which have enabled them to produce more cheaply than any land under the sun. Thus they have been enabled to sell their products at a profit on the markets of the world, in competition with the penny a day laborers of India and China.

This development of farming by machinery has greatly increased the purchasing power of the American people. In the thirty years, from 1816 to 1848, the total exports of wheat and flour averaged only $6,000,000 per year; while in the thirty-one years beginning with the time that the use of the reaper had begun to be felt in the harvest field of America, the exports averaged $60,000,000 per year—a tenfold growth. In the single season of 1892 the United States sent abroad $236,000,000 worth of wheat and flour.

How Machinery Increased the Size and Value of Farms

The ability to cultivate great areas by aid of the implements of agriculture has increased the size of farms in the United States. This is contrary to the expectation of change with growth of population. As the people of the old world have increased in numbers, the size of the farm holdings have decreased. At the time when agriculture was almost the sole employment of the people of the United States, farms averaged less than fifty acres each. Now, however, with only one-third of the population on the farm, by the aid of agricultural implements, more land can be cultivated by each person, and the farms have increased in size until they average throughout the United States 137 acres each. In France, for a comparison, more than one-half of the holdings of land devoted to agriculture average less than two hectares; about five acres. There are some comparatively large tracts, but the percentage of holdings that contain fifty acres is very small. Also in Belgium, Holland and Germany this statement will be found not far from the fact. In England the majority of the holdings are less than nine acres in extent.

The foreign student of agriculture looks upon farming in America as rather shiftless, and thinks the farmers are trying to do more than can be well done. He calls his own farming intensified, and points with pride to the large average crops. When it comes, however, to a question of net profits per acre there is no doubt that the American farmer leads the agricultural world.

It hardly seems possible that in the short space of fifty years the value of the farms of the United States has increased from one to twenty thousand millions of dollars, but such is doubtless the fact. Much is said of the great billion dollar combination of the iron and steel industries of the country, and of the enormous amount of money that those industries are making, but their figures seem small when compared with the business that is being carried on in farm products. And all this great increase in the value of the farms and farm products has occurred without any new grain or grass or species of live stock of first rank being added to the list during the last century. The agricultural colleges have done good work in calling the attention of the farmer to the kafir corn, sorghum and alfalfa for the semi-arid regions of the West, but outside of these, and their value as compared with the other forage crops is small, there has been no addition to the forage plants of the farm.

But the eighty million acres of corn, the forty million acres of wheat, the twenty-eight million acres of oats, the twenty million acres of cotton, and the fifty million acres of grass have been harvested, and it should be remembered that this tremendous harvest was made possible only by the new implements of agriculture. So profitable have these crops been that the nation has become the richest of the world.

The Farmer's Dependence on Machinery

Enough has been said to show somewhat the tremendous development of the farms of the United States, and there is no need of any demonstration or statistics to show how utterly impossible would be the tillage, harvesting and marketing of crops from our great area of land by the remaining farm population without the improved implements of agriculture. If this proposition is not self-evident, consider for a moment how it would seem to try to harvest the eighty million acres of small grain grown in this country with a sickle, or how far beyond the possibility would be the ginning by hand of the ten million bales of cotton. It was in its time a good day's work for one expert hand to pick the seed from two pounds of cotton, while the gin of to-day, operated by two persons, will pick the seed from 3,000 to 7,000 pounds.

While the cotton crop of this country probably gives employment to more capital and labor than any other one product of the farm, still, the area planted in cotton is only one-fourth of that planted in corn, and this area has increased but little compared to corn; so that the crop can be got in by the old methods. But with the small grains the plow, seeder, planter and cultivator have produced areas that it would be impossible to harvest without the self-binding harvesters. The crooked stick, the plow of centuries, merely tickled the surface of the ground. Our inventors have so fashioned

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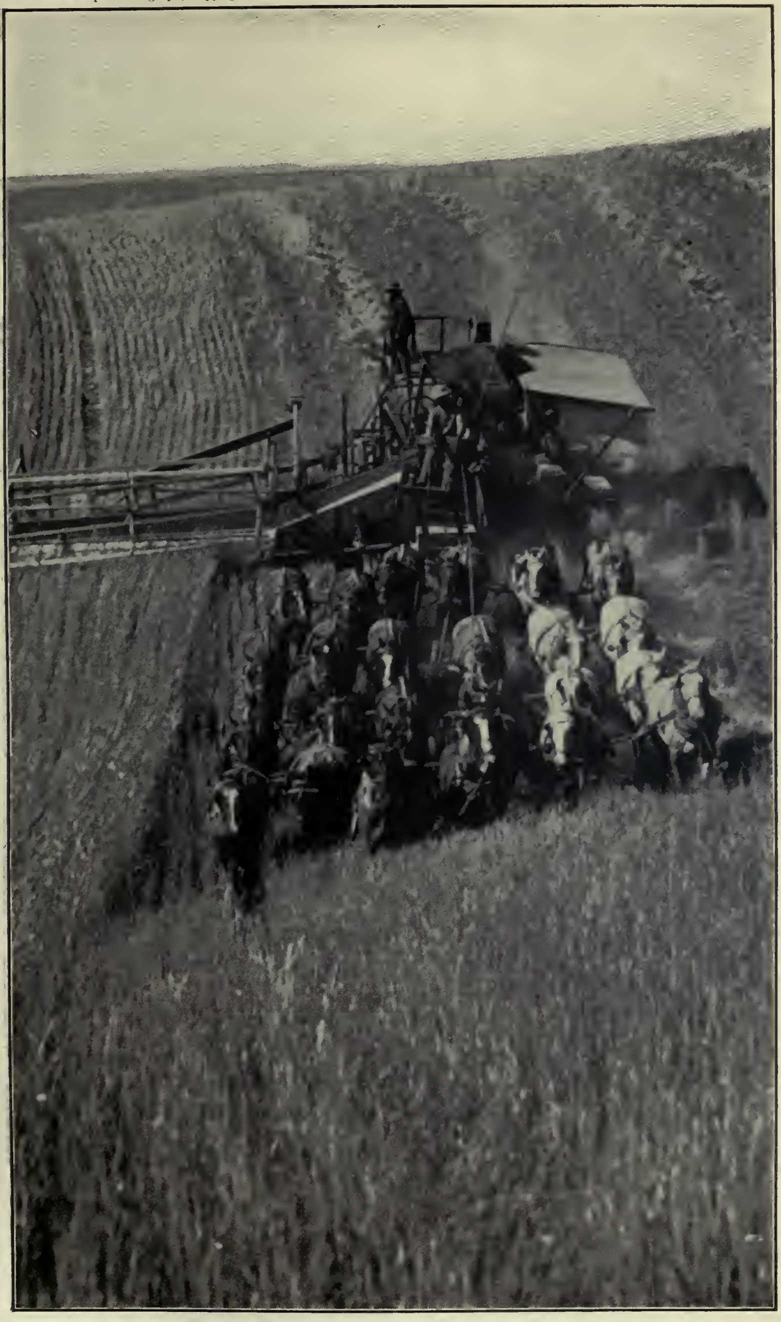


HARVESTING IN THE GREAT WESTERN WHEAT FIELDS—COMBINED HARVESTER, CUTTING, THRESHING AND SACKING MACHINE

it that the soil is completly turned over, whatever be its nature. The operator now rides, and in place of one furrow he rolls over two or more. Harrows of many varieties, from eight to thirty feet wide, follow after, and the soil is prepared for the seed in better shape than on the small farms in China and Holland. The improvements in drills, seeders and planters have not added as much to the area that it was possible to plant as they have to the superior quality of the planting. It is only by the harvesting machine, however, that the areas that can be planted can be gathered. Cotton can stand in the field for three months after it ripens, and corn is frequently picked in the snow, but wheat, oats and rye must be harvested when they are ripe. The reaper is, therefore, the key of the situation, and on no other implement is the progress of the country so dependent.

How Machinery Reduced the Cost of Farming

That the machines for the farm are economical all will admit, but few have realized how they have reduced the cost of production, and that they yearly produce such immense values. The figures of the Department of Agriculture for the year 1899 are astounding. In 1830 it took over three hours' labor to raise one bushel of wheat. In 1896 it took but ten minutes. In 1830 the labor in one bushel of wheat cost 17¾ cents per bushel, and in 1896 it cost but 3½ cents per bushel. In 1850 the labor represented in a bushel of corn was 4½ hours, while in 1894 it had been reduced to 41 minutes, or from 35¾ cents per bushel to 10½ cents per bushel. It used to take nearly two hours to shell one bushel of Yankee corn, whereas now one of our improved shellers will frequently turn out one bushel per minute.

It is also interesting to note the economical results of the machines that have been invented for harvesting the fifty millions of acres of hay. In 1860 it is estimated that the labor in one ton of hay in bales represented 35½ hours, while in 1894 this labor had been reduced to 11½ hours, or from a cost of $3.06 in labor in 1860 to $1.29 in 1884. The labor of mowing, considered separately, is very interesting to the man with blistered hands. He could cut one ton of grass in about eleven hours, according to the figures given in a report of the Department of Agriculture, but if the grass was only an average crop of three-quarter ton per acre it would keep him busy. This labor is estimated to have been reduced from eleven hours per ton with a scythe in 1860 to one hour and twenty minutes per ton by machine in 1896. Statistics, however, tell but little, because we do not always comprehend figures. Consider the harvest of three hundred acres of wheat in 1869, for example. The reaper was the harvesting machine. The men were stationed around the fields and bound their allotments, wasting more grain than it costs to-day for the whole labor of harvesting. The overseer could say but little, because help was scarce, and wheat was getting ripe, and it had to be harvested or go to the ground. Long hours, hard labor in the fields, harder labor in the house for the overworked women, and all in all that harvest of three hundred acres was more a task than it is to some of our bonanza farmers to harvest three thousand.

The agricultural implements in the United States in 1902 saved in human labor a sum in excess of $700,000,000, and this immense sum on the following crops only: Corn, wheat, oats, rye, barley, potatoes, and hay. This great sum probably would be doubled if all the crops of the country were included. In 1855 Hon. W. H. Seward estimated that the reaper was saving annually $55,000,000, and with prophetic vision he stated that this saving would increase throughout all time. The hard facts, as shown by the statistics, dwarf the half-century-old prophesies of Mr. Seward, and the material progress of the country, made possible by the labor-saving farm tool, is greater than was conceived by the most enthusiastic speaker, even in his wildest flights of oratory. The farm machine is the talisman, and to its inventor all honor is due.

Summary of Results of Machine Farming

The introduction of improved agricultural implements and machinery, during the latter half of the nineteenth century, was a development of such importance as to amount to an industrial revolution. The most conspicuous effect of the use of improved machinery is the reduction in the cost of producing farm products. Another result of the use of improved implements is the lessening of the number of laborers required on a farm. The Industrial Commission, however, states that machinery has brought with it a more intensive system of agriculture and an extension of agricultural operations, so that in some localities the number of laborers has not been diminished. It is also stated that improvements in agricultural machinery have brought about diversification of crops, and that by the opening up of new avenues of industry it has given employment to those formerly engaged in hand labor, and so, on the whole, improved the condition of labor. There is no doubt that improvements in machinery have lessened the drudgery of farm labor and made the work less severe and fatiguing. Another important effect of improved machinery is the educational effect upon those who use it. While there is perhaps less manual skill of certain kinds among farm laborers than formerly, as there is no longer any demand for expert cradlers or expert binders, on the whole the effect of the use of machinery has been to raise the intelligence and skill required on the part of those who use it, whether hired laborers or farm owners, and this is said to have resulted in improving the intellectual status of the American farmer.

The less general use of improved machinery in the South than in other sections is said to offer an explanation of the slow rate of agricultural progress in that part of the country, and is itself explained in part by the lack of mechanical skill on the part of the negroes and by the cheapness of labor, which makes it more economical to employ hand labor in many operations which could be done at lower cost by machinery where labor is high. Various kinds of agricultural machinery are being gradually introduced in the South, however, notably in the cultivation of sugar cane and rice in Louisiana. Where improved machinery is used in the South it is said to increase the wages of those who are able to handle it.

The Western Farms

Wheat growing affords one of the best illustrations of machinery farming. The West, the Northwest, and the Pacific Coast have a scale of operations in this industry distinctively their own. Big is the adjective that best applies to their farms, and wholesale best describes their dealings. A tract of land that would be a large estate in Europe, or even in many parts of the Eastern United States, is a mere plot of ground in California or Dakota; and as farms in these regions are of heroic proportions, heroic methods must be followed in farming, from the sowing of seed to harvesting. Ordinary methods would be disastrous.

On the Atlantic side of the continent the farmer raises a dozen different things, not to speak of food products for his own table. In the far West he raises one crop. Especially is this true of wheat farms which continue to yield from year to year without fertilization other than the renewal of the land by summer fallowing. No supplies are produced for the table; they are brought from the nearest market.

Everything is done on a mighty scale by the use of the wonderful machinery referred to in the previous paragraphs. There is no gardening. Plows are set in gangs; reapers and binders, or reapers and sackers, are built with cutting bars of a big reach, and the machine is of huge proportions throughout; one man, with as many horses as he can manage, plows and harvests a wide area. By the use of that wonderful machine, the combined harvester, three or four men control the strength of twenty-four to forty horses, cutting, threshing, recleaning and sacking bushels of wheat at every turn of the wheels. The only limit to the speed of these operations is the speed with which the machine can be pulled over the ground.

Farms on the Pacific Coast

The total wheat area of the Pacific Coast is about 5,000,000 acres, nearly the size of the State of Massachusetts. The yield is from twenty to seventy-five bushels an acre; but this does not count fields greatly damaged by insects, drought or other unusual injury. The total annual product is sixty to seventy million bushels, worth on the farm about $40,000,000.

The principal wheat section of California, as described in the reports of the United States Department of Agriculture, is in a central valley between the Sierra Nevada and the coast ranges of mountains. This is one of the best agricultural regions of the State. Plowing is done in this valley in gangs of four to fourteen plows, with a six or eight mule team. Attached to the rear of the plow is a broadcast sower, which sows the seed as fast as the ground is plowed. A harrow, also attached to the plow, follows the sower and harrows the seed into the ground. Thus the three operations are completed at one time by the one man with a team of eight mules, at the rate of ten to fifteen acres a day. No further attention is paid to the field till harvest time. On the larger farms the plowing and sowing is frequently done by gang plows drawn by a traction engine, and in this way a prodigious amount of work is got through with in a short time.

The "tule" lands near Stock offer a very interesting illustration. These were once great flats covered with water and bulrushes. Reclaimed by drain levees and pumps, they yield from fifty to eighty bushels an acre, perhaps not quite so good in quality as the wheat of other parts of the State. On account of the softness of the ground and large cracks in the surface horses can not be used on much of this land, and the draught work is done by traction engines, the tires of which are broadened by the addition of enormous drums.

Not the least picturesque scene in these wheat fields is the harvest. Probably two-thirds of the entire crop is brought in by use of the harvester thresher. The great level plains, and even the long slopes of the foothills, permit work with the most ponderous machinery. The great harvester sweeps through miles of ripened grain, cutting swaths from sixteen to forty-two feet wide, cleaning, threshing, sacking, and leaving behind a long trail of sacked grain, ready to be hauled to the warehouse, railroad or mill. This mighty engine is drawn by twenty-four to forty horses, requires four men to operate, and cuts a swath sixteen to twenty feet and harvests and sacks twenty-five to forty-five acres a day. The steam outfit, traction engine and harvester takes eight men to run it, cuts a forty foot swath, and harvests sixty to one hundred acres a day.

The sacks, holding two and one-half bushels each, are stacked in the field and left sometimes for weeks without harm in that dry climate.

In contrast with the methods just described, wheat was sown broadcast by hand in 1830, harrowed in by drawing brush over it, cut with sickles, threshed on the barn floor with flails and winnowed on a sheet attached to rods which two men held, and tossed the wheat up and down till the wind blew the chaff out. By the improved ways it takes ten minutes of human labor to produce a bushel of wheat, where by the old it required three hours and three minutes. The cost of labor in 1830 was seventeen and three-quarter cents; now it is three and one-third cents.

Then comes the shelling of the corn, which is one of the most striking instances of the changes that have been wrought by machines. In this case, the machine operated by steam shells one bushel of corn per minute, while in the old way the labor of one man was required for one hundred minutes to do the same work.

In 1890 men mowed grass for hay with scythes, raked into windrows with a hand rake, cocked it with a pitchfork, and baled it with a hand press. This required thirty-five and one-half hours of human labor per ton. Now with a mower, hay tedder, and a hay rake, hay gatherer and stacker drawn by horses, and a press operated by a horse, the time of human labor has been reduced to eleven hours and thirty-four minutes, while the cost of human labor per ton has been reduced from $3.06 to $1.29.

The more important economy in hay making is in the mowing and curing the grass. In these two operations the time of human labor has declined from eleven hours to one hour and thirty-nine minutes, while the cost of human labor has declined from eighty-three and one-third cents to sixteen and one-quarter cents.

Conduct of a Great Wheat Farm

In the West the man who owns or "runs" a great farm is called, like his prototype in the East, a farmer; but the Western farmer is also a business man. He has to be. Take the Eastern farmer who all his life has called a hundred acres a large farm and give him ten thousand acres in the Dakotas. He would not know how to go to work to plant the seed; he would follow his hundred-acre methods, and the whole season would pass before planting was finished. Having been always a retail farmer, he would not understand wholesale ways. He would not know how to organize a regiment of laborers, would not know what machinery to order, nor how to use it if "thrown in" when he bought the place. To run a great Western farm successfully the manager must combine the talents of the business man with the skill of the agriculturist. He must be the kind of capitalist who knows when to open his purse and when to keep it closed. He must be as cautious as a banker. He must be as well acquainted with his market as a manufacturer, and as enterprising as a merchant who must sell his goods now or never.

Here is a typical Western farm. It is in South Dakota. It is a wheat farm, and it represents the kind of business the business farmer conducts. There are thousands of such farms in the Dakotas, in Montana, Washington, Oregon and California. Some contain two thousand acres, some contain ten thousand. But the typical farm now under consideration is one of the so-called "Bonanza" farms, say 7,500 acres, and this is how it is operated:

It is as level as a desert, which is a very poor comparison, save as to the one point of similarity, which makes the desert all the more hopeless and the wheat farm all the more valuable. If the land were otherwise than level, all these great machines, pulled by horses, the whole resembling a regiment of artillery at drill, could not move in such order over the fields—across fields so vast, indeed, that communication from field to field is by railroad, horseback being too slow. On a Western farm, a worker is not so near to nature as he is to a machine. Even the farm-hand is a machinist. He tills the soil indirectly. His principal business is to run a machine. In a day's journey in the wheat belt you will hardly see a single man with a two-horse team. Hand tools, such as hoes, rakes and forks are almost unheard of.

Management of a "Bonanza" Farm

Like a mammoth manufacturing plant, like any great business establishment, the Western farm must have its headquarters, or brain-centre, and its various divisions and subdivisions. The great wheat farm has, perhaps, four divisions, each run like a separate farm, as is each department of a railway system, and yet all under one central management.

In the main office are the general manager, the bookkeepers and clerks. This is the counting-room of the farm. Here the ledgers and daybooks are kept as carefully as those of an auditor's office. From this office the manager directs operations, issuing orders every night as to the exact work to be done on the morrow. The four division superintendents, like men holding similar positions in a railroad company, report every night to the manager—usually by telephone, to save time. For, of course each division has its office, and in each office there is a telephone connection with headquarters. In one room in the main office is a ticker—and here you will probably find the owner, or one of the owners of this farm. The man at the ticker is called the owner because he owns the wheat in that particular seventy-five hundred acres. The owner of the land may live two thousand miles away, in New York or Pennsylvania. Usually, however, the individual, firm, or corporation which owns the wheat also owns the land.

When selling time approaches, then it is that the owner sits closer to the ticker, and pays more attention to the tape than to the farm work. For in the news the tape brings lies his hope of more cents a bushel for the output of his 7,500 acres. Every hour the ticker brings to that office, in the middle of the prairie, news of the markets at Minneapolis, Duluth, Chicago and

Buffalo, and between times gives news of crops in other States and other countries.

To the owner fingering the tape the news of a famine in India is a matter of congratulation; for a famine means no rain, and, therefore, less wheat on the world's market. Rainfall in India, or unexpectedly large crops in Oklahoma or elsewhere, means a lower price for wheat at Minneapolis, Chicago, Duluth or Buffalo. Thus the farmer in the Dakotas, California, wherever there is a large farm and a ticker, is in as close connection with the whole world as the shouting members in the pit of the New York Produce Exchange, who buy and sell a great quantity of wheat that does not exist on the face of the earth.

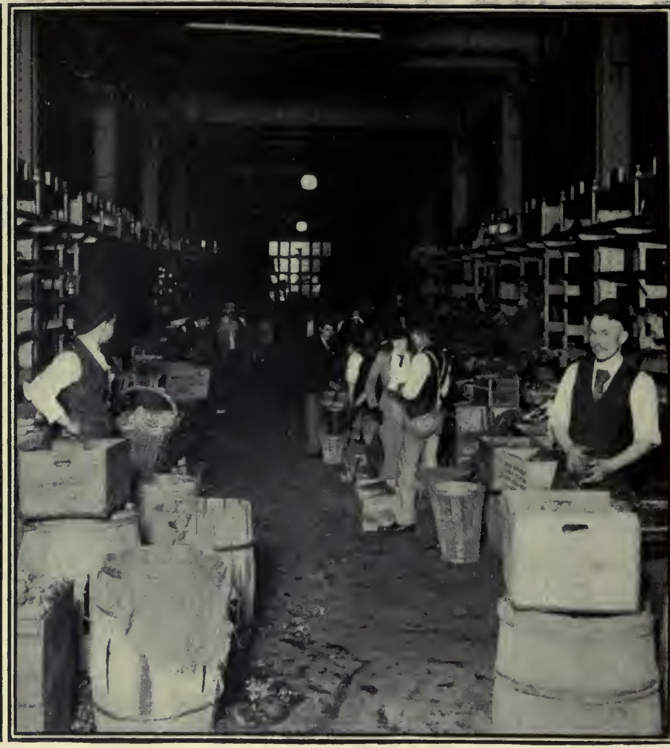
Now let us make a tour of this farm, looking first at all the buildings. Here, near the central offce, are two houses, one for the manager and his family, the other for the bookkeepers and general assistants, who work at the brain-centre of the farm. Here, too, is a huge barn where sleep the forty or fifty cows which furnish milk for the hands. Nearby is the storehouse. Judging by its contents, one might mistake it for a wholesale grocery house. Here are kept enough bacon, beans, canned goods, rations of all plain kinds, to feed a regiment for a month. In this building, too, there are rooms full of supplies for the harness men and for those whose duty it is to repair the machinery. If it were possible to erect an Eiffel Tower at headquarters, so that the four corners of the farm could be seen at once, several buildings would be discovered in the middle of each of the farm's four divisions. Two of these are the dining-rooms and sleeping quarters of the men.

Headquarters, as already suggested, divides the farm into four districts, somewhat as the Capitol building at Washington divides that city into northeast and southeast and northwest and southwest. But in Washington you may go from the northeast section, for instance, to the end of the southeast in ten minutes. On the farm, however, the four groups of workmen live so far apart that often they work through a whole season without the members of one group meeting any of the members of another group.

Now take the private train over a private railway—for it must be remembered that this farm comprises about twelve square miles—to one of the group ot buildings in any one of the four divisions, and one will see there a colony similar to that in each of the three remaining divisions. The dining-room and dormitory prove to be whitewashed, comparatively clean affairs. In the dormitory, especially, the beds are more comfortable than those allotted to laborers on a New England farm. In the stables are about seventy-five horses, and a blacksmith shop at one end. Then here is the shed or implement barn, in which a wonderful array of machinery, wagons, carts and tools used on that division are stored in winter. In one end of this building is a wood-worker's shop.

Each of the other divisions, as stated before, has similar buildings for another seventy-five horses and the necessary machinery. In addition to

CHINESE PICKING OLIVES IN CALIFORNIA



THE PRODUCE MARKET, PHILADELPHIA

Vol. II., p. 747

all these buildings, it should be mentioned that the private railroad by which we travelled to the centre of this division connects two elevators, each having a capacity of fifty thousand bushels, at the two sides of the farm.

How a Wheat Crop is Raised

In the Northwest, all the wheat grown is spring wheat; therefore the operations begin in October. First, the straw of the previous year's crop is burned. Then begins the plowing—thirty-two four-horse plows, probably in divisions of eight, travel daily about twenty miles, turning two furrows at a time, and covering thousands of acres in less than six weeks.

The eight plows on each division work across the field, seemingly one behind the other, but really in a kind of formation, which in the army would be called "right oblique," or "left oblique." That is, each plow works to the right or to the left of the plow in front of it, so as to turn up the two furrows parallel to those turned up by the machine in front or behind. This is called "gang" plowing, the division superintendent riding beside the "gang" on horseback, and directing operations as a captain of a battery of light artillery directs manœuvres. As there are eight plows of four horses each on each division, there are 128 horses at work at one time on the four divisions. When the fields are all plowed the transient hands are discharged, and operations cease for the winter.

With coming of spring, the harrowing begins, half a dozen four-horse harrows on each division. One man with a twenty-five foot machine can harrow seventy acres a day. Then comes the planting, the seed being sown with half a dozen four-horse drills, covering eleven feet, on each division. Then again the transient laborers are discharged.

In the latter part of July, "transients" again appear, fifty of them at a time, for now the work must be done in the shortest possible time, while the owner anxiously watches the heavens. Now across the sea of wheat giant machines move, like so many cars of the Juggernaut. These are the combined harvesters and binders. Six on each division are pushed by traction engines. All through August this work continues, the machines cutting the wheat and tying it in the sheaves with binder-twine. The farm's twenty-four binders use up a whole carload of twine during the season.

Then begins the threshing season, one steam thresher for about every one thousand acres, and about thirty men working at each machine, threshing about twenty-five hundred bushels of wheat a day. The wheat, as fast as it is threshed, is hauled to one of the farm elevators, where it is kept in bins until it is at last pitched into the railroad cars.

Now the farmer's work for the season is over. He sells his grain, is paid for it, but, with thoughts of the next season, he still watches the ticker. Consulting his books, he finds that he has averaged twenty bushels to the acre, and that his net profit is nearly $20,000 for the whole crop—an income unknown among Eastern farmers. But then the Western farmer is a business man.

Labor on a Great Farm

On farms like the one just described about forty hands—ten on each division—are employed permanently. These "tend" the stock and do the chores common on all farms, large and small. All other help, excepting of course the employés at headquarters, are "transients," birds ot passage, who may have homes a thousand miles away. They rove from farm to farm, from Texas to Montana, for the plowing here, the harvesting there, the threshing somewhere else. And finally, when the crops are all in and they return to their homes, the aggregate of the money in their pockets, representing the season's wage, is easily a million dollars. For each man receives $25 to $30 a month besides his board and lodging and laundry; and as he has no chance to spend it, he saves every dollar. These transients can use the machinery, and are classed as skilled laborers. It is the permanent hands who do the drudgery. In their dormitories at evening they have their "smokers," their songs and their yarns. There is no canteen, no drinking and no card playing.

The Training of "Machine" Farm Hands

The profound influence of the use of machinery on farms consists not alone in changing the methods of plowing, sowing, harvesting, threshing, by a transition from hand and horse methods to steam engines and automatic machinery, it has also, as before suggested, created a demand for a new and wider line of technical knowledge and experience than have hitherto been supposed to belong to farming in any of its branches. Henceforth, therefore, the farmer or his helper must become something of an engineer and machinist, in order to adapt himself to the new conditions of his calling. He can not afford to compete with the machine by retaining the slower and more expensive methods of former times, since such a mad attempt would mean only that his margin of profit is so hopelessly cut down that he must share in the ruin common to all the "conservative" element in attempting to stay the wheels of progress. In the great farms of the West steam, and even electrical, power has almost entirely supplanted the horse, thus enabling immense tracts to be worked and cultivated profitably, at the smallest possible expenditure of time and labor. While power machinery will probably have a much restricted sphere with the smaller farmers for some years to come, the movement toward machine work has already begun in the use of portable steam threshers and portable power saw-mills, whose owners have regular itineraries in certain districts. In fact, this type of farm assistant has already become a recognized institution.

On the larger farms, however, there must always be a full supply of all agricultural power machinery, which involves that trained engineers be regularly employed. It is also exceedingly desirable that managers and foremen of such estates should understand something of the construction, operation and repair of these machines, in order to supervise their operation to advantage, not depending wholly upon the experience of an employé.

CHAPTER XI

FRUIT, FLOWERS AND MARKET PRODUCE

The Fruit Industry—Classification of Fruit—Fruit Transportation and Cold Storage—Ocean Carriage of Fruit—The New York Fruit Market—Fruit Auction Sales and Pushcart Men—California Fruit—The Watermelon Industry—The Apple Industry—The Berry Industry—The Grape Industry—The Grape Basket Industry—The Raisin Industry—The Prune Industry—The Nut Industry—The Flower Industry—Florists—Florists' Exchanges and Organizations—The Vegetable Industry—Market Gardening and Truck Farming—The Truck Farmers' Associations—Market Men

The Fruit Industry

PROBABLY in no other class of products of the soil has there been a greater percentage of increase of volume in recent years than in fruit growing. At a Fruit Growers' Convention in California it was stated that the shipments from California orchards alone increased from sixteen thousand car loads in 1890 to more than sixty-six thousand carloads in 1900, over four hundred per cent in ten years. The Census reports indicate a similar increase in fruit growing in every part of the country. As, for instance, in Delaware there has been a marked increase in everything except peaches, ranging from forty per cent on cherry trees up to nearly fourteen hundred per cent in prunes and plums. It is true that the prunes and plums in Delaware are still in limited quantity, although the increase was more than seven thousand bushels. During the same period the increase in pears in that State was more than one hundred and thirty thousand bushels. In Connecticut during the same decade the growth of the fruit industry as shown by percentages was as follows: Apple trees, fifty per cent; cherry, sixty per cent; peach, four hundred and eighty-nine; pear, forty-three, and plum and prune, twelve hundred. Like Delaware, some of these products are still in limited quantities, although the advance is quite marked.

During the investigations of the Industrial Commission attention was called to the advantages of fruit growing both from the standpoint of present profit and of the utilization of soils which are not well adapted to other crops. Thus in Maryland soils which are of no value for general farm purposes are found to be particularly well adapted to the production of late peaches. Owing to the high prices of fruits which prevailed a few years ago it was not unusual for California orange growers to net $500 an acre. Fruit growers in West Virginia are said often to make twice to five times as much money as farmers engaged in general agriculture. Also the profits from fruit farms in Georgia, Missouri, Arkansas and Kansas have attracted attention in the North and some immigration.

The fruit imports, including nuts, of the United States, in 1902, amounted in round numbers to $20,000,000 worth; the exports to $11,000,000 worth; of the former half was lemons and bananas; of the latter a third was apples.

A fruit merchant says: Surely the science of keeping fruit has been evolved to a high degree of perfection when the great ocean liners, no matter what flag they fly, no longer patronize the European fruit markets for their supplies for the return voyage to America, but stock up here in the New York market for the entire round trip. Indeed, in the handling of fruits, the most wonderful progress has been made during the last few years, and the years to come will show still more rapid strides not only in scientific and artistic handling, but in the importance of the traffic and the advance in intellectual and social standing of those whose lives are devoted to the broadening and uplifting of this business. This is the day of scientific specialization in the fruit trade as in other branches of business. Volumes have been written, State colleges have been endowed, and the lives of eminent men have been devoted to horticulture. The time has now come for an equal enthusiasm and energy in the handling of these gifts of nature after they leave the hands of the husbandman.

Classification of Fruit

Technically speaking, fruits may be divided into two classes, deciduous and citrus, the first including all fruits, except berries, growing at certain seasons, once a year. Citrus fruits embrace the oranges, lemons, and grape-fruit, bearing all the year, and not perceptibly shedding their leaves, which seem always green.

Under the head of orchard fruits are subsumed apples, apricots, cherries, peaches, pears, plums. About 370,000,000 trees are represented in the annual average yield of over 212,000,000 bushels of these fruits. Of this number 55 per cent represents apples, 27.2 per cent peaches, 8.4 per cent plums and prunes, leaving the remaining 9.4 per cent for pears, cherries and apricots. The total orchard produce of the country includes over 1,750,000 barrels of cider, 392,500 barrels of vinegar, and about 145,000,000 pounds of dried fruits, such as prunes, apples, etc. The greater numbers of apple, cherry, peach and pear trees are in the North Central States, while about one-half of the plum and prune trees are in the Western States, principally in California and Oregon. However, of the total value of over $83,750,000, the North Atlantic States represent nearly $25,500,000, and the North Central, about $24,400,000.

Over 310,000 acres in the United States are devoted to producing small fruits, strawberries, raspberries, blackberries, cranberries, currants, gooseberries, etc. Their cultivation is most extensive in the North Central States, which form the greatest farming region of the country, although all parts of the Union report more or less activity in the industry. Strawberries are the most important from the point of acreage, covering nearly 151,400 acres, out of the total of 309,800. Of this area nearly 33 per cent is situated in the North Central Region. The total yield represents an average of nearly 260,000,000 quarts. No other fruit occupies one-half the acreage of strawberries, raspberries coming nearest, with about 61,000 acres, and not quite 77,000,000 quarts. Of the 20,500 acres occupied by cranberry culture about 25.1 per cent is reported from Massachusetts.

Fruit Transportation and Cold Storage

You may handle cotton, hardware, personal baggage, with a hook, a bang and a hurrah. But fruit—notice that the 'longshoremen handle each particular crate as though it were a baby. Come into the refrigerator cars, see how carefully the crates are piled, slats between the cases so that the air can circulate freely over and under each. The fruit within the boxes was packed with even greater care. At each end of the refrigerator car is an ice tank, by which the temperature in transit is kept at about 40 degrees. For the preservation of fruit, many experiments have been tried—charcoal lining for the roof of the car, electric fans attached to the axles—but refrigeration alone has made possible the rapid developments of the commercial fruit industry.

Without the modern cold storage facilities, also, the fruit trade could not have been developed to its present large proportions. There are more than six hundred establishments for the storage of fruits and produce under artificial refrigeration. The capacity of the fruit and produce cold storage warehouses is about fifty million cubic feet. If the meat storage establishments are included, the capacity rises to a hundred and fifty million cubic feet. American cold storage has been imitated to some extent in London, Liverpool and Glasgow. Berries, peaches, plums and early pears are not stored in large quantities, as the market is generally ready for them, save when occasionally overstocked. Storage hurts their flavor. Great quantities of Bartlett and later pears are stored, sometimes, for a relatively long period, single warehouses in Western New York, for instance, holding twenty-five thousand barrels of Bartletts at one time. New York City beats even this record, some cold storage establishments containing forty thousand barrels. Fruit will not retain much of its flavor if stored more than eight weeks. Even six weeks' time is too long. Many of the large canneries keep pears and other fruits in their storage rooms, awaiting the canning process.

As a matter of course, fruit growers are dependent on transportation facilities for the marketing of their products. All the great railroad lines now run refrigerator cars of their own, besides the numerous private refrigerator car lines. Many of these are devoted to the transportation of fruit and berries, which may be loaded in many instances from the packing-houses directly into the refrigerator cars, for transportation perhaps three thousand miles. These refrigerator cars often make up whole trains, running to the principal markets in the season. The cars may be supplied with relays of ice at points along the route. In the United States, Canada and Mexico there are more than sixty thousand refrigerator cars in service. Of the California deciduous fresh fruits, 95 per cent is handled by these cars. Fruit growers are thus enabled to increase and diversify their crops. The safe length of time in transit for summer fruits is governed by the conditions of ripeness, etc. Strawberries will stand from two to five days in transit, and peaches and plums six to eight days. California deciduous fresh fruits may now be delivered by rail to any town in the United States in ten days, in a fairly good condition. Strikes and other reasons have, however, sometimes detained fruit in transit for twenty-six days. A carload of California peaches and prunes kept in transit for this period sold at high prices in New York, spoiling quickly, however, when placed on the market.

Ocean Carriage of Fruit

The method of carrying fruit across seas is interesting. A fleet of nearly 150 steamers, specially constructed, plies between the principal fruit ports of the tropics, the Mediterranean, and America. Ten million dollars' worth of perishable merchandise, at least, is brought to New York annually in these vessels, and every banana, every cocoanut, peach and pear, is in good condition. For the fruit steamers have concealed walls of charcoal which are impervious to heat; they have separated deck planks giving air circulation to the cargo below; they have cold storage apparatus; they are, on the high seas, what the refrigerator car is on land.

Some fruit from the United States is shipped a little green, and allowed to ripen slowly on the voyage, the temperature being kept as near to forty degrees Fahrenheit as practicable. Apples, pears and oranges make up the most of these shipments, with a few grapes.

Apples, oranges and lemons were shipped in excellent condition from New South Wales to Chicago at the time of the Columbian Exposition. The possibilities of ocean transportation of fruit are thus shown to be capable of indefinite expansion.

Almost all fruit shipped by sea is brought by steamers. An exception to this rule must be noted in the case of pineapples, which are generally brought here in schooners, from Key West and the Bahamas.

There is a duty of 75 cents a box on Mediterranean oranges, besides the freight charge of 30 cents a box. Ordinary freight charges from California are 90 cents a box, with refrigerator car charges about 35 cents a box. A shipper may charter a refrigerator car for $115 from California to New York, and the ice may be renewed three times on the trip.

The New York Fruit Market

Between the orchards and fruit groves of California, the orange and lemon groves of Italy, the banana plantations of the West Indies and the ten thousand fruit stands of New York City there lies a kingdom that carries on a trade of fifty million dollars a year and furnishes tens of thousands of men, women and children with paying occupation. This is the kingdom of fruit, and Washington Street, New York, is its capital. With the thousands of carloads from California come to this market six million boxes of oranges from Florida, ten million pineapples, $250,000 worth of limes, train loads of lemons and strawberries, the tropical fruits from Florida mainly, and the berries from all along the coast as the season advances. Also to this centre come shiploads from the West Indies and Central America, from Sicily, Almeria, and Malaga, from Smyrna and all up and down the Mediterranean. Pickers in foreign lands are paid so little that the fruit can be sold in New York cheaper than the American fruits.

There is no retailing in the far Western fruit. It is sold by two auction firms. The Mediterranean fruit is also sold by auction, as likewise is about thirty per cent of the pineapples, and perhaps ten per cent of the bananas. Fruits other than these, coming by railroad and express, go to the commission merchants' stores direct, to be sold there to the retailers.

Fruit Auction Sales and Pushcart Men

At Pier 20 there is a room, the size of the United States Senate Chamber, with seats arranged as in the gallery of a theatre. This is the auction salesroom of the New York fruit market. Two hundred and fifty buyers occupy these seats. Each buyer holds a catalogue, waving it on high whenever he makes a bid. Elevated on a rostrum, facing the buyers, sits the auctioneer —a lean, nervous, intelligent man who is more the autocrat in that auction theatre than was Czar Reed in the House of Representatives. Falls his gavel on the stroke of nine, and "Shut up" he shouts to Italian and Greek and German—and the voices of the buyers subside. "Lot-number-one-three-hundred-boxes-tragedy-prunes-from-San-Jose-California-what's-the-bid-175 180-185—" Thus the autocrat begins the sale, seeming to speak Choctaw and Hundustani and the patois of the trainmen on a suburban railroad all at once. Ten buyers simultaneouusly cry "190," meaning $1.90 per case. Pandemonium reigns, and the scenes in wheat-pits and stock exchanges are, by comparison, reduced to mere enthusiastic prayer meetings. Men jump upon their seats naming higher figures.

Despise not the pushcart men. At the fruit auction sales they buy ten per cent of all the fruit that comes into New York. At an ordinary sale $40,000 worth of fruit is sold, and for their share the pushcart men pay $4,000 in cash. The boss pushcart men run from ten to fifty carts and corner stands, and some of them, in Naples or Genoa, would be deemed millionaires.

The sales in the auction room are not made by samples, but sold "strictly as is," no allowance being made for any cause whatsoever, the buyers taking all risks. As fast as each sale is made, a memorandum is sent to the boss teamster on the dock, who delivers the fruit to the proper drayman; so that by the time the sale is over, all the fruit contained in the forty cars which arrived at midnight has left the dock, and the process of distribution to all parts of the city and nearby States has begun.

While all California fruit is sold thus at auction, some of the Southern fruit owners who control the Southern trade of New York still dispose of their goods by private sale. It is declared, however, that before long all perishable fruit will be sold at auction, the argument in favor of this method being that the man who waits for private sale or for the market to advance finds his fruit all the while deteriorating—even in cold storage—and in the end is obliged to sell at a sacrifice.

The retail price of fruit fluctuates almost imperceptibly; but at wholesale the difference in price from day to day is written in dollar signs. Generally speaking, the law of supply and demand governs trade in fruit as in other merchandise, but locally the demand is independent of the supply. On a rainy day, for instance, when the pushcart men can not take to the streets, both the demand and the price fall off at the auction sales despite the supply. So also on a very warm day, after four hours in the sun, fruit becomes garbage. A washout on the railroad, too, delaying fruit for a day or two, during which it has time to ripen, sends the prices down.

The Banana Trust, which controls the trade in the most American of all fruits, receives millions of bunches of bananas yearly from Jamaica, British Honduras, Northern Venezuela and other West Indian countries, selling the fruit at one of the New York piers. The sale begins as soon as the banana ship arrives. Out of the hold they come, all green as the Irish flag. Three trucks stand backed up to the gangway, and as each 'longshoreman appears with his bunch of bananas, an expert examiner shouts: "Number One," or "Two" or "Three"—thus at once specifying the grade of a particular bunch and the truck upon which it is to be loaded. The buyers stand by the trucks with watchful eyes. As soon as a truck is loaded, whether with No. 1, 2 or 3 grade, the auctioneer mounts the fore-wheel, shouting: "What's-offered-for-the-125-bunches-on-this-truck?" Bids are made: 75 cents, 80 cents up to $1.25 per bunch—and in less than one minute the lot is knocked down, the truck pulls away, another backs into its place, thus until the ship is emptied of bananas.

At the Ward Line Pier on the East River are sold thousands of barrels of pineapples from Cuba, while at the docks of the Clyde, the Savannah and other steamship lines running south are sold tens of thousands of watermelons from Georgia and Florida. A single steamer often brings a consignment of 12,000 watermelons.

Washington Street, as said before, is the Capital of the Kingdom of Fruit in this country. From Jay Street to Fourteenth, this thoroughfare is lined with the shops and warehouses of wholesale and retail fruit merchants. Via this street, fruit—deciduous, citrus, dried, canned—even tomatoes from Texas, Tennessee and Mississippi, which are as eligible as melons to classification as fruit—reaches the hotels (one large hotel alone buying about $75,000 worth of fruit annually), the boarding houses and private homes, yachts and steamships.

California Fruit

North from San Francisco, south from San Francisco, the railway trains rush through a land of orchards. For ever since the days when the Francis-can monks first established their missions in California that region has been a great fruit raising centre. As early as 1792 there were five thousand orange and other fruit trees growing at the mission stations. To-day in this "Italy of America" nearly thirty million fruit trees are growing in orchards that spread over a territory a thousand square miles in extent. Over six hundred thousand acres of the most fertile lands of California are planted in what may be called food trees.

A large part of the success of California fruit growing is to be credited to the manner in which it is handled and shipped. The aim of the grower is to get his product on the market in a fresh and attractive condition, and for this he spares no pains. Methods of packing have steadily improved and the transportation facilities have been made better to keep pace with the general progress, until California fruit makes the best appearance among the competitors on the great markets. On some of the fruit farms women and children are employed as packers, but this work requires a certain kind of skill, deftness and delicacy of touch, and Chinese and Japanese are generally employed because of these qualities, developed through centuries of training in the same family. Fruit growers declare that the Chinese are the best packers available, and without the yellow men it would be impossible to harvest the fruit crop properly.

Shipments are made in a way to insure the keeping of the fruit on its trip across the continent. The refrigerator car has done most to solve this problem of the industry, and the question has been how to get the cars into the orchards and groves fast enough to meet the demand. More than once there has been a car famine, and great losses of fine fruit in consequence.

It is necessary to consider the magnitude of the fruit business of California to understand how easily thousands of dollars' worth of the finest oranges are sometimes lost for lack of shipping facilities. The statistics of the average annual shipments of fruit from California, carloads of ten tons each, are as follows: Citrus fruit, 25,000 carloads; deciduous fruits, fresh, 10,000 carloads; cured fruits, 10,000 carloads; canned fruit, 8,000 carloads; raisins, 4,000 carloads; vegetables, 5,000 carloads; walnuts and almonds, 700 carloads. Of course part of these are not perishable goods, but when it is considered that in making these average figures there are years when the totals are twice as great, the difficulties of the freight men will be better understood. For it is the uncertain probability of an unusual production of fruit that the railroads must provide for. The crop may be cut down by some unusual condition just before ripening, and then the car supply may be too great, a result more unprofitable to the roads than a car famine.

In a bulletin issued by the Department of Agriculture the varieties of California fruits best known to commerce are discussed as follows:

> The apple does phenomenally well along the coast where the temperature is not too high, in the mountain counties, and in the foothills of the Sierra and coast ranges; the fruit is very fine, and the crop is an exceedingly profitable one, when grown within reasonable distance of transportation lines.

Peaches are grown extensively and thrive best in the higher portions of the warm valleys and the lower foothills. The peach is probably the favorite deciduous fruit of California. It ripens early, has a good flavor, and yields profitable returns as early as the second year after planting.

Pears grow to perfection over a much wider range of the State than most other fruit, the tree seeming to adapt itself readily to diversity of soil and climate. It also stands exposure well.

The commercial cultivation of apricots is practically confined to the Pacific coast. This is one of the choicest fruits, and succeeds particularly well in California.

The quince thrives wherever apples and pears are grown. The fruit is of very large size and of the finest quality.

The cherry crop is a remunerative one, and this fruit is grown profitably in many localities.

The fig grows in all sections of the State. The fruit is larger and of better quality in the warmer regions. The fig has never been very successful as a fruit crop for commercial purposes, but in the past three years the introduction of the Blastophaga insect from Italy has raised hopes that the Smyrna fig may be ripened in perfection and the growing of figs become commercially an important industry.

Olives thrive all over the State, except in the higher altitudes of the Sierras and in the low lands of the coast. The olive industry is as yet hardly beyond its infancy in California, but the bearing trees can be found in almost every county, and all bid fair to make paying returns.

California prunes are of superior taste and quality, and the crop is increasing in commercial importance. Prunes are more extensively cultivated than any other fruit of the State. Returns are very large, trees in full bearing yielding annually from 150 to 300 pounds of green fruit each.

Plums, while not so extensively cultivated as prunes, grow to perfection in many localities and yield abundant returns.

The extraordinary profits of citrus fruit cultivation have attracted wide attention, and the industry has developed wonderfully in the last few years. Much of the land of the State is especially adapted to the cultivation of citrus fruit, and, while by far the greatest portion of the commercial crop of the State is at present grown in southern California, fruit of this character can be safely and profitably grown all along the foothills of the Sierra Nevada Mountains, from San Diego to Tehama County, a distance of over seven hundred miles.

The Watermelon Industry

During the last quarter of the nineteenth century a large business in growing and shipping watermelons sprang up in this country, principally along the Atlantic seaboard. The melons are in very active demand in the hot days of summer in all the great cities, from Washington north to Boston and west to Louisville, Cleveland and Chicago, although melon-growing sections for the supply of the Western cities are being developed nearer the source of demand.

There are usually about five thousand acres planted in watermelons along the line of the Southern Railway, from which shipments are made to other than local markets. A conservative estimate for 1903 is a crop of 2,000 carloads for shipment over this one line. This acreage is divided among about two hundred growers, the individual tracts ranging from one to three hundred acres, most being from ten to fifty acres and yielding two to fifteen carloads each. Nearly the whole of this acreage lies in Georgia and South Carolina.

The profits of the business are very large when the crop hits the market right, and there are considerable losses by an oversupply. Carloads are sometimes sold for less than the freight charges. Much depends on the weather and other considerations which it is very hard to forecast safely.

The Apple Industry

No branch of the fruit industry has developed more solidly and satisfactorily than that of growing apples for market. In the beginning of the last century there was little apple trade outside of the neighborhood where the fruit was grown, and often farms had no orchard, or very poor orchards. Little attention was paid to keeping apples through the winter, and he was accounted a progressive man who had a barrel or two of good fruit in March. The varieties of excellence were few and little known. Shipments to Europe were of course of comparatively small importance. There is a record of a package of Newtown pippins sent to Benjamin Franklin while he was in London, in 1758, and in 1773 there was "considerable trade"; but the earliest reliable statistics, of the date of 1821, show only 68,443 bushels for the total export of apples, valued at $39,966. These figures had grown in 1897 to 1,503,981 barrels, worth $2,371,143. Since that date there has been a decline, partly due to a short American supply, and the exports in 1902 were less than 1,000,000 barrels, worth, however, nearly as much as the greater quantity in 1897. Nearly every Northern State now raises an abundance of apples for its own use. Centres of apple growing are in Michigan, Pennsylvania, West Virginia, Maryland, and Virginia, while there are extensive orchards on the Western prairies and in the Pacific Northwest.

The Berry Industry

The growing of small fruits is best suited to the small farm. The somewhat large amount of capital per acre required is offset by the fact that the necessary labor may be done by the fruit grower and his family. In some few instances small fruits are cultivated on a large scale. Except the currant, nearly all of the varieties of small fruits are of American origin, including the strawberry, blackberry, raspberry and gooseberry. Much attention should be paid to the boxes or baskets, which should be neat and clean. A slovenly looking box will kill the sale of the fruit. Care must be taken to see that the packages are of the standard size, as light as possible, and attractive to the eye. Formerly the crates were returnable, but this is not now the custom if the transportation is over a long distance.

There should be a packing house near the berry fields. A flat-roofed shed, open to the north, and large enough to shelter a certain quantity of picked fruit, will suffice for ordinary berry farms. A brand of the grower's name should be used on every package, so that it may become known in the market. This often insures quick sales.

The Grape Industry

In the State of California there are 157,000 acres planted to grapes. Of these about 90,000 acres are wine grapes, table and raisin grapes making up the remainder. Perhaps 27,000 acres are devoted to the culture of table grapes, so that the raisins get 50,000 acres. It is hardly realized by the public that the wine trade of that State amounts to 20,000,000 gallons, 6,000,000 of which are consumed in California itself.

There are other grape belts, for instance the Chautauqua region, extending from near Buffalo almost to the Pennsylvania State line. Brocton and Westfield are the centre of this thirty-mile tract. Although the crop is so enormous, the picking must be rapidly performed. Quick work is an absolute necessity. Strangers flock to the district, including many Italians and Polanders, and numbering at least four thousand persons. Among the pickers are two thousand girls. The workers are paid $3.50 a week and board, or, under another arrangement, they get a cent a basket. The work in the vineyards lasts from six to ten weeks, and active girls can earn $1.25 a day, in a pleasant occupation. In a recent year, more than seven thousand five hundred cars filled with basket grapes were shipped from Westfield and Brocton by November 10. At the wholesale price of 13 cents per eight-pound basket, the value of this crop of grapes would be more than $2,000,000. But wines and grape juice are also shipped in large quantities. In the Westfield factories 5,760 tons of grapes on an average are crushed every autumn, while the output from Brocton is even larger. Grapes intended for pressing generally bring about twenty dollars a ton. The owners of the Westfield factories thus spend more than $100,000 a year for grapes, and the proprietors of the Brocton wine-making establishments perhaps one-fourth more.

The Grape Basket Industry

The basket-making itself is an extensive industry. Even though they are only paid twenty-five cents per hundred baskets, the boy and girl workers are so skilful that they easily earn $4 to $4.50 a day on an average. These baskets are sold to the grape growers at $20 a thousand, and from thirteen to fifteen millions of them are used every autumn, costing from $260,000 to $300,000.

There is a good profit in the grape trade. In a recent year 153,120,000 pounds were picked in this district, valued at $2,488,200, 124,000,000 pounds being packed in baskets, 9,120,000 pounds crushed for grape juice, 15,000,000 made into wines, and 5,000,000 crated for transportation. The Chautauqua grape business pays six per cent on $41,470,000.

The Raisin Industry

It is rather remarkable that the number of pounds of raisins annually consumed in the United States about equals the population. The recent average annual consumption has been about 80,000,000 pounds. Nearly all of these raisins were produced in this country. The raisin-producing district of California includes ten counties, having not less than 64,000 acres devoted to this crop. The "Raisin City," Fresno, is in the centre of a most prosperous section of the industry. In a recent season there were in California sixty plants for packing and seeding raisins, nearly all of them in the Fresno region, employing about five thousand hands, who earned about $250,000 during the season. In fact, in California the raisin industry is a close second to the wine production. In the season of 1897 more than four thousand carloads of ten tons each were produced, bringing an average price of one and three-quarters cents a pound, which was a loss to the growers, one thousand carloads not being disposed of. This was the result of reckless overproduction and bad management. All this was regulated by an association of raisin growers, and the output of the next year, amounting to about three thousand carloads, was sold for 3½ cents. The association now carefully guards the interests of the growers, and the industry is on an excellent footing.

The Prune Industry

A few years ago the prune was an object of contempt, despised by all men. Of prunes the people would have none, not even at cents a ton. In the days of their disgrace the only friend who stood by the prune was the boarding-house keeper. Hence great warehouses the country over were fairly bursting their walls with prunes, like the granaries in the time of Joseph. The prunes were not even worth moving. And yet prunes then were no less luscious, no less nutritious, than prunes now. It was simply that the prune had been libelled by newspaper funny men. Their fair name had been besmirched by the joke writers of the press. So, held up to ridicule, jeered at and hooted to cover, they remained in the warehouses. No one would even pay their railroad fare to possess them. Suddenly some one said, "Gag the humorists and we'll sell our prunes. The way to do this is to advertise." So the owners of the prunes made up a purse, and in all the newspapers of the land they advertised: "Just Say Prunes," and with magic effect. Instantly the joke writers stopped jibing, and forthwith from a hundred storehouses prunes began to "move," at a cent a pound.

The State of California boasts of the largest prune orchards in the world, there being several in the Santa Clara and Sacramento valleys, comprising more than 120 acres each, or 12,000 trees. There are two or three orchards of 500 acres with 50,000 trees. In Central California there are several firms, each having more than $175,000 invested in prune orchards. The crop has been sold on the trees, in some seasons, for $60 a ton. The duty on French and Turkish prunes has boomed the home market. There are at least 66,000 acres of prune orchards in the State, four-fifths of which are bearing, representing a value of about $20,000,000, if the land, trees, tools, packing houses, irrigation systems and harvesting devices are included. The crop runs from 90,000 to 110,000 tons, according to the weather conditions. The industry gives pleasant work to many thousands of men, women and children in Central and Southern California. Wide sheets of cloth are laid under the trees, into which the prunes are shaken from the branches. They are then carefully poured into padded boxes. The fruit then is carried to the washing boxes and the dipping caldrons. Heavy wire cages filled with several hundred pounds of prunes are dipped into running water. After this cleansing process the cage is swung on a crane and let down into a caldron of hot water mixed with concentrated lye, in order to crack the skin, and thus hasten the drying process. Once again are the prunes lifted and dipped into clear hot water mixed with a white syrup, which gives the fruit a gloss. The fruit is dried in two or three acre drying yards, being spread in trays upon the ground, and covered with some cheap cloth. The drying is generally accomplished in three days, so hot is the Southern California sun. The dried fruit is placed in "sweat boxes" for a week or ten days until all moisture has evaporated. Many large prune growers handle seventy tons or more of the fruit in a day. The proportion of weight is about three to one between the green and dried prunes. The fruit is sold according to the sizes, there being six grades. The grading may be done by machinery. Of the eleven varieties raised in California, only four are much grown, the d'Agen, the Col's Golden Drop, the Bulgarian, and the Tragedy.

The Nut Industry

Nuts were formerly a desultory crop. But nut trees are now planted for profit by the farmers of the East. From a nut orchard there may be realized as large a profit as from a peach or apple orchard. Farm hillsides, formerly running to waste, are successfully used for the planting of walnut, chestnut and butternut trees. Land in the West and Southwest, too wet for other crops, produces good returns when used for hickory and pecan nuts. California took the lead in the development of nut culture, and produces now more than two million pounds of English walnuts, with many almonds, a fine grade of chestnuts, in addition to English filberts and hazel nuts. The new industry has sprung up within the last fifteen years. The importation of nuts has been affected by the great quantities grown here for the market. A greater demand for them has been forced, and the consumption of nuts has greatly increased. From pecans a valuable oil is made. Japanese varieties of chestnuts have been grafted on native American stock, producing what is sold in the market as the Japanese chestnut. Some imported Japanese trees are also grown. The burrs open without waiting for frost, thus gaining an early market. English walnut trees have to be protected from the rigors of our winters, while young. They find a favorable climate in the South and on the Pacific slope. Pecans may be raised from the seed, yielding great harvests in ten years, producers generally buying three-year-old trees from the nurserymen. Pecans come next to chestnuts in the size of the crop. They will grow wherever hickories and oaks are found. Pecan trees should be planted from thirty-two to forty-two feet apart, as is the case with walnut, hickory, and chestnut trees. Almonds and filberts may be planted from twelve to fifteen feet apart. The shellbark hickory tree comes into bearing in about ten years from the seed, producing a very valuable crop. Black walnuts and butternuts are also profitable. English filberts and the improved hazel nuts give good returns.

The peanut crop is of importance. It occupies nearly 520,000 acres, and represents the labor of 134,000 farmers. The annual yield is about 12,000,000 bushels, the average being twenty-three bushels to the acre, valued at 61 cents per bushel. The great peanut region of the country is in the South Atlantic States, Florida, Georgia, North Carolina and Virginia, which contain 75.5 per cent of the total area, or nearly 390,000 acres. The South Central States contain about 24.3 per cent, or about 126,000 acres, two-thirds of which are in Alabama. There are also about 450 acres in the West and 575 acres in the North Central States.

The Flower Industry

Horticulture means that department of the science of agriculture which relates to the cultivation of gardens, the growing of flowers, fruit and vegetables. Horticulture may be subdivided into two branches: The useful, known as truck or market gardening; and the ornamental, known as floriculture. Horticulture as a business is carried on in the United States to the extent of about $50,000,000 annually. This figure represents the value of the output of plants, flowers and vegetables.

Over 9,000 acres of land in the United States are devoted to the cultivation of flowers and ornamental plants; not quite 9,000 farmers and florists being engaged in the business, three-fourths of whom make it a specialty. The value of products annually sold is nearly $19,000,000, about 23 per cent of which is consumed in necessary expenses, such as labor, care of animals and machinery and the purchase of fertilizers. This last item represents an annual expenditure of over $500,000. The North Atlantic States lead in the florist business, with nearly 53 per cent of the total number of establishments; the North Central coming next, with another 32 per cent. New York leads with 983 establishments and a total value of products of nearly $3,000,000.

There are about 5,000 nursery establishments in the United States. The North Central States claim about 840 of these; the North Atlantic, about 500; the South Central, about 290; the Western, 240, and the South Atlantic, 170. New York is the greatest nursery State in the country, having nearly 240 establishments, with products valued at about $1,700,000. The value of nursery stock sold annually is over $10,000,000. After New York, the greatest nursery States are Iowa, Illinois, California, Ohio and Pennsylvania, every one of which makes annual sales of over $500,000.

The demand for palms, ferns, and allied plants is greater than the nurserymen of the country can meet. Besides the great greenhouse establishments in Florida and elsewhere, devoted exclusively to the culture of this class of "green goods," American florists have established palm nurseries in Jamaica and Trinidad in order to meet the demand of the people of the

United States. Money invested in palm nurseries will yield large returns, for plants of this kind are used as decorations in hotels, restaurants, cafes, and private dwellings.

An idea of the extent of the trade in flowers and plants alone can be gained from the statement that the sales of these products in New York City aggregate annually more than $5,000,000, an amount of business far in excess of that of any city in Europe. One of the most profitable branches of floriculture is cut-flower growing. Among the cut flowers the rose takes the lead in dozens of varieties, the American Beauty being the favorite, and bringing from $30 to $150 per hundred. Over two million dollars' worth of cut flowers are sold every year in New York City alone.

Florists

So great has been the development of commercial floriculture, and so keen is the competition in the trade that the result has been a remarkable specialization. Certain florists grow roses exclusively; others carnations; still others grow nothing but chrysanthemums; others nothing but violets; and so on through the list of flowers.

Over ten thousand "boss" florists are engaged in this industry. Each of these has "under glass" an area of from 1,000 to 100,000 square feet. The average is about 5,000 square feet, or 50,000,000 for all, yielding an average annual output valued at $1 for each square foot.

New York leads the industry with 1,000 or 1,200 establishments, having about 4,500,000 square feet of glass. Illinois is second and Pennsylvania third. A fair estimate of the value of all the establishments in the country is $11,250,000, or fifty cents for each square foot of glass. This estimate includes houses, boilers, fixtures, etc. The producer averages fifty cents a square foot annually, or $11,250,000. The retailer realizes double this sum, that is, $1 per square foot, or $22,500,000. The cut flowers of the United States are worth $12,500,000 annually, $6,000,000 being received for roses, $4,000,000 for carnations, $750,000 for violets, $500,000 for chrysanthemums, lilies and other flowers bringing $1,250,000. If we put the average retail value of roses at $6 per hundred, carnations at $4 and violets at $1 we find that the annual output is 100,000,000 roses, the same number of carnations, and 75,000,000 violets, or a total of 275,000,000.

The retail value of the plants sold is about $10,000,000, at an average of 10 cents a pot. There are at least 100,000,000 plants sold annually.

For the conducting of this business there is one man for every 1,500 square feet of glass, or 1,500 men, although great rose-farms will get along with one man for each 10,000 square feet. The average of labor is increased by the numerous small establishments.

In New York and other cities the retail stores are marvels of beauty, often displaying exquisite taste in the arrangement of the flowers exhibited for sale. In very many instances, however, the retailers are not producers.

Auction sales of flowers have become popular in some cities, while commission houses or flower-brokers do an enormous business in cut-flowers. Some of these brokers make a specialty of certain kinds of flowers, such as roses, violets or carnations.

Flowers which have been left unsold by the wholesalers and are a trifle stale are disposed of to street fakirs in New York, mostly Greeks. They have pushcarts, or stand at prominent corners, and make a great many sales.

Florists' Exchanges and Organizations

In the larger cities there are cut-flower exchanges, often controlled and managed by the growers. The New York Cut-Flower Exchange is six or seven years old, and is in excellent condition and very popular. The flowers are finally disposed of to the consumers by the retail stores, which handle incredible amounts of blossoms. In New York City several of the best retailers sell flowers to the value of three or four hundred thousand dollars annually. To achieve this success a retailer must be able to create new fads, and to force a demand for new varieties. Tastes must be considered in every detail of the business. Boxes, ribbons, delivery wagons, and messengers must be up to the very latest standard. Slipshod methods are obsolete.

Floriculture as a commercial enterprise is well organized, many of the leading florists having banded together for mutual interest under the name of the Society of American Florists.

The Vegetable Industry

Under the general head of vegetables are included such staple market produce as potatoes, sweet potatoes, onions, chicory and sugar beets, which annually occupy nearly 6,000,000 acres. Of this area over 51 per cent is devoted to potatoes, over one-half of which crop is grown in the North Central States, and not quite one-third in the North Atlantic. The annual output of potatoes is over 273,000,000 bushels. Sweet potatoes cover nearly 540,000 acres, and have an annual output of about 42,500,000 bushels, mostly from the South Atlantic States and Alabama. Onions cover nearly 48,000 acres, and yield nearly 12,000,000 bushels. On the remaining 2,000,000 acres, and over, devoted to general vegetables, fourteen familiar varieties are grown annually. The total value of the production of all vegetables is not quite $240,000,000 annually.

There are more than 10,000 establishments in the United States for the growing of plants under glass. About one-tenth of these are devoted to raising vegetables for the winter market—lettuce, cucumbers and tomatoes, for example, are thus forced. Within a short radius of Boston, say fifteen miles, there are at least 1,742,400 square feet of glass used for forcing vegetables. Hothouses make up perhaps two-thirds of this, hotbeds and frames constituting the remainder. Near Providence, R. I., are fully ten acres of glass for vegetable production. If we take into account New York, Chicago and other big cities a conservative estimate brings the total up to one hundred acres, or about 4,500,000 square feet of glass for this culture. Boilers and other adjuncts included, this glass is worth about $2,250,000, or an average of fifty cents a square foot. The growers get an annual return of fifty cents a square foot, or $2,250,000 in all. The retailers receive about double this amount, or $4,500,000. The number of men employed is about 22,500.

Market Gardening and Truck Farming

Raising fruits and vegetables for market is known in the North as market gardening, and in the South as "trucking." In this branch of horticulture many more persons are engaged and the financial considerations are greater than in floriculture, the ornamental branch. More money can be made in market gardening than in raising ordinary farm crops. Small fruit growing, as stated in a previous paragraph, is an industry involving large capital and employing thousands of men, women and children.

For successful truck farming certain conditions are necessary. Besides a favorable climate, sandy soils must be chosen in which the vegetables can be planted early and forced to a quick ripening. The facilities for rapid transportation must not be overlooked. Along the Atlantic coast from Massachusetts southward there is a strip of very light sandy soils especially adapted to the growing of early "truck." Crops raised one hundred miles south of Norfolk mature a week earlier than those grown further north, and bring higher prices at the time from lack of competition. So vital is the transportation element that land on a railroad is many times more valuable than equally good land lying at a distance of three or four miles, as handling and hauling injures the produce, and transportation is more expensive. Land immediately on the water is desirable because in addition to transportation facilities it has a certain immunity from frost. This is especially notable in the early spring months, when farms only half a mile inland may be ruined by frost, while the coast districts escape. These coast conditions are so favorable that about sixty per cent of truck farming in the United States is situated along the Atlantic. Exclusive of market gardening the total area of truck farms in the whole country is about six hundred thousand acres.

A high degree of cultivation is obligatory in truck farming, causing a large expense. In the first place, suitable land runs in price from $40 to $500 an acre. The value is determined by several factors, such as the nature of the soil, the distance from the market, and the facilities for transportation. Perhaps $200 per acre would be a fair average value. The profit in truck farming is indicated by the fact that before this district was devoted to this culture, land within its borders was not worth more than from $1 to $5 an acre.

A large item in the expense is the cost of labor, which runs from $10 to $30 per acre. Seeds and plants cost from 50 cents to $10 an acre, according to the variety of the crop. The use of fertilizers is general. Ordinary grades will cost from $10 to $50 per acre, while the best grades will compel an expense of from $60 to $75 per acre. Some considerable capital is thus demanded for truck farming, from $6,000 to $20,000 being required to work a small farm. Large farmers often use $40,000 a year. Besides the outlay of capital the risks can not be ignored. Truck growers must therefore, of necessity, be very cautious, and must be masters of the art of cultivation. An annual risk of $40,000 is a great matter.

The inevitable tendency of the age toward combination, observed in so many industries, is now noticed among the truck farmers. Such are the competition and risks, and the outlay required, that this tendency could hardly be resisted. Large growers have certain advantages over smaller ones, and the latter are finding themselves somewhat handicapped.

Early maturity is essential to success in truck farming, other conditions being secondary. The time of ripening is the first thing to be considered. Modern rapid transportation facilities have caused the development in truck raising. Dependence was formerly placed upon market gardeners near the towns and cities, and the vegetable season was necessarily short. Now the fresh vegetable season for northern cities lasts all the year round. The business is constantly increasing, and, as the prices are thus kept reasonable, the great public is vastly benefited. The development of the industry increases toward the South, Florida and Texas showing an enormous expansion. The South, of course, reaps the advantage of high prices, which are quoted at the first of the season.

The Truck Farmers' Associations

In many local centres there are truck farmers' associations which are gaining every year in power and influence. They receive daily telegraphic market reports from the chief markets and distributing points. By concerted action in putting their potato crops, for instance, upon the market, two or three large planters can depress the price in New York, to the injury of small dealers. The aim of the truckers' associations is to bring about such an equable distribution of crops throughout the North and West that a uniform scale of prices may be maintained. Efforts are constantly made for the accomplishment of this object.

The new methods of canning and preserving fruit and vegetables have greatly augmented the scope of truck farming and increased its markets. The income from crops during various seasons may thus be averaged, and disastrous sacrifices avoided. It is well known that the canning industry has grown to enormous proportions.

Market Men

Of the market places of the world, America has the smallest number and Germany the largest. In the rural districts the Americans have their country stores, the miniature of the city department stores, but the Germans love the market place and they support one or more in every city, town, village and hamlet throughout the Empire. When the American housewife says she is "going to market" she means, if she lives in the city, that she is going to the nearest butcher shop for meat and to the grocery for canned goods, vegetables and fruits. If one lives in the country, the housewife's market is the store before-mentioned, where she can buy everything from a cracker to a side of pork.

The American market place, as such, is doomed. Grocers, and butchers, and fish dealers, all have delivery wagons, and will set the goods down in the customer's very kitchen. Not so the market man. His customers are scattered over a territory so great that delivery of goods would rob him of all the profits of his sales. Hence, the falling off of business in our markets. Moreover, American pride has reached the point at which it will have nothing to do with a market basket. The housewife who used to go to market and carry her purchases home, now patronizes the shops on her own block, ordering her meat and potatoes and bread sent to the kitchen.

In many of our large cities during the last year or two, all sorts of schemes have been tried to save the market place. All failed. The last futile effort was a system of advertising in the daily papers. The market men formed the American Market Association, and each member was assessed two dollars a week to defray the expenses of advertising. The popularity of the market place was by no means revived. After six months' advertising there were more empty stalls than ever.

The only really thriving form of American market place to-day is the open-air market in the poorer and most populous districts of the cities, where the venders line up at the curbstone and offer their wares to the passing throng. The people will not go to the markets, so the markets come to the people. Here the stalest and poorest of market produce is offered at ridiculously imposing prices, though it is eventually sold far below the offered price to the highest bidder. In these street markets on a Saturday night you can buy not only all kinds of fish, flesh, fowl, fruit and vegetables, but everything for the household, from a spoon to furniture, and everything for the person, from a shoe button to an overcoat.

CHAPTER XII

THE DAIRY, POULTRY, AND ALLIED INDUSTRIES

The Dairy Industry—Milch Cows—The Milk Trade—The Milkman—The Condensed Milk Industry—Process of Condensed Milk Manufacture—Cheese Factories and Creameries—Butter Manufacture—The Butter Trade—Oleomargarine Manufacture—Cheese Manufacture—The Poultry Industry—The Incubator and Its Work—The Egg Trade—Bee Keeping—The Honey Industry

The Dairy Industry

DAIRYING is among the leading industries allied with agriculture in the United States. Its progress has been constant and rapid. Organizations and associations have sprung into existence with the purpose of controlling local interests and safeguarding general ones. Legislatures have enacted laws for its protection. In many sections there are wide districts in which it is a specialty.

The value of dairy products annually realized in sales is estimated at about $282,000,000, which represents an average of over 2,000,000,000 gallons of milk, 518,000,000 pounds of butter, nearly 21,000,000 gallons of cream, and about 15,000,000 pounds of cheese. Judging by values, almost 43 per cent of such products come from the North Central States; and over 30 per cent from the North Atlantic. The North Central States also report more than one-half the total of $282,000,000 for eggs and poultry products, which figures represent 51.3 per cent for eggs and 48.7 per cent for poultry raised for market. The highest values of poultry come from Illinois, Missouri, Iowa, Ohio and Indiana, which States, with Pennsylvania and New York, also represent the bulk of values for eggs.

The figures just given are those of the Twelfth Census. The Department of Agriculture doubles some of the Census figures, especially as to value of farm products. The total value of the dairy products of the United States, according to the Department of Agriculture, exceed $500,000,000. This amount may be raised to fully $600,000,000 if we include the skim milk, buttermilk, whey, and the yearly increase of calves.

The annual imports of butter average about 45,000 pounds, and the exports over 18,000,000 pounds; the average imports of cheese, about 13,000,000 pounds, and the exports about 48,500,000; while of condensed milk the imports aggregate about 530,000 pounds, and the exports about 14,200,000. Adding the imports to the figures already given for each of these products, and subtracting the exports, we find that the average annual available amount of each inhabitant of the United States is about 19 pounds of butter, 3.3 pounds of cheese and 2.3 pounds of condensed milk.

Milch Cows

The ratio of the number of milch cows to every one thousand of the population has been fairly constant. For 1902 it was 240, but the average for many years was 259. The improved productiveness of the average cow, brought about by superior breeding and better general conditions, compensates for this apparent falling off. The number of dairy cows has been very evenly distributed throughout the country. The greatest gains have occurred in the eleven States of the Western Division, with the North Atlantic Division second. In the latter, the demand greatly exceeds the local supply in the matter of combined dairy products. All the nine North Atlantic States have more cows kept for milking than ever before, excepting New Jersey. New York stands at the head with 1,538,317 dairy cows. More than 36,600 of these are not on farms. Iowa has lately fallen to the second place, with Illinois third and Wisconsin fourth. Each other State has less than a million cows. Minnesota, Wisconsin, Vermont and New York have made the greatest relative gains in the last decade.

The milk product is, in most cases, directly consumed in the Middle and Eastern States by the large towns and great cities, butter being the chief dairy product in the Central West and Northwest.

The Milk Trade

The expansion of the milk trade has become enormous in proportion and value. Local ordinances regulate it, and supervision and inspection tend to prevent adulteration, and to keep the average quality of the supply up to the standard. Apart from the influence of these compulsory methods, there are very large milk companies whose object it is to dispense milk and cream of absolute purity. Many of these establishments have built up a reputation, so that their certified or guaranteed milk is widely sold, and by it a high standard is forced upon the trade at large. In this case, as in many others, competition does more than legal enactments to maintain proper conditions.

Dairying has resulted in the rehabilitation of the drooping agricultural interests. A market near home was found for a common product, in New England and the Middle States, while in the West it followed ruinously low prices for cattle and cereals. The State of New York is in the front rank in the development of the dairy interests, with about 2,000 factories making butter and cheese. The supply of milk goes largely to New York City, which consumes four hundred million quarts a year. Buffalo comes second, with the annual consumption of twenty-eight million quarts. Such are the transportation facilities that much of this daily supply is shipped five hundred miles to market.

One of the largest creameries in the world is in Lincoln, Nebraska. The old-fashioned method of collecting cream by sending wagons through the surrounding country to collect the cream at the dairies and bringing it to the creamery for churning, was soon abandoned. "Feeders" were established at convenient points, from which the cream was brought in bulk to the creamery. But still the expenses involved in running seven or eight butter factories were too large, and it was determined to bring all the cream for churning to one central factory. A central butter factory was equipped with the latest devices in machinery, and supplied with the best expert butter-makers. There were at first twenty "skimming stations," the farmers taking away the skim milk after it had been through the "separator." Ten gallon cans of cream were sent on express trains from these points to the central plant at Lincoln. This central factory now receives cream from more than one hundred skimming stations. Most of these are situated in southern Nebraska, with some in northwest Nebraska, Colorado and Kansas. The output of butter is very large.

The Milkman

The milk trade of New York, Philadelphia, Boston, Chicago, St. Louis and San Francisco shows an extraordinary development. Seventy-five per cent of the trade in Boston is controlled by a few wholesale firms, by contracts with producers. In greater New York ninety per cent of the milk is bought and sold at prices fixed by the Consolidated Milk Exchange. The Philadelphia Milk Exchange regulates the trade in that city. In Chicago there is a milk shippers' union which establishes a schedule of prices subject to changes if conditions demand.

In a recent year in New York the price to milk producers was altered by the Exchange ten times, from the minimum of three-quarters of a cent to three cents a quart. Nothing can excel in promptness and regularity of service the milk trade of the large cities. From the milker to the consumer, the milk supply passes within the outside limit of thirty-six hours, thirty hours being perhaps a fair time expenditure. The railroads all run milk trains, with no extra charge for the refrigerator cars. To understand the excellence of the transportation conditions, regard must be paid to the volume of the milk traffic. In New York City, where the trade is highly organized, in 1902 the receipts were almost 10,000,000 forty-quart cans, arriving on fifteen lines, making a daily average of 26,000 cans, or 1,040,000 quarts a day. Five States furnish this supply. Much of it travels three hundred miles in transit to market. There are more than fifty wholesale and retail milk dealers to handle this product. Their capital runs from $3,000 to $1,000,000. Perhaps two-thirds of the capital is in the hands of nineteen or twenty dealers, some of whom have their own dairy farms. As in New York City, the large dealers elsewhere are both wholesalers and retailers. The fact that some dealers have their own dairy farms tends to keep down the price of the milk bought from the farmers.

The farmers are bound by their contracts with the dealers to allow a rigid inspection of the milk and the conditions under which it is produced and shipped. There are regulations in reference to the cows, the stables, the utensils, the feeding, the handling of the milk, and its delivery at the railroad stations. At least three per cent of butter-fat in the milk is demanded by the standard. By Dr. H. D. Chapin's recent authoritative analysis there was a showing of from 3.10 to 3.25 per cent of butter-fat in thirty-two tests of milk bought in the open market in New York City. Twenty-two analyses showed four per cent and more. Ten tests disclosed a trifle below four per cent. A fair average is four per cent, the analysis covering seventy-five per cent of the milk consumed in New York, so that it may be seen that there is a high standard in reference to the butter-bearing quality.

The conditions and methods of production are influenced by this general standard of the market. There are also certain classes of consumers who are enabled to fix their own special standards. Take the large hotels and expensive restaurants, for example. They consume enormous quantities of milk, and it must be of the very highest grade. Although the profit per quart is small, yet the dealers, delivering milk in forty-quart cans, find the hotel trade very profitable. But all this raises the general standard, and the result is a constant increase of carefulness in the conditions and surroundings of production, involving more labor, time, and capital. Milk substitutes and adulterations have almost been driven out of the market, from which consumers and honest producers suffered alike. Milk may be still watered and "doctored" in some few instances. But the offenders are severely dealt with if caught. As a whole, the milk trade is in a praiseworthy condition, ethically and commercially, comparing very favorably with any other.

The Condensed Milk Industry

Condensed milk is a product representing the discovery of a long-sought method of preserving milk for a greater period than is possible in the natural liquid form, also of rendering it more readily portable. The process, which is largely one of mechanically evaporating most of the water in the milk, and adding sugar to preserve it from decomposition, was first devised by Gail Borden in 1856. The "plain," or unsweetened, condensed milk was put upon the market about 1861, and at the present time is an important item in the retail dairy trade of the country. Both varieties are extensively manufactured both in the United States and Europe, although the sweetened milk sealed in tin cans forms the greater part of the annual output. The fifty factories in fifteen States produce, on the average, about 187,000,000 pounds of condensed milk, representing over 421,000,000 pounds of liquid milk and nearly 51,000,000 pounds of sugar. The value of the finished product is given as nearly $12,000,000, while that of the natural milk is nearly $5,000,000, and of the sugar, about $2,600,000. There are various qualities of condensed milk, from pure condensed cream and condensed whole milk to the weak skim milk variety thickened with sago and other adulterants. Moreover, there appears to be no very clearly defined lines of discrimination between the superior and inferior qualities, some of the worst brands being sold as "condensed cream."

Condensed milk is now used in every country. The inadequate and unsuccessful desiccations, solids and powders were entirely abandoned in favor of a semi-liquid form. The vacuum principle applied to milk condensation was undoubtedly the idea of Gail Borden, although there are several other claimants for the honor. His patents in the United States bear the dates: August 19, 1856; May 13, 1862; February 10, 1863; November 14, 1865; April 17, 1866. His foreign rights were not at first properly secured.

Process of Condensed Milk Manufacture

Vacuum pans are used in the condensing factories. They are large, egg-shaped, copper vessels, often measuring about seven feet in diameter and eight feet in height. The process of condensing milk by boiling in the vacuums, just mentioned, is the most popular method, the water being carried away as fast as it is evaporated. A moderate degree of heat is produced by steam passing through a coil in the interior of the pan, with a steam jacket outside. Through the glass cover of the man-hole the milk may be seen boiling. The process must be attended with the utmost care and judgment. Experts are trained for this branch of the industry, as the slightest error may ruin an entire batch, generally about ten thousand quarts. Each pan, after the process is finished, is most thoroughly cleansed, the inner surface being scoured with sandpaper or emery before being used again.

Cheese Factories and Creameries

A phase of industry that has been steadily increasing for many years is the manufacture of butter, cheese and other dairy products at factories, instead of on farms. These factories are either private concerns or are maintained by co-operation among a number of farmers, the former class being apparently the more numerous, although their increase has been contemporaneous with the growth of co-operative dairying. The preparation of condensed milk in dairying sections is another industry that has increased along with the creameries, skimming establishments, and butter and cheese factories. There are about 9,300 establishments in the United States that fall under these three heads; over 2,000 skimming or mechanical separating stations being under their control, and about 750 other branches.

The "syndicate," or factory, system of dairying is evidently borrowed from the methods followed in France and Switzerland for at least 400 years. It has been in operation in the United States for about fifty years, having been first successfully tried in Oneida County, New York. Having once demonstrated its value, it spread rapidly, until at the present time practically all the butter and cheese made in the United States come from syndicate factories. At the present time about 300,000,000 pounds of cheese and nearly 450,000,000 pounds of butter are annually manufactured in such establishments. Cheese-making on farms is an insignificant item, although butter-making is still mostly produced in this manner, not quite one-third of the total product coming from the factories. The total annual production of butter from both sources is about 1,500,000,000 pounds. In the meantime the export of cheese is assuming important dimensions, being at the present time well over 100,000,000 pounds annually.

Although cheese factories, and especially creameries, or butter factories, were originally started on the co-operative plan, only 1,800 out of the 9,250 are at present conducted on this principle. The remainder are in the hands of individual proprietors, firms or incorporated stock companies. The scheme followed in co-operative concerns is for a number of farmers to band together, and contribute to the building and equipping of a suitable factory, to which all may bring milk to be made into butter. Such co-operative owners are called "patrons." The business is conducted by a specially-appointed board, or by an individual manager, and the proceeds of the business are divided on an agreed scale, or according to the amounts of milk consigned. Very often milk is received from outsiders on a pro rata basis, or is bought outright at market prices, payments being made monthly. Such methods are largely modified in practice, to suit cases; the general results being satisfactory, although, like co-operative business undertakings in general, failure very frequently results from bad management or disagreements.

By the proprietary plan the business is conducted very much like any other factory, with the advantage that all milk is paid for at current prices, and disagreements are exceptional. Factories owned by individuals are 4,500 in number, while those owned by firms are over 1,300, and by corporations over 1,600. Thus, out of the 2,000 factories and creameries in Wisconsin, not quite 400 are co-operative, while the proportions are even lower in other States, except Massachusetts. The stock-company plan is frequently disastrous, on account of injudicious location or overcapitalization. Thus, there seems to be considerable changing about in the location, management, and operation of these factories.

Butter Manufacture

The farms still hold their own in the matter of butter-making, in spite of the rapid growth of creameries in such States as Minnesota, Nebraska, Kansas, South Dakota and Washington. Creamery butter controls all the large markets, but home consumption and the local markets still make up two-thirds of the whole output. There are thousands of creameries now in operation, but they make only four hundred and fifty million pounds of the total fourteen hundred million pounds of the annual product. The greatest butter producing State is Iowa, and it claims the greatest proportion made in factories. In this State are seven hundred and eighty creameries. Of these about two-fifths are co-operative. They turn out about eighty-eight million pounds of butter a year. The milk is supplied by six hundred and twenty-four thousand cows. The farm dairies of this State produce an additional amount of fifty million pounds yearly. Iowa claims a total butter product, therefore, of one-tenth of that made in the whole country, sending more than eighty million pounds of butter annually to other sections. Next in importance as a butter-making State comes New York, followed by Pennsylvania, Illinois, Wisconsin, Minnesota, Ohio and Kansas. Taken all together, however, these States just mentioned produce but little more than one-half of the total output of the country. Iowa is the only State in which half of the butter is made in creameries. Although the standard of butter has much improved with the modern creamery system of production, yet there is much poor butter put upon the market. This poor quality is "renovated" by patent processes. Several States have enacted stringent laws to prevent this fraudulent product from being sold under the name of creamery butter.

As to the importation of butter into this country, it resembles the snakes in Ireland, that is to say, there is no such importation.

When the central creamery system was first introduced, the practice was to send around to the various patron farms, to collect the cream that had been separated by the natural gravity process. This was called "cream-gathering," and, although it involved the obtaining of far less cream than by the present method of using the centrifugal separator, it saved the labor of bringing the milk in bulk to the factory. Thus, with the introduction of the power centrifuge, about 1879, cream-gathering was largely abandoned, and the milk of 200 or 300 cows was brought to the creamery to be mechanically treated. The obvious disadvantage of carting milk in bulk to the factory led to the founding of branches to the creamery where smaller separators were maintained, and, finally, to the use of individual hand-operated separators at the various farms. Thus, with the extended use of the centrifuge, the old system of cream-gathering is once more coming into vogue. Added to this improvement we have the advantages afforded by the Babcock milk test, in which the exact amount of fat in either milk or cream may be determined by a chemico-mechanical contrivance, and the pay made on the basis of its butter-making qualities. Most of the milk now delivered at creameries is tested and paid for on this system.

The Butter Trade

Butter is packed in two distinct shapes for transportation to market, either solid or in prints or rolls. The relative quantities packed in either of these two styles depends largely upon the proximity of the creamery to the retail market and the facilities for selling direct to customers. Butter put up in the form of printed bricks or in balls or rolls has the advantage of appealing strongly to the eye, and for this reason can be readily sold for a higher price than that packed solid, and sold from tubs and firkins. Of course, the method of shipping butter in the form of prints and rolls adds greatly to the labor and the expense of transportation in bulk, but this consideration is unimportant when the market is near the factory, on account of the advanced prices to be obtained. Thus, the average price per pound for solid packed butter in the United States is 19.4 cents to the creamery, while that shipped in prints or rolls brings 22.1 cents. The prices for the latter product vary according to the States and the proximity of the market. In Connecticut it is 24.6 cents, in Massachusetts, 23.5 cents; in Pennsylvania, 23.4 cents. The relative quantities packed in these two shapes vary, of course, in different States. In Rhode Island the proportion by weight of solid to print butter is 8 to 1; in New York, 4½ to 1; in Pennsylvania, the quantities are about even; in Vermont it is 1 to 4; in Wisconsin, Iowa, and Minnesota, 1 to 18; and in Dakota, 1 to 100. In California, Oregon and Washington, on the other hand, about three-fourths of the creamery butter is shipped in two-pound rolls or prints, to suit the demand of retail custom.

Oleomargarine Manufacture

Oleomargarine, or fat butter, is manufactured in twenty-four establishments in the United States, which produce about 100,000,000 pounds annually. Most of these establishments operate in connection with slaughtering and packing houses; others purchase the fat from these places or from retail meat dealers. Their product represents an attempt to produce, by artificial means, a substance containing all the essential constituents of natural butter. The process consists briefly in comminuting the cooled beef fat, which is then melted in steam-jacketed caldrons at a temperature of about 160° Fahrenheit. The steam jackets permit regulation of the temperature, while slowly revolving agitators keep the mass moving, so as to evenly distribute the heat. Salt is then added to the melt, which is allowed to settle for about two days, with the result that the scrap settles to the bottom and the stearin—or glyceroid substance—is allowed to crystallize on the surface and around the sides of the vessel, leaving the pure oleo oil between. When the settling is complete the substance is broken up into a mushy mass, which is wrapped in canvas-covered packages of about three pounds each, and subjected to great pressure gradually applied. Thus the oil is separated and drawn off into tanks, from which it is piped to the floor below, to be mixed with other substances and churned. The substances mixed with the pure oil vary according to the grade of oleomargarine to be produced—the better grades containing a higher percentage of neutral lard and pure cream or butter with salt and coloring matter, the lowest grade containing milk and cottonseed oil. The process of churning takes place in steam-jacketed caldrons, in which revolving agitators churn the mass violently, at a temperature sufficiently high to maintain the liquid condition. When the mixing is complete the mass is drawn off, cooled and packed for shipment. The milk, cream or butter added to the oil gives the proper flavor, while the neutral lard gives the substance the desired body.

Cheese Manufacture

The day of farm-made cheeses, as stated before, has passed. One hundred million pounds of cheese were made annually on farms in the United States, fifty years ago. The annual production had shrunk to about three million pounds when the present century came in. Of this output ninety-six or ninety-seven per cent was made in factories. There are about three thousand factories in all, New York and Wisconsin each claiming a thousand. New York, however, makes about twice as much cheese as Wisconsin, the factories being larger. Three-quarters of all the annual product of the country is made by these two States. After them, in the order of production, follow Ohio, Illinois, Michigan and Pennsylvania. The output from these States is not very large, however. Again the combination system is observed, as in so many other industries. Factories are united under a single management, and improvements in the quality of the product and a reduction in the cost of manufacture are secured. This country does not stand very high as a cheese-eating nation. Together with the small amount imported there is a yearly allowance of less than four pounds per person. However, as from thirty million to fifty million pounds are annually exported, the per capita consumption of cheese is reduced to three and a half pounds per annum for the United States.

Cheese factories are conducted on about the same lines as creameries, except that the whole milk is used in the manufacture, leaving no other waste than a thin liquid, known as whey. That cheese-making utilizes a much larger percentage of the milk than butter may be understood from the fact that, while the annual production of cheese in the United States is about 300,000,000 pounds, only a little over 209,000,000 pounds of whey is left. There are about 4,000 cheese factories in the country, the majority of which are engaged in the manufacture of the "standard," or so-called "American" cheese, which is, in general, the same as the English product, known as "cheddar." Of this variety nearly 226,000,000 pounds are produced annually, the remaining 74,000,000 pounds being principally fancy varieties and imitations of well-known foreign products, such as Neufchâtel, Brie, camembert, Gruyère, limburger, etc., etc. The percentages for these varieties vary with the different States. Thus, in the oldest cheese-making States, Ohio, Michigan and Pennsylvania, the standard product represents 89.2 per cent of the total, while in Wisconsin it is about 62 per cent, and in Illinois less than 50 per cent. The American cheese, however, is the more profitable, being worth about 11 cents per pound at the factory, while the lower values of the imitation varieties bring the average down to 9.5 cents.

The whey produced in the manufacture of cheese, like the skim milk of the creameries, is used largely for feeding stock, principally swine, being worth about 9 cents per hundred pounds. It is, however, of use in the manufacture of sugar of milk, which is already produced in this country in larger quantities than in any other. Although only a small percentage of whey, about 25 per cent, is sold for this purpose, it is becoming a recognized fact that this material is the cheapest for use, and also quite as rich in sugar as skim milk.

The Poultry Industry

The poultry industry pays from a very small to a very large profit, according to the management—in some cases from one hundred to three hundred per cent. The largest percentage is made in exhibition fowls by those who know how to use their knowledge. In practical poultry rearing the best profits are, as a rule, made by those who make eggs the primary, and dressed poultry the secondary, object. Modern conditions in the poultry field mean incubators and the hatching of chickens, geese and ducks by thousands instead of by small broods. In other words, modern conditions in poultry raising are similar to conditions of to-day in many another industry in respect to the use of machinery and in conducting the business on a wholesale scale.

Experts in chicken raising declare that the chicken farmer of to-day, by feeding his chickens scientifically, can get all the eggs from a hen in two years where formerly five years were required to exhaust the apportionment; then at the end of the second year the chicken is fattened and sold.

The profit to be derived from chicken farming should prove an incentive to many farmers to engage in this specialty. A computation recently made "supposes that each hen averages two hundred eggs per year, and that she is kept for two years and then sold." The estimate regards her as laying thirty-three dozen eggs, for which a fair price would be twenty-five cents per dozen—rather low for fresh eggs. This would amount to $8.85. If it costs $2 to raise and feed the chicken two years, there would remain a net profit of $3.42 a year; and the profit to be derived from ducks and broilers is estimated to be even larger.

Valuable information is furnished from time to time by the United States Department of Agriculture, on the hatching, raising and marketing of fowls. This information is furnished free on application. One of the recent reports of the Department declares that "barnyard fowls are regarded by most farmers as a very insignificant part of their live stock; and yet, although so often neglected and forced to shift for themselves, the poultry and egg crop constitute in the aggregate one of the most important and valuable products of American agriculture. The conditions in this country are such that the poultry industry is capable of indefinite expansion, and therefore able to meet any demands that may be made upon it either by home or foreign markets."

The Department of Agriculture names certain special lines of agricultural operations with which poultry raising may be advantageously connected. In dairying, for example, there is usually a large quantity of skim milk or buttermilk which may be utilized to furnish a considerable part of the poultry ration. There is also much food to be gathered by the fowls about the stables, manure piles and pastures which would otherwise go to waste. On fruit farms, fowls are also of advantage. They keep down insect pests, and they may have a free range the greater part of the season without the possibility of doing damage. Plum growers have found poultry especially helpful. Apple orchards, too, are considerably benefited by the presence of fowls. If small fruits are injured, they may, of course, be protected by confining the fowls for the limited season when the fruit is ripening. The waste fruits, either in winter or summer, are a welcome and valuable addition to the poultry ration. The market garden also furnishes a large amount of waste products which may be utilized for poultry feed. There is the waste lettuce, the small heads of cabbage, the unsold beets, carrots and potatoes, the peas and corn which can not be marketed for any reason; the waste of the small fruits, etc.

If properly cared for, the hens will bring a steady and reliable income during the winter months. Dried clover and other green feed, roots, and tubers should be saved for them during the summer. These should be steamed and fed with the mash, or cabbages and beets may be fed raw. A catch crop of buckwheat or oats and peas will furnish much food at little expense. Bran, meat, meal, wheat screenings, and oats purchased for poultry will bring good returns in eggs, and will also add materially to the fertilizer supply.

Dairymen who have town or city milk routes, and market gardeners who retail their produce, have exceptional opportunities for marketing fresh eggs and poultry at the highest prices. They become well acquainted with many of their customers by their daily visits, and they are looked upon as the direct channel of communication between the country and the city.

The Incubator and its Work

The incubators, such as may be bought in the market to-day, are so simplified that they do not require the care of an expert of long standing; the average farmer can learn to use one of these machines very much quicker than he can learn, for example, how to run an automobile.

There are two kinds of apparatus, one heated by hot water, the other by hot air. The regulation of the apparatus is sometimes by bars made of brass, iron, rubber, or aluminium, while other incubators are regulated by the expansion of water, ether, electricity or alcohol. In either case the eggs are placed in rows, in trays, and the trays are placed directly under the tank that supplies heat to the egg chamber. The average incubator can be most successfully operated in the spring or fall. The smaller incubators range in size from a capacity of from twenty-five to six hundred eggs.

Twenty-one days are usually required for eggs to hatch, during which time the temperature is maintained at from 100 degrees to 106 degrees. When the little chicks at last break from the shells they remain in the incubator for about a day and a half, after which they are transferred to another section of the incubating apparatus, known as the brooder. These brooders are able to meet all requirements, from one that holds a modest one hundred chickens to the brooder in which three thousand chickens may be placed at one time. In these brooders the chickens are kept until ten weeks old.

The capacity of the incubators seems almost limitless, for of late certain companies have turned out machines with a capacity of sixty thousand eggs, which means a production of fully half a million chickens a year. Even moderate-sized poultry plants, such as those in New York, and which contribute to New York City's egg supply, are capable of turning out one-third of a million chickens each year. But the mere hatching of the chickens is not all. The operation of the incubator, indeed, is the simplest part of this modern method of raising chickens. It is after they are hatched that experience and skill come into play, for in order to bring the chickens to a marketable age the closest watching is necessary.

The incubator, in a commercial sense, is certainly a wonderful aid to nature. Not only does this apparatus render the hen no longer necessary as a hatcher but it takes the place of the hen when hens can not be made to supply the demand. In other words, the incubator has increased the capacity of the henyard a thousand fold; for where a few years ago the farmer raised one chicken he can now raise a thousand in the same time.

The Egg Trade

In New York City and vicinity the poultry and eggs consumed in one year amount in value to $45,000,000, while the value of the same products in the entire United States probably does not fall below $700,000,000. An astoundingly large number of eggs are used in manufacturing industries. The number of eggs used in this country in 1902 by calico print works, wine clarifiers, and photographic establishments was fifty-four million dozens; and many more millions of eggs were used by book-binders, kid-glove manufacturers and finishers of leather.

It is related that a competition was once held for the purpose of giving a reasonably definite answer to the question: How many eggs will a hen lay in a year? At this competition the average number of eggs laid by a pen of eight pullets was two hundred and eighty-nine.

Experience has shown that of all classes of chickens the one which leads in the production of eggs is the Leghorn, while the Cornish is the best for flesh. It is said, however, that the best all-round, every-day fowls are the Plymouth Rocks, the Brahmas and the Wyandottes, and that where the farmer must keep his chickens in close confinement in a small yard, the best all-purpose class is that which includes the Cochins and Brahmas.

Bee Keeping

Bees may be profitably kept in any section of the country adapted to farming, gardening or fruit raising. Apart from these districts, the bee-keeper might find many locations where, on account of lack of transportation facilities or the nature of the soil, agriculture has not been developed. Apiaries may be maintained in or near towns, and even in cities. In Washington, for instance, bees do well in the spring and summer, finding better pasturage in the gardens and parks and shade trees than is afforded by the suburban vicinage. Especially fond are the bees of the linden, or basswood, which flourishes to an enormous extent in Washington. While planting, even for a large apiary, is not profitable, yet the bee keeper, in choosing crops for cultivation, or in selecting shrubs and trees for planting, should select those which will supply pasturage for the bees at a period when other pasturage is not available. The bee keeper should make a list of the plants and trees which the bees visit. The time of blossoming, the facts as to the question whether honey or pollen or both are collected, and the quality of the product, all must be carefully noted.

Beginners never can realize the truth that very little should be expected from a small territory. As bees often fiy as far as three miles in all directions from their home, their range is over a territory of from 12,000 to 18,000 acres.

Large apiaries are run for the purpose of making an income. The hard work involved, and the constant care necessary, obviate the possibility of a dilettante study of the bees, as everything must be extremely practical. It is an odd fact that no absolutely correct inference can be drawn from the output of a fixed number of hives in a certain locality from one season's product. The seasons vary considerably in this respect. General deductions may, of course, be made.

In common with other agricultural industries, apiculture depends upon the location and the character of the season. The output is also largely dependent on the knowledge and industry of the owners. A chief factor of success, furthermore, is the proximity to a good market. In the matter of an estimate, for a locality of average excellence, thirty to thirty-five pounds of extracted honey or twenty pounds of comb honey per colony may be expected, with good wintering and a fairly propitious season. This output may be exceeded when two or three important honey-yielding plants abound in large quantities, with several minor ones. Each hive ought, under good conditions, to give a gross annual return of from $2.50 to $3 extracted honey, selling at the wholesale price of six to seven cents, and comb honey at twelve or thirteen cents. One-third must be deducted from this for incidental expenses, not including labor, such as the purchase of comb foundations and sections, repairs, replacing of hives and instruments, and the interest on the investment. The fortunate bee culturist may make three times this sum by choosing a location in the vicinity of linden forests, or clover fields, or buckwheat, or alfalfa meadows, or mesquite, or California sages, or mangroves, or palmettoes, or titi, or sourwood, or tulip trees or asters. Bad seasons will occur even in these localities. By droughts, heavy rains, and frosts, the bee pasturage may be injured or ruined. Caution is therefore necessary at every step, so that bad seasons may be tided over without discouragement. If one is willing to expect occasional setbacks, the industry of apiculture may be placed, in the long run, among the best and safest.

The Honey Industry

In the West the producers generally sell their honey extracted, Eastern producers selling it in the comb. The highest price is brought by white clover honey, basswood coming next. Comb honey is higher priced. It has not been determined, however, that it pays better than extracted honey. There is much adulteration of extracted honey, so that producers who can build up a reputation for pure extracted honey may get good prices for the product sold with the guarantee of their own especial brand and seal.

Comb honey is always marketed in one-pound frames, these being shipped in cases of twelve or twenty-four frames, with glass fronts. The manufactured shipping cases pay for themselves in attractiveness over the home-made ones. Below the bottom of the case a sheet of paper should be placed, turned up around the sides. By this the drip is caught. Light cleats should be tacked on this for the frames to rest upon. Several cases should be crated together for long shipments, straw being placed in the bottom of the crates, the latter having projecting boards to serve as handles. Glass jars and pasteboard cartons are used for the retail trade. Tin cans, with a capacity of five gallons each, are used in shipping extracted honey, being frequently placed two in a box. Screw-topped tin pails are also used in various sizes.

Reports for the year 1900 showed that bees were kept on one farm in every nine. Texas led in 1899 in the value of honey and wax produced, the sum being $468,527. The Southern States share largely in this production, but their average is kept down by the fact of small local demand. Iowa, Illinois, Ohio and Pennsylvania stand well to the front, but do not equal in this industry such States as Arkansas and North Carolina. That the climate is an important factor is proved by the fact that California stands fifth, and by the high average production per hive of Hawaii, Colorado, Arizona and Nevada. In 1900 the number of colonies of bees was 4,109,626, valued $10,186,513. In 1899 the number of pounds of honey produced was 61,196,160, and of wax 1,765,315, with a total value of $6,664,904. Texas claimed the production of 4,780,204 pounds of honey. California followed with an output of 3,667,738 pounds. New York came third with 3,422,497 pounds. Missouri was fourth with 3,018,929 pounds. Illinois, Kentucky, Wisconsin, Iowa, Pennsylvania, North Carolina and Michigan followed next in the order named, each producing more than two million pounds.

CHAPTER XIII

THE STOCK RAISING INDUSTRY

Live Stock in the United States—Organizations of Cattlemen—Conditions in the Grazing Business—Areas of Production of Live Stock—The Principal Live Stock Markets—Domestic Animals in Cities and Towns—Cattle Raising—The Modern Cowboy—Horse Raising—Hog Raising—Sheep Raising—The Wool Supply—Foreign Wool—The Wool Trade—Goat Raising

Live Stock in the United States

THE raising of live stock is one of the most profitable industries in the United States; it is also one of the greatest in the aggregate. The total value of the live stock in the United States, exclusive of Indian holdings, amounts approximately to three billion dollars, a sum greater than the total combined value of all the corn, wheat, and other cereals; all the potatoes, hay, cotton, sugar and molasses; all the tobacco, lumber and wool; all the coal and petroleum; all the gold, silver and precious stones, and all the iron, copper, lead, zinc and other metals produced annually in the whole country. In other words, the value of domestic animals in any recent year exceeded the total combined values of all the fields, forests and mines in the same year.

The total includes 17,500,000 horses; over 61,000,000 sheep, including lambs and wethers; over 67,000,000 kine, including 11,500,000 cows kept for milk, and nearly 63,000,000 swine. The average number of fowls of all kinds, including chickens, turkeys, geese and ducks, is nearly 250,700,000. There are also over 3,366,000 mules, asses and burros, used as beasts of burden. The relative values may be judged by saying that 31.5 per cent represent neat cattle other than dairy cows, 29.2 per cent horses, 16.5 per cent dairy cows, 7.5 per cent swine, 5.5 per cent sheep, and 2.8 per cent poultry.

Cattle, horses, hogs and sheep, then, are the principal classes of animals grown, and form the four great divisions of the business. For every thousand inhabitants there are over two hundred milch cows, nearly nine hundred neat cattle, two hundred and fifty horses and mules, and over eight hundred swine, almost universally called hogs in this country.

Organizations of Cattlemen

The principal organization of live stock growers is the National Live Stock Association with headquarters at Denver. It is composed of 126 live stock and kindred associations, and represents an investment of over six hundred millions of dollars.

Of breeders' associations there are listed by the Department of Agriculture fourteen national organizations for cattle, the more important of which are the Hereford with 120,000 registrations; the Shorthorn, with 450,000; the Jersey, with 220,000; Holstein-Friesian, 100,000; and the Aberdeen-Angus, 35,000.

The horse breeders have eighteen associations of breeders, including that for asses. Probably the best known are the Trotting Registry, with fourteen volumes of registrations, the last of which contained 18,000 entries, with fewer in the earlier volumes; American Stud Book, Thoroughbred, with 26,000 registrations; Clydesdale, 11,000; French Draught, 11,500; and the Morgan and the Shire Horse, with 5,000 and 6,000 respectively.

Twenty-seven sheep breeders' associations are listed, with Cotswolds and Oxford Downs in the lead, showing 23,000 registrations each; South Down, 15,000; Rambouillet, 15,000; Dorset Horn, Hampshire Down, Lincoln and Cheviot, about 10,000 each. The Merinos, however, are divided into several societies, of which the Michigan has 50,000 entries.

Hogs have sixteen associations of breeders. Berkshires report 60,000 registrations; Duroc-Jersey, 16,000; Chester White, two associations, 25,000; Poland-China, 215,000 in four associations.

Besides these, there are many State breeders' organizations, but they do not keep pedigrees usually, and are not recognized by the United States Government.

Conditions in the Grazing Business

Success in the grazing business upon the open land is dependent largely upon ability to control the water supply. If a man can obtain possession of a spring or stream he can exclude the cattle or sheep of other owners from the water, and thus be in a position to monopolize thousands of acres of grazing land, useless to others, because their animals can not obtain water to drink. By systematically taking up small tracts along both sides of a stream these can be strung out in such a way as to control the water frontage, and by fencing contiguous forty-acre tracts a continuous line can be made for many miles, preventing access to water. Cattle companies have employed men with the understanding that they would thus take up land along the streams, and a glance at the map of the great unoccupied public domain shows the forty-acre tracts entered in such fashion as to include nearly all of the running water.

The keen competition for grazing, brought about by overstocking of the public ranges, has thus resulted in putting a premium upon lands which, while not irrigable nor suitable for farming, yet control access to water. A recent advertisement in a Western paper illustrates the condition: "For Sale, 160 acres, controlling 10,000 acres of good Government grazing." No particular harm would result if the lands thus disposed of by the government passed into the hands of men who would make the best use of them; but, as a rule, this is not the case. Areas which might be made into many farms are held as portion of a great cattle range the owners of which can make a larger interest on their investment by thus holding it than by attempting to conserve the water and to subdivide the land into small tracts. Many of the best reservoir sites are being taken up in one way or another by men who confessedly do not intend to utilize them but to hold the land for sale at a good price whenever water conservation is attempted. Speculations of this kind are lawful and may be commendable to a certain degree, but when they result in tying up some of the best land of the country and in excluding population they become injurious to the public welfare.

Areas of Production of Live Stock

The areas of live-stock production may be divided on the basis of the four classes of live-stock products before mentioned; namely, cattle, horses, hogs and sheep. The great areas of supply of horses and mules—power animals—are the States in which pasturage is found in superior quality and abundant quantity and where other kinds of animal food (cereals) are relatively inexpensive, and therefore unimportant in the cost of production. This is the case with the more mountainous States of the South, east of the Mississippi, and of the great cereal States of the interior, both east and west of that river. Seventy per cent of the horses of the country are found in sixteen Southern and Central States. The largest of these are Texas, Illinois and Iowa, having each over a million head of horses.

The productive area of mules is confined somewhat more to the Southern States and the less developed agricultural States west of the Mississippi, with Texas, Missouri, Georgia, Tennessee and Mississippi as foremost sources of supply and use. Oregon horses have been slaughtered for the foreign meat supply as a regular business. Calves are largely a by-product of dairy-farming sections, lying nearer to city markets.

Hogs are produced most economically in the corn-growing States. Seventeen States have from one to nine and a half millions each, and together contain eighty per cent of the whole number of swine in the United States. The largest producers of hogs are in their order, Iowa, Illinois, Missouri, Nebraska, Indiana, Kansas, Ohio, Georgia and Illinois, each of which has over three million head.

With cattle of various kinds the sources of supply are widely distributed. Milch cows are, of course, found in the districts in which dairying is a leading feature of farming. Of the 18,000,000 head in the United States, only New York, Illinois, Iowa, Wisconsin and Pennsylvania have each over a million head. Of other cattle the country has 48,000,000 head, with sixteen States which have over a million head each. In the order of their numerical importance they are Texas, with 4,500,000; Iowa and Kansas, with over 2,000,000 each, and Missouri, Illinois and Nebraska, with between 1,000,000 and 2,000,000 head each.

The distribution of sheep has for many years tended Westward in advance of tillage. When pasturage gave way to tillage on the frontier, the shepherd moved his flocks still further Westward, and when the ranges narrowed, the shepherd and cowboy competed for the field.

The sheep industry is tending Northwestward, and appears to be centring in the mountain States. The cattle industry is moving Southwestward for the longer pasture season and for the surplus corn. The great sheep States are Montana, with 6,000,000, according to the Twelfth Census; Wyoming and New Mexico, 5,000,000 each; Ohio and Utah, about 4,000,000 each; Idaho, Oregon and Michigan, about 3,000,000 each; and California, two and a half million.

The Principal Live-Stock Markets

The four great receiving centres of live stock in the United States are Chicago, St. Louis, Kansas City and Omaha. The prominence of these cities as markets is due to their location within easy reach of the great productive areas and the incomparable facilities for reaching out on the one hand into the producing sections and of distributing their products on the other hand to the consuming centres of meat products.

With the exception perhaps of Chicago, which seems likely to yield its primacy to the more Western markets, these great packing centres are in the midst of the great stock-raising and stock-feeding States. The decentralization of Chicago is probable. The primary markets for beef cattle, hogs and sheep for slaughter are bound to follow; the movement of live-stock production for slaughtering purposes yields to the trend of corn production. Nothing but a low freight rate from beyond the Mississippi to Chicago, and the persistent tendency of the States nearest to Chicago to convert their corn into animals for slaughter, can prevent the gradual decline of Chicago as a meat-packing centre.

The apparent recovery of more recent years is a compliment to the enterprise of Chicago as a consuming centre.

These gateways between the producer of live stock and the consumer of provisions manufactured therefrom occupy a geographical position of great economical strength. The value of this adjustment of the packing industry to the sources of supply of live stock is evidenced by the rapid growth of the business of handling this species of farm product. In the last sixteen years a nest of farms at Omaha has been converted into an industrial city of 15,000 inhabitants, which ranks third in the list of packing centres of the world.

At Kansas City the capacity of the slaughtering houses is almost 53,000 head of stock per day. Nearly 10,000 hands are employed in the packing industry alone. The receipts of live stock at this market in 1899 had a value of $121,000,000.

The live-stock business at St. Louis is somewhat more general than any other of the four great markets. St. Louis stands first as a market for

COWBOYS AFTER THE ROUND-UP ON THE PLAINS

Vol. II., p. 778

horses and mules. During 1902 the receipts reached near 150,000 head. The standing of this market in this respect is national, as shown by the fact that in 1902 thirty-five States and Territories were represented in the consignments made to St. Louis markets for horses and mules alone. The position of the St. Louis market for cattle is benefited much by the attention given to the quality of the product. An authority recently said: "Breeders throughout the State [Missouri] are giving much more attention than formerly to the quality of the cattle, a fact which is a tribute to their sense and business shrewdness, and in no small degree contributes to the success of the State as a cattle producer, and is reflected at our market, resulting in a very large demand for Missouri butcher cattle for immediate use."

These facts, in a general way, show the position of the different markets of the leading "surplus" States.

Domestic Animals in Cities and Towns

At great labor and expense, the Census Bureau gathered statistics of live stock in cities and towns; that is, domestic animals in barns and inclosures, not on farms or ranges. In a bulletin, giving these statistics, the number of animals not on farms, but in man's service, are given. The value of these statistics is to give dealers an estimate of the number of these animals that can be marketed in future, and the relation of the demand for them to the existing supply. The totals show at the present time, outside of the farms and ranges, nearly 3,000,000 horses, 174,000 mules, and nearly 16,000 asses. The total of these three classes is less than one-fifth of the total number of these animals at the present time on our farms; and yet our city horses, mules and asses outnumber those of all the same kind on the farms of most of the European countries.

Austria, at the last census, had on its farms over 1,600,000 horses and mules, or less than one-tenth of those on our farms, and one-half those in our cities and towns. Great Britain had 2,000,000 on its farms. This is one-eighth of our farm horses, and only two-thirds of those in our cities and towns. The French farm horses numbered 3,000,000, while those in the German Empire even make a total of only 4,000,000. The latter country has the largest supply of farm horses of any nation of Europe, with the exception of Russia, and yet its supply of such animals is only one-fourth that of this country. These figures show why Great Britain purchased horses and mules in the United States for the South African war. They also explain the reason Great Britain finds so much difficulty in readily supplying the animals on which to mount any large number of soldiers.

Cattle Raising

The greater part of the live-stock industry in this country is occupied with cattle. Of the total valuation of stock, two-thirds is for beef and dairy cattle, in the proportions of one-fourth dairy and three-fourths beef cattle, or neat cattle, to use the old term that is still employed in the government reports.

Of the neat cattle, numbering nearly 70,000,000 head, Texas has nearly as many as any other two States; and nearly thirty millions are found in the six States of Texas, Iowa, Kansas, Nebraska, Illinois and Missouri. Other States having over a million each, in order of numbers, are New York, Wisconsin, Ohio, Pennsylvania, Minnesota, Oklahoma, Indiana, South Dakota, Indian Territory, California, Colorado, Michigan and Kentucky. Most cattle in the first group of States are perhaps still on the ranges; in the second, most are inclosed on pastures on farms: though the division is not closely made in either case. The Illinois and Iowa cattle, for example, are all on farms and are feeders, while the Oklahoma and Indian Territory herds are stockers on the ranges.

The Modern Cowboy

In the management of the great range herds many changes are taking place at the present time. The cowboy of the Wild West and of the dime novel is disappearing. You may find him now mending fences or doing the chores on a farm. For where the great herds in his care used to roam, there are farms, and steam harvesters, and binders, and fences. Moreover, it is no longer necessary to drive cattle long distances to market. Railroads have gridironed the West. The herd is carried, instead of driven, to market, and the occupation of "cow-puncher" is nearly as extinct as that of the buffalo hunter.

The ranch, to-day, must generally have its fences, its inclosures. There are still free and open grazing grounds on government lands in some of the Western States; but the conditions and restrictions of grazing are numerous, and before a single cow may step upon that land, the cattleman must tie his whole herd together, as it were, with red tape.

With each herd fenced off from that of other stockmen, the "roundup" is not such a general feature of the cattle industry as formerly. Then, too, very many of the herds of to-day are housed in winter. When it comes the time for the branding iron, the cattle are driven in orderly procession through a narrow-fenced alley, a chute, not unlike the lane leading to the barnyard common to a New England farm. And through a similar chute the cattle, much tamer than in the old days, are driven direct to the gangways of the freight cars that carry them to Chicago or elsewhere. Also as the railways have penetrated the cattle ranges, the old custom of making long overland drives of immense herds is giving way to transportation by rail. This is doubtless partly due to the restrictions of the government on the movement of tick-infected herds. For it was recognized, even before the source of Texas fever was found in the tick parasite, that especial danger for Northern cattle lurked along the path taken by the range herds of the plains in their journey toward the Northern markets.

And with the cow-puncher and his pistols and broadbrim hat has gone, to a large extent, the long-horn stock that died by hundreds of cold, neglect and disease. In the remote corners of Texas to-day there are well-bred bulls and thousands of grade calves of good breeding promise, while disease is watched almost as sharply as on the farms of New York and Kentucky. This is shown by the demand for blackleg vaccine from the Department of Agriculture which comes in from the great ranches of the Southwest as well as from the Eastern farms.

Horse Raising

In America horses are bred on a large scale, and not for pleasure or as a fad but for business. The progress made in the manufacture of light-running vehicles and the improvement of roads have increased the demand for trotting horses as against that for saddle horses. There is still, of course, a steady demand for the thoroughbred of the race-course, and there always will be so long as wealthy men are willing to pay their jockeys $50,000 a year. Also saddle horses of first class qualities will always bring good prices. But the trotter is the horse, outside of draught and general work animals, that is generally raised. The thoroughbred is handled in the bluegrass region of Kentucky and in one or two localities on the Pacific Coast and the saddle horse trade has its centre in Kentucky, with a little doing at several points in other States; but there are centres of breeding trotters in Michigan, Iowa, Illinois, Wisconsin, Tennessee, and in fact there is hardly a State where there is not more or less of breeding of the speedy horse for the sulky.

Of course the greatest number by far are draught and plow horses. These are raised in all States by thousands. It is probable that half of them never go from the county where they are born. Several years ago the attention of the Secretary of Agriculture was drawn to the demand in the armies of Europe for cavalry horses, and steps were taken to encourage breeding to meet this requirement. The movement has received great impetus from the purchases by England for South Africa; so that now a special branch of the business is springing up in this direction. Also the need of horses for breeding purposes in Argentina has stimulated the raising of pedigreed stock for this export trade. Development in the line of specialties such as these is relieving the depression that followed the introduction of electricity in street car service. The immediate turn was toward the use of the over-supply for horse meat and for fertilizer; but this meant great loss to owners and breeders. It became possible to cure horse meat and ship it to Germany and Belgium at six cents a pound, while the fertilizer factories would pay only two or three dollars a head for the worn-out street car hacks. They reckoned the hide worth three dollars, and the bones, fat and tankage as much more. But the old horses are pretty well used up, and the new supply is coming on for the new demands. There is, accordingly, a prospect that prices will be well maintained, with a chance of advances in the near future to something like the old figures.

Hog Raising

The number of hogs in this country at the present time is probably near 60,000,000. Nowhere else in the world is swine raising carried on to anything like the same extent. In 1883 it was estimated that of all the countries of the world for which statistics could be obtained, the United States possessed over forty-seven per cent of the hogs. Russia came second, with eleven per cent, and Germany third, with eight per cent; Austria-Hungary fourth, with seven per cent, and France fifth, with six per cent. The only other countries possessing over one per cent were, in order of importance, Spain, the United Kingdom, Switzerland, Italy and Canada. Since then the United States has maintained its lead.

More than three-quarters of all the corn grown in the world is grown in the corn belt of the United States. The average corn crop in this country is about two thousand million bushels. With the exception of about 250,000,000 for export, it all has to be marketed or fed upon the farm. And there is no other animal to which corn can be fed so profitably as to hogs. Tests have been made at experiment stations showing that from one hundred pounds of dry feed, nine pounds of live steer, eleven pounds of live sheep, and nearly twenty-four pounds of live hog are produced, or nearly 270 per cent greater results in pig than in steer from the same amount of food. Thus the raising of hogs is a great economy in the farmer's business. This is true not only as regards the feeding of corn, but also in the matter of the consumption of the by-products of the dairy. The aim now is to get seventeen pounds of pork out of a bushel of corn, and nineteen pounds of pork out of a bushel of wheat. The hog has been called the "great mortgage lifter." In truth, the hog is the animal which can be turned the quickest of all into cash, being grown and marketed as rapidly as a crop of grain, and without lessening the value of the soil. The market value of the hog is always good. Feeding cattle is apt to be without profit unless they are followed by the hog. The dairyman's profits are also increased by turning dairy waste into profitable pork. There is thus a triple advantage to the farmer in raising hogs.

Sheep Raising

Sheep furnish one of the most nutritious of foods, and for sanitary reasons, for economy and durability their wool makes the best clothing material. Yet wool growing, though very profitable, is one of the least well developed industries in this country. The total number of sheep in all the States is estimated under 60,000,000, and trade returns indicate that this is considerably under the total needed to supply wool for our mills.

The principal sheep States are Montana, Wyoming, New Mexico, Idaho and Colorado, with over twenty million; California and Oregon with five million; Ohio, four million, and Michigan, Indiana, Illinois, Iowa, Missouri and Kentucky, together, about six and a half million; and the big States of

Texas, Pennsylvania and New York five million more. A glance at these States and figures will show that the greater portion of the sheep of this country are grown along the great mountain ranges of the West. Here they alternate their grazing between the level lands at the base of the mountain pastures.

Great "bands," as the flocks are always called there, are driven annually as summer comes on into the government reserves in Wyoming, Oregon and California. This, with the open government ranges on the plains, gives grazing to produce over half of the "clip" of the United States, and makes the business under such conditions exceedingly profitable. Wool can be grown in these sections as advantageously as in Australia.

While wool growing occupies the great West, the flock masters of the East pay equal attention to furnishing mutton for the city markets.

Under present conditions, the production of mutton will continue to be profitable, and should be, in some of its branches, one of the important rural industries of our older and more populous States.

The present distribution of mutton sheep, as shown in a Department of Agriculture report, is more general than ever before. They have invaded the pastures so long sacred to the development of the American Merino in Vermont and the strongholds of Merino breeding in New York, Ohio and Michigan. They have nearly driven out the fine wool competition in Indiana and Illinois, and taken possession of sheep pasturage on the meat-producing prairies of the Missouri valley. This movement has long been in progress.

In the recent period of depression, when growers would fain have ceased to think of sheep as a wool-bearing animal, the mutton sheep hastened its migration to the ranges of the Rocky Mountains; and essayed the muttonizing of Merino flocks by cross breeding. So active and persistent was this effort to get some profit from meat, where wool failed to pay the cost of shearing and growing, that in the entire range of country thirty per cent of flocks were of mutton breeds. The same authority thinks that in the farming States seventy, and perhaps eighty, per cent of the wool is from sheep in which the blood of the English breeds predominates. This would indicate a nearly equal division of the Merino and English races in the United States.

The Wool Supply

The consumption of wool in all departments of the industry in 1900 amounted to nearly 400,000,000 pounds, of which nearly 258,000,000 pounds were of domestic production and over 136,000,000 imported. According to these figures, the annual quantity of new wool used in manufacture had increased 12.3 per cent since 1890, while the annual quantity of shoddy used in the same period had increased as much as 25.8 per cent. During the same year about 3,000,000 pounds were exported. According to government reports, the total foreign product consumed in manufacture for the decade 1891-1900 amounted to nearly 1,600,000,000 pounds, while the domestic wool used in the same period was nearly 2,900,000,000 pounds, or over twice as much as the imported, or over seventy-one per cent of the net supply.

The quantity of wool produced in a given year varies, of course, with numerous conditions, which affect the growth decidedly. Thus, while the product of 1900 was nearly 310,000,000 pounds, that of 1897 was but little over 259,000,000, which was the lowest record since 1881, when the figure was 240,000,000. Thus, although the figures generally run close to 300,000,000 pounds and over, the several poor years pulled the average for the two decades previous to 1900 as low as 283,000,000 pounds. In addition to the large production of sheep wool in this year, the Census shows that an extensive industry in the hair of the angora goat (mohair) has arisen in the United States. According to returns, there were nearly 455,000 of these animals in the country, representing a total product of 361,328 pounds of hair, valued at nearly twenty-eight cents per pound, or nearly $100,000.

Foreign Wool

The importation of wool, as of any other commodity, depends upon conditions of supply in the place of its production, as well as of the demand in this country. The increased proportions of both conditions in the last century have naturally raised the figures from the minimum of 1,291,400 pounds in 1824 to the maximum of 350,000,000 pounds in 1897. Tariff laws are partly responsible for the enormous fall to 70,000,000 and 77,000,000 pounds for 1898 and 1899, respectively, and the business had only begun to recover itself by 1900, when a little over 128,000,000 pounds were imported. However, the annual importation has increased steadily since 1825, the average percentage of advance being about 53.93 per cent in each succeeding period of five years to 1900. The figures for the five years ending 1890 were 63.74 per cent; for the five years ending 1895, 33.38 per cent; and for the five years ending 1900, only 15.35 per cent of increase, the fall being obviously attributable to the changes in tariff legislation during those periods. The greatest actual increase in pounds occurred in the period ending 1890, when an excess of 216,295,081 pounds were imported, although the percentage of advance was only 63.74.

The relative importance of the foreign sources of wool supply differs in very much the same particulars as do the actual amounts received in a given period. Thus, while in 1890 Argentina headed the list with nearly 14,000,000 pounds of class III. wool, with Asiatic Turkey second, with over 12,000,000 pounds, and Russia third, with over 10,000,000, all these countries showed a falling off in actual amounts and in relative importance in 1900. In the latter year China headed the list with nearly 31,000,000 pounds; Scotland came second, with a little over 10,000,000, and India third, with a little over 9,000,000 pounds. In the other grades of wool the case is somewhat different. Thus in class II. England led in 1890, with nearly 6,900,000 pounds out of a total import of nearly 7,660,000; and also in 1900, with nearly 5,700,000 pounds, out of a total import of about 9,900,000 pounds, her closest competitor being Ireland, with about 1,660,000 pounds. In class I. wools, the returns for 1890 show Australia in the lead, with about 11,900,000 pounds, followed by British Africa, with a record of about 1,103,000 pounds; the total imports for the year being about 15,500,000 pounds in all. In 1900, we find that Australasia still holds first place, with a total import of nearly 23,000,000 pounds, an advance of about one hundred per cent, while Argentina follows with over 11,000,000 pounds, leaving British Africa with a record of only about 626,000, or a fall of nearly fifty per cent; the total importation for this class being, roughly, 37,000,000 pounds. The wools designated as classes I. and II. represent the qualities used by the general wool manufacturer, and which, as a consequence, compete with domestic wools. Class III. includes the coarser grades of wool, which enter principally into the manufacture of carpets.

In 1900 nearly 140,000,000 pounds of foreign wools were used in manufactures, about 36.5 per cent of that amount being coarse carpet wools, included under class III. In addition to this raw wool, over 9,000,000 pounds of worsted yarn were used in the mills, which represented, on an average, two pounds of wool to one pound of yarn, giving a grand total of over 70,000,000 pounds of class III. According to returns for that year, another quantity of raw wool, amounting in all to nearly 33,000,000 pounds, was purchased for carpet yarn manufacture, of which, as estimated, nearly one-third must have been actually used.

The Wool Trade

The wool producer deals directly with the trade. He may receive bids for his clip from wool-buying houses in the East or West, as the owners of the great sheep ranches do in Montana; or he may be visited directly by a buying agent. The latter method of buying through agents who travel for the purpose, and are sent out by the dealer or manufacturer each season, is generally followed throughout the country where wool is a feature of production. More general still is the practice, especially east of the Mississippi, of the growers selling locally to the home buyer or dealer. This local buyer's charge, when acting as the agent of an Eastern dealer or manufacturer, is generally from one to two cents a pound.

Montana now yields the largest wool clip in the United States. The tendency of the wool industry is toward the Northwest and the Southwest. In these two localities the methods of marketing have made most advances. Montana has three marketing centres, at which more than half of the twenty-one million pounds of wool is concentrated for marketing. These are Great Falls, Billings, and Big Timber. In this same State an important improvement in the method of marketing wool has been brought about by the introduction of the wool exchange. By this system the wool buyers at the principal markets have a common meeting-place or exchange, to which market the owner of wool brings his product, lists it on the exchange without charge, and at the appointed time receives bids on it from the various buyers present. This plan is proving far more satisfactory to the wool growers than the system of private sales to buyers that prevailed heretofore. It is employed, of course, only at the larger centres of wool receipts, where buyers appear in sufficient numbers to make the bids competitive.

Goat Raising

An industry closely associated with sheep raising is the growing of Angora goats, which has received a great impetus from the investigations and publications of the Department of Agriculture in the past five years. An association was recently formed with headquarters at Kansas City, and a number of States, including Iowa and Missouri, have shown much activity in this line. Texas, California and Oregon, however, continue to be the centres of the industry. This beautiful little animal, brought to this country originally seventy years ago from the Turkish village of Angora, attracted comparatively little attention till it was discovered how effectively a herd would clean up a piece of brush land. This, added to the fact that the herd will take care of itself against ordinary sheep-killing dogs, gave the goats great usefulness in many sections and spread the industry. It was found by the students of the subject that there was a good demand for the clip to make some elegant forms of very durable cloths, including the plush commonly used in upholstering railway cars. Also it was found that the meat was very good eating, much resembling mutton, and that considerable quantities were actually sold annually from the Southwestern ranges under the name of mutton, and, of course, at the same price.

In the sudden expansion of the business there has been occasional loss by lack of experience on the part of those attempting to handle the goats. Two things especially are easily forgotten: the mother neglects her kids unless watched closely; and a good wire fence is necessary to hold goats.

Very successful shows have been held at Kansas City and at the Pan-American Exposition at Buffalo, and the trade in the goats for breeding purposes continues quite active. While the demand has not assumed the form of a fad, as in the case of the Belgian hare, some fancy prices have been paid for very desirable animals. The highest figure so far recorded was $1,050. A new importation from Turkey was made in 1901 for the first time in fifty years, and the energy displayed by breeders indicates that the industry is being put on a solid foundation.

CHAPTER XIV

HOMESTEADERS, PUBLIC LANDS AND ABANDONED FARMS

Unappropriated Lands in the United States—Rules Governing Entry—How the United States Land Office Conducts a Drawing—Public Lands in Oklahoma—Public Lands in Missouri—Public Lands in Idaho—Public Lands in the State of Washington—Public Lands in Oregon and New Mexico—Irrigated Land and the Home Seeker—Increase of Homes and Farms by Irrigation—Irrigation by Corporations and the Government—Colonies in the Irrigated Sections—Summary of the Irrigation Problem—Abandoned Farms

Unappropriated Lands in the United States

THE public lands of the United States are included within the States of Alabama, Arkansas, California, Colorado, Florida, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, North Dakota, Ohio, Oregon, South Dakota, Utah, Washington, Wisconsin and Wyoming, the Territories of Arizona, New Mexico and Oklahoma, and the Territory of Alaska. In Ohio, Indiana and Illinois only a few isolated tracts of public land remain. In these States and Territories, with the exception of the three last mentioned, there are land districts with defined boundaries, in which a land office is established by law, where a register and receiver are in attendance for the sale or other disposal of lands embraced therein. There were more than 600,000,000 acres of public lands open to homeseekers on January 1, 1903.

According to the Land Office reports, 15,562,796.30 acres of public lands were disposed of during the fiscal year which ended June 30, 1901. These included 1,301,668.94 acres sold for cash and 14,151,780.34 acres appropriated for homesteads, allotted to Indians, secured by land warrants and scrip locations, and set aside as swamp lands, as State railroad, and wagon road selections. The following table gives an approximate estimate of the number of acres of unappropriated lands in the States and Territories at the end of 1902:

Alabama	312,630	Indian Territory..	19,658,880	New Mexico	55,585,124
Alaska	364,983,506	Iowa		North Dakota ...	16,956,491
Arizona	48,771,054	Kansas	1,085,315	Ohio	
Arkansas	3,224,128	Louisiana	319,335	Oklahoma	4,653,605
California	42,049,008	Michigan	462,157	Oregon	33,784,023
Colorado	39,115,814	Minnesota	4,148,193	South Dakota ...	11,869,004
Florida	1,459,774	Missouri	281,727	Utah	42,515,865
Idaho	42,475,176	Montana	65,803,307	Washington	11,913,164
Illinois		Nebraska	9,926,670	Wisconsin	230,813
Indiana		Nevada	61,322,225	Wyoming	45,656,896
Grand total......................................					914,656,974

Rules Governing Entry

Agricultural public lands are subject to entry only under the homestead and desert-land laws. The homestead laws of the United States secure to qualified persons the right to settle upon, enter and acquire title to not exceeding 160 acres of public land by establishing and maintaining residence thereon and improving and cultivating the same for the continuous period of five years.

A homestead entry-man must be the head of a family or a person who has arrived at the age of 21 years and a citizen of the United States or one who has declared his intention of becoming such, and he must not be the owner of more than 160 acres of land in any State or Territory. A wife who has been divorced from her husband, or deserted by him, can make homestead entry. Payment of $14 to $16 fees and commissions must be made at time of entry, and final proof can be made at any time after five years' residence thereon with cultivation of a portion, when the fee, including publication of notice, taking testimony, and commissions, is $14.25 to $15. A party can at the time of making homestead entry of 160 acres also make an entry under the desert-land act. He will be required to pay 25 cents per acre at the time of making entry, after which he is required to expend $3 per acre ($1 per acre each year for three years) in labor or money in improving the land, and constructing reservoirs, canals and ditches for irrigation and reclaiming the tracts entered, and the party may make final entry at any time prior to the expiration of four years on making the required proof of reclamation, of expenditure to the aggregate amount of $3 per acre, and of the cultivation of one-eighth of the land and making a final payment of $1 per acre.

How the United States Land Office Conducts a Drawing

The following description of the methods pursued by the representatives of the United States General Land Office at the recent registration of the persons who desired to take up public lands in Oklahoma, and the subsequent drawing for lots is taken from the report of the representative of the Land Office who had charge of the work:

> The clerks who were to make the registration at El Reno reached that place July 10, 1900, and began the registration at six booths. Upon the opening of the booths several thousand people were in line. There being a great many women in the lines, I proceeded to procure and furnish a booth to be used exclusively by women, of whom eight thousand were registered. As they were not prohibited from registering at the other booths, it is estimated that a total of ten thousand women were registered at El Reno. Upon Friday, July 26, registration closed.
>
> The total registration of El Reno was 135,416. Upon the first day of registration there was considerable disorder at several of the booths at this place, the people appearing to have an idea that it was necessary for them to secure and hold their positions in line by force and to take every means to guard their own interests. In a very short time they appeared to become satisfied that they were to receive fair treatment; that there would be no favoritism, and that the entire matter was to be honestly managed; after that there was no disturbance of any kind in connection with the registration.
>
> The identification cards were carefully guarded during the day, at the time of the registration, by being placed in locked cash boxes through a slit cut for that purpose, no one but myself having the key to any of these boxes.

The committee first met at El Reno on the evening of the 25th day of July, and readily agreed upon the plan by which the drawing should be conducted. Two boxes were constructed in which were to be placed the envelopes containing the names of those who had been registered. At the hour designated in the President's proclamation for the drawing, these boxes were taken upon the platform and placed upon trestles upon which they could be revolved. The envelopes containing the names of all who had been registered were also brought upon the platform. These envelopes had been separated according to the respective land districts, were of two colors, one being buff and the other white, and bore no distinguishing mark other than the name "El Reno" on those for one district and "Lawton" on those for the other. The envelopes were in pasteboard boxes, each of which contained four hundred envelopes, and the boxes of each district were consecutively numbered. Small cards had been prepared bearing numbers corresponding to the numbers upon the envelope boxes, which cards were placed in a receptacle from which they were drawn at random, and the envelope boxes taken in the order in which the cards were drawn and their contents placed in the larger boxes, a portion of each box through each of the large openings, and well scattered throughout the entire length of the box.

When all of the envelopes had been thus placed, these openings in the drawing boxes were closed and securely sealed, and the boxes revolved until the envelopes were thoroughly mixed. Ten reputable young men had been selected, all of whom were under age and therefore not registered and in no way interested in the drawing, to draw the envelopes from the boxes. These young men were assigned to the holes in these boxes by lot, and it was also determined by lot which one should begin the drawing at each box. The young man at the hole numbered three drew the number entitling him to take the first envelope from the El Reno box, and the young man at the hole numbered four drew the number entitling him to take the first envelope from the Lawton box, the drawing thereafter to continue in numerical order. The drawing began with the El Reno box by the young man at hole numbered three drawing an envelope, which was numbered 1. He then opened the envelope and took therefrom the identification card and caused the same number to be placed upon it.

While the drawing of names was in progress a force of land-office clerks was engaged preparing postal card notices to those whose names had been drawn, which were placed in the post-office upon the evening of that day. This course was followed during the entire drawing of the six thousand five hundred names from each land district, the postal cards being mailed on the same day upon which the names were drawn.

The drawing was continued upon the platform at the rate of two thousand per day for each land district, until the total of six thousand five hundred envelopes had been drawn for each district.

Public Lands in Oklahoma

As long ago as 1897 the impression had gone forth that all of the Government land in the Territory of Oklahoma suitable for agricultural purposes had been taken up, but the bountiful crops since then have induced many people each year to settle on land that at first had been rejected. According to a report of the Governor of that Territory, during the two years ending June 30, 1899, over ten thousand quarter sections were thus taken, and so agreeable has been the experience of all these settlers that others have been coming and are still coming and taking up lands that had been overlooked or rejected by those who preceded them. During the year 1901, six hundred and three thousand and five hundred and twenty-seven acres were filed upon by persons representing nearly four thousand families of new settlers outside of those who purchased farms or located in towns or cities. There are still five million seven hundred and thirty-three thousand three hundred and eighty-five acres of vacant Government land in the Territory subject to homestead entry. Most of this is too high or rough to be suitable for agriculture, but there are still some excellent farms upon which one can combine stock raising with some little farming and do exceedingly well.

The farm lands of Oklahoma, like those of all sections of the country, vary in fertility, and these conditions, together with cultivation, improvements, and proximity to market, all combine to fix the selling value of farms in the Territory. While many farms near the larger towns sell for from $25 to $50 per acre, good farms fairly well improved, from four to ten miles from market, can be bought in any part of the Territory from $8 to $15 per acre, and in many sections much cheaper. The large immigration into the Territory during the past two years has caused a steady demand for lands, and considerable farm property is changing hands in every county. The increased demand and the absorption of all the desirable Government lands, which will take place in 1903 and 1904, will cause a steady increase of price of land in the Territory for the next few years. In addition to the school and other public lands rented by the Territory, good land can be rented in almost every county for crop-rentals of from one-third to two-fifths of corn, wheat, and oats and one-fourth of cotton and cash rent ranging from $1 to $3 per acre.

Perhaps the greatest single feature that is most fully recognized is the unusual number and variety of products that may be grown and matured. The farmers who went to the new country were from every State in the Union, and carried with them the knowledge of the crops and methods to which they were accustomed. Farmers from the States North, South and East settled in the same township, and the result has been a system of agriculture which is unique in many ways. The nature of the population has been such as to preclude the hazardous system of growing only one or two crops. Exactly the opposite, a wide diversification, has contributed largely to the prosperity enjoyed during the past decade by the farmers of the Territory. In addition to the mineral deposits, the agricultural, horticultural, and the live stock products of the Territory offer many inviting fields for the investment of capital and energy to great advantage.

The Governor of the Territory, in his report, says:

> There are great stone, cement, clay, and salt deposits which offer special inducements for development. The quarries of Clay County turn out the finest building and paving stone in the West, while equally good stone is found in nearly every county, and the supply of granite in the Wichita Mountains is inexhaustible. In Kay, Kingfisher, Greer, Canadian, Lincoln, Woods, Woodward, Blaine and other counties are beds of cement sufficient to furnish all the world with the finest quality of plaster.
>
> In Woods and Woodward counties are a number of large caves filled with countless numbers of bats that have inhabited these vast recesses for centuries perhaps. Here are immense deposits of guano of great commercial value, and within the past year hundreds of tons have been taken out and hauled long distances to railway stations for shipment, some of it going as far as California. These deposits will be the source of great revenue to that portion of the Territory.

Public Lands in Missouri

The State of Missouri owns no lands and therefore has none for sale; but the United States has yet much valuable land within the State which is available for entry for homesteads or may be purchased outright at $1.25 per acre. All remaining swamp and school lands belong to the counties wherein they lie, and are for sale by the several county courts. Such lands are nearly all in counties lying south of the Missouri river. On June 30, 1902, the total area of government land in Missouri subject to entry was a trifle over 200,000 acres—the land being taken up at the rate of about 50,000 a year. Since June 30, 1897, the year in which the Missouri Bureau of Labor first published information relative to these lands, the reduction in their total area aggregates 216,533 acres. These lands are subject to homestead entry, or may be purchased at $1.25 per acre.

The Land Office fees, payable when application is made, are as follows: On 160 acres, $14; 120 acres, $13; 80 acres, $7; 40 acres, $6. The Land Office commissions, payable at the time of making final proof, are as follows: On 160 acres, $4; 120 acres, $3; 80 acres, $2; 40 acres, $1. The fees for reducing testimony to writing in making final proof are 15 cents for each 100 words, which in each case amount to $1, sometimes to $1.50, and must be paid with the other final proof commissions.

Public Lands in Idaho

In the Clearwater country, Idaho, there are hundreds of sites for homes, orchards and fields, which are enriching the non-resident stockmen who pasture their roving herds thereon. A State Labor Bureau report refers to a valley called the Snake River Canyon, that yields a profit of $100,000 annually to stockmen whose herds feed exclusively upon the wild grasses. The average home seeker would call this valley a desolate canyon upon first impression, but when the available rich lands are cultivated the crops will not only feed one thousand dollars' worth of stock for every homestead, but they will yield grain, fruit and other commodities worth as much more. The spirit of the pioneer is in demand to inspire the first home seeker to build roads and break the solitude of remote valleys by the chanticleer's voice and the shouts of the children at play twenty miles from a schoolhouse and forty miles from a town. When he has a hundred neighbors he will laugh at his own dread of isolation. When his homestead, a year old, becomes a townsite the pioneer will reap his reward. This is not an overdrawn picture. There are vacant town sites in every quarter of the Clearwater country awaiting the new-century homesteader. Every new settlement, every new mining camp, every new lumber centre, will build a new town, a new social centre and a new market for the products of the new farms in the interior.

The new conditions encountered often overawe home seekers who visit the West for the first time. The rugged mountains which border the narrow valleys seem to inspire the idea that they proscribe opportunities. There have been instances of home seekers becoming discouraged by the contrast of conditions impressed upon them after only limited observations along the common routes of travel. The valleys and canyons are only a small portion of this great country. Less than the one-hundredth part of the productive area of this district is in the river bottoms. If the home seeker will invade the interior he will find conditions of climate and soil that will satisfy the most exacting demand. He will find the widest range of crops on one farm, or he can find farms that will produce almost any special crop that will grow outside of a tropical zone.

The visitor who is looking for business opportunities, says the report of the Idaho Labor Bureau, should visit the great new reservation region. There thousands of homes have been made on virgin lands within five years. Farms can be purchased, the crops of which, already planted, will pay for the land. Then he will find business opportunities of every class known to a new country. Then there are the new mining districts. They offer fortune to every class of business men. The present valuation of property in this district is the highest of any rural district in the United Sates. The income from exports is the highest of any district of equal area in the United States. This fact alone is a guarantee of great opportunities and good times. Within the State's boundaries are to be found almost every avenue open to human endeavor—farming, stock raising, fruit culture, mining, lumbering, manufacturing, and railroading. These are yet in their infancy as to development, and should therefore be an incentive to other sections, or the inhabitants thereof, less favored.

Public Lands in the State of Washington

The man with money, who is looking for investment, can satisfy himself that there is an opening in some of the lines of business, or in the development of the natural resources, of the State of Washington. Many of these resources are as yet practically untouched.

The advantages usually offered by a new country are that the land is not fully occupied, and therefore every newcomer may find a farm and go to work with a reasonable certainty that he will be fairly well paid for intelligent and well-directed industry. In Washington, if he is unable to procure government land for settlement, he still may be able to buy lands at such prices as will warrant a change from less favored communities.

The Washington Labor Bureau reports that it is possible for each immigrant, who carries a few hundred dollars with him, to get land in Washington, and that by careful and diligent effort he can engage at once in a business on his own account. What is wanted is intelligent farmers with money enough to commence business. Such men, by thrift and industry, can soon acquire and improve the best of homes in this State.

To those who have larger means and are looking for first-class improved farms that will produce more wheat to the acre than any other country, and who are willing to pay for the same, certain counties offer opportunities to procure the same. Irrigated lands can also be secured in large areas. The time of the settler is not always fully employed on his own property at first. Settlers who so desire can usually procure work at other occupations during certain parts of the year. Nearly every branch of mechanical industry is carried on to some extent in the State, and any reliable workman can nearly always find employment at good pay. The man who is able to adapt himself to the variety of occupations will be able to maintain himself on the farm from the very beginning.

There is still some government land to be had in the State, a large portion of which, however, is classed as uncultivable, although there is no doubt that considerable portions of the same will be found to be tillable and equal in fertility to many other lands differently classed. The government lands available are located in the valleys toward the heads of the streams in the mountains, and somewhat remote from the railroad and transportation lines, but as the same are settled and the country developed, no doubt the railroads will supply the means of transportation as they have thus far done in other portions of the State.

Public Lands in Oregon and New Mexico

Of all the inhabitable regions of the world, where all the favorable conditions of life are present, the basin of the Columbia River is the most undeveloped and unsettled. But its time has come, for people living in those sections of the East where crops fail, where winters are long and cold and the summers excessively hot, are looking this way for homes. So says the report of the Board of Trade of Portland, Oregon.

There is yet available an area of more than 50,000,000 acres of public domain in New Mexico, capable of supporting an immense population. Thousands of acres of these lands are to be had by complying with the United States land laws, much of it being contiguous to water and desirable for colonization purposes when ditches and water storage reservoirs are provided. The land grant question is no longer a bugaboo in New Mexico, and through the action of the land court titles to vast tracts have been cleared up and settled. Some millions of acres have been confirmed by the courts to private ownership, while, on the other hand, a much larger acreage has been rejected so far as the grant claimants are concerned, and the land added to the public domain, subject to entry.

Irrigated Lands and the Home Seeker

The anomalous condition is becoming apparent that although one-third of the United States proper, excluding Alaska and outlying possessions, consists of vacant public land, yet there is no longer an outlet for the home seeker upon these lands. In the past the vast unoccupied public domain has served as an outlet for surplus labor and has afforded scope for the energies of thousands of young, able-bodied men who without financial means have had the ambition to become land-owners and to grow up with the increasing development of a new country.

After the close of the Civil War, and at times of great industrial depression, when men sought for an opportunity to earn their daily living and the doors of factories and machine shops were closed, there has been a steady stream of pioneers representing the best of the bone and muscle of the country going out upon the broad plains and prairies, building up substantial communities and expanding within our borders the area of the highest type of civilization. All this has passed away. There are no longer to be seen the prairie schooners and the emigrant wagons filled with household goods, with the children on top or trailing behind. Only the Pike County wanderer, who is always seeking for something better, is still to be found pursuing his aimless search for the promised land. It is true that the railroads have done away with the necessity for the overland journey, but the railroads cover only a very small extent of the vast inland empire of the United States. Stretches of hundreds of miles of vacant public land lie between the railroads, but across these fertile plains the home seeker no longer travels.

It is not because there is a lack of land, for there are in the Western States and Territories nearly 600,000,000 acres still vacant, much of this the richest soil of any in the United States. It is not because the pioneer spirit no longer prevails, for the country is as full of adventurous spirits as ever, and it requires merely the intimation that some Indian Reservation is to be opened for thousands of people to gather to make the rush, or try their chance in a lottery. There is plenty of land and there are numberless people eager to occupy it. What, then, is it that prevents their doing this? Simply the lack of water. The country is dry and the ordinary farm crops can not be cultivated without an artificial application of water at certain times and seasons.

It must not be supposed that there is no water to be had. On the contrary occasional storms occur, sending down vast quantities of water and inundating the thirsty plain. This rushes off and in a few hours the channels of the rivers are nearly dry. There are also, at long intervals, large perennial streams, but most of these flow in narrow, deep canyons.

The country under discussion is not wholly uninhabited but at nearly every spring and along every river which is not flowing in a narrow canyon there are to be found ranches and occasional small towns. All of the easily available sources of water supply have been seized upon, and in the aggregate over 6,000,000 acres have been brought under irrigation, this being about one per cent of the total area of the remaining vacant lands.

Not all of this 600,000,000 can be irrigated, for some of it is mountainous and covered in part with timber. Other portions are rough and broken, and even if all of the floods were conserved in great reservoirs, and all of the rivers which could be diverted were turned out from their canyons, there would not be enough water for more than 60,000,000 acres, or possibly 100,000,000 acres; but this would be a great increase, say ten times, over the area now in use.

Increase of Homes and Farms by Irrigation

In that portion of the United States where the vacant public lands lie, and where farms and homes can not be made without irrigation, there are now living 4,000,000 or 5,000,000 people. If ten times the amount of land were irrigated, it is possible that the population would be increased to at least 40,000,000 people, and possibly far more, because of the other industries which would be developed as more land is cultivated. The mineral wealth of the region is very great; gold and silver, iron and coal are now produced, the precious metals having special value. The poorer ores are for the most part neglected, because of the high cost of transportation, of labor, food and forage. With more land cultivated in scattered areas throughout the country, and greater population, better transportation facilities must come and cheaper food material, making it possible to work some of these low-grade ores. Great deposits which now are practically valueless can then be worked, affording employment for thousands of men, and adding to the population and wealth of the country. With a regulated water-supply such as that needed in irrigation, cheap water-power can be had, not only for pumping water to the fields, but for various industries connected with the handling and reduction of the ores, and thus, one industry feeding another, the West must develop its wonderful resources with increasing rapidity.

But the question may well be asked, why is this not now taking place if there are so many people wanting land? Why is it that the settled area has actually diminished in some portions of the West and population has tended to concentrate in the towns? It is because the irrigators and investors in irrigation systems have utilized all of the easily available sources of water and have developed agriculture by irrigation nearly to the limit of the capacity of these. They have demonstrated that irrigation is not an experiment, but an assured success, highly profitable to the man who cultivates his own land. More than this, they have shown by numerous failures that reclamation works on a large scale do not pay financially nor yield the satisfactory returns that the small works have done. There are no longer opportunities for these small works, and if the big enterprises can not be made sources of profit what then is to be done?

Irrigation by Corporations and the Government

Numerous instances can be cited where corporations have been formed, stocks and bonds issued and a million dollars invested in great reclamation works, in building reservoirs, dams and canals, resulting in an increase of values in the vicinity of $3,000,000, yet the investors lost every dollar. They could not control and bring to themselves the profits of the enterprise. These went to the public, and under existing conditions could not be realized by the men who took the risk. The people who bought stock and bonds of irrigation enterprises are no longer willing to play the part of philanthropists to benefit the public, and they say that although the schemes offered are equally enticing to those in the past, we will not be led into another enterprise of this character. Hence development has practically ceased, and, relatively, the country with its vast opportunities seems almost stagnant.

Numerous writers upon social and economic questions are beginning to sound the note of warning against further delay, against the policy of procrastination, which allows the speculative element to gradually acquire possession of the places where water may be stored, and to render difficult or impracticable the ultimate reclamation of the public land and the creation of homes for workers. President Roosevelt, in his clear-cut, decisive fashion, has reached to the very heart of the matter, and has recommended that the Government, the great land-owner, should construct and maintain the reservoirs as it does other public works. He says that this is properly a national function, and that it is as right for the National Government to make the streams and rivers of the arid region useful by engineering works for water storage as to make useful the rivers and harbors of the humid region by engineering works of another kind.

The importance of prompt action is shown by the way in which the remaining public lands are being taken up by speculators. Although several millions of acres are being disposed of annually, yet these are not passing into the hands of people who are making homes upon them, and that the homestead and desert land act is being used as a means for securing titles to lands which are not brought under cultivation. The greater part of the arid West is devoted to grazing; herds of cattle and flocks of sheep range over the public lands eating the herbage without restriction, the whole country being practically an open common. This business is at times extremely profitable, and has attracted large capital, influential companies being formed. The business has increased to such an extent that the ranges have been overstocked, and being free to all there has been a struggle for existence.

Irrigation properly conducted means intensive farming, the cultivation of the soil in the best possible manner, and diversified crops. The area which any one man can cultivate under such conditions is far less, and the yield per acre correspondingly greater. In the best irrigated regions farms are very small, the average size of cultivated area in Utah being less than thirty acres. Small farms and the economy which must be practiced in conveying water, result in comparatively dense rural population. In Southern California the irrigated tracts in orchards and vineyards are so small that the farming region takes on the appearance of suburban communities. The houses instead of being a mile apart as on the prairies and plains of the central part of the country, are within a few rods of each other. Social intercourse is possible, good roads are assured, and rapid communication through electric car lines. Thus results a far higher type of civilization than is possible on the isolated, lonely farm. Diversified agriculture, the raising of vegetables and small fruits, the keeping of various domestic animals, also necessitates greater mental as well as physical activity, continuous employment for all the members of a family, and many minor industries impossible where attention is concentrated upon a single crop, such as wheat, corn or cotton.

Colonies in the Irrigated Sections

The small farms so successful under irrigation make possible a colony life such as that so successfully practiced by the Mormons in Utah, and exemplified in the early history of the Greeley colony in Utah. The success attained has led to a most interesting experiment, that of the Salvation Army in helping the people get back to the soil. In its work in big cities the Salvation Army has come across almost innumerable men and women who are eager for an opportunity to get away from their surroundings and start life anew in the open air. Out of the thousands of applications received there have been selected those families which apparently are best qualified for success, and these have been located upon small, irrigable farms. Nothing is actually given to these people outright except the opportunity to help themselves. They are sold a tract of land and a small house, the necessary tools, and seed upon credit, and are given a reasonable time to repay the loan thus made, with interest. From one aspect the enterprise might be regarded as money-making, but from the higher standpoint, it is one of the greatest philanthropies yet undertaken.

This work of the Salvation Army in establishing colonies in Colorado and California is really more than an experiment, for sufficient time has elapsed to give it a trial, and its success may be considered as demonstrated, sufficiently at least to justify further and larger efforts along this line. It is not believed that the "submerged tenth" can be lifted bodily and put upon the land to become successful farmers, but the weight of humanity above this tenth, the keen struggle of those a little better off helps to submerge the despairing portion of the community and to obstruct every avenue of escape. Relief from the congested condition of the cities can come in part at least through furnishing opportunities to those who are able to go out upon the land and to become independent land-owners and citizens. Ordinary farming can not offer any attractions to these people who have spent much of their lives in the cities, as they are largely dependent upon keeping in crowds. The small farm and the suburban life possible under irrigation alone makes it possible for such people to leave the city environment and become tillers of the soil.

Summary of the Irrigation Problem

To sum up the problem we may say that we have the vast extent of vacant public land of wonderful fertility; we have water which will make a portion of this land productive; we have the people who are seeking for the opportunity to make a living, and who would gladly escape from the congestion of the cities. We have the public funds and the public interest toward developing our country to the highest degree, but we are a long way from bringing these powerful forces to effective action. We are allowing the lands so necessary to the development of the nation to drift out of its control; we are allowing the waters and the opportunity to conserve them to be monopolized and become subject to speculation, and we are allowing barriers to be gradually erected shutting off the opportunities for development of our great internal resources.

The call to action has been sounded by the head of the nation; it has been taken up by his lieutenants, and has been heeded in part by individual members of Congress, especially those from the West; but the matter must be considered from the larger standpoint, not of immediate local benefits through the construction of a public work in one locality or another, but as a great national undertaking whose benefits reach out to every community, and which helps solve some of the most difficult of the social questions of our times.

Abandoned Farms

The abandonment of farms in New England began about fifty years ago. The two principal causes of this rural exodus appear to be the rapid development of the West and the attractions of the cities, the former cause being assisted by cheap transportation and local discriminations in freight rates, the latter being both the cause and the result of the difficulty of obtaining suitable farm laborers, especially for truck farming. A contributory cause is said to be the demoralizing effect upon agriculture exerted by summer boarders. In Maryland the abandonment of farms is attributed to the loss by the original owners through mortgage foreclosures, and to the exhaustion of the soil by continuous farming of the same crops.

Several of the New England States seek to bring the abandoned farms again into use by advertising them for sale. Three-fourths of the abandoned farms in New Hampshire and Massachusetts have been taken up, in many cases by people of wealth, for summer residences.

There are more abandoned farms in Massachusetts than in any New England State. New Hampshire probably has the second largest number. All these farms are for sale cheap, and many are suitable not only for farmers but for the city man who seeks a country place at small cost.

The Commonwealth of Massachusetts issues a descriptive catalogue of farms that can be bought at a low price "in proportion to the cost of the buildings and the productive capacity." This catalogue will be sent free upon application to its compiler, James W. Stockwell, Secretary of the State Board of Agriculture. The ninth edition of this remarkable record of abandoned farms is dated September, 1901, and contains a description of nearly two hundred farms which can be had for a song—for an amount of money, indeed, not exceeding that which the ordinary family would spend for a summer's outing. They are in retired locations, mostly among the hills. Some of them are ideal places for summer residences of the well-to-do, others are adapted to specialties in agriculture.

In order to secure accurate information, Secretary Stockwell inserted an advertisement in the State agricultural papers which read somewhat as follows: "Notice—Owners of partly abandoned farms who wish to sell are requested to so inform the Secretary of the State Board of Agriculture, State House, Boston, who will supply necessary blanks for description of such property. There will be no expense to such owners. The object is to print these descriptions in a catalogue, as continued requests for a catalogue of such farming property are coming from all parts of the country."

As a result of this advertised notice, and of a general circular of inquiry, nearly two hundred descriptions were received, the average acreage of the farms offered being 135 acres, and the average price asked, $1,720.

The chief reasons assigned by individuals desiring descriptions of their property included in the catalogue may be summed up as follows: In other business, living elsewhere, no use for it or unable to carry it on, old age, poor health, having another farm, and to settle an estate. In no instance was there any expression of dissatisfaction with farm life, or of the opinion that farming does not pay. Purchasers as a rule appear to be well satisfied with their bargains, and the very cordial words with which some of them have indorsed the work of the authorities show that in their opinion it is meritorious.

The real object of this work is to advertise unoccupied farms which may be used for purposes of cultivation or as summer homes. Many of these farms are believed to be worth, well worth the price asked for them—for the prices in all cases are very low.

There is another class of farms, those which are occupied by their owners, but which are only partially cultivated, if at all, on account of age or ill-health. Descriptions of such farms, have a rightful place in the catalogue.

Here are a few descriptions, out of the entire lot of goods offered at a remarkably low price on this bargain counter of abandoned farms.

ORLEANS.—*Farm of 20 acres:* Nearly all suitable for cultivation. Light, old-fashioned one-story house. Water supply from a cistern. Twenty apple trees and two pear trees; plenty of grapes. Farm best adapted to small fruits and poultry. Railroad station, Orleans, 2 miles. One mile from beach and church. Good place for a summer home. Price, $200 cash.

BLANDFORD.—*Farm of 195 acres:* Mowing, 45; pasture and woodland, 150; suitable for cultivation, 30. Two-story house, 15 rooms, 7 large; in fair condition; L, back room, woodshed and carriage house all connected. Good well at house and well at barn. Thirty grafted apple trees. Woodland mostly young growth of hemlock; two groves of white pine, beech, maple, and other kinds. Probably one thousand dollars worth of very sharp quartz if quarried. Farm best adapted to dairying or sheep raising. Price, $1,500.

SANDISFIELD.—*Farm of 100 acres:* Mowing, 35; pasture, 45; woodland, 20; suitable for cultivation, 40. Large two-story house, with L and woodshed and summer cook room; in good repair. Two barns, recently shingled. Good well at house and running water near barn for stock. Woodland mostly hard wood. Farm best adapted to tobacco, potatoes and small fruits. Price, $800; $300 down and balance in yearly payments.

STURBRIDGE.—*Farm of 50 acres:* Mowing, 14; pasture, 23; woodland, 13; suitable for cultivation, 10. House, 22 x 26; L, 22 x 14; 8 rooms; outside newly clapboarded and shingles painted, but wants painting over, and inside wants painting and papering. Barn, 22 x 24; good dry cellar; nearly new built. Never-failing stream runs through the farm; good well within ten feet of the house. Ten apple trees and two or three pear and plum trees. Woodland is ten to forty years growth, and is mostly pine and hard wood. Farm best adapted to small fruits and gardening; interval land good for grass. Would be a good poultry farm; will keep two cows now and could be easily made to keep four. Price, $500; $100 cash at delivery of deed; balance, $50, to be paid yearly until all is paid at 5 per cent; and taxes kept up by purchaser.

WINCHENDON.—*Farm of 60 acres:* Mowing, 10; pasture, 15; woodland, 30; suitable for cultivation, 35. New house, 28 x 22, piazza in front; 3 rooms and pantry finished on first floor. Barn, 30 x 40; clapboarded and painted, but needs repainting. Three small hen houses. Good well and pump; spring 300 feet from house. Twenty apple trees, 7 pear trees; one acre raspberries, currants and gooseberries—one acre strawberries. About 5 acres low meadows we mow for hay. Woodland is mostly second growth; birch and white pine. Farm best adapted to small fruits, vegetables and poultry. Soil is warm, sandy loam, protected from wind on north and west by woods. Near which is a thriving village with 10 or more factories; is a good market and a good place to get work. Price, $1,200; $600 down, and balance on mortgage at 6 per cent; with $50 and interest each year.

CHAPTER XV

THE FISHING INDUSTRIES

The Piscatorial Resources of America—Functions and Work of the United States Fish Commission—Employment in the Fisheries Department—The General Extent of the Fishing Industry—The Utilization and Preparation of Fish as Food—Different Methods of Preserving Fishery Products—Fisheries of the New England States—Fisheries of the Middle States—Fisheries of the South Atlantic and Gulf States—Fisheries of the Pacific States—Fisheries of the Great Lakes and Interior Waters—Pearl Fishery—Mussel Fishery—The Lobster Fishery—The Oyster Fishery—The Sponge Fishery—The Whale Fishery—Miscellaneous Fisheries

The Piscatorial Resources of America

FEW if any countries have been more highly favored by nature than the United States, this being no less true of its water products than of its vegetable and mineral resources. The abundance and variety of edible fish have exerted a marked influence on the settlement, development, and prosperity of many parts of the country; and fishing is to-day the leading industry in numerous coastal and interior sections. By the recent acquisition of insular possessions, more especially the Philippine archipelago, our fish-producing capacity has been very largely increased.

While our fisheries, compared with many other national enterprises, are of minor importance, nevertheless they are entitled to be regarded among our leading industries, because of their enormous contributions to the food supply of the world, the international disputes in which they have involved the country from the outset of our national career, and the unparalleled stimulus they have received from artificial propagation, whose aid has been invoked to supplement nature. The fisheries of a number of other countries are relatively more important than those of the United States. Norway, Japan, and Newfoundland are the most conspicuous examples of countries whose population is very largely dependent on fishing for a livelihood. In the actual extent of its fisheries, however, the United States takes first rank; and in the perfection of methods of catching and handling water products, and in the magnitude of its fish-cultural operations, it far surpasses any other nation. The fish resources of the United States represent all classes of the animal kingdom, fishes proper being exceeded in value by mollusks.

Extensive as are the fisheries of the United States, it is evident to fishery experts that the industry is capable of great increase through the development of new grounds, through the utilization of species now entirely discarded or only imperfectly employed, and through the stocking and replenishing of waters by artificial means. In the science and art of cultivating the waters and producing valuable aquatic animals, greater progress has been made by the United States than by any other nation. Millions of dollars' worth of foodstuffs are thus annually added to the supply from natural sources, but the possibilities in this direction are far from being fully realized, as practical fish culture is still in its infancy, and the area of water yet to be brought under the influence of man is vast. The farming of the great public water estates lying off our shores, as well as the interstate rivers and lakes, is naturally intrusted to the national fishery commission, while the needs of the local and State waters are looked after by the State authorities.

Functions and Work of the United States Fish Commission

An important factor in the development of the fisheries is the national Commission of Fish and Fisheries, which came into existence about thirty years ago. This bureau is charged with the investigation of all questions pertaining to the maintenance and improvement of the fisheries in public waters, and with the artificial propagation of food fishes and the stocking of waters therewith; and is the adviser of Congress in fishery legislation. Besides the corps of scientific assistants who study the biological questions which underlie national fish culture, the Commission employs a large number of experts, at its numerous stations in all parts of the country, who spend all their time in working for the increase of fish in our fresh and salt waters. No other country has achieved such signal success in fish hatching as the United States, and no other country so liberally supports and encourages fish-cultural work. The popularity of the operations of the National Fish Commission depends on the scientific principles on which they are based, and the numerous strikingly successful evidences of their pecuniary value. For an expenditure of a few hundred thousand dollars a year in biological investigation and experimentation, and in artificial propagation, millions of dollars' worth of fish food is added to the wealth of the country. Fish culture, as now practiced, is in reality an investment, which guarantees immediate large returns.

Upward of thirty different kinds of food fishes are regularly propagated by the Commission, and the annual plants in public waters now number about 2,000,000,000 young and adult fishes. The shad, the salmon, the trout, the bass, the whitefish, the pike-perch, the shore cod, the oyster and the lobster fisheries have now been brought well within the control of the fish-culturist, and other important branches will soon be in the same condition.

The work of the government is ably reinforced and augmented by that of the States, most of which are actively engaged in the artificial propagation of fish, in addition to the protection of the fish from unnecessarily destructive fishing methods. The government exercises no legislative functions in the matter of fish preservation and protection, and its efforts are thus greatly facilitated by the enactment of State laws restricting fishing and prohibiting the pollution and obstruction of streams.

Employment in the Fisheries Department

The government employs a large corps of scientific men in the Fisheries Department, and scattered throughout the country at the different hatcheries there are hundreds who spend all their days in working for the increase of our fresh and salt water fishes. No country in the world has achieved such signal success in fish hatching and propagating as the United States. The Fish Commission has not only stocked the waters of our country with millions of young fish, but its members have imported the fish of other countries, discovered new foods for our native fish, protected millions of young fry by removing dangerous enemies, saved our streams from pollution by factories which would have destroyed all fish life, and in short made our fish food double, treble, and quadruple in a decade. Scientific fish propagation is one of the most popular branches of the government work. For an expenditure of a few hundred thousand dollars a year in experimenting and cultivating young fish millions of dollars' worth of fish food is added to the wealth of the country. Thus the many profit by the concentration of the science, skill, and energy of the experts under the control of experienced leaders.

Like all the other scientific departments, the remuneration of workmen and experts in the Fisheries Department depends upon the character of the labors required, and the special fitness of the men.

Statistical field agents in the Fish Commission's service are scattered throughout the country, with salaries for beginners ranging between $300 and $1,200 per year. Station superintendents at the hatcheries receive the higher wages, while minor employés average between $700 and $800.

The General Extent of the Fishing Industry

The number of persons who derive a livelihood from the fisheries is about 215,000; these and those dependent on them number fully a million. Some of the fishermen are engaged in no other occupation and are therefore entitled to be called professionals; others, while making most of their income out of the water, engage in other business at times; and still others are farmers, mechanics, boatmen, etc., who take up fishing when their regular occupation can not be followed or when a special run of fish makes fishing more profitable.

The capital invested in fishing properties is upward of $72,000,000. Vessels, employed either in taking or in transporting fish, are a prominent factor in the investment, nearly 6,500 craft of over five tons burden being now employed in our fisheries. While the larger proportion are sailing vessels, many steamers are used in the whale, oyster, menhaden, and other fisheries, and the number of steam vessels is increasing yearly. The net tonnage of our fishery marine is nearly 200,000, and the value of the vessels and outfits is more than $13,000,000. In the fisheries prosecuted from the shore, 74,000 boats and vessels under five tons are employed, with a value of $4,350,000. The apparatus used in the capture of fishery products—comprising seines, gill nets, hand lines, traw lines, traps, pots, fykes, dredges, tongs, harpoons, etc.—is worth $7,880,000.

Few industries yield larger and more immediate returns than the fisheries. The first value of the fishery products taken in the United States annually is about $46,500,000, or nearly double the investment in fishing property. Of this amount, exclusive of land, buildings, wharves, and other shore property, the coastal fisheries represent $41,900,000, the Great Lakes fisheries $2,600,000, and the interior fisheries $2,000,000. By another classification it appears that fishes proper yielded $27,415,000, mammals $1,315,000, reptiles and batrachians $230,000, mollusks $15,105,000, crustaceans $2,100,000, sponges $310,000, and marine vegetables $25,000. The aggregate weight of the annual catch is about 2,000,000,000 pounds.

The foregoing figures, supplied by the United States Commission of Fish and Fisheries, do not include the fisheries of any of our outlying possessions.

The Utilization and Preparation of Fish as Food

Fish in one form or another is almost universally recognized as one of the most important food materials, combining comparative cheapness with high nutritive value and easy digestibility. It enters into the dietary of almost every American family, although comparatively few persons have any adequate conception of the methods and extent of the fisheries which provide their food, the source of their fish supply, or of the measures taken for preparing and preserving fishery products.

In few countries has greater attention been given to the preparation of fishery food products than in the United States. In the various international expositions our exhibits of this class have excited favorable comment because of the great variety and excellence of the products and the neat and convenient forms in which they are prepared for sale.

The Fish Commission is authority for the statement that the large representation of foreign nationalities in the United States has probably been a factor in increasing the number of our methods of preparing marine foods. People emigrating to America and devoting their time to handling fishery products naturally make use of the ideas and methods in vogue in their native countries. The smoking of haddock was introduced in this way by Scotchmen; the Chinese on the Pacific Coast and in Louisiana prepare fish and shrimp by methods similar to those practiced in the Orient, and the preparation of sturgeon products was first begun here by natives of Germany and adjacent countries.

The congregation of people of foreign birth in our Coast and Lake cities also tends to increase the list of fishery products; as, a small local sale for certain products developing among those people, the trade gradually extends until such articles become of recognized importance in the food markets. There are, however, many additional methods of preserving marine food products that could be employed advantageously to meet the wants of new markets.

Some products highly valued in Europe and Asia are never utilized here, although abundant in the United States waters; and many of our fishery resources are undeveloped through a failure to appreciate and follow the foreign methods of preservation. Herring, for instance, is one of the most abundant species of fish on the United States coasts, being very frequently obtainable in much larger quantities than the fishermen make use of, yet the United States imports annually over $2,000,000 worth of preserved herring. The frugal Chinese, the ingenious Japanese, and the industrious German can teach us much in the way of utilizing our natural resources.

Fish destined for consumption in a fresh state leave the hands of the fishermen either round (*i.e.* whole) or dressed. Dressing consists in splitting and eviscerating (with or without the removal of the head), or in eviscerating through the gills without splitting. The commendable practice of selling fish alive is followed in a few places, Key West, for example. Many of the products of other branches of the animal kingdom are usually sold alive.

Different Methods of Preserving Fishery Products

Different methods of preserving fishery products are employed for special articles or in special sections, a slight variation in some process sometimes making considerable difference in the appearance or flavor of the prepared product. In many cases preservation is only to ensure transportation to remote points in good condition. Low temperature is the means most commonly employed for this purpose. By taking advantage of the recent improvements in apparatus and methods of chilling and freezing, fish may be shipped long distances and kept a long time in good condition.

Large quantities of fish are salted and smoked, the processes being employed alone or in combination. These methods ensure preservation, but at the same time modify the flavor. Various secondary fishery products are also prepared by one or more of these processes. Caviar, which may be cited as an example, is prepared from the sturgeon roe by salting; the methods of salting and packing vary somewhat and give rise to a number of varieties. Although formerly prepared almost exclusively in Russia, caviar is now made to a large extent in the United States.

When fish are salted and cured, there is a considerable loss in weight incident to removal of the entrails and drying. Cod loses sixty per cent in preparation for market as dry-salted fish. If the fish is boned, there is a further loss of twenty per cent.

Various kinds of fish extract, clam juice, etc., are offered for sale. These are similar in form to meat extract. There are also a number of fish pastes and similar products—anchovy paste, for instance—which are used as relishes or condiments.

Oysters and other shellfish are placed on the market alive in the shell or are removed from the shell and kept in good condition by chilling or other means. Oysters in the shell are usually transported in barrels or sacks. Shipment is made to far inland points in refrigerator cars and to Europe in the cold-storage chambers of vessels. Large quantities of oysters and other shellfish are also canned. Oysters are often sold as they are taken from the salt water. However, the practice of "freshening," "fattening," or "floating" is very widespread—that is, oysters are placed in fresh or brackish water for a short period, and they then become plump in appearance and have a different flavor than if taken directly from salt water.

Fisheries of the New England States

The fisheries prosecuted along the Eastern seaboard of the United States are very extensive and of an exceptionally varied character. Each of the regions has distinctive fisheries and shore industries related to the fisheries.

In the New England States nearly 35,500 persons are engaged in the fisheries. These are distributed as follows: Maine, 17,000; New Hampshire, 150; Massachusetts, 14,000; Rhode Island, 1,600; Connecticut, 2,500. The capital invested in the fisheries of this region is about $19,500,000, of which $4,000,000 is to be credited to Maine, $52,500 to New Hampshire, $13,000,000 to Massachusetts, $957,000 to Rhode Island, and $1,200,000 to Connecticut. The leading item in the investment is vessels, of which more than 1,400, valued at upward of $4,000,000, are in use. Other important items are boats (10,500, valued at $600,000), pound nets, trap nets, and weirs (1,070, valued at $420,000), hand and trawl lines to the value of $300,000, lobster pots (200,000, valued at $210,000). The annual yield of the New England fisheries is about 393,000,000 pounds, with a value of $9,600,000. Massachusetts leads, with products worth $4,400,000, followed by Maine with $2,650,000, Connecticut with $1,550,000, Rhode Island with $1,000,000, and New Hampshire with $50,000.

Probably the most characteristic feature of the New England fishing industry is the high-sea fisheries carried on with fine large vessels, which operate from Cape Hatteras to Newfoundland and sometimes extend their cruises to Africa and Europe. The fishermen of these States are emphatically those "who go down to the sea in ships." On the vast outlying "banks," some of which are more than a thousand miles from home, the indefatigable Yankees seek the bottom-loving cod, hake, haddock, cusk, and halibut; and among the surface fishes, they follow the wily mackerel, the pugnacious sword-fish, and the humble herring.

Other branches which are characteristic of New England are the lobster fishery, the soft-clam industry, the herring fishery carried on with brush weirs, the smoking and canning of herring, and the manipulation of cod, haddock, mackerel, and other fishes brought in by the off-shore vessel fishermen.

Whaling, which in the early days contributed so largely to the wealth and prosperity of the colonies and nation, is now an almost unknown calling, the fishery having been transferred to the Pacific Coast.

The leading product of the New England fisheries is the cod, which is taken in every State and supports numerous people in Maine and Massachusetts. The annual catch is 90,000,000 pounds, for which the fishermen receive $1,800,000. The quantity and value of the yield of other prominent species are: Haddock, 45,500,000 pounds, $576,000; hake, 37,000,000 pounds, $300,000; halibut, 11,000,000 pounds, $575,000; herring, 65,000,000 pounds, $600,000; mackerel, 8,800,000 pounds, $482,000; lobster, 14,650,000 pounds, $1,276,000; clam, 1,225,000 bushels, $580,000. The oyster fishery of Connecticut and Rhode Island, which depends entirely on the crop from cultivated grounds, has an annual value of nearly $2,000,000.

Fisheries of the Middle Atlantic States

The Middle Atlantic States have the distinction of maintaining more valuable fisheries than are carried on in any other part of the country. The fishing population numbers 95,000, and is thus about equal to that in all other parts of the country combined. In the number of vessel fishermen, boat fishermen, and shoremen, this section is pre-eminent. Maryland leads in this respect, with over 40,000 persons; Virginia is second, with 28,000; New Jersey follows with 12,500; then come New York, with 7,500, Delaware with 2,400, and Pennsylvania with 1,900.

The fishery capital invested here—$15,200,000—is less than in New England, owing largely to the expensive class of vessels in that region. The extent to which the different States are represented in this investment is as follows: Maryland, $5,800,000; New York, $2,100,000; Virginia, $2,900,000; New Jersey, $2,400,000; Pennsylvania, $1,600,000; Delaware, $400,000. No less than 3,800 vessels of over five tons register are engaged in fishing, which fleet has an aggregate tonnage of 58,000 and is valued at $4,200,000. More than a third of the vessels belong in Maryland. The 3,200 boats used are valued at $2,000,000.

The fisheries of this section yield upward of 600,000,000 pounds annually, which bring the fishermen $14,500,000. The Maryland fishermen's harvest amounts to $3,620,000, that of New Jersey to $3,615,000, that of New York to $3,400,000, and that of Virginia to $3,200,000. The interests of Pennsylvania and Delaware are relatively small.

Among the especially prominent features of these fisheries are the very large number of small vessels and boats engaged in taking oysters; the extensive use of pound nets, gill nets, seines, and fykes in the rivers and bays; the employment of many sail and steam vessels in catching menhaden for oil and guano; the taking of crabs and clams; and the valuable shore industries dependent on the oyster and menhaden fisheries. The oyster alone, however, is sufficient to give to the fisheries of this region the importance they have attained. This animal is worth $8,875,000 a year to the people of these States—a sum representing 19,850,000 bushels, of which 14,300,000 bushels, valued at $4,950,000, come from Chesapeake Bay and its tributaries. The other leading products, which are more important here than in any other section, are shad, 35,850,000 pounds, $980,000; menhaden, 270,000,000 pounds, $475,000; alewives or river herrings, 36,000,000 pounds, $230,000; bluefish, 18,000,000 pounds, $580,000; eels, 1,800,000 pounds, $93,000; hard clams, 900,000 bushels, $820,000; and crabs, 19,000,000 pounds, $345,000.

Fisheries of the South Atlantic and Gulf States

The fishery interests of the South Atlantic and Gulf States are less developed than those of other coast sections, although the variety and abundance of valuable economic products are noteworthy. The persons who make a living by fishing number only 31,000, of whom 12,000 are in North Carolina, 6,100 in Florida, and 1,200 in Texas. The capital devoted to the industry is $2,347,000, of which North Carolina is credited with $1,220,000 and Florida with $1,300,000. The annual catch amounts to about 146,000,000 pounds, worth $4,100,000, the North Carolina yield being $1,316,000, Florida $1,100,000, and Texas $290,000.

Mullet, shad, alewives, sheepshead, snappers, squeteague, sponges, oysters, shrimp, and alligators are the principal products of the waters of these regions. The mullet is the leading fish, upward of 22,000,000 pounds, valued at $330,000, being taken each year, mostly in North Carolina and Florida. The most valuable product, however, is the oyster, which is found in every State, and is destined to attain still greater importance under cultivation.

Fisheries of the Pacific States

In the Pacific States, salmon is almost synonymous with fishing, so preponderant are the interests centring in the capture and handling of the enormous runs of the various salmons in the rivers and coastal waters. Other important fishery enterprises, however, are conducted by the energetic people of the Western seaboard, who have extended their operations to the Aleutian Islands, Bering Sea, and the Arctic Ocean, as well as the mainland of Alaska. While the fisheries of this region are less extensive than those of the New England and Middle Atlantic States, they are probably destined to assume first rank, unless the phenomenal abundance of salmon should be overcome by indiscriminate fishing methods.

The 28,000 persons employed in the fisheries of this region are chiefly engaged in salmon, whale, fur-seal, cod, herring, and oyster fishing, the salmon industry commanding the services of at least two-thirds of them. About 4,000 persons are employed in California, 5,600 in Oregon, 10,000 in Washington, and 8,000 in Alaska. The capital here invested amounts to $19,000,000, of which $2,750,000 represents vessels. Over three hundred vessels, many of them steamers of large size and fine construction, are engaged in the whale and other fisheries. The contribution of the waters of the Pacific to the wealth of the nation is about $13,700,000 a year, of which the share of California is $2,550,000, of Oregon $855,000, of Washington $2,870,000, and of Alaska $7,415,000. The leading factors in this large sum are salmon, $10,270,000; cod, $200,000; whales, $460,000; fur-seals, $567,000; and oysters, $1,050,000.

The shore waters of the Pacific States have been enriched by the introduction of the shad and the striped bass from the Atlantic. Both species have become so abundant and well-established that they support a growing fishery already worth $80,000 a year—a truly remarkable outcome of a government investment of less than $5,000 about twenty-five years ago.

The great salmon fishing grounds are the Sacramento and Columbia Rivers, Puget Sound, and the islands and mainland of Alaska. The salmon yield exceeds 248,000,000 pounds annually, and the catch, as placed on the market, is worth $24,000,000. The government and the States endeavor to maintain the salmon supply by extensive fish-cultural measures.

The whale fishery, which formerly centred at New Bedford, is now practically confined to San Francisco. Here the vessels fit out, and here they land their catch. The recent scarcity of whales has greatly reduced the profits of whale fishing, and has made this branch one of exceptional financial risk; nevertheless, the San Francisco fleet last year killed whales whose bone and oil sold for $456,000.

Cod taken about the Aleutian Islands were valued at $200,000; herring, chiefly from Alaska, were valued at $26,000; oysters, largely from San Francisco Bay, sold for $1,045,000; and the products of the fur-seal, sea-lion, sea-otter, and walrus fisheries were worth $572,000.

Fisheries of the Great Lakes and Interior Waters.

The 100,000 square miles of water in the Great Lakes support a rich fauna, including some of the most highly-prized food and game fishes of the country. If the American and Canadian fisheries are combined, they constitute the most valuable lake fisheries in the world, the yield in the past twenty years being worth nearly $100,000,000. Superior, Michigan, Huron and Erie support extensive gill-net and pound-net fisheries, Erie ranking first in the number of persons employed, capital invested, and products taken.

The fisheries of the American side of the Great Lakes give employment to 10,000 persons, of whom 4,000 are in Lake Erie, 3,260 in Lake Michigan, 1,250 in Lake Huron, 600 in Lake Superior, 400 in Lake Ontario, and 450 in Lake St. Clair and tributaries. The aggregate capital devoted to the industry is $6,600,000, of which Lake Erie is credited with $2,720,000 and Lake Michigan with $2,915,000. Gill nets fished from steam vessels are prominent means of capture in Lake Erie and Lake Michigan, which lakes also have nearly 2,500 pound nets set around their shores and on the shallow reefs. The combined length of the gill nets operated in these lakes is upward of ten thousand miles.

The annual yield of the Lake fisheries is about 115,000,000 pounds, for which the fishermen receive $2,611,000. Lake Erie's share of this amount is $1,150,000, Lake Michigan's $876,000. The fish taken in largest quantities is the small whitefish, improperly called the lake herring; it represents about one-half of the quantity and one-third the value of the fisheries of the entire basin. Other species are whitefish, lake trout, and wall-eyed pike.

The active fishing in these waters is beginning to show its effect on the abundance of fish. Lake Ontario has been practically fished out, and other lakes will doubtless have the same history, unless more adequate protection is given the fish, more especially at their spawning season, and unless the already extensive fish-cultural operations of the government are continued and increased.

The innumerable interior rivers and lakes are important as sources of food supply, and are destined to attain even greater prominence as the population of the country increases. In nearly every interior State and Territory there are commercial fisheries of some consequence, but in only a few of them does fishing assume the proportions of an established industry. The Mississippi River and its tributaries naturally support the most extensive fisheries, but some of the lakes and other waters also have a profitable business.

The fishing population on the interior waters numbers about 12,450; of these 2,400 are citizens of Illinois, 325 of Louisiana, 2,650 of Iowa, 500 of Minnesota, 460 of Arkansas, 400 of Indiana, 475 of Tennessee, and 1,530 of Missouri. The value of the fishing property is $1,818,000, and the annual value of the catch is about $1,200,000, representing 99,000,000 pounds. Missouri has the largest investment and catch, followed by Iowa, Illinois, Louisiana, and the other States mentioned as having the most numerous fishing population. The leading product of the Illinois fisheries is the German carp, of which over 9,896,000 pounds, selling for $244,000, were taken and sold in a recent year; the carp is also an important species in other States. The catch of other prominent interior fish are—black bass 1,030,000 pounds, $66,000; buffalo-fish 14,215,000 pounds, $350,000; catfish 7,800,000 pounds, $347,000; sturgeon 250,000 pounds, $8,300; suckers 3,275,000 pounds, $100,000; and wall-eyed pike 243,000 pounds, $15,000.

Pearl Fishery

One of the most fascinating, uncertain, and needlessly destructive branches of fishing is that for pearls, which is sometimes enormously profitable, although the average income is so small that few persons would engage in it were it not for the possibility of finding very valuable pearls. The United States waters do not produce any mollusks comparable with the oceanic pearl oyster in pearl-bearing qualities; but in the fresh waters of nearly every State there are mussels which produce more or less valuable pearls.

About every ten years a new wave of interest arises in connection with fresh discoveries of pearls at some point where the shells have lain long undisturbed; it again absorbs the attention and excites the imagination of the community around and spreads to other parts of the country; a fresh campaign of ignorant extermination is carried on for several summers, then the yield is exhausted, and there is nothing more but to leave nature to recuperate, if possible, and slowly to restore, in limited amount, the abundant life that has been destroyed.

In the reports of the United States Fish Commission it is related that in 1897 the pearl fever broke out in various parts of the country, the particular scene of discovery and excitement being the hitherto undisturbed streams and bayous of Arkansas. These waters teem with mussels, and pearls have at times been found by the rural population for years past; but there has been, usually, no knowledge of their nature or their value. They have been simply regarded as "pretty stones," and used as playthings by the children—like the first South African diamond, which attracted the notice of a trader in 1866 as he saw it in the hands of the children of his Boer host at the Vaal River.

Several valuable pearls, however, were found in 1897 by persons from St. Louis and Memphis, who at once sent them to those cities and ascertained their value. The same persons then searched for more, and took steps to lease the land where pearl-bearing shells were abundant. Ere long the facts became known, and a wild excitement set in and spread through large portions of Arkansas, extending into Missouri, Kansas, and the territory of the Choctaw Nation. The first important discoveries were on small lakes or bayous formed by affluents of the White River in White County. The subsequent activities prevailed along the general valley of the White River and its branches, then on the Arkansas, the Ouachita, and the Black, Cache, and St. Francis Rivers, thus affecting almost all sections of the State. In one district an entire lake was leased, guarded and fenced for its pearl contents alone.

The newspapers took up the subject and published highly sensational accounts of the treasures to be had in what was widely proclaimed as "the Arkansas Klondike." These articles were copied all over the country, and led to a great amount of pearl-hunting in many States, both East and West. Iowa, Tennessee, Georgia, New York, and Connecticut were all more or less stirred up to activity. The former pearl region of Tennessee was less affected than a new section in the eastern part of the State, along Clinch River, where great crowds searched for pearls, and large quantities were obtained. The Georgia interest was chiefly along the Oostenaula, near and above Rome. The New York activity has been in the northwestern angle of the State, along Grass River, in St. Lawrence County. Connecticut has yielded some good results to the searchers on the Mystic and the Sheprang Rivers, at almost opposite ends of the State.

Some pearl-hunters are professionals, but the majority are farmers, laborers, or persons engaged regularly in other branches of fishing.

The usual method of removing pearls is to forcibly separate the valves of the mussel. Inasmuch as the mussel is thus killed, whether or not it contains a pearl, the waste is enormous. Some fishermen crush the shells, and some pile the mussels in a dry place to die and decay—the Oriental method of opening the true pearl oyster. It is possible, however, to gently open the valves with a pair of tweezers and disclose the presence or absence of pearls, and to return the mussel to the water alive and uninjured.

Only a few approximate figures concerning the yield of pearls can be given. The total production of pearls may be summed up as follows: In the 1868 excitement, $50,000, worth to-day at least four times that amount; in the 1868 excitement, $50,000 worth; in the 1889 Wisconsin excitement, perhaps $300,000 worth; the Tennessee fisheries, $100,000; Kentucky, $20,000; Texas, $20,000; Arkansas produced pearls in 1897 of a total value of $35,000, some selling for over $1,000 each, and many for over $100 and $200. In 1901, the value of the pearls from the upper Mississippi River was reported to be nearly $200,000; the selling price of some of the individual pearls was from $500 to $1,600.

The great importance to a rural population of obtaining ready money easily by pearling can not be overestimated, the pearlers being aided in the payment of taxes, interest, and for such things as only money will buy; and the protection of the pearling interests is, therefore, very desirable, as the industry, if properly regulated, yields a product which can always be sold for cash.

Mussel Fishery

The gathering of mussel shells, to be used in the manufacture of buttons, is one of the newest and most interesting fisheries in the Mississippi basin. Originally quite local, the fishery has spread up and down the river from Iowa, and now extends from Wisconsin to Arkansas. Although the business of manufacturing buttons from the shells of our native fresh-water mussels is of quite recent origin, it has already attained comparatively large proportions, especially in the Mississippi River, and seems destined to have still further growth, provided adequate protection is afforded to mussel beds, which on account of the comparative shoalness of the water are readily accessible and liable to rapid depletion.

The mussel fishermen in the region under consideration, according to investigations made by the United States Fish Commission, are mostly people who have been engaged in other branches of fishing, or who, as boatmen, are familiar with the river. Many of them depend on mussel fishing for their livelihood, and follow it throughout the year, but others seek mussels only when their regular work is suspended. Thus, in winter especially, the ranks of the regular mussel fishermen are considerably augmented by saw-mill hands, farm-hands, and others.

The number of regular mussel fishermen along the Mississippi and its tributaries now reaches several thousand, most of whom are in Iowa and

Illinois. As many of the fishermen have no premanent headquarters, but move from place to place, it is difficult to obtain an accurate statement of their number.

In view of the small amount and inexpensive character of the apparatus (rakes, scrapes, etc.) required to prosecute the fishery, the comparative ease with which the mussels are taken, and the little experience required, mussel fishing is regarded with favor by many, as they are readily able to get their catch to market and dispose of it, receiving cash in payment. When they find a good mussel-bed they sometimes make thirty dollars or more per week. The average earnings, however, are considerably less, at this time probably being less than ten dollars per week. Some days two or three dollars will be made, but inclement weather prevents fishing and reduces the average.

The prices which the fishermen receive for shells vary considerably, depending on the supply and demand. The size and kind of the shells also affect the price. The standard shell is the "niggerhead." In 1897 the market value of this species in Muscatine ranged from forty to sixty-two cents per hundred pounds. Shells were cheaper in 1898 than at any previous time, but in February, 1898, there was a scarcity of shells at the factories, prices went up to $18 and $20 per ton, and many fishermen were thus induced to enter the business for the first time, and the supply was soon in excess of the demand. By July, 1898, the prices had fallen as low as thirty cents per hundred pounds for small "niggerhead" shells and thirty-five cents for large ones. The quantity of mussel shells taken by the fishermen and sold to the button manufacturers now amounts to 5,000 to 10,000 tons annually, valued at $60,000 to $100,000.

The Lobster Fishery

The lobster fishery is prosecuted to a greater or less extent in all the States on the Atlantic Coast from Maine to Delaware, but nearly seventy-five per cent of the total annual yield is from the waters of Maine.

The statistics show that the total yield in 1880 was 20,128,033 pounds, valued at $488,871, and in 1889 it was 30,771,573 pounds, valued at $861,297, an increase of 10,643,540 pounds in quantity and of $372,426 in value. There has since been a great reduction in the quantity of lobsters annually produced, but the value has been constantly increasing. In 1898 the total yield was 15,188,062 pounds, valued at $1,318,299, a decrease, as compared with 1889, of over fifty per cent in quantity and an increase of over fifty per cent in value.

The greater part of this decrease in quantity has occurred in Maine and Massachusetts. From 1889 to 1896 the lobster yield of Maine declined about fifty-five per cent in quantity, while it increased about seventy per cent in value. In Massachusetts there has been an almost steady decline in the yield since 1880. In that year the catch was 4,315,416 pounds, valued at $158,229, and in 1898 it was 1,693,741 pounds, valued at $147,-

602, a decrease of 2,621,675 pounds, or sixty per cent in quantity, and of $10,527, or about six per cent, in value.

As this industry gives employment to at least 4,500 persons, and represents an investment of fully $1,660,000, the continued decrease in the supply is occasioning deep concern and demands very active measures to restore this valuable commodity to its former abundance. The decline has been brought about by overfishing, fishing at all seasons, catching lobsters of all sizes, and sacrificing the extruded eggs, which are carried on the mother-lobster for months. The measures which will lead to the re-establishment of the lobster are the more rigorous enforcement of the law and more extensive artificial propagation on the part of the government.

The Oyster Fishery

In the preceding chapter reference was made to the extent and importance of the oyster industry. The oyster, besides being the most valuable of our fishery products, is also the most generally distributed. Oystering is carried on in every coast State except Maine and New Hampshire, and the oyster is the leading object of fishing in most of the States on the seaboard, in some being more valuable than all the other species combined.

Efforts to acclimatize the Eastern oyster on the Pacific Coast have been successful in places, and a large part of the oyster crop from San Francisco Bay now consists of the transplanted stock.

A fact of far-reaching importance in connection with the oyster industry is that the product is readily susceptible of cultivation, and each season shows a larger proportion of the supply taken from planted grounds. The oyster exemplifies more strikingly than any other fishery product the feasibility of successful water-farming. Under wise laws for the encouragement of oyster planting, some of the States have ceased to pay any attention to the natural oyster grounds and now depend entirely on their cultivated stock. Conspicuous examples of the success of the oyster industry under the modern régime are afforded by New York, Connecticut, and Rhode Island, which have increased their oyster output three to five times as a direct result of artificial measures. Strange to say, some of the States which have the most vital interests at stake are neglecting measures known to be beneficial, and continue to depend largely on the natural supply of oysters, which is surely becoming exhausted.

The Sponge Fishery

The sponge fishery of the United States presents the interesting antithesis of an industry restricted to the single State of Florida, and a product perhaps more generally employed and having a wider range of usefulness than any other article yielded by the American fisheries. There is scarcely a civilized habitation in the country in which the sponge is not in almost daily use. Besides its very general employment for toilet purposes, it is utilized in many other ways—in the arts, trades and professions, and in domestic life.

The merchantable sponges of the waters of Florida are named by Dr. Hugh M. Smith, of the United States Fish Commission, under five heads—the sheepswool or "wool" sponge, the velvet sponge, the grass sponges, the yellow sponge, and the glove sponge, of which the first-named is by far the most valuable.

About one hundred registered vessels and two hundred unregistered vessels and boats are employed in the fishery, which, with their outfit, are worth about $260,000, and are manned by upward of 1,400 fishermen. While many of the fishermen are white, a large proportion are negroes from the Bahama Islands.

Sponges are by far the most important of the fishery products of Florida, representing about one-third of the annual value of the fishing industry. In the calendar year 1895 the Florida sponge fishery yielded 306,070 pounds of sponges, of which the value was $386,871. The catch in 1896, as represented by the purchases of the wholesale buyers, who handled practically the entire output, was 234,111 pounds, having a value of $273,012. In 1897 the product was 331,546 pounds, valued at $284,640; and in 1899, 304,400 pounds, which sold for $367,914.

Key West and Tarpon Springs are now the only ports at which the cargoes of sponges are discharged and sold. At the former place, in 1899, there were eight purchasing firms and at the latter six, two firms being represented at both places.

Key West is the headquarters of a large fleet of vessels and boats employed in sponging about the keys and on the grounds off the west side of Florida, and is the exclusive market for the sponges taken on the southern and eastern coasts, although receiving a good proportion of the crop from the grounds to the northward. Tarpon Springs is very conveniently located in the proximity of the important grounds off Rock Island and Anclote Keys, from which the largest quantity and best quality of sheepswool sponges come; and the prominence of the place as a sponge centre has been increasing from year to year.

In 1895 the value of the sponges purchased at Tarpon Springs was only $60,000, or less than fifteen per cent of the total value of the sponge crop of that year, while in 1899 the Tarpon Springs trade amounted to over $230,000, or more than sixty per cent of the aggregate value of the output.

The sponge fishery is very uncertain, in that its success depends largely on the prevalence of calm weather and the clearness of the water. Rough weather or turbid water prevents the fishermen from plying their calling and entails heavy losses. The sponges are gathered by means of long-handled hooks, with which the sponges are secured and torn from their attachment on the bottom. The exhaustion of the shoaler grounds and the serious depletion of many of the deeper grounds have induced the Fish Commission to undertake experiments with reference to the cultivation of sponges, either from eggs or from cuttings.

The Whale Fishery

No other fishery prosecuted on the high seas has undergone such a remarkable decline as has whaling, which early engaged the attention of the American colonists and at one time was the leading fishery enterprise of the United States. The decline has been due partly to the substitution of lower priced mineral and animal oils for whale and sperm oils, and partly to the decreased abundance of whales. Even as late as the outbreak of the Civil War, 514 vessels of 158,000 tonnage were engaged in the United States whale fishery; by 1871 the fleet had dwindled to 218 vessels, by 1881 to 161 vessels, and by 1891 to 92 vessels. In 1901 only 40 whaling vessels, of 9,000 tons burden, carried the American flag; 11 of these were large steamers, 16 were barks, and 13 were schooners.

For many years New Bedford was the leading centre of the whale fishery, and this place is still the nominal home port of more whalers than sail from any other city; practically, however, San Francisco has for a long time been the headquarters of this industry, having an important local fleet as well as being the rendezvous of some of the New Bedford vessels. Fifty years ago the whaleships owned in New Bedford would have made a line more than ten miles in length, and 10,000 able-bodied sailors were required to man them; now this port has only 22 vessels. The disposition of the remainder of the fleet was 13 vessels at San Francisco, four at Provincetown, and one at Boston.

Whaling now is not involved in the glamour or romance which characterized the whale fishery of early days; but it is still one of the most exciting, hazardous, and important, and at the same time most uncertain, branches of the fisheries. A single voyage of a single vessel may make or mar the owner's fortune. During recent years, some vessels have made long cruises without killing a single whale; while others have taken many whales and brought home products whose aggregate value was almost fabulous. One of the most remarkable voyages in recent years was that of the steamer *Mary D. Hume* in 1890-92. She sailed April 19, 1890, and returned to San Francisco September 29, 1892, having passed two winters in the Arctic Ocean at Herschel Island. During this time the vessel killed thirty-eight bow-head whales, valued at $400,000. The share of the captain was about $35,000, and that of each of the crew from $1,000 to $2,000.

The most productive whaling grounds are the North Pacific and Arctic Oceans, although the old grounds in the Atlantic continue to be resorted to by a considerable fleet. In 1901, the Atlantic fleet of sperm whalers had a fairly successful season, the catch of twenty vessels reaching 12,550 barrels of oil. The barks *Caton* and *Sunbeam* secured 1,000 barrels each during the summer cruise, and smaller vessels took from 300 to 500 barrels each. Five vessels cruised in the Japan and Okhotsk Seas, and secured about 4,000 barrels of sperm oil. The fishery for right whales is confined to the northern seas, and is followed by the vessels sent out from San Francisco. The 1901 season was very unsatisfactory, the catch being the smallest for many years. Only forty-three bowhead whales were taken in the Arctic, against eighty in the previous year, and only thirteen right whales against fourteen in 1900. The aggregate yield in the North Pacific and Arctic in 1900 was only ninety-four whales, the take in the previous year being 140. The product of nineteen vessels was 6,000 barrels of oil and 188,000 pounds of bone.

The prices of the whale products vary much from year to year. Of late, whale oil has been worth about thirty-seven cents per gallon, and sperm oil 50 cents. The value of bone has fluctuated to a remarkable degree. In 1861, the average price was sixty-six cents a pound, while in 1891 it was $5.38 a pound. During 1901, about $2.50 was the average price.

Nearly every State and Territory is represented on the whaling vessels, and a large proportion of the crews are of foreign nationality. Canada, every European country, Africa, China, Japan, Hawaii, and the South Sea Islands contribute their quota and give to the whale fleet an exceedingly cosmopolitan make-up. All sorts and conditions of men drift into this fishery, and many of them are without experience, not only in fishing, but in any other maritime enterprise. Consequently, to many, perhaps most, of them only small pecuniary returns come, even after a fairly successful cruise; but to those who are experienced, industrious, and temperate, whaling is still a remunerative occupation and affords opportunities for the exhibition of the greatest bravery, hardihood, and seamanship.

Miscellaneous Fisheries

Among the important fisheries restricted to certain sections or addressed to a single species are the whalebone fishery of the southern California coast, mostly in the hands of the Chinese; the shrimp fishery of California, also controlled by the Chinese, who dry their catch and export it to China; the hunting of diamond-back terrapins in the salt marshes of the Atlantic Coast, the toothsome diamond-backs having become so scarce that large ones sell for more than $100 per dozen; the turtle fishery of the Florida Keys, the green turtle being sought for food and the hawksbill turtle for its shell, which supplies the tortoise-shell of commerce; the killing of fur-seals, under government supervision, on the Seal Islands in Bering Sea; the hunting of alligators in the Gulf States; the gathering of Irish moss in Massachusetts; the pursuit of the walrus and the sea-otter in Alaska, the latter furnishing the most valuable of all pelts; and the hunting of the musk-rat and fresh-water otter.

PART III

THE PROFESSIONS

CHAPTER I

THE ENGINEERING PROFESSIONS

Engineering as a Profession—Achievements of Engineers—Classification of Engineering —Specialization in Engineering—Engineering Schools and Employment for Graduates —The Training of an Engineer—Conditions of Success in Engineering—Earnings of Engineers—Engineers as Business Men—Institutes of Engineers—The Surveyor—The Civil Engineer—Railroad Engineering—Structural Engineering—Municipal Engineering—Sanitary Engineering—The Mining Engineer—Qualifying as a Mining Engineer —Mining Schools—The Mechanical Engineer—Qualifying as a Mechanical Engineer —Mechanical Engineering Schools—Steam Engineering—Gas Engineering—The Electrical Engineer—Qualifying as an Electrical Engineer—Training and Earnings of Electrical Engineers—Telephone Engineering—Marine Engineering

Engineering as a Profession

TO GIVE a broad definition of the word engineer, we may say that he is "one who is skilled in the application of the forces and materials of nature to the uses of man." Of course, there must be as many kinds of engineers as there are varieties of forces and materials to be so applied; and, as we soon discover, there are as many kinds of specialists as there are methods of application, each one dealing with conditions and accomplishing results quite outside the spheres of the others. Thus, of two men trained in the same way, and, it may be, in the same school or college, the one devotes his practical life to the designing of machinery or the preparation of specifications for machines to accomplish given ends, while the other turns his attention to the practical carrying out of such designs and specifications, or to devising mechanical means to accomplish the results indicated. In America the general rule is that the first kind of engineer merely indicates the precise requirements in the desired machine, while the second provides the designs for realizing them: in Europe the second kind of engineer acts only as builder, making the machine exactly as designed, without taking the responsibility of adding or subtracting any minute detail, and thus placing the responsibility for its operation entirely on the other's shoulders. In the constant advance and change in engineering methods and devices it is obviously impossible that any technical course should be so inclusive as to prepare the student in the recognized fundamental principles of mechanical or engineering science, and, at the same time, anticipate the advances that must inevitably be made in practice. Thus, unless the engineer keeps himself constantly informed on the progress and current conditions of his calling, as set forth in technical publications and in the reports of professional organizations, he will soon find himself and his methods out of date and inadequate. The same statement holds good for every branch of industrial or professional science. Such means of spreading intelligence of practical results and experimental laboratory work have the additional advantage of saving energy that might, otherwise, be wasted, in only duplicating the work of others.

The result of the demand for the American engineer abroad is that he is more than ever a rover. He is obliged to pitch his tent here to-day and there to-morrow. He finishes his work in South America only to be called at once to India; his work in a Western or a Mexican mining centre is finished, and he starts at once for South Africa. This state of affairs lends to engineering its feature of uncertainty, a feature which has its charm for the young men and is not loved by the older ones. Like the newspaper correspondent the engineer must keep his trunk constantly packed, as it were, for a change of base; he must be ever ready to depart for any corner of the earth. This is especially true of the civil and the mining engineer.

Achievements of Engineers

A brief record of the wonderful achievements of engineers in the last quarter-century would fill many large volumes. In the long distance transmission of power, alone, engineers have revolutionized hundreds of industries; they have made water power a substitute for coal; they have carried electric currents over snowclad mountains; they have opened the interior of Africa to commerce; have connected the Cape with Cairo by bands of steel; have harnessed Niagara; have drained the city of New Orleans, once a seemingly impossible task; have given commerce the most useful canal in the world, the Sault Ste. Marie; have joined Tien Tsin to Pekin by rail; have bridged the great rivers and canons of India; have built American bridges in Burma and constructed a railroad in Corea; have given New York a great water-works, and are now giving to Boston the greatest water-works in the world. Other engineers have just completed the Trans-Siberian Railway. Others are building a wonderful bridge across the East River, connecting New York with Brooklyn; others are cutting a great hole under the City of New York, from end to end, building a railroad therein; others are about to tunnel beneath the North River and beneath the East River to give the Pennsylvania Railroad and the Long Island Railroad each a terminus in New York.

The services of the engineer, indeed, have been the more needed, the higher civilization has grown. Theories become matters of fact, and the engineer is always abreast of the times. In fact, he has received by far too little credit for his place in the march of progress. The conquering prowess of the Roman armies was no more momentous than the records left by the engineers who followed them, in bridges, roads and great aqueducts. Distance is no longer reckoned by miles, but rather by length of time in transit.

The journey from New York to Liverpool is now performed in less than a week; formerly it required thirty days. How many are the monuments of modern engineering skill! To name only a few, there are the St. Louis, Brooklyn and Forth bridges; the Mersey, Sarnia and St. Gothard tunnels; the Manchester and Suez canals.

The tendency of people to flock to great cities presents new problems to the engineer. There are questions of rapid transit, pure water supply, sewage disposal, and public health, for the engineer's consideration. Although the history of industrial advancement may be prosy reading, yet the greatest practical civilizing agent in the world is the engineering profession.

Classification of Engineering

The old-fashioned classification of engineering into two departments is obsolete. The modern divisions are civil engineering, mechanical engineering, electrical engineering, mining engineering, and marine engineering. The next decade may introduce the department of aeronautic engineering. Each of the chief divisions just named is subdivided, and the subdivisions are differentiated into further classifications. For example, civil engineering is subdivided into Railroad Engineering, Structural Engineering, Municipal Engineering and Government Engineering.

Under the first head, or Railroad Engineering, come first steam roads, with the departments of Construction, Maintenance, Yards and Terminals, and Signalling, and secondly, electric roads.

Under the second head, or Structural Engineering, come first, steel construction, with the departments of bridges and roofs, and architectural; secondly, steel imbedded concrete construction; thirdly, city subways; fourthly, inspection of materials; fifthly, sub-aqueous construction, the last being divided again into foundations and tunnelling.

Under the third head, or Municipal Engineering, come, first, city surveying; secondly, water-works, with the subdivisions of storage and distribution, filtration and power development; thirdly, sewerage works, subdivided into conveying system and sewage disposal; fourthly, roads and pavements; fifthly, street cleaning; sixthly, waste disposal; seventhly, improvement of water fronts.

Under the fourth head, or Government Engineering, come, first, river improvements, with the subdivisions of navigation and land protection; secondly, harbor improvements; thirdly, land reclamation, with the sub-classifications of irrigation and drainage; fourthly, geodetic and topographical surveying; fifthly, public roads; sixthly, civil engineering in the United States navy. Government engineering is the term largely applied to the fourth classification, viz., geodetic and topographical surveying, and it is generally performed by graduates of the Military Academy at West Point, although it can not be strictly included with military engineering. There are other subdivisions known as chemical engineering, landscape engineering, and social engineering.

Specialization in Engineering

As in all professions, all trades, all callings, the man who becomes recognized as a specialist in engineering earns the most money. A general civil engineer, or a general mechanical engineer, having attained the rank of chief, may of course earn his $10,000 a year, but the civil engineer who makes a specialty of bridge building, or of the construction of waterworks, earns more than he who has adopted no particular specialty but who builds canals to-day, constructs bridges to-morrow, and lays out a town the next day. The same in mechanical engineering. The engineer who is most expert in a certain kind of machinery earns more than the man who undertakes to build any kind of machine as the opportunity offers.

Engineering Schools and Employment for Graduates

Through the influence of technical schools engineering has become scientific instead of traditional. The introduction of the laboratory method of instruction has much to do with this advancement, America leading the world in this branch of teaching, and rendering study abroad quite unnecessary. The curriculum of the engineering college now consists of 10 per cent of English or modern foreign languages, 30 to 40 per cent of indirect technical studies, such as mathematics, physics and drawing, with 50 to 60 per cent of purely technical work. The tendency is to make the engineering courses entirely professional. There is a general effort to force back some of the indirect technical subjects, such as advanced algebra and trigonometry, into the preparatory schools. In the post-graduate departments of the leading institutions only one quarter of the students are in engineering.

The graduates of engineering courses in the various institutions of the country numbering about two thousand a year, the question arises how they shall all find employment. Mechanical engineering leads in the number of its graduates, with civil and electrical engineering coming next, and mining engineering taking the last place. There need be no anxiety among youthful engineers, however, as the demand for graduates is very great, far exceeding the supply. It is a good thing for these young men to be thrown on their own resources, as the vast majority of them are. So keen is the competition and so various and exacting are the demands of the present day, that specialization seems to be indicated as almost the only way in which to obtain distinction for most young engineers.

The Training of an Engineer

At college the young man acquires simply a knowledge of fundamental principles. He learns mathematics, of course, and the principal facts which form the basis of the processes in other branches of the profession. He learns that the electrical engineer, for example, must have a knowledge of the work of the civil, mechanical and mining engineer. Then he learns the strength of materials and their behavior under varying conditions of temperature and moisture; learns the laws of physics; learns the elementary rules of geology, chemistry and electricity.

Having studied many branches of the profession, he is able by experience to determine just what kind of knowledge is most valuable to him in the division, or the specialty, which he has chosen as his life work. But he never forgets that prime requisite of a modern engineer—formulæ. Unless he knows exactly which formulæ he needs at a certain time and where to find them and how to use them, he will never achieve success in his profession.

The cost of the training of a young engineer is no more than that of the young man studying for any other of the professions; that is, the cost of the regular college course, which is usually about $4,000 for the four years at college.

Once graduated, the young engineer has advantages not generally possessed by the lawyer or the physician fresh from college; that is, the young engineer can probably find work at once at which he will earn from $40 to $60 a month, while the lawyer or the physician must spend several years of work in a law school, office or hospital without pay. But it is said that because the young engineer can at once earn a salary he does not so soon acquire the habit of independence as does the doctor or the lawyer. The young member of the bar, or the young medical practitioner, hangs out his own sign and, according to the traditions of his profession, starves, if necessary, while waiting for clients or patients. The engineer, on the other hand, having a salary at the outset, is lacking in that courage necessary to face the unremunerative period that must precede his establishment in independent practice.

Conditions of Success in Engineering

What are the qualities that bring success in the engineering profession? First, and above everything, accuracy. The fact that to make mistakes is human is not recognized among engineers. While at college the embryonic engineer might make an error in a calculation during a blackboard demonstration. Such an error merely meant a low mark instead of a high one, and continued errors simply meant more low marks. Such mistakes involved no loss to capitalists, no interference with the work of a contractor. But when the practicing engineer makes a mistake the result is serious. An error in a calculation now means loss of money and time for the men who are furnishing the capital for the enterprise, and a few such errors mean the complete ruin of the engineer.

There is one phrase in the engineering world which the engineer dreads as much as the soldier dreads the word "cashiered." This is "constitutionally inaccurate." Once this phrase has been applied to an engineer for cause, the future has no hope and he might as well abandon his career; inaccuracy in engineering is a defect for which there is positively no excuse, a vice for which there is no known cure. An engineer must conform to the highest standard of his profession or his usefulness ceases. A doctor's patients may die, a lawyer's failures are overlooked, but a blunder on the part of an engineer is something material and tangible, and such blunders do not allow others to forget the man whose failure remains thus permanently in evidence.

Earnings of Engineers

The American engineer earns, as a rule, a great deal more money than the foreign engineer. He can earn a salary at once, while his brother in England or Germany is obliged to pay for the privilege of working under the direction of a distinguished engineer, in a factory, a shipyard, or a mine.

The engineer in this country leaves college, say, at the age of twenty-two. After eight years of practice, if he is destined to be successful at all, his income will be sufficient to keep a large number of wolves from the door. There are many competent engineers employed in the maintenance of way or motive power departments of railroads, who at the age of thirty earn $50 a week. At this age, it may be supposed that they are just getting the first firm foothold in their profession. Their headway after that is usually very rapid. Railway engineering, it should be added, is perhaps not so well paid as some other branches of the profession. Many mining engineers at thirty earn twice as much as the railroad engineer.

The highest salaried man in the engineering profession is the chief engineer engaged on a great public work. His salary is perhaps $10,000 a year, though a few earn considerably more than that. The highest rewards in this profession, of course, are represented by fees paid to those who are practicing independently.

Engineers as Business Men

The nature of his training fits an engineer for commercial life. A great number of corporations, especially those which manufacture machinery or mechanical devices, employ mechanical engineers as salesmen. This is a lucrative field for the young man who has not the courage to enter upon the practice of his profession independently. In the electrical world, the less studious or scientific engineer can find ready employment in negotiating contracts for manufacturers. For this work engineers are often paid even higher salaries than are usually paid for purely technical work.

Another field which an engineer may enter with success is that of the contractor. He either becomes an independent contractor or secures employment with an established firm. This field is becoming yearly more popular with engineers; first, because their professional standing is not impaired, and, because of the opportunity to add comparatively large sums of money to their professional earnings. The engineer-contractor, as we may call him, has the advantage of the ordinary contractor in that in addition to his business training, he brings to the enterprises intrusted to him that technical knowledge which the ordinary contractor lacks.

Institutes of Engineers

Every young engineer desires to become, as soon as possible, a member of one of the five leading engineering societies, namely:

The American Institute of Electrical Engineers, which has 1,350 members, the entrance fee being $5 and the annual dues $10 for associates and $15 for members.

The American Institute of Mining Engineers, the membership of which numbers nearly 3,000, the annual dues being $10.

The American Society of Civil Engineers, 2,500 members.

The American Society of Mechanical Engineers, which has a total membership exceeding 2,000; initiation fee, for associates, $25; for juniors, $15; annual dues for members and associates, $15; for juniors, $10.

The Society of Naval Architects and Marine Engineers, which has nearly 300 members, the entrance fee being $5 and the annual dues $5.

No other profession requires so high a qualification for membership in its national societies as does engineering. It is a coveted distinction, only given as the reward of merit. In England, membership in such societies takes the place of diplomas. The position of the engineering profession with regard to degrees is very high. The degree of C.E. or E.E. does not count with engineers as much as an M.D. for doctors or an LL.B. with lawyers. It carries a presumption, perhaps, but very little weight. Experience is necessary for the making of an engineer, no matter how thorough his preliminary training may have been. Natural aptitude is presupposed.

The Surveyor

The profession of civil engineering has as its simplest exponent the land surveyor, whose work is to measure tracts of land, determine boundaries and topographical features, and to prepare maps setting these forth. Every surveyor is not a civil engineer, but every civil engineer must understand surveying. This work, although involving skill in the use of several delicate instruments and a good knowledge of some branches of mathematics, is a simple matter readily mastered.

In former days there was a class of surveyors distinct from engineers. At the present time this distinction is disappearing, although many engineers find that the bulk of their work consists in surveying. Such are generally those who are located in country districts where there is not much construction work. The earnings of surveyors are usually very small. Their work is principally making surveys of pieces of land, dividing up land into lots, and, in the government lands, laying out township lines. Very few graduates of civil engineering schools are exclusively employed as surveyors.

The Civil Engineer

The profession of civil engineer is more than an extension of surveying. It demands an extensive knowledge of higher mathematics and mechanics;

also ability to grasp situations, so as to lay out towns, railroads and public works in general, also to design bridges, breakwaters and such other constructions as require special adaptations of principles to suit natural conditions. Although every civil engineer is supposedly able to discharge any of these functions, the profession is at the present time subdivided into a number of distinct specialties, determined by the study and experience of the operator within some limited field of work. Thus, one man so specializes his efforts that he establishes a record as a bridge engineer, becoming either a consulting specialist or occupying a remunerative position with some construction company. His training and experience enable him to grasp the requirements of each bridge situation; to determine the kind of structure required, and to design it accordingly. The conditions of bridge building vary so greatly that the services of a specialist are often required, to design a bridge utterly different from anything previously built. The business of a railroad engineer frequently involves the problems of bridge building, in addition to which are those of laying out and constructing a road capable of fulfilling the requirements of modern railroading, with its heavy trains and high speeds, also of choosing courses, so as to avoid, as far as possible, heavy grades and costly bridges or tunnels. Indeed, most of the problems confronting the laying-out engineer, or the one regularly employed on the finished road, are such as to demand special experience of long duration.

Again, the modern conditions of life in towns and cities have given rise to another distinct profession, that of municipal engineer, who is concerned with the practical problems of laying out streets, planning and conducting the construction of public works, such as parks, sewers, etc., with a view to combining economy in expenditure with durability of construction.

Yet again, we have the calling of hydraulic engineer, who is concerned principally with designing and executing water supply and power systems; with improvements in canals, harbors and rivers; with the problems of irrigation, so important in agriculture in some sections, and with the proper installation of hydraulic machinery.

It may easily be seen by the young man that civil engineering offers a field for activity and usefulness that is unsurpassed. Its responsibilities are great, no doubt, but so are its opportunities. It is well for him to secure the advantage of training in a good technical school, so great is modern competition.

The standards in these schools have been much advanced with a corresponding elevation of the standards of the profession. The young engineer should realize the fact that he must be a man of affairs as well as a mathematician, that he must have judgment as well as education, that he must be ready to plan for the future as well as to absorb the past.

Railroad Engineering

The field of railroad engineering has not by any means been exhausted. Apart from the opening of new roads, which in itself may not be so great a branch of activity as in the past, there are countless opportunities for the young engineer. Every year great sums of money are expended by the leading roads in the reduction of curves, the levelling of grades, and the shortening of distances. Improved safety appliances are constantly introduced and adopted. Yards and terminals are put in better condition. Grade crossings are abolished, existing lines are being double-tracked or quadruple-tracked. Spur lines and feeders are constructed.

Graduates of technical schools are generally preferred in the engineering departments, when it is the question of employing new men. These beginners get from forty to sixty dollars a month at the start. In these departments the organization, of course, varies with the different railroads. Many roads have separate departments for construction and maintenance of way, while on others they are united in one. Engineers naturally find the construction department the most interesting. Still, the work in it is much harder. And service in it is apt to last a shorter time, for at the first sign of general business depression, economy or complete stoppage follows in the construction department, throwing out of employment many engineers, just at a time when they find it difficult to secure work elsewhere. But even if young men are thus forced at times to leave railroad service, the engineering experiences and discipline there gained are of vast benefit to them.

In the maintenance of way departments positions are much more secure, leading, on most roads, to promotion, even to the very highest offices in the service. Looking at the various steps in promotion, we see that positions as assistant supervisors are generally filled from the list of those who have served several years on construction. The assistant supervisors get from seventy to seventy-five dollars a month. The next step is the position of supervisor, at a salary ranging from ninety to one hundred and twenty-five dollars. Next comes, after five or six years more of service, the place of assistant engineer, or roadmaster, bringing to the incumbent from one hundred and twenty-five to one hundred and fifty dollars a month. The next place is differently styled on different roads as principal assistant engineer, superintendent, or division engineer. In this the salary runs from two hundred to three hundred dollars a month. Among the higher offices next in order are general superintendent, engineer of maintenance of way, —sometimes known as engineer of roadway or superintendent of maintenance—chief engineer, general manager, vice-president and president.

The young man who is afraid of hard work, long hours, and, at first, rather small pay, would do better to stay out of railroad engineering. Yet, to one fond of an active and energetic life, the work has the strongest fascination, in that it presents so many difficulties to conquer, and affords such opportunities to exercise authority as well as to obey orders. Good work in railroading always breeds enthusiasm.

The ambitious railroad engineer should possess perfect health, in order that he may stand the wear and tear of his profession. Energy, self-reliance and determination must be predominant in his mental make-up. Executive ability will aid him greatly. Overtime work will be the rule, at first, and personal ease will have to be forgotten. And yet, in no branch of industry will a man be treated with more absolute fairness, and he will always find gentlemen as his associates. If he is properly qualified he will find his work of never-failing, but constantly augmenting, interest. Good habits and a presentable appearance are presupposed to exist.

The elimination of cut-throat competition, by the vast consolidations now so much in vogue, may reduce the number of high positions in the railroad service, but it does not follow that engineering positions are reduced, either in number or in salaries. In fact, to attract better men, the salaries tend upward.

Such is the expansion of railroad interests that some of the universities are beginning to shape their courses with reference to the needs and opportunities of railroading. The very highest degree of efficiency is demanded by the modern railroad. Safety must be combined with speed, and technical knowledge is required in many branches of the service. So the universities, in some instances, notably Purdue, have offered chances for study in a number of railway subjects, forming practically a department of railroad engineering.

The astonishing results in reducing the cost of transportation during the last generation are a promise of greater things to come. The lowering of freight charges has enabled us to export products of our farms and factories to the extent of $1,500,000,000 a year. Engineers will devise future improvements, reducing the cost of construction, maintenance and operating, and thus the cost of transportation will be still further lessened. For example, an angle-bar, making the joint as durable as the rail, is bound to come, as well as a cheap method of permanently preventing the oxidation of iron.

Structural Engineering

The graduate of an engineering school who aims to specialize as a structural engineer often begins in the draughting-room of a bridge company, or with a consulting engineer. In the former case he is thrown with other young men in the same line, and reaps a benefit therefrom. From the older men he may learn much. In the shops which he visits, he receives object lessons from up-to-date materials. He does not get more than from fifty to sixty dollars a month, at first; perhaps seventy-five, after a year's service.

The first thing he should do is to pitch in and get a reputation for accuracy. He will then be given the drawings of others for "checking," or verifying. Not the slightest error must be permitted to pass by the "checker." The position is thus a responsible one, but is fertile in opportunities for gaining a knowledge of details. A service of from two to four years is enough for a bright man in a draughting-room. The salary there hardly ever exceeds one hundred and fifty dollars, about one hundred and twenty-five being considered fair, for experienced workers.

Promotions to the next grade, the estimating department, are not easily obtained. If too long delayed, the young engineer may seek a place in the erection department, or in the field of inspection. To the estimating department only very well equipped men are taken. And a service of from three to five years is necessary to become an expert at estimating. Such experts are paid from one hundred and fifty to two hundred dollars a month. Many men never get above this level, but notable ability promotes others to the positions of contracting agents, chief engineers, and managers. At this stage the ambitious young man is apt to start a business of his own, as organizer of new works, or as general contractor, or consulting engineer.

Bridge companies generally maintain regularly organized erection departments, which are fine schools for young engineers, giving them great opportunities for original work.

The inspection of materials, for steel mills and bridge shops, is generally done by private firms, charging so much a ton, the prices being previously arranged, and inspection during the building of a bridge often being included in the contract. This branch also affords him opportunities for gaining coveted experience. Successful "inspection" requires a liberal allowance of tact and common sense, the interests of the employer being faithfully conserved, while the "shop" is not unnecessarily antagonized. The inspector who is finicky and captious will not succeed, as he will offend both parties. As a rule, the less the experience, the more the captiousness and fault-finding. In this special branch of the service many men establish themselves permanently, and make a good income out of it.

Bridge departments are maintained by the chief railroads. In these, an additional experience of great value may be gained. Their own structures are designed by many roads, and erected and inspected as well. Observation of wear and tear of material is also greatly facilitated by service in this field. Inspection and repairs are constantly demanded.

In structural engineering new fields have been opened by the "steel skeleton." Engineers are taken into consultation by architects of such buildings, the engineers looking after the foundation and the steel framing. The growth of structural engineering marks the modern industrial prosperity, affording an unprecedented demand for experienced men.

Municipal Engineering

Although the civil engineer of to-day is largely concerned with the design and building of structures and machines, yet his profession includes a far broader field. Very frequently, civil engineers are elected in great cities to high public offices, in which they may exercise a general supervision over important municipal improvements, securing to the citizens the best scientific results, and saving the town much expense. For the discharge of these administrative duties the civil engineer is well fitted by the broadness of his training. It is of necessity based upon truth, and upon the practical. Every error in engineering being checked by immediate and open failure, juggling, sophistry and deception are completely eliminated. The business ability of civil engineers is frequently developed by the necessity which falls to their lot in the management of men. Tact and skill in direction are thus evolved. The very truthfulness of the basis of all their scientific efforts cultivate and produce the highest moral tone among civil engineers.

Municipal engineering includes many heterogeneous elements. In engineering offices the deleterious influence of politics is largely eliminated, civil service requirements assisting in this good work. In fact, city engineering officials are rarely the subjects of justly adverse criticism. Competent and honest men generally fill the higher positions. The young graduate should look upon a municipal position as a valuable school of experience, not considering too much the salary or the shortness of the hours of service. To gain the position of consulting engineer on municipal problems is a high ambition. In connection with water supply and sewerage such a position is particularly desirable, being generally given only to those of marked ability.

The nineteenth century city will have to be made over—reconstructed—and it will be done by engineers, architects, and scientists. An unprecedented ratio of increase is observable in the population of cities, and even modern appliances and inventions are hardly keeping pace with it, in spite of their extraordinary strides. A description of the Chicago of the future, for example, if it could be made to-day, would doubtless appear an extravagant dream.

Sanitary Engineering

A special course in sanitary engineering is offered at many of the universities. By this the student is prepared to undertake the problems peculiar to city life. These include the water supply, sewerage, paving, parks, and so forth. Instruction in civil engineering constitutes the first part of this course, as the underlying and basic principles are the same in both.

At some colleges and universities, among them Columbia, special studies in sanitary subjects are substituted for the higher structural and mechanical departments of the profession. Especial features are accentuated. For example, the sanitary treatment of buildings, the care of the public health, and the consideration of the water supply, receive particular attention. A thorough training is given in sanitary chemistry, biology and bacteriology. Studies of the problems of the sanitary adjuncts of modern buildings, the drainage of towns and cities, systems of heating and ventilation, and analysis of water are followed with especial care and thoroughness.

The Mining Engineer

The profession of a mining engineer involves a wide variety of knowledge. He must understand how to prospect for and locate a good mine, whether of coal or metal ore; must be able to judge precisely what kind of working is best suited to the deposit in hand; must be able to assay the ore extracted, so as definitely to determine the value of any vein or seam; and, from his special knowledge of geology, must be able to determine definitely how to follow deposits cut off by faults or breaks. In addition to all this, he must be sufficient of a mechanical engineer to install and superintend the working of modern mine machinery. In this profession, as in every other technical calling, modern science has introduced such vast improvements, and opened up so many departments of new and exact knowledge, that the profits of metal mining have been immensely increased. On account of perfection of metallurgical processes, even the tailings of old mines may now be worked over with profit, while many deposits of metal formerly considered commercially worthless may now be opened with advantage by improved machinery and appliances. Indeed, such is the perfection of theory and practice in modern mining that the operations of only a few years since seem slipshod and crude. The mining profession has also profited by the latest discoveries in sanitary science, lighting and signalling, so that the ventilation and general arrangements of coal and other workings render life and limb as safe in the mines as on the surface of the earth. This profession, in short, is a curious illustration of the widely-inclusive nature of modern specialized knowledge, and also of the wonderful degree of exactitude that may result from the application of a few exceedingly simple scientific principles.

To the young man who contemplates training for any particular profession, the question of its profitableness is one of deep and often disproportionate interest. In reference to the study of mining engineering, this question resolves itself into the more specific inquiry: What are the chances for obtaining a position after graduating from a school of mining engineering? In answer to this question, it may be said that, with the increased development of our mining interests, there is a corresponding demand for competent mining men, and at the present time the profession of mining engineering would seem to offer rather unusual opportunities for brilliant achievements and commensurate rewards. The advancement of any man in any profession depends quite as much upon his character and ability, however, as upon his technical training and his business opportunities.

Qualifying as a Mining Engineer

What constitutes a mining engineer? What are the ear-marks that distinguish him? Does a course of training in a school of mining engineering make him one of the profession? Or lacking the conventional training, is he forever barred from being recognized as a mining engineer? These are questions that are frequently propounded, especially by our mining brethren across the water.

So far, no one has been able to answer them satisfactorily. It would seem, however, to be the consensus of opinion that college training alone can not make a mining engineer. Men whose technical education has been meagre have often achieved so much in a practical way that those whose opportunities have been more abundant can not becomingly show any professional arrogance.

It is curious to see how unerringly a man with a well-developed mining instinct will go straight for a body of ore. No amount of education seems able to supply this instinct, if nature did not bestow it. Many a time has a man of little education, who makes no pretence of being an "engineer," made a commercial success of a mine that an engineer with all kinds of degrees has failed to make profitable.

A writer in the "Mining Reporter" says that an ideal mining engineer should have, besides education and the power to work hard, what New England people call "faculty," and also that quality described by the word "gumption." Of these four qualities, the mining engineer can do very well with only three, but the non-essential quality is neither "faculty," "gumption," nor the power of working hard.

This same writer maintains that, although there is no royal rule by which a mining engineer can be measured, the spurious article is frequently easy to identify. A man who parades around in high boots, flannel shirt, and corduroy suit, using long words where short ones will apply, and trying to make others believe that he is the only one who knows anything about mining, is, in the opinion of this writer, not a mining engineer. He never has been one, and even his chances for becoming one are very slim.

Mining Schools

Many excellent schools are scattered now throughout the country where a young man may be admirably prepared for the practice of mining engineering. No school can turn out finished engineers, but a good institution can fit a man for the ready assimilation of the practical experience he will get in actual work. Some of these schools are connected with State universities and some are independent of all other institutions. Those located near mining camps naturally have an advantage over those more remote from producing mineral deposits, as the opportunities afforded at the former places for practical demonstration of the principles inculcated are necessarily more numerous. When the line of operations for which a school is training its students is the dominant one of the region the advantage is obviously great. If those in control of these operations are in sympathy with the institution and are willing to place the plants under their charge at its service, these plants are truly part of its equipment, and the environment thus becomes a factor which must greatly increase the efficiency of the instruction.

The Mechanical Engineer

The mechanical engineer in latter days has been making the field of productive industry specifically his own. A distinction which has been occasionally made, is that the civil engineer concerns himself with the problems of statics, while the mechanical engineer concerns himself with the problems of dynamics. This distinction, while popular, rather than exact, brings out very clearly the distinction between the functions of the civil and the mechanical engineer in the railroad. The civil engineer may be considered responsible up to the top surface of the railway ties, above this point the mechanical engineer reigns supreme. The system of switches, of signals, the manufacture of rails, and nearly the whole motive power problem and rolling stock problem have been the achievements of the mechanical engineer.

In structural engineering, including the erection of steel buildings and steel bridges, the mechanical engineer, as the person responsible for the production of the steel, has invaded the field which the civil engineer used to claim as his own. The line just here is a difficult one to draw, and its solution is changing year by year.

The invention of machinery for production, and the generation and transmission of power from prime movers, steam engines or hydraulic motors, have been conspicuously the field of the mechanical engineer. We owe to him the invention of the steam engine and its improvement to its present advanced state. We owe to the mechanical engineer the development of the locomotive, the printing press, the power loom, the machinery for making shoes, watches—in fact every labor-saving appliance which has given to America its pre-eminence as a producing country. We owe to him the machinery and the processes for the utilization of steel in rails, beams, armor plate, and the whole field, down to watch springs. We owe to the mechanical engineer the development of the marine engine and the construction of the steel ship in all its relations to the transportation problems of the country.

The power plants of all street railways and lighting installations belong to the mechanical engineer, up to the point at which the armature of the dynamo or generator means the transformation of mechanical energy into the electrical form whereby it is so much more conveniently transmitted. A tendency is manifesting itself, however, to transfer the manufacture of standard electrical machinery into the hands of the mechanical engineer, who is becoming more and more familiar with the handling, control, repair and similar functions in connection with electrical machinery. The electrical engineer is more concerned with the design of these electrical apparatus and less with their management and installation after the design is completed and it becomes a question of their manufacture on the commercial scale.

Two types of mechanical engineers may be mentioned: First, the professional man who works mainly with his head in design as an office practitioner, and second, the executive or administrative type of man who, at the head of important producing concerns, such as manufacturing corporations and firms, is a combination of engineer and business man. The latter is a combination which is peculiar to mechanical engineering, but where it exists it brings the most important results in money and influence.

There is, of course, a third class, which includes the draughtsmen, those putting into practical or concrete form the ideas of others and furnishing them to the practical operators or artisans in charge of shops. These, taking the drawings made from the inventor's ideas, reproduce the conceptions in material forms in iron and steel.

Naturally there is a prejudice in favor of the intellectual side of mechanical engineering in certain directions, but, on the other hand, the importance of the practitioner must not be undervalued. The man who drives a locomotive is not as a rule a professional man, in the sense the word is used above, but on the other hand he must have a distinctly engineering instinct, and must be well qualified by experience to know what his machine can do, and what is to be done in case of possible accident.

Qualifying as a Mechanical Engineer

The strenuous demands for special practical training, coupled with theoretical knowledge of the broadest possible description, is nowhere greater than in the domain of mechanics. The graduated mechanical engineer may be an expert on general theories and the construction and operation of special machinery, but the increasing stream of improved devices in each special branch puts him at a disadvantage in each new line of work he may enter. The same is true of the machinist. He is no longer the general shop worker, capable of operating any and every appliance, but rather the specialist, who understands one machine, or one branch of the work and does nothing else. He is also handicapped by the fact that, while he may understand the working of a given machine, he knows little or nothing of its theory or construction, and is frequently only a machine tender, equally ignorant of all other processes and machines and of the machinist's trade in the broadest sense. While these conditions remain practically unchanged, there is the broadest field for the ambitious and studious man who will take the trouble to work himself up in his line. The old saw that "there is plenty of room at the top" is receiving new exemplifications daily in every branch of industry, while the eminent helps offered by such educational methods as correspondence courses can qualify a man to fill the positions of master machinist, foreman or superintendent. One department of the mechanical industry in which there is a constant and great demand for workers is that of draughting. Not only must every master machinist and mechanical engineer be himself able to design and lay out machinery, but he has constant need of trained assistants who can assist in this line. Only a short time since the public press set forth, as the reason for a serious stagnation in the structural iron work trade, the lack of available trained draughtsmen to prepare the necessary drawings and working plans.

Mechanical Engineering Schools

The leading schools for the training of mechanical engineers are the Massachusetts Institute of Technology, Boston; Columbia University, New York City; Stevens Institute of Technology, Hoboken; Cornell University, Ithaca, N. Y.; the Rose Polytechnic, Terre Haute, Ind.; and Leland Stanford University, in California, under the institutions founded and conducted upon private endowment. The State universities of the Middle, Central and Western States, which have been founded upon agricultural and mechanical foundations, are doing splendid work in this line, and from their conditions and support are destined to do more and better work in the future. The most noteworthy of these are the University of Michigan, University of Wisconsin, Purdue University (Indiana), and the University of Illinois.

Steam Engineering

In former times a steam engineer was one of the best examples of skilled craftsman, who, after serving an apprenticeship and acquiring such knowledge regarding the management, operation and maintenance of steam engines as comes from experience, was awarded a license. He needed very little, if any, technical knowledge, his "practical ability" serving every need of his calling. At the present time, with the rapid advances in all branches of mechanical and industrial science, the distinction between technical and merely "practical," or "rule-of-thumb," knowledge is being largely lost sight of, except for the most subordinate assistants in large engine rooms. In all large plants, as well as in very many of smaller size and power capacity, a thoroughly trained and experienced head is required to direct operations and to see that the requirements of efficiency, economy and safety are properly fulfilled.

According to modern requirements, a chief engineer must possess a wide range of knowledge, including not only complete information on the details of construction, installation and operation of steam boilers, furnaces, engines, and their various attachments and auxiliaries, but also on the numerous details of electrical dynamos and motors; including the wiring and operation of light and power plants, the theory of current generation, supply, measurement and control, and the construction, uses and operation of transformers, switchboards and other necessary apparatus. In almost all cases, also, he must be able to manage and direct the repair of elevator and steam-heating plants, which involves that he must be conversant with their theory, construction and familiar defects. Of course, the proper exercise of such knowledge involves the use of testing and measuring instruments of various kinds for both steam and electric machinery, together with the physical and mathematical principles upon which they depend. At this point, at least, it is evident that the skilled and thoroughly equipped craftsman has attained the dignity of a learned profession, with the ability to command a correspondingly high rate of salary.

In all this we have yet another example of the fact that modern conditions of industry, while tending toward a most rigid degree of specialization, demand intelligent work, and offer the highest inducements to a man of all-around equipment. Despite the rash and ill-founded statements of pessimists and calamity-howlers—these persons represent a thriving and remunerative industry—there is no reason why the worker should be a victim of conditions, while any advantage is at the command of the man who improves his time by training his intelligence and equipping himself for a better understanding of his own calling. This rule reaches even the most subordinate employé, who will readily reap the rewards derived from performing his own simple tasks understandingly.

While it may seem technical and unnecessary, that a fireman should understand the theory of combustion, or that the constructional details of boilers or furnaces should have a bearing on his duties, the fact remains that these things have a vital relation to the economy of fuel in maintaining desired boiler pressures, an item which is of the first importance in large steam plants. If, therefore, a man in this small, though important, office is sufficiently ambitious to acquire the rudiments of this "technical" information, he will undoubtedly reap the reward of his efforts in a speedy raise of pay. The engineer, or any of his assistants, such as oilers or wipers, need not neglect available information on construction or operation, because "it belongs rather to the designer," as some have said, since such knowledge assists them not only to know how to do a thing, but also to know why it is done. The value of a man informed even in the simplest particulars, such as lubrication, for example, will soon be estimated in dollars and cents by his employer.

Gas Engineering

With the practical perfection and increasing use of gas and oil engines in the last twelve or fifteen years, there has actually arisen a demand for a new profession. A goodly number of practical machinists and engineers know little or nothing of the essential operation of this type of motor; many of them being somewhat uncertain as to the real distinction between it and the steam engine. Thus, in coming into contact with a gas engine, in the way of operating or repairing, they seem literally to be facing a mystery. Bearing in mind the fundamental distinction between the two types of power producer—that the steam engine operates through the expansion of a heated vapor produced in a separate generator, the boiler, while the gas engine operates through the explosion, by intermittent heat, of an inflammable gas behind the piston—he will readily understand that there are peculiar physical, mechanical, mathematical and constructional conditions to be met and mastered. A thoroughly competent gas engineer must know something of the laws of gases and the required proportions to produce explosive mixtures of air and gas; must also understand how to compute the conditions met in practical experience, as well as to be familiar with the design and construction of the motor and the numerous delicate and difficult adjustments required. All these things become not only desirable, but imperative, in view of the rapidly increasing introduction of internal combustion engines in all branches of industry, and their undoubtedly augmented importance in the near future. The gas engine is a growing factor now, but its growth has been rapid and nearly unprecedented in the history of mechanics and mechanical appliances.

The Electrical Engineer

Though electrical engineering is one of the newest of branches, the field even now offers so many and such varied opportunities to young men that there is danger of overcrowding the ranks. Almost daily new uses are found for electricity, and every time such new use for this wonderful modern agent is found, more engineers are needed to make it subserve the purposes of man. Meantime the electrical engineer must be reckoned with in almost every industrial enterprise, and in all matters of public improvement, in the lighting of cities, in the running of railroads and in a hundred other respects. Knowing this, an army of young men have rushed into the field, and have adopted electricity in the scientific courses at colleges with a view to becoming specialists and with visions of great wealth and fame.

The young engineer's best chance for immediate advancement, the greatest promise for the near future, lies in the field of electrical engineering. In this comparatively new field, which has expanded so suddenly and so enormously, opportunities have been created so rapidly that it has not always been possible to meet them. Despite the great number of students who, in increasing numbers, in the past few years have entered our colleges to take the special electrical course, the demand for young men thus trained has greatly exceeded the supply. Several young men reached high positions and won a national reputation in their profession within five years after graduation from one school of electrical engineering. One of these young men became the chief engineer of the Niagara Falls plant, the largest electrical power plant in the world; a second became professor of electrical engineering in a great university; and a third, within two years after graduation, achieved the position of chief engineer of a large manufacturing concern. A study of the alumni roll of any of the schools of engineering throughout the country, would show several hundred instances similar to those just mentioned, in which the progress of the engineer has been so rapid that he has reached a place of eminence and a generous salary within five years after graduation.

All of the principal officers and engineers of the electrical companies in this country, the greatest as well as the smallest, are young men who were advanced to such positions before the young lawyers, for instance, who graduated the same year, advanced far enough to be intrusted with an important case. The electrical companies without exception prefer young men who have graduated from one of the electrical schools. Some of the larger companies, such as the General Electric and Westinghouse, announce that such a training is an absolute requirement for admission to certain departments of their works. There are a few self-made electrical men, of course, just as there are certain self-made army officers.

Qualifying as an Electrical Engineer

It is natural that the older men now holding high positions in the electrical field should be self-taught; for until within recent years there were no schools in which special training in this branch of science could be acquired. The majority of novices in electrical science are not at all fitted for the practical work of this exacting profession. Many young men have entered the field because it seemed attractive and because they had somehow gained the impression that in this calling money could be made easier than in other occupations. These students imagined that their genius would lead them to make a great discovery immediately upon graduation, and that they would thus easily acquire wealth, or at least a large income. It is because a great number of young men of this sort have entered the electrical field that the profession is said to be overcrowded; but the professors in the electrical schools, as well as the heads of industrial companies, understand that the field is only apparently, not really, overcrowded. Young men who have taken up electricity as the result of a mere whim, or because of a desire to make money easily, soon drop out and only the men of exceptional ability remain and forge ahead.

Mr. Edison's advice to young men in the electrical field is: "Don't watch the clock." Presumably, this means that the young engineer or electrician engaged at a salary to work so many hours a week, will never rise above a certain level as long as he keeps one eye on the clock with the intention of working only the number of hours called for "in the bond," instead of eliminating the factor of time and trying harder and working longer than other young men in the same field. Edison knew not the clock, and perhaps this was one of the reasons why he forged ahead of his fellow workers.

He who would be successful in electrical engineering soon finds that something more than general intelligence or general knowledge of the subject is necessary. He must possess a special taste for electricity, must be gifted with a special talent for it, a capacity that in many ways resembles the peculiar gifts of the successful musician or artist. After these intangible qualities, the electrical engineer must possess certain fixed mental characteristics, all of a decidedly tangible character. He must, for example, have an exceedingly alert mind; he must be able to think rapidly and to comprehend and act quickly; he must have a capacity for analysis, so as to be able to reach conclusions rapidly.

In the electrical field something new is announced almost every day. It may be a new invention, or a suggestion for a new way of applying electricity, or a new process of some kind. The simple fact that a thing is new must commend it to all engaged in the field. Men of the older professions are apt to look askance at anything that is new. In electricity conditions are reversed and conservatism is not tolerated. This is the reason, perhaps, that Americans have made greater progress in electricity than Englishmen or Germans.

Electricians assert that in no other science or profession are conditions so definite as in electricity. In this field one thing follows another with assured certainty. In what other branch of mechanics, for instance, would it be possible to tell what a machine will do within a fraction of a per cent, before that machine is built? Yet calculation as fine as this is possible while an electrical machine exists only on paper; but it is a calculation that proves correct when the machine becomes a thing of iron and steel. Wonderful feats are foretold with conviction. As an example of such feats may be mentioned the transmitting of electrical power over 100 miles; the sending of several messages simultaneously on the same wire; the locating of faults on submarine cables; telephoning a thousand miles or more; telegraphing without wires; and producing the Roentgen ray. The men who invented the various devices that accomplished these wonderful things, were certain of the results beforehand. The great problem was to make the necessary apparatus to produce a known result.

Training and Earnings of Electrical Engineers

The work of an electrical engineer may have to do with general electrical conditions—in which case he must be extremely well equipped or be able to deal only very generally with very many cases—or else, he must be a specialist in some one of the numerous and constantly-increasing branches. Thus, as a dynamo or motor expert, as a street railway engineer, as a telephonist, as a telegraphic engineer, or as an electric light specialist, he must have intimate knowledge of many things with which his fellow-electricians deal only very lightly, if at all. This is true, because, not only does each industrial branch involve the use of special and peculiar apparatus, but it has its own problems that do not emerge in other branches, and which, to be treated properly, must be exhaustively and practically understood. Indeed, even the best-equipped graduate electrician is faced with the inevitable specialization situation, and is largely handicapped, not only by the nearly proverbial lack of practical knowledge, but also by having only a very general knowledge of very special applications of his science. It thus follows that he must often begin his career by periods of work in the shop or on the line, so as to familiarize himself with practical problems and working conditions. Furthermore, in order to properly discharge the frequently recurring task of designing special machinery and apparatus, he must have more than a general knowledge, either theoretical or practical. He can not turn his mind directly from the conditions involved in power transmission, to telephony or telegraphy, or even to electrical lighting, as a special branch, because each branch involves the use of a very definite variety of apparatus, also of particular and carefully-calculated principles of current strength and use. Moreover, the constant improvement in each special line soon leaves any but the closest student of that branch far behind, even in point of ability to grasp intelligently the situations he must face. These facts give only a general idea of the present immense development of electrical industry and the professions dependent on it, although for the specialist, either college-trained, or self-instructed, by private study or correspondence methods, it offers the widest field and the most stimulating prospects.

While preliminary electrical instruction in colleges and technical schools is valuable for those intending to become electrical engineers it must be supplemented by practical apprentice work in the shop, the central station, or on the railway line. The graduate of the technical school is only half-equipped, its function being to prepare students to absorb the lessons of future initial practice in the foundry, and in other fields of practical activity. Electrical engineers must be trained in actual, practical work. Laboratories typical of engineering work as it really exists can not be maintained by schools and colleges. The memorization of theories will not suffice to enable a graduate to earn his living in electrical engineering. The lessons of practice in business life are absolutely indispensable to the rounding out and full development of his fitness to become a practical, self-supporting member of the profession. The class-room is very good; the shop, or foundry, or central station, is obligatory.

Telephone Engineering

Not to be behind the times some of the universities have established courses in telephonic engineering. In these instruction is given in special telephonic work, as the general courses in electrical study are not sufficient to cover this field of activity. Electrical study has always had to be supplemented by two or three years of merely apprentice-work. But by the new course of instruction now afforded by this special department in the universities, this apprenticeship may be omitted, or at least largely abridged. The curriculum includes training in electrical engineering, English, mathematics, shop-practice, drawing, physics, German, chemistry, history, descriptive geometry, physical and electrical measurements, mechanics, engineering design, and kindred topics, by way of preparation for the direct study of practical telephoning applied to actual scientific and business conditions.

Marine Engineering

In olden times, and until within one hundred years, the practical work of operating a ship on the ocean, on rivers or on inland waters, required only a knowledge of the science of navigation, together with an experienced familiarity with the dangers to be encountered in any given course. Later, with the introduction of steam motive power on ships, mechanical and engineering knowledge began to be of importance. At the present time, when the accumulated knowledge and experience of three-quarters of a century have brought ship engines, with their auxiliary apparatus, to such a wonderful height of perfection and efficiency, an entirely new profession, with utterly novel situations—that of marine engineering—has been developed. A multitude of trained minds have been working all these years on the problems of increasing the efficiency of marine engines; in facilitating to the utmost the generation of steam; in economizing its use, and in deriving the greatest degree of heat from fuel. As a consequence, the wonderfully complicated triple and quadruple-expansion engines have been devised, with the several types of vacuum pumps and condensers, for utilizing the power of steam from the highest boiler pressure to below atmosphere; also, highly efficient types of boilers and furnaces, with improved apparatus for furnishing artificial draught and some entirely new problems of construction. Added to all this are the numerous types and varieties of auxiliary apparatus—feed pumps, circulating pumps, ash ejectors, evaporators and distillers, steering, hoisting and pumping engines, the electric light plant, and all the highly elaborated and delicately adjusted adjuncts of every one of them—with which the marine engineer must have a thorough and exhaustive acquaintance. Furthermore, each of the five types of steam-propelled ship or boat—ocean-going, condensing and non-condensing lake, bay and sound boats, and condensing and non-condensing river boats—has its own peculiar construction and involved problems, which must be thoroughly mastered and understood. When, therefore, we consider the immense responsibilities placed upon the chief engineer of any kind of craft, and on his assistants, it seems hardly remarkable that the law should require the most exacting kind of examinations for securing a license. The necessary knowledge includes a wide range of information, from pure mathematics and mechanics to the most complicated problems in construction, operation and repair of steam and electrical machinery. The candidate must also exhibit a thorough and intelligent comprehension of every subject, particularly mathematics, and be possessed of such clearness and readiness of mind, as shall prove him capable of meeting the trying and exceptional situations that constantly and inevitably arise in marine practice.

Despite all the difficulties and exactions to be met and overcome, there are few workers aboard a steamship, including even the coal passers, stokers, wipers and general helpers, who, at some time in their several careers, do not entertain the ambition to become chief engineer. It is for this reason that we find these men anxious to serve apprenticeships in the engine room, or to devour any one of the numerous excellent treatises on marine engineering that have appeared in recent years. We also find that many of them hope to save sufficient funds to attend some course on the subject.

CHAPTER II

CHEMISTS AND CHEMICAL ENGINEERS

Chemistry as a Profession—The Training of a Chemist—The Chemist in the Law Courts —Chemists in Agriculture—Chemical Engineering—Training for Chemical Engineering

Chemistry as a Profession

THE first criterion of a young man's fitness for the profession of chemistry is his fondness for the study of the science. As an occupation it holds out no alluring prospects of great wealth. There are, of course, exceptions to this rule, as in cases in which some fortunate discovery in metallurgy or in manufacturing processes has made the inventor rich. But the certificate of originality issued by the Patent Office is not always a guarantee of coming wealth. Neither as a teacher nor as a salaried employé does a prospective fortune loom up in front of the professional chemist. There is the chance that he may become manager of some prosperous manufacturing concern, which position will bring him a "competence." Or, as president of a college, he will be in easy circumstances, should he attain that eminence. In the majority of cases, the professional chemist will not get rich.

Above and beyond the glittering prizes of wealth, the chemical profession can "point with pride" to the many fundamental services it has done for humanity. The chemist stands at the bridge between matter and spirit. The very secret of life is almost his. He may yet determine the chemistry of cerebration, and pursue biology and etiology to their very fountains. The magic power of autogenesis can never be his, but alleviation of life's harder conditions has been and shall be within his scope and ken.

It is a part of the dignity of chemistry that it stands so near to nature's heart, and gains new insight into causality and analysis from its secret throbs. These things place the chemist on a high plane, above the pettiness of professional jealousies. In the success of other chemists he sees the welfare of the profession and the uplifting of humanity. He may, then, with genuine sincerity, congratulate his more successful brother, taking also new spurs therefrom, new incentives to harder work on his own part.

Looking at the ethics of the profession, we see that all chemists are moved by the spirit which prevents them from taking, without permission, out of the hands of a fellow chemist, an investigation which he has commenced or pre-empted. This is considered dishonorable and unprofessional.

So, too, is the attempt to underbid a brother chemist in the matter of offering professional services. There ought to be a closer concert, a consensus among members of the chemist's profession, to establish upon a proper and higher basis the rights and privileges of the craft. Other professions look to the special interests of their members, and chemists should emulate them in this respect, standing together firmly upon their rights.

No other scientific profession is so largely represented in the great modern industries as the science of chemistry. The only possible exception is physics, and that is generally confined to electrical industries and those of a strictly engineering category. And in mining engineering, the engineer is useless unless he is also a chemist.

Many of the leading universities of the country have honored themselves and the profession by selecting professional chemists as presidents. In this list are Harvard University, Lehigh University, the University of North Carolina, the University of Tennessee, and Purdue University.

There is great significance in the selection of so many college presidents from men pursuing the science of chemistry. It goes to show that the professional study of this science has a tendency to broaden the mind and to bring a man into close touch with all the forces and industries of modern life. Chemical science is taught with a thoroughness not always to be found in other branches of learning. Its study may not develop administrative ability, but it brings the mind into general contact with human affairs. Thus, in the avocation of the educator, we find that the influence of chemical research is predominant. The same is true where chemistry touches directly the great modern industries.

From all these considerations, and by many other facts, the dignity of the profession of chemistry is established beyond the reach of cavil or contradiction.

A false position has been held by chemists with regard to the commercial value of their own services. Too long has there existed among the brothers of the profession a tendency to consider as derogatory to their dignity the demand for a properly adequate and justly remunerative pecuniary stipend for their professional work. The popular physician does not feel that it is beneath his dignity to accept a large honorarium. The eminent divine does not refuse a large salary. The legal profession is considered dignified enough, and yet great lawyers are not exactly shrinking violets in the matter of fees. It is an undoubted fact that professional chemists should have more regard for the dignity of their work in connection with great industries, insisting upon its proper classification with other chemical research and employment. There is nothing derogatory about industrial advice and superintendence.

The Training of a Chemist

The calling of a chemist demands no other particular qualifications than ability to master a thoroughly systematized science and sufficient intelligence to apply principles learned. However, as in all other branches of industry, the greater the culture, the greater the success. Although, as in former days, a man may become a qualified chemist by serving an apprenticeship. Many colleges and technical schools offer thorough courses in the science, at an average charge of between $100 and $200 per year. Several excellent correspondence courses are also offered at even lower figures. Considering the wide field open in his profession at the present day, the student can not afford to neglect any opportunities that may enlarge his knowledge or usefulness. A qualified chemist can almost always command a salary of between $75 and $100 per month, and in many of the connections open to him there are no fixed limits to the remuneration of his skill.

The Chemist in the Law Courts

From the rules of evidence now obtaining in American legal procedure, the chemist, in testifying for his client, is undeniably often placed in an unfavorable light before the public. While the expert should favor his client as far as possible, yet he must never pass beyond the boundaries of truth, nor attempt to bolster up a false claim. The system is at fault, not the chemist. He ought to be employed by the court and not the litigant, an improvement in legal procedure that is bound to come.

Chemists in Agriculture

The prowess and worth of chemistry is nowhere better illustrated than in its great influence upon the development of scientific agriculture. Vastly beneficial have been the agricultural experiment stations maintained by the United States Government throughout the country. Among the forty-nine directors of these establishments twenty were selected from the ranks of professional chemists, in deference to the relation between scientific chemistry and modern agricultural research. Very few other sciences are represented in the list of directors, or even among the subordinates, in comparison with the chemical profession. The proportion is illustrated by the relative numbers of employés representing each science in the employ of the agricultural experiment stations of the United States; viz., one hundred and fifty-seven chemists, fifty botanists and forty-two entomologists, and still fewer in other branches of scientific work.

While it would be invidious to mention names of those particularly prominent at the present day in the class of eminent chemists, a few of those who are counted pioneers in the profession in its connection with agricultural colleges and experiment stations may be mentioned. The first regular bulletins were published by Professor F. H. Storer, of the Bussey Institute, in Massachusetts. These have been of great worth, as has been his well-known book, first printed in 1887. In 1846 Yale College appointed John Pitkin Norton as professor of agricultural chemistry. His efforts were very profitable to the profession. Samuel William Johnson was made instructor in agricultural and analytical chemistry in 1855. His valuable publications are still used as text-books. Professor E. W. Hilgard, of the University of California, stands in the front rank in the union of chemistry and agriculture, having obtained by his researches and books a world-wide fame. Professor G. C. Caldwell, of Cornell, has given great assistance to the profession by his book on agricultural chemical analysis, printed in 1869. In the class of leaders must also be mentioned the name of Professor C. A. Goessmann, of the Massachusetts Agricultural College.

Chemical Engineering

There is a branch of technical knowledge that has a more inclusive importance than chemistry, since there is scarcely a branch of industry into which it does not enter, and in which a well-equipped chemist can not find a good chance for employment. In the three trades—tanning, glass-making and ore-working—which were for many centuries the sole lines of chemical activity, there are still constant opportunities for chemical experts, who, indeed, have done more than the merely "practical man" to bring them to their present stage of perfection. Paper-making is another business in which the chemist has a wide field, and where his assistance is constantly required, particularly in the modern industry of wood-pulp paper-making. In practical mining, particularly in the department of metal-ore work, the services of the assayer and analytical chemist are in constant demand, in order to determine the value of a mine or working, and thus save large expenditure in fruitless operations. It has frequently happened that a gold or silver mine has been exploited by a company or by individuals, who might have been saved from financial embarrassments, had they employed competent assayers to determine whether the metal could be extracted in paying quantities. Strangely enough, however, as history shows, many otherwise astute men have neglected to take this necessary step.

Other fields in which modern science has opened up great opportunities for the analytical chemist are those of agriculture, where there is constant demand for the analysis of soils, fertilizers and products; sanitary science, where there is a demand for analysis of water, foodstuffs supposed to be adulterated, and fuels. In the steel industry it is important that the exact composition of crude iron be constantly determined; also that the materials added in the process of manufacture be carefully analyzed to secure the exact proportions of nickel, manganese or carbon desired for the particular product. Chemists are also employed and kept constantly busy by gas companies, bleacheries, soap manufacturers, and brewers. Even railroad companies and others, using large quantities of fuel, paints, varnishes and other substances, constantly require the services of chemists to analyze materials, boiler water, fuel, and thus to save time, money and machinery, by indicating proper courses to pursue. The United States Government employs chemists in the agricultural, geological and ordnance departments, the opportunities for trained men in the first line of work being particularly brilliant. Chemistry is also an important part of the electrician's work at the present day, not only in testing metals, such as copper, whose conductivity may be impaired by such adulterants as arsenic, etc., but also in furnishing a complete understanding of the theory of primary, and especially of secondary, batteries, which depend for their operation on very exact chemical knowledge. In addition to all these general fields may be mentioned the modern processes of synthetic chemistry and electro-chemistry, by which a large variety of valuable substances have been produced. The vast number of synthetic products derived from coal tar, as well as artificial graphite, artificial indigo, etc., example the enlarging sphere of chemistry.

The application of chemical knowledge in the manufacture of fertilizers and in agriculture generally has resulted in increasing the production of wheat in this country threefold. In the manufacture of medicines chemistry plays an important part in preserving human life. Were it not for our chemists, printers would suffer, for the manufacture of good ink is dependent upon chemical science. All explosives, used either by the armies of workmen in time of peace, or by the regular army and navy in time of war, are the product of chemical laboratories. Chemistry has given us, for illuminating purposes, a superior quality of pure gas. Chemicals, too, are used as food preservatives.

Neither the house and sign painter nor the artist could exist without the chemist, for it is the latter who teaches how to purify mineral and vegetable oils and all pigments used for painting. The process of tanning depends upon the skill of the chemist, and, indeed, were it not for the science of chemistry the development of the leather industry would be an impossibility. The photographer is indebted to the chemist for the coal-tar products which are called "developers" and the manufacture of dry plates. Photography, indeed, would fall into disuse but for chemistry. No wonder, then, that an authority states "that the measure of a country's civilization can be determined by the activity of its chemists."

It is apparent, therefore, that not all the best work of the chemists, nor that which has brought greatest results to American manufacturers, has been done in industries which may be classed as chemical. With modern methods the chemist is no less necessary to the steel plants, to the sugar refiner, to the great dyeing establishment, than their steam engines.

But it is in connection with his work in the great oil refining industry that his work is most familiar. For it is from its by-products that the Standard Oil Company has won its greatest triumphs in the industrial world and worked its greatest changes in industrial life. At least one-third of the company's product was formerly wasted. To-day, thanks to the skill of the chemist, this waste is manufactured into more than two hundred by-products. Nothing is now lost. The naphtha is transformed into different grades of gasoline for all kinds of motors and for use in the arts. Here alone has been effected a saving of at least three and one-half millions of dollars. The tar products form a larger and most wonderful group. These are developed by distillation. Thus are produced, besides other oils, the paraffine wax and the oils so largely used in many ways. These are in scores of grades. From the results here obtained come supplies to manufacturers in many industries. The makers of chewing gum, hair oil, shoe blacking, vaseline, headache powders, salves, and other products draw largely thereon for their raw material. From these remarkable waste products, too, the chemist has by his wonderful skill been able to extract the aniline dyes in all the colors of the rainbow, all the flavors of the fruits of the orchard and garden, and then, finally, the refuse, if such it may be called, is turned into fertilizer, to make two blades of grass grow where one grew before. No industry has enforced so clearly the lesson that the commonest things may be made to have their uses. To the main industry the result has of course been a great cheapening of product and at the same time a great improvement in its quality.

Chemists are expected to find some new chemical method of generating electricity as a substitute for the present mechanical method. The chemist who can generate electricity chemically cheaper than by the methods of to-day will make millions. The cost of motive power must be lessened at all hazards, and the world looks to the scientists to help solve the problem. To chemists, also, the world looks for the production of foods, or, in other words, the artificial preparation of natural products by chemical means. M. Berthelot declares that the chemical manufacture of food will be the great scientific achievement of the present century, although this will be preceded by an equally revolutionary change in motive power.

Training for Chemical Engineering

In the technological schools there are courses in the study of the application of chemistry to the arts and to those problems of engineering connected with the use and manufacture of chemical products. These courses are supplementary to the study of chemistry alone, and presuppose the possession by the student of a facility in, and fondness for, mathematics and drawing. Instruction is given in textile coloring, preparing the student for employment in the textile industries.

Formerly, expert workers in chemical engineering were educated in Europe, in most cases. Our own excellently equipped institutions of technical instruction have done away with the necessity of studying abroad. The imperative demand for the utilization of by-products has compelled the employment of scientific men, whose chemical knowledge will enable them to plan and execute new processes, and whose engineering ability will suffice to devise and superintend their equipment. A man scientifically trained can enter at once upon a career of immediate usefulness in such establishments, intelligently grasping the processes in their minutest details, By actual practice, he becomes familiar with the handling of vast quantities of materials, and is certain to be rewarded by early promotion. The student, to fit himself for this service, must be well versed in theoretical, analytical, physical, electrical and industrial chemistry, and thoroughly grounded in mathematics and physics as applied to engineering, in its mechanical, electrical, civil and hydraulic divisions. He will thus be equipped to plan and superintend the engineering plants for the generation and control of heat, the production and application of vacuum, and the transfer, in huge quantities, of solid, liquid and gaseous materials.

A course of chemical engineering ought always to supplement the study of chemistry, in order that the chemist may be prepared for all the exigencies of his profession. In some institutions, the study of the application of chemistry to manufacturing covers two years, including class lectures and demonstrations, inspection visits, lectures by practical experts, and; when practical, there is laboratory investigation.

Extremely important, in these modern days, is the rapid and exact analysis of raw materials in such industries as cement-making, the manufacture of fine porcelain and glass, and the various branches of metallurgy. To take one example, for purposes of illustration, the wide use of serium and thorium oxides for incandescent mantles shows what exact analytical research has done. And such opportunities for original methods and discoveries will constantly arise.

CHAPTER III

INVENTORS AND MISCELLANEOUS SCIENTIFIC PROFESSIONS

Americans as Inventors—The Training of the Inventor—Achievements of Inventors—Inventions in the Electrical Field—The Reward of the Inventor—Opportunities for Inventors—The Patent System—How to Protect an Invention—How to Sell a Patent—How to Market a New Invention—Astronomers—The Night's Work of an Astronomer—Explorers—Metallurgy as a Profession—Forestry, a New Profession—Positions for Trained Foresters—Preparation for Forestry Work—Positions for Foresters' Assistants—The Farmer and the Bureau of Forestry—Scientists in Government Employ

Americans as Inventors

THE great majority of the 40,000 patents which are issued yearly by the United States Patent Office are in the names of persons under thirty years of age. Moreover, the greater number of these patent rights cover inventions by persons who are not of high station, but who are rather in the humbler walks of life. Thus the records of the Patent Office show that the young men, and the comparatively poor men, of this country are taking advantage of the great opportunities which the government offers to inventors in protecting the products of their brains.

No other government in the world, save, perhaps, that of Germany, offers such inducements to the inventor, nor guarantees such absolute protection of his invention, as does the United States Government. Even in Germany the government does not insure patent rights covering inventions which serve to improve the working of a particular part of a machine already invented; in the United States, however, he who can improve a machine, even in the most minute detail, is secure in the ownership of the device which he has invented. For example, while to one man may belong the patent rights for the general invention of the telephone, there are scores of inventions representing small improvements which serve to make the telephone more efficient. The result is that the most humble workman operating a machine is induced to study his machine or tool and invent, if possible, a device by which the machine can either be improved, or the output increased. On the other hand, in Europe, even in Germany, where the government is the most liberal in protecting inventions, there is no inducement to the workman to discover a way to improve the machinery amid which he spends his life. European workmen are, as a class, simply part of the machinery which they operate, doing only what they are told to do. America, meantime, is a country of inventors, and to these inventors is due a large part of the credit for our wonderful industrial progress.

Invention among Americans has, indeed, become a habit; as a result the United States is the only country in the world in which inventors form a distinct class or profession. It seems that the encouragement is so universal and the rewards so great that once a man has invented a successful article, he becomes what may be termed a professional inventor—that is, one who devotes his entire time to inventing something. Mr. Edison, therefore, may be said to be the leader of this profession, his life having been devoted to the evolving of mechanical improvements and to the creation of things new and useful.

All over the country there are laboratories in which young men are spending their lives in the attempt to realize an ambition to become a second Edison. Almost every school and college has such a laboratory, and here we find the inventors of the future. In hundreds of manufacturing plants men are employed and paid large salaries to do nothing but experiment with a view to improving the machinery or methods in use in the mills or factories. At the same time nearly all the mechanics in a manufacturing plant are self-constituted inventors. It has often happened that one of the mechanics has invented a device which has proven far more valuable than anything invented by the expert especially employed for the purpose.

The Training of the Inventor

To certain minds the most fascinating of all fields of endeavor is that of invention. Like the journalist and novelist, the inventor is interested in every phase of man's work. While the writer studies or explores this or that industrial territory with the purpose of suggesting improvements through the medium of stories or magazine articles, the man with the mechanical turn of mind explores the same fields with the idea of making improvements, if he can, through invention. One day the young man of inventive proclivities discovers a definite need, and straightway he proceeds to make a special study of the particular corner of the field in which the discovery is made. He knows that merely to invent something for use in that particular part of the territory, he need not spend his time in trying to master the details elsewhere. He may be a workman at the bench. He thinks he can improve a certain tool. If so, he studies only that one tool and the work which that tool is expected to accomplish.

Neither the workman nor the professional inventor need understand every detail of an art or industry. He has a problem to solve in one single department of the business, and therefore he confines his study and his energy to that one department. But he must know that department thoroughly. He must then learn the real meaning of patience, perseverance and industry. An invention is not a matter of a day nor a month. Sometimes years are required.

After these qualities comes the habit of intelligent observation. In each and every phenomenon may lie the one thing that he is searching for, the one element necessary to success. Nothing is so trifling that the inventor can let it pass without investigating and understanding it. Many men have tried, many are now trying to discover just what electricity is. Some day one of these patient, persistent, industrious, observing scientists will give an exact definition of electricity.

The inventor need not be a scientist, and yet he can and does invent many articles of great practical use to science. He need not even be an electrician in order to invent something that will make electricity still more useful to mankind. He may not be a printer nor a machinist, and yet he may invent a device that will further increase the output of the printing press. He will achieve success because he is an observer, because he sees and values the possibilities in a phenomenon which others would pass by as of no consequence.

Such is the training of the inventor. He may be a college man, or his education, so-called, may have been confined to the public school. But neither colleges nor schools make inventors. They can only teach a young man to observe and how to observe. For therein lies the only training that can be given the future inventor. To teach a man a language does not make him an author. No more does a knowledge of tools make one an inventor. Each inventor is simply an individual phenomenon who has worked out something in his own individual way. For the inventor there are no rules. He questions everything, upsets theories and overthrows science itself.

Achievements of Inventors

Inventors have, above all, given us automatic machinery. They have made America supreme in the iron and steel industry, because they have invented machinery which gathers up the ore at the very mouth of the mine, carries it to the mill, and converts it into steel, the whole process requiring but few hands. He who visits certain iron and steel plants wonders where the workers are. It seems incredible that such vast results can be obtained with such a small number of hands. Again, the inventor has made our railroads the best, the safest, the most comfortable in the world. Westinghouse gave us the air-brake, Woodruff gave us the sleeping-car, not to speak of the inventors who have improved and developed the locomotive until to-day we have the wonderful iron horse racing seventy miles an hour.

Other inventors have made Americans the masters of the cereal markets of the world by giving us machinery by which the land is plowed and harrowed, by which the seed is planted and the harvest reaped, all on a wholesale scale. We have newspapers that cost only one cent each, because inventors gave us the machinery that grinds the trees of the forests into pulp, that converts the pulp into paper, that covers five miles of paper every hour with words and pictures. We wear the best shoes in the world, for which we pay the lowest price, because inventors gave us machinery which turns out a pair of shoes complete every twenty minutes.

Instances in which the inventor has contributed to our national progress might be multiplied indefinitely, but enough has been said to show that all that inventors have accomplished in the past has served to create new and greater opportunities for the young men of to-day to attain place and fame and wealth by inventing something that will render the inventions of yesterday still more useful, that will cause the wheels of industry to revolve still faster, that will render the product of machinery still cheaper.

Inventors in the Electrical Field

For inventors in the electrical field there are almost unlimited possibilities. A study of inventions that have been made in electricity merely since the centennial year would show that a great many men have come to the front and have reaped magnificent rewards. At first the inventors constructed apparatus that revealed fundamental ideas; then came one invention after another for the application of electricity; and the inventors of the next twenty years will have plenty of opportunities to improve upon the inventions of the last two decades. Electrical railways are to be developed to the point where the people may have not only local trolley lines but high-speed railways, annihilating the distance between great cities. The Germans are constructing an electrical railroad between Berlin and Hamburg on which they expect to run trains at the rate of 150 miles an hour. To run at such tremendous speed, however, involves the danger of the train leaving the track, and here is a chance for still other inventors.

Other opportunities are in the transmission and distribution of electrical power to motors in factories, mills and mines. In fact, in every industry in which power-driven machinery is used, the advantages of motors are becoming more and more apparent. Cotton, woollen, and all other textile mills will soon be run entirely by electricity, as well all printing establishments, chemical works, machine shops, iron works, and, in fact, all mining and manufacturing establishments.

Another great chance for inventors is the discovery of a way of generating electricity directly from coal. Mr. Edison and other great inventors have given their attention to this important problem. It presents one of the greatest and most urgent needs of the electrical world. A colossal fortune awaits the man who will invent some successful process or apparatus to meet this need. Such an invention would mean that we should no longer be obliged to depend upon the boiler, steam engine, and dynamo for nearly all of our electrical current.

Meantime, new electrical inventions are being announced in the United States almost daily. The majority of such inventions are simple devices by which electricity may be used in the various arts, while others are of extreme importance in that they promise to revolutionize this or that industry.

The Reward of the Inventor

Inventors are not rewarded in every instance as liberally as might be expected. The reward depends upon the value of the thing invented. A new machine, such as that of the cotton gin, for example, yielded larger returns than would have the invention of a small device in the running-gear of a great machine already invented. The cotton gin brought the inventor untold wealth, because one single such machine performed in a given time the work of several thousand persons. Again, the patents issued to Cyrus H. McCormick for his harvester made him a millionaire, because he had invented a better way of cutting grain than with the scythe. Elias Howe received over $100,000 a year in royalties, because, after the patient study of years, he discovered that by punching a needle at the point instead of at the head, sewing could be done by a machine instead of by hand. Charles Goodyear reaped wondrous wealth by discovering the process of vulcanization, which at once became the basis of the rubber industry. It is patents like these, of course, which reap the largest rewards, because they represent a great saving of time and labor.

Hundreds of very simple articles, however, have made fortunes for those holding the patent rights thereof. Such articles may have only an ephemeral existence, and be of no service to mankind save as a source of momentary amusement. One class of such inventions is that known as parlor games. The invention of a picture of a tailless donkey, for instance, led to the game called "Donkey," in which each player is led blindfolded to the picture of the donkey and is obliged to pin the tail to the animal. The inventor of the parlor "Target and Dots" received between $35,000 and $40,000 from his invention. The "Pigs in Clover" puzzle was likewise a great money-maker. Inventions like these, of course, are dependent for success upon the whim of the public, or upon the investment of great sums of money in advertising. At the best their popularity is only short-lived, for they are not necessities.

There are thousands of very simple inventions, however, which are extremely useful. Among these may be mentioned Mr. Parker's invention of the tobacco-box fastening, which consists simply of a "bulge in a dent." Again, the man who invented a patent clip for fastening together the pages of manuscript reaped a fortune. It is related that an inventor who obtained a patent for a washing machine sold it for $50,000.

Opportunities for Inventors

In spite of the giant strides of the technical sciences during the last few decades, there are still many requirements in mechanics and industry awaiting the touch of genius that alone can subdue natural forces to the uses of mankind. To-day inventors are nearly as numerous as poets, but there is as great a dearth of really worthy contrivances as of real poetry, because that, in both fields, the majority of work is done by people who do not understand the fundamental principles of their crafts, or lack the talent to apply them. Such facts should not discourage people with original ideas, but they should emphasize the utter necessity of understanding the science or industry to which proposed inventions relate, in order that useless efforts may not be made, and that new devices may embody the ideal of simplicity. Even a general knowledge of electrical science, for example, will immensely modify a would-be inventor's conception of desired results and the available methods of achieving them; while, with insufficient information, he must flounder hopelessly, achieving nothing of use or merit. Such is the story of a very large number of devices for which patent rights are sought, and, also, of very many that are actually patented. The amazing simplicity of some of the inventions that have proven most profitable only shows how far science contributes to success.

Among the new devices anxiously awaited by the world are improved apparatus for increasing safety in travel, both at sea and on shore. Thus, the apparently hopeless problem of a steamship that will not sink still lures engineers and amateurs by the prospects of immense profits. The ideal railroad car coupling is still to be devised, while really reliable rail-joints, automatic signals, and devices capable of dealing with heavy snowstorms and the dangers of derailment would yield fabulous returns. Many practical apparatus, such as brakes, heaters and switches, are capable of great improvement. There are not yet enough agricultural machines to supply the demand for means to conduct farming as economically and efficiently as the needs of the present day demand. A cotton-picking machine would bring its inventor large profits, and there is still need for a sugar cane reaper or a fibre separator for hemp and other such plants. Labor-saving kitchen utensils of real merit would have a wide sale, while large prizes await the successful inventor of a superior oil lamp, or of a match mixture that contains no phosphorus.

Such substances as India-rubber, wood, asphalt, etc., will undoubtedly become scarcer, as time progresses, and rise in price, hence really meritorious substitutes for any of them, made from waste or cheap materials, are eagerly sought for. India-rubber has been imitated in products of such plants as milk weed, and at least one experimenter announced that he would presently make it compositely from coal tar, but the problem still remains unsolved, while the demand increases. In a few years, also, wood-pulp paper will be an expensive article. Hence the devising of a cheap substitute is claiming the attention of many practical minds, using the hulls of cotton seeds being at present the most hopeful solution of the question.

Labor-saving machinery in all branches of industry is as much in demand as ever, while the cry for more efficient arms and ammunition grows louder as the arts of peace advance. Mining and metallurgy in all their branches offer equally strong inducements to well-equipped inventors.

The Patent System

One hundred years ago there was neither telegraph, steamboat nor railroad. There were no exports but agricultural products, and no manufacturing of importance. There were no carpets made here, except rag carpets, up to 1776, and there were no power looms for carpet making up to 1850. Iron plows were made here in 1819, reapers in 1833, and threshers in 1850. The country was mainly agricultural until the close of the Civil War, although manufacturing had previously begun. But now the exports of manufactures exceed the imports. All this has arisen from the introduction of labor-saving devices, most of which were invented in this country. And this leads us to a consideration of the United States Patent System.

Our system of patents is sometimes called the "examination system," differing from those in vogue in Europe. While ours is an ideal system, if the examinations can be made with sufficient care, it is becoming a difficult one through lack of time to make perfect by thorough examinations on account of the rapidly increasing number of patents. More than two million domestic and foreign patents have been issued. The increase of scientific publications has also been enormous. The encouragement given to inventors and investors in patents has been one of the prominent causes of the great industrial and manufacturing prosperity of the country.

Our patent laws are more liberal than those of other countries. A too frequent change of commissioners prevents the establishment of definite policies. Too many appeals are permitted, and interference proceedings are too complicated and cumbrous. The power of keeping applications in the office through delays in amendments is a serious flaw, the Act of March 3, 1897, not having remedied this to the extent hoped for. But even under existing rules, about seventy-five per cent of the patents granted are issued within one year after filing. Without undue delay of applications, this number would reach ninety per cent of the whole. It is a fact that recently there were pending 4,329 applications filed prior to January 1, 1898, three of them having been filed as far back as 1880. From this it would appear that an application may be kept alive indefinitely.

There is no record of salaries paid to employés of the Patent Office before 1803. Men may have been detailed for this work, while on the payrolls of other departments. The personnel of the Patent Office in 1816 consisted merely of a superintendent, one clerk and a messenger, the total salaries being $1,772. In contrast with this we may note that the office force now includes 679 persons, and the aggregate of salaries for a single year is $761,691.

The receipts of the office have, however, kept pace with the expenditures, the receipts for a recent year being more than $1,350,000, while the expenses were about $1,260,000. The total excess of receipts over disbursements from 1836 to the present time is $5,177,458.

How to Protect an Invention

As a rule the sole cost of inventing something that will lead to a fortune is that of a few tools and of the patent right. The cost of securing the patent is about $55, of which $5 is the fee charged by the government and $50 the fee charged by the patent attorney.

It is important that the young inventor should study the Patent Office practice and have a good working knowledge of patent law. Every experienced inventor will impress upon the youngster the importance of exercising great care in drawing up applications for a patent.

Over half a million of patented articles have been registered in the Patent Office since the law granting patents was first passed by Congress. Up to a few years ago the law required that a model of every invention be placed in the Patent Office. As a result there are thousands and thousands of models now on exhibition in Washington, the study of which will afford the young inventor a more or less thorough knowledge as to the development in almost any class of inventions. In the Patent Office there is an expert called an examiner, for each of thirty-eight classes of inventions.

Under the present patent law it is not necessary to place a model in the Patent Office, but the government does require a drawing and a specification prepared by a patent attorney in a prescribed legal form. It is in the preparation of these drawings and specifications that the utmost care should be used. The inventor should not send in his application for a patent until he has studied the drawings and specifications over and over again. Patent attorneys are oftentimes so busy that they delegate the details to clerks or assistants. These subordinates have from time to time made trouble for inventors, their blunders leading to protracted lawsuits. The litigation over a telephone transmitter patent, covering a period of fourteen years, was the result of carelessness on the part of the inventor in intrusting the work of drawing up the patent application to an attorney's clerk.

In addition to covering his invention by patent in the United States, the inventor should secure European patents if his invention is sufficiently valuable to justify the expense at the outset.

The inventor can intrust his plans to the Patent Office with every assurance that he will receive honest and fair treatment and that the product of his brain will be kept a secret until such time as he is fully protected by patent and publicity will do no harm.

How to Sell a Patent

The first step after securing the patent is to give the invention as much publicity as possible. Publicity will prove of great value, either in disposing of the patent rights or in bringing the invention to the notice of capitalists upon whom the inventor depends for marketing the article. Inventors are not usually good business men; they often have exaggerated ideas of the commercial value of their patents. Moreover, the average inventor is not equipped to secure the best terms from capitalists, and therefore it often happens that the inventor who attempts to exploit his own patent finds himself outwitted by capital at the very outset.

The young man who wishes to dispose of his patent, therefore, should find a partner, or an agent, who possesses the shrewdness of a business man. In every large city there are patent agents, whose sole business is the selling of patent rights. These agents subscribe to the "United States Patent Gazette," which is issued weekly, and send out their circulars to all those mentioned as having secured patents. The inventor will probably receive scores of such circulars as soon as the "Patent Gazette" has published the fact that he has invented something. The agent will charge five to ten per cent of the amount secured from the sale of the patent right. Or, if preferred, the inventor can make an arrangement with the agent for a fixed sum, which he must pay in advance, and which is considered an equivalent for the agent's services, whether the patent is sold or still remains on the hands of the patentee at the end of a certain time.

How to Market a New Invention

By somewhat similar arangements the inventor, through another class of agents, can secure the capital necessary for the marketing of his invention. Capital is ever on the outlook for something that is good, and the inventor can depend upon it that if he has something which is really meritorious he will sooner or later secure the requisite amount of money for the launching of his invention. Is his invention one that represents an improvement on a certain machine, or a device that will save time and money in the factory or shop? His best chance then is to go at once to the manufacturers to whom his invention will prove of greatest value. Notwithstanding the general distrust of corporations, it is said that inventors usually secure far more liberal terms from corporations than from individuals.

Astronomers

Astronomers may be divided into two classes—mathematicians and observers.

The mathematician spends his time in computations and methods of mathematical analysis, by which great discoveries are made and the places of the heavenly bodies determined through past and future centuries. This branch of the profession is but little known in a popular way, for the study of the mathematician constitutes that highest and most difficult branch of astronomy called "the science of celestial mechanics." As those engaged in this branch of the profession seldom use the telescope, that is, seldom make observations themselves, they can hardly be called astronomers in the popular sense of the term. They are usually termed "mathematical astronomers." They develop new methods of solving abstruse problems, spend a great deal of time in libraries consulting the observations of astronomers proper, the principal tools of their trade, as it were, being the mathematical and scientific books, the use of which is known only to a few specialists. These specialists in astronomy work and study by day rather than by night. Newton and Darwin were mathematical astronomers, as were also Laplace, Newcomb, Poincare and Hill.

The more familiar class of astronomers includes those who work by night and whose observations and measurements among the stars furnish the foundation of man's knowledge of the universe. The regular astronomer who passes his nights with his eye to a telescope, in profound study of the celestial bodies, must bring to the observatory not only practical talent in the use of the instruments, but a mind thoroughly trained in mathematics and physics and other high branches of science. Almost every State has its observatory, and in these silent halls of science, through the night, hundreds of astronomers, young and old, the novice and the veteran, are lost to all things earthly, engaged in the contemplation of the movements of worlds, sometimes as far distant as 70,000,000,000,000 miles.

Among the best known workshops of astronomers in this country are the United States Naval Observatory in Washington; the Lick Observatory on Mount Hamilton, in California; the Yerkes Observatory at Williams Bay, Wisconsin; and the Lowell Observatory in Arizona. Many of the universities have observatories in which important discoveries now and then have been made. The largest and most famous telescope perhaps is the one used at the Lick Observatory, which has a 36-inch refractor—the largest lens, perhaps, in the world. This particular lens was the masterpiece of the late A. G. Clarke of Cambridgeport, Massachusetts.

Astronomers declare that the science of the stars is the most fascinating, most exacting and most laborious of all the professions.

This form of mental occupation, resulting, as it does, in the forgetfulness of earthly ills or suffering, prolongs the life of men thus engaged. In the popular mind the cause of longevity among astronomers is the supposedly easy nature of the work; that is, as the star-gazer works in the solitude of the night his labors are imagined to be so quiet, so free from strain on the nerves, that it is only natural that he should live many years. It is declared, however, that the practical observer of the stars actually works harder than the ordinary professional man. His task is principally performed in the latter half of the night, the very time when, from the inherited tendency of generations, the human system is most in need of rest. It is during these hours that the vital forces of the physical organism are at their lowest ebb; therefore, even after a quarter of a century of work in an observatory, when it might be supposed that the human system had become accustomed to unnatural working hours, astronomers still experience the peculiar bodily suffering and discomfort resulting from disregard of the demand of nature for sleep. Despite the circumstances, as a matter of fact astronomers live longer than men engaged in other professions. It is not unusual to be informed that this or that worker at the telescope is seventy or eighty years old; some have even continued observations beyond their eightieth year. It is explained that the longevity of astronomers is the result rather of a process of natural selection which draws the stronger individuals to this sublime science. Longevity in this instance, therefore, is an indication of the strength of those who choose the profession rather than the measure of its quietude and ease.

It can not be said of this profession, as of others, that it is overcrowded. For obvious reasons young men do not rush into astronomy as they do into law or medicine or engineering. He who wishes to take up astronomy as a career must possess a great capacity for mathematics—"the faculty of mind necessary for its successful cultivation being admittedly the highest and rarest gift of the race." In short, the young astronomer must pass many years of his precious youth in training, must possess the peculiar temperament that is capable of sacrificing his personal comfort without hope of any great material reward. Astronomers as a rule make but moderate incomes. Their reward, after a tiresome vigil lasting through the entire night, after hours of physical exhaustion and pain, lies principally in occasional discoveries which they are able to announce to the world.

The Night's Work of an Astronomer

At certain seasons of the year when conditions are most favorable for "seeing," as the astronomer says, it is not unusual for the astronomer to pass as many as eighteen hours out of the twenty-four in the observatory. Oftentimes it is necessary to work thus hard for six weeks or two months, or even three months.

While making observations, a few years ago, at the Lowell Observatory at a place near the City of Mexico—the observatory having been moved bodily from Arizona—Dr. See tells us that Mr. Lowell himself usually appeared about nine o'clock in the morning; made observations until one o'clock; then devoted an hour to luncheon; then returned to the observatory and worked until sunset; took an hour for dinner; then again returned to the observatory and observed until three or four o'clock in the morning. Dr. See at this time usually put in as many as sixteen hours a day at the telescope. He even had his meals brought to the observatory in order not to lose much-coveted moments in the middle of the night. He usually worked until sunrise, and during a period of six months sleep was neglected and almost forgotten. In a single night he sometimes examined as many as 1,000 of the brighter stars. Between sunset and sunrise it was not unusual for him to find and measure fifty or sixty systems, many of which were new.

Great achievements are expected of astronomers in the present century, and to American astronomers the world looks for the greatest of these achievements. Sir Norman Lockyer, director of the Solar Physics Observatory, declares that to the progress of this science the most valuable contributions in the near future will be made in the United States, which has more observers and better instruments than any other country in the world. One of the first of such achievements will be the forecasting of famines in India, of drought in Australia, and of important weather changes in all countries. These forecasts can be made a long time in advance by means of the spectra of sun spots. It is expected that astronomers will be able to predict not only the time, but also the area and extent of drought and famine, thus making it possible to take timely precautions. In this way astronomers can make their work of great practical service to mankind. Astronomers have three other great tasks before them; first, the chemical classification of the stars; second, the completion of a photographic chart of the heavens; third, the substitution of photography entirely for the observation of individuals in recording the transits of the stars.

Explorers

While the work of explorers themselves can hardly be said to comprise a distinct profession, the explorer is usually a man of science, and his work can therefore be included under scientific pursuits.

In various ways the archæologist, the botanist, the ethnologist, and others have added to scientific knowledge as explorers. Africa and the Arctic region have for years been the favorite fields for exploration.

Hundreds of thousands of dollars have been expended and many lives lost, especially in the quest of the North Pole. For commerce, glory and wealth—this, in brief, is the answer to the question, "Why do explorers again and again seek the North Pole?"

The theories of the philosophers may be revolutionized by the conquest of the North Pole. They are at present based upon inference and mere conjecture. A mighty hand of retardation and arrested development has been laid upon that section of the earth's surface. Cosmology and cosmogony show there the status of the glacial period, when all the world was ice. What mysteries of world-history may be unfolded by observation of this region of darkness and silence! Mile by mile has man fought his way toward this goal of scientific exploration, through untold hardships and privations. Lives and fortunes have been lost in this quest for scientific knowledge. But science will not be baffled by any obstacles, and, as sure as sunrise, the day and the man will come, revealing to mankind the secrets of prehistoric epochs, and perhaps of human races who went down to death, leaving behind them no traces heretofore disclosed.

The director of the Geological Survey of Canada, in one of his reports, makes the statement that practically nothing is known of one-third of the Dominion.

There are more than 1,250,000 square miles of unexplored lands in Canada. The entire area of the Dominion is computed at 3,450,257 square miles, consequently one-third of this country has yet been untravelled by the explorer. Exclusive of the inhospitable detached Arctic portions, 954,000 square miles is for all practical purposes entirely unknown.

The Government has made a great effort in the direction of exploring and developing this vast territory. It has recognized the fact that railroads are essential to the development of a new country, and liberal inducements for their construction are made by granting millions of acres of land as a bonus. The indications are that, during the next five years, at least 5,000 miles of new railroad will be completed throughout the Dominion, most of which will run through unexplored wilderness.

The mineral wealth of this unknown region is undoubtedly immense, and perhaps inexhaustible; while the dense forests of hard wood, now of so little value, will, when brought to the markets of the world, become a source of large profit.

Metallurgy as a Profession

Metallurgy has advanced at an even pace with modern mining engineering, the two together having gone far to reducing the practical operations of extracting and working ores to an exact science, involving the minimum of waste and the maximum of production. Properly speaking, metallurgy is a branch of chemistry, and, like it, has profited immensely by the introduction of electrical processes. Thus, by an electro-metallurgical process, aluminium, formerly obtained from its compounds by reduction with sodium or similar metals, at a cost of about one dollar per pound, may now be obtained by electrolytic reduction of its oxides, so as to enable it to be sold at thirty cents per pound. Other improvements enable the profitable working of copper ore, averaging as low as three per cent of metal, while the inventions of Edison and others have made it possible to extract iron from the poorest deposits. Such improvements have, of course, immensely extended the sphere of mining operations and increased the total output for all metals. Thus, the average amount of copper annually recovered from domestic ores is about 601,000,000 pounds, and from imported ores about 62,500,000 additional: of lead, 276,000 tons from domestic, and over 103,000 tons from imported ores; of gold, nearly 4,000,000 ounces from domestic, and nearly 2,000,0000 ounces from imported ores; of silver, over 59,000,000 ounces from domestic, and nearly 47,000,000 ounces from imported ores. The total production of aluminium is over 7,000,000 tons. These figures example the wide field open to the competent metallurgist, also, the great advance in the science, which, of all others, has been the index to civilization.

Forestry—A New Profession

Since the business of forest management has been undertaken by the government, a profession absolutely new to this country has been created. This is the profession of forestry. Certain it is that the government can not conduct its work in forestry without a large number of independent and specially trained men. In order to secure the required number of foresters, therefore, the government is educating a number of young college graduates in this art and paying them for their services.

This branch of the government work is in charge of the Bureau of Forestry under the Department of Agriculture. The chief forester and head of the bureau is Mr. Gifford Pinchot, who is unquestionably the leading authority on forestry in the United States. Mr. Pinchot, aided by members of his family, secured the endowment for the establishment of a school of forestry at Yale University. A similar school is also maintained at Ithaca, New York, by Cornell University. Graduates of either of these schools, or of any other forestry school in the United States, are at once given employment in the United States Forest Bureau, as Mr. Pinchot is ever glad to obtain the services of young men so trained.

Positions for Trained Foresters

The Bureau of Forestry has positions open to trained foresters. These employés are known as field assistants, starting with salaries of from $720 to $1,000 at first, with extra allowances for living and travelling expenses incident to field work. Half of each year is spent in the field, and the other half in Washington, reports being prepared in the capital city. Incompetent men are excluded from entrance into this service by strict technical examinations under the United States Civil Service Commission.

The Bureau of Forestry is constantly engaged in the preparation of working plans for the development and maintenance of private State and Federal forest lands, for the pursuit of forest investigations, and in tree planting. To do all this work there is a dearth of properly trained foresters. And private forest owners are seeking the services of skilled foresters to check the wasteful methods of lumbering now in vogue. Trained men in this branch of work will find excellent opportunities in the Philippines.

Preparation for Forestry Work

Preparation for forestry should be undertaken upon a broad basis. It ought to begin with a college course, giving the student some knowledge of such allied subjects as geology, physical geography, mineralogy, chemistry, botany, and pure and applied mathematics, including surveying. Some attention may well be paid to physics, meteorology, and political economy. A post-graduate course should be taken at one of the schools of instruction in professional forestry.

The student should spend all his vacations in the woods, studying forest conditions from day to day, and getting used to forest methods in field work, especially learning all he can about lumbering, which is closely allied to forestry. If European forest study can be added, so much the better, as results of different methods, long employed, may be thus observed. In so much as all these branches of preparative work have been pursued, by so much more thorough is the fundamental training of the forester. Study at a forest school, at least, is essential, though the rest be out of reach. Insufficient training will be found to be a great drawback to advancement, no matter how great may be the student's natural ability.

Positions for Foresters' Assistants

Application blanks for the position of student assistants in the Forestry Bureau may be obtained by writing to the bureau. The applicant will be required to state whether it is his definite intention to make forestry his profession and to say when he reached such a decision. The student must state the degree of his knowledge of the following subjects: Forestry, lumbering, geology, physical geography, surveying, botany, and auxiliary sciences. The applicant has the privilege of naming the region of the country to which he prefers to be assigned, but the application blank adds: "The work you are applying for will be hard and monotonous. Cheerful obedience to orders is essential to success."

Each applicant stands about one chance in five of being accepted. As soon as he receives his appointment he will be assigned to work in the Bureau at Washington, where about twenty-five young foresters are employed, or he will be sent out on field duty, sixty-five students being thus employed in various parts of the country during summer. The student will be required to pay his own travelling expenses, and his salary during his apprenticeship will be $25 a month. The young man who seriously intends to make forestry his life work learns the business thoroughly, and as a full-fledged forester can ultimately command a good salary. These foresters must be something more than mere timber-cutters and woodsmen: they must have a knowledge of the needs of trees, a practical working familiarity with the different varieties of growths, and a fair knowledge of entomology. Insect ravages are so great in many of our forests that the forester must be thoroughly informed on the natural history of the pests and the methods for exterminating them.

The student assistants in the field are, in the performance of technical work, under the supervision of trained foresters, who explain and elucidate matters coming before their men, and suggest individual study in certain directions. Still these supervisors are not formal instructors, with lectures at given hours. The student assistant can learn much, however, from his daily routine.

The Farmer and the Bureau of Forestry

The steady growth of public interest in the preservation and wise use of forests is a subject for congratulation. Not only has the interest in forest management spread among important lumber companies and other holders of forest lands, but the interest in forest preservation has taken a firmer hold than ever before of those portions of the country whose prosperity depends upon their water supply. There has been a marked development of the forest movement in the South. The growing appreciation of the advantages of practical forestry is here, no less than in the North, largely the result of practical assistance from the Bureau of Forestry of the United States Department of Agriculture to private owners in handling their forest lands.

Every farmer who owns woodland can profit by writing to the Bureau first named for the reports in relation to the special branch of forestry in which they may be interested. Every branch of the operations of government forester is of direct benefit to the farmer, and all who desire may be made acquainted with the results and investigations of the forester. The farmers of Wisconsin and Minnesota can receive benefit from the Bureau's study of forest fires. All farmers in mountainous regions can use to advantage the advice given by the Bureau in respect to protection against forest fires, for such protection is of vital importance to agriculture. How to maintain the lumber supply without impairing the profits of lumbermen is a subject also treated of in the forestry publications. Every possible practical assistance is given to owners of forest land, even to the owner of a small wood lot, including advice as to the most suitable trees to plant in various sections, especially in the treeless West, and the best manner of handling wood lots wherever situated.

The conditions under which the Bureau of Forestry undertakes to assist the owners of wood lots to make the most of them are very simple. It has nothing to do with the receipts and expenses which arise under its plans. The farmer must attend to the actual work of cutting and marketing his wood, or else furnish the necessary labor. The cost of doing so he must pay, and the money it yields goes to him. On the other hand, all investigations, advice, and supervision needed to prepare and carry out the working plan are entirely at the cost of the Bureau. The assistance of the Bureau costs the farmer nothing except the desire to improve his property and the willingness to be assisted.

The object of this whole undertaking is to convince the farmers of the real advantage to them of better ways of handling their wood lots. To spread this conviction by the proof of actual examples in successful operation, which must be satisfactory to the men chiefly concerned before they can be of use to others, the whole scheme is arranged so that its success depends on the way it is received by the farmers. Just so long as the working plans are satisfactory to the farmers for whom they are made, just so long they stand a chance of being useful as examples, but no longer. Consequently the wood lot agreement is so worded that it can be ended at ten days' notice by either party. Furthermore, if a working plan is not satisfactory to the owner when it is made, it will not be put into effect. These conditions have been made so easy because the close relation of the wood lots to so many millions of our people, the vast area they cover, and their very great national importance as sources of fuel, fencing and other material, require and justify great effort to improve their condition and increase their productive power.

Scientists in Government Employ

There are a number of technical and scientific positions in the various departments and bureaus of the government which require special examinations. Applicants for these places are notified when vacancies occur and informed as to when and where examinations will be held. These positions can not be classified, as many of them stand by themselves. Hence examinations have to be made to fit each individual case. Such positions are as follows: agrostologist, anatomist, astronomer, botanical artist, bibliographer, cartographic draughtsman, cataloguer, chart corrector, chemist, climatologist, entomologist, horticulturist, assistant hydrographer, lapidist, lithographer, map colorer, microscopist, nautical expert, scientific assistant in the National Museum, ornithologist, pharmacist, photographer, pomologist, pattern-maker, road expert, soil physicist, tea examiner, vault, safe and lock expert, verifier of weights and measures, wood engraver, and vegetable pathologist. This list shows to a certain extent the varied interests, professions and trades which the government touches in its department administrations. The salaries paid to these different experts range from $1,000 to $3,000 or $4,000.

The work performed by the government scientists is as varied and different as the industries which make our national life so successful. For the sake of brevity and system, however, they are classified under great departments and bureaus, and in each one there will be found specialists in a dozen different lines. No man in scientific research has attained too great a reputation to make him above working for the United States Government, and no man is too humble of origin to be passed by unnoticed if he has anything new and of special value to the country. In the Department of Agriculture there are thousands of trained experts and men of science who are laboring in the interests of some ten million farmers. One of the largest libraries in the world is that which the Department of Agriculture publishes, and copies of the books and pamphlets issued from this department run into the millions.

The Department of Agriculture is administered by the Secretary, who is a Cabinet Minister, appointed by the President, and he makes his own selections for the heads of the different bureaus. The civil service law applies to many of the appointments in this department, and there is an unwritten law applying to many places outside of the civil service that no competent man shall be dismissed without cause. It is a well-known fact that there are scores of important positions in the department which are hard to fill, and a good man is retained in service for a lifetime. These scientific experts are paid good salaries, ranging from two to five thousand dollars a year, with some few exceeding the latter figure.

In all these positions under the government some scientific training or knowledge is necessary as a preliminary. The fear or favor of political pull is less than in most other departments. The work is all of a scientific or semi-scientific character, and a mere political follower or ward henchman can hardly cut a decent figure in such a position. Consequently the positions are in less demand than the mere clerical ones.

CHAPTER IV

THE MINISTRY AND ALLIED PROFESSIONS

The Ministry as a Profession—Qualifying as a Preacher—Number of Ministers and Vacant Pulpits—Ministers' Salaries—Theological Schools—Theological Students—Sunday School Teachers—The Catholic Church and Clergy—Training for the Priesthood—Sisters of Charity—The Jewish Church and Clergy—Missionaries—The Achievements of Missionaries—The Practical Side of Missionary Work—The Educational Work of Missionaries—Medical Missionaries—Missionaries as Printers and Publishers—Candidates for Missionary Work—Churches as Employment Agencies—The Practical Work of the Salvation Army—The Practical Work of the Volunteers of America

The Ministry as a Profession

THE profession most affected by the spread of the commercial spirit in America appears to be that of the ministry. Not that commerce has had the effect of keeping the people from church. On the other hand, in the last forty years during which the commercial spirit has been developed to its present magnificent maturity, church membership, according to the figures in the case, has increased proportionately with the increase of the population. Therefore the effect of the growth of commercialism is to be found in the theological schools and in the pulpits rather than among the laymen in the pews. It seems that in a practical age young men do not take kindly to the least practical of the professions. The material rewards in the ministry are so small that our young men pass by the open doors of theological schools, bent upon seeking entrance to the colleges of law or medicine or engineering, where the promise of the material future is brighter than that afforded by the seminary.

The influence of the pulpit, however, even in this age of commercialism, is as widespread and far-reaching as it ever was. The moral teachers are the social leaders. The pulpit will never be dispossessed. Preaching is a lofty form of conversation, or persuasion; an effort to bring the truth to bear upon conduct and character, so that the conscience may be quickened and the moral sentiment refined. The foundation of moral instruction is in the family, where the example of the parents is a constant, concrete lesson. The preacher must supplement this influence and expand it. Great is the printing press, and books may teach immortal truths. But, after all, it is only the living voice of the preacher, the persuader, that can touch some natures. Men need spiritual leaders of flesh and blood, and religion must be upheld and fostered and disseminated by priests and clergymen. It is the speaking philosopher who wins converts. Books, as a rule, do not carry conviction, do not proselytize, or convert. Spoken truth burns its way into the mind and heart. Man is governed by moral teachers, guiding the multitude out of the wilderness. Exterior laws do not make men good. Spiritual principles must work upon the heart.

There are difficulties to be faced by the modern preacher. He must be an expert in social reform. He must know the conditions of life in reference to illiteracy, vice, and crime, and not be a stranger to the demands of the tenement house. He must keep abreast of the times in all the various branches of contemporaneous human activity and interest represented in his congregations. He is forced to read much. Public duties must not be overlooked.

Qualifying as a Preacher

What particular qualities are required to make a preacher? The ministry used to be considered the most learned of the professions, especially in the United States. To-day, while it is still classed among the learned professions it has also a place as a practical calling. A New York clergyman says that the minister of to-day lives the life of every other man in the community. His life is more in the open, but amenable to the charge of being unpractical in the very effort to be practical. Ministers are now trying to adjust themselves to new conditions. For centuries they have ranked as cloistered men; to-day their work is among men shoulder to shoulder. Under the new conditions, therefore, the faculties of seminaries realize that young men in training for the ministry must receive instruction in sociology as well as in theology. For ministers to-day are not asked to give personal opinions on things which mere man is never destined to know, but "to take a useful part in the things which everybody has to do."

The most successful men in the pulpit under these conditions are those who are men of affairs as well as preachers, who have the practical mind of lawyers, the tact of politicians, the habit of investigation common to scientists, the thoroughness of educators, the sympathetic qualities of physicians and the courage of soldiers. In other words, the minister of to-day is judged not so much by his scholarly attainments as by his ability to make his teachings conform to the life practical. He must be a doer as well as a thinker. For these reasons his profession, which formerly was made difficult by demanding that those entering it be masters of Hebrew and the classics, is now made more difficult by the fact that the minister must understand the things of earth as well as of heaven, that he must know the ways of man as well as the ways of the Saint, that he must be a reader of newspapers as well as of the Bible. The preacher who wishes to hold his congregation to-day must have something vital and something practical to communicate. There never has been a time, therefore, when real ability has been so much in demand in the pulpit.

Meantime, the ministry offers the shortest of all the world's roads to employment, excepting that of the day laborer. The comparison is not odious, for ministers have often been compared to those engaged in the humble field of activity just mentioned. To say that the ministry offers a "short road," does not mean that there is a guarantee that the minister will continue in the employment thus secured. He will hold a pulpit only so long as he conforms to the requirements mentioned above. But up to the day on which the newly-ordained preacher comes into his first charge, his pathway is easier to travel than that in any other profession. Tuition at the seminary is free and he is given monetary aid, besides, for his support. After graduation he has not nearly such a long road to travel before taking his place in the active field, as has the young lawyer or physician. He encounters no harrowing delays, is not obliged to wait for clients or patients; for when he bids farewell to the seminary, there is somewhere a congregation waiting for him, pledged to his support. It is not often the case that a theological school graduate is obliged to wait a long time before securing a charge. Indeed, many are definitely engaged before they actually graduate. In most cases a call is extended from the particular church to the person desired. In the Methodist Episcopal body assignments are made by the ecclesiastical authority. No doubt it would be more satisfactory in many cases if there were in all churches some central body that had at least a degree of authority in the direction of young ministers with reference to suitable charges, but at present this is the exception and not the rule.

Number of Ministers and Vacant Pulpits

It is said that there are too many ministers, that the ministerial field is quite as much overcrowded as the professions of law and medicine. There are three replies to this statement, any one of which is sufficient to encourage rather than to discourage young men who may be thinking of entering the ministerial field. First, there are in this country at the present time thousands of unoccupied pulpits. Second, the number of students in Protestant seminaries during the last ten years shows a very decided decrease when compared with the number of students in the same seminaries during the previous decade. Third, and most important, if there appear to be too many ministers of a certain kind, there are not too many ministers of the right kind. And this last statement applies to all professions and to all members of such professions who are imperfectly educated.

In spite of the fact that the seminaries of the various denominations turn out an ever-increasing number of young clergymen, it remains a fact that, recently, at the beginning of the winter season, there were fifty pulpits vacant in the city of New York, representing an aggregate sum to be paid in salaries of $100,000 a year. New York congregations, at present, are disinclined to accept an untried man. The preference is for men of established reputations and proved ability. Young men flock to New York with the expectation of securing a church. They soon find that it is no easy task, and are content to take a charge, or parish, in some suburban town or distant city. In Presbyterianism, the modern church is not controlled by two or three elders, as in former days, but the congregation has a voice in the selection of a pastor. Thus the process of selection is somewhat more difficult and protracted.

One prominent sect recently had upon its lists 1,200 vacant churches. But the Church is now devising methods by which the vacant pulpits may be properly filled, and all available men be sent to places where they can immediately be useful. This would be a good training for the younger graduates, and would enable many of them to find permanent charges.

Ministers' Salaries

Say what statisticians will, the clergy are underpaid. There are bishops in the Episcopal church who may receive as much as $12,500 a year, with an average among them of $5,000 per annum. Rich Presbyterian churches have paid $15,000 a year to their ministers. But these are exceptions. Men of equal relative prominence in other professions might earn double these amounts. Taking all the various churches together, the general average of ministers' salaries is not far from $800. Expert statisticians have placed it at $847 for Methodist ministers, this average being pulled down by the very low salaries in the South, where the average is $500. In the Presbyterian church the general average rises to from $1,000 to $1,200. The Congregational average has been placed at $1,047; probably too low.

Among the mission workers of the Presbyterian church, in the home field, the average salary is about $866. The ranks of these mission workers contain many heroes, who face all kinds of hardships and dangers. A minister, animadverting upon the neglect of old clergymen in some denominations, wrote a brochure entitled "At What Age Ought Ministers to be Shot?"

All sects are agreed that the salaries of clergymen should be higher, and that they should be relieved of the many humiliations to which they are now subjected by this scantiness of wage. The present system of eking out an utterly inadequate salary by alms, disguised as "donations," should cease. The laborer is worthy of his hire. It is high time that justice should be done to this noble calling, in the way of proper financial support.

Theological Schools

Some writers on the church's method of helping young men into the ministry by means of free tuition, scholarships, and monetary aid otherwise, allege that this method lowers the standard of character among divinity students and robs them of the dignity of independence. Acquaintance with the students, however, as well as a survey of the ministerial field, shows that this allegation is not well founded. In the first place, the great majority of theological students come from the ranks of poverty. About ninety-eight per cent of the students in theological seminaries would be absolutely unable to take the seminary course were they not aided as they are. A canvass of the students of the General Theological Seminary in New York showed that all the students at the time of the canvass, with the exception of two, were receiving assistance from some source. In further defence of the church's method of helping students, a Presbyterian clergyman defies any one to go to the General Assembly and pick out those who were self-supported from those who had been aided in the preparatory studies of the church. "The thing," he says, "can not be done." As a matter of fact, many of the brightest clergymen of to-day are among those whom the church aided in securing their education.

Another very excellent argument in defence of the method of aid and support, is that the cadets at the National Military Academy at West Point receive each year the sum of $540 from the government in addition to free tuition. Certainly the character of the cadets is not injured by this aid; therefore, the conclusion is drawn that the character of another body of young men is not necessarily injured by receiving $100 a year from the church in addition to free tuition.

At the Princeton Presbyterian Seminary, at the Baptist Seminary at Rochester, and the Drew Methodist Seminary, not only is the tuition free, but aid is given to the student in addition. These facts are not cited to indicate that the seminaries give free instruction as an inducement for the young men to enter their doors, but to show that a young man can train for the ministry at less cost than for any other of the professions. At the same time the course of study in theological seminaries is in most instances shorter than in other professional schools. The pathway to the pulpit, indeed, is easier than that which the student must travel to reach the bar.

There are over 150 theological schools in the United States, having 8,000 students, while 96 law schools have over 12,000 students, and 200 medical schools fully 25,000 students.

Theological Students

By means of scholarships and free tuition generally, the young man who wishes to join the Protestant clergy is not debarred because of poverty. Everything is so arranged for him that he need not steal time from sleep or study in order to earn his way through the seminary, nor need he in any way suffer the strain or anxiety which comes to other young men who must meet pecuniary necessities.

A Presbyterian clergyman argues that the ministry should be first of all a learned profession, and that therefore it is inexcusable to require candidates to earn a living and attend at the same time to all the exacting requirements of a college curriculum. The Presbyterian church says to her young men:

> From whatever other profession or walk in life a condition of poverty may shut you off, it shall not be said that simple poverty shut you out from the holy ministry. Poverty shall not of itself constitute a passport into the sacred office; only it shall not shut you out. You must have brains and energy and piety and love of souls.

Young men intending to begin theological studies must be well grounded in Latin, Greek, philosophy, history, and English. Their special education, besides the ordinary curriculum of the theological seminary, ought to include practical experience in fields of labor. Some churches place theological students under the direction of their committees on Home Missions and Sabbath-school work. There are also permanent committees for the purpose of supplying vacant pulpits. This gives experience and fosters the missionary spirit.

The method of training followed in the leading seminaries is in many respects acknowledged to be the best training that any young man can receive for the ministry. More than ninety per cent of theological students are graduates of colleges.

Sunday-School Teachers

A popular movement has begun for the establishment of the Sunday-school upon a new basis. There are many young men and women who are ready and willing to give their services as teachers in the Sunday-school. The new idea, however, is to have normal schools for the especial training of Sunday-school teachers. This would be easy in college towns and in great cities. Educational endowment funds are proposed for the payment of the workers in the teachers' schools, the heads of departments in these schools, and Sunday-school teachers, graduating from these courses, in cases where payment is not superfluous.

In the matter of training schools for Sunday-school teachers, this has been provided for in Pennsylvania, Washington and New Jersey. In Philadelphia, the County Sabbath-School Association made the beginning in teacher-training. In the State of Washington such an institution is carried on for part of the year. The Bible Teachers' College of New York City is an ambitious venture of several years' standing. For the training of superintendents and other Christian workers, the Moody schools at Northfield, Massachusetts, and the Moody Bible Institute in Chicago, and the Bible Normal College of Hartford, Connecticut, are specially engaged. There are a number of cases where Sunday-school superintendents are under salary.

Though the number of Sunday-school scholars in the United States is only a trifle more than half of the number of pupils in ordinary schools, yet there are three Sunday-school teachers to each ordinary school teacher. To be exact, statistics show that there are about 12,000,000 Sunday-school scholars in 135,000 Sunday-schools, and that there are 1,500,000 teachers. Of the 12,000,000 scholars, 1,000,000 are in Roman Catholic Sunday-schools.

World's Sunday-school conventions are held every five years. The next convention will be held in 1903, the fourth gathering of the kind. The third convention was held in July, 1898, in London. The two great questions usually before the conventions are, first, the training of Sunday-school teachers, and, second, the question of paying salaries to Sunday-school teachers.

The Catholic Church and Clergy

One-fifth of all the Catholics on the American Continent live in the United States. The figures are 58,000,000 in the Western Hemisphere, and 10,000,000 in the United States. Of the total number of communicants in this country, 9,000,000 are Roman Catholics; 15,000 belong to the Polish branch; there are 10,000 Old Catholics, and 1,500 Reformed Roman Catholics. The total of Catholic churches in the United States is nearly 12,100, and there are nearly as many members of the clergy. The Roman Catholic Hierarchy of the United States consists, first, of the apostolic delegation at Washington; second, fourteen archbishops; third, eighty-one bishops.

Training for the Priesthood

Every young man who enters the priesthood, who gives himself to the Church, stands a chance some day of becoming Pope. The path toward the College of Cardinals, however—all the members of which are eligible as successors to the Pope—is one of unceasing work, sacrifice and devotion. The College of Cardinals comprises five cardinal bishops, twenty-six cardinal priests, and eight cardinal deacons.

The theological seminary is the official institution preparing young men for the priesthood. The minimum of necessary qualifications for admission to a seminary is either the education received in the Petit Seminaire or a college education of six years. The seminary itself devotes two years to philosophy, and from three to four years to the theological branches. A still longer time is required by those who take the degree of D.D. If the candidate has studied a year of philosophy at a larger college, the year is deducted in the seminary; if he has taken a two years' course of philosophy, both years are deducted upon examination. A considerable number of college graduates visit European universities to make or finish their theological studies and to obtain the degree of D.D. The three schools patronized by American students are the American College in Rome, whose members attend the lectures of the Roman University; the American College of Louvain, whose students attend the lectures of the University of Louvain; and the theological department of the University of Innsbruck, Austria. The highest degrees can also be obtained at the Catholic University at Washington, D. C.

Candidates for the priesthood are usually required to have completed the classical college course which leads to the degree of Bachelor of Arts. The Eastern colleges of the Jesuits do not especially aim at the training of prospective clerics. The purpose of the colleges of the Jesuit Fathers is to impart a general education as the groundwork for any profession to be chosen later. The only Catholic college, perhaps, that limits its endeavors to fitting students to become clerical candidates is St. Charles College in

Maryland. But preparatory or "little seminaries" also exist in Rochester, N. Y., Philadelphia, and elsewhere. After undergoing a satisfactory examination before a board of clergymen, the young men selected are sent by the bishop to a seminary, such as the one at Yonkers, N. Y., or at Boston, Massachusetts. There two years are spent in the further study of philosophy, Hebrew and scriptural subjects, and the four following years are devoted to scripture and theology. At the end of the six years mentioned the bishop ordains to the priesthood those who have satisfied all mental, physical and moral requirements.

Promotion to positions of responsibility in a diocese depends on the local needs, and the aptitude of the newly ordained clergyman. Usually some years of curacy precede the responsibilities of a pastorate, and a period of rustication or country life antedates a city charge.

Sisters of Charity

In the streets of Paris a picturesque feature is that of the Sisters of Charity in their dark blue cotton gowns, white handkerchiefs and huge white bonnets. In the streets of New York and many other American cities, a familiar feature is that of the Sisters of Charity in their black gowns and "nun's veil" and their white-rimmed shovel bonnets. Whether in blue or black, in France or the United States, or elsewhere, these are all Sisters of Charity of St. Vincent de Paul. There are to-day more than 20,000 of these Sisters, and more than 2,000 houses which they have established, or serve or direct.

The mistake is often made of supposing that any woman who wears a recognized religious dress and is engaged in works of mercy is a Sister of Charity; as a matter of fact, there is only one community in the world legally entitled to the name "Sisters of Charity." This community is the one mentioned above, the Sisters of Charity of St. Vincent de Paul. The United States courts recognize this fact, and hence bequests intended for one of the numerous sisterhoods engaged in works of mercy, whenever the testator has failed to designate a specific order in his will, have been given to the Sisters of Charity of St. Vincent de Paul.

Though all the branches of the Sisters of Charity in the United States are incorporated in the original organization at Paris, the American Sisters of Charity have never adopted the dress of the French sisterhood, deeming it too conspicuous, and therefore unsuitable to their work in this country. Their many ministrations extend to all who are afflicted in mind or body; to the soldier wounded in battle; to the orphan, the outcast and the foundling; to the prisoner condemned to the scaffold or the electric chair; to those of every race, every color, every creed, every condition of affliction. The sisters themselves live the life of poverty, toil and privation. The three cardinal vows taken by all the sisters are "poverty, chastity, and obedience," to which the Sister of Charity adds the care of the sick and poor.

The government of each community of sisters is vested in the Mother Superior, assisted by an assistant superior, treasurer, and the procurators. These officers, together with the ecclesiastical superior, form the Council of the community. The mother and her principal assistants each serves a term of three years, and their successors in office are elected by the members of the community.

Do you wish to be released from the trials of the world? Knock at the door of the Mother House of the sisterhood. Whether you are of high or low degree, rich or poor, you will be admitted. You must, first of all, however, submit to a drastic cross-examination. The Mother Superior conducts this examination politely, but insistently. She will ask you questions concerning your age, your health, your family ties, your obligations. Upon the judgment of the Mother Superior at this moment depends your future. If she believes that you possess traits of character which would make it impossible for you to find peace, happiness and usefulness in community life, she will say so frankly and you must remain "of the world." On the other hand, if you secure the approval of the Mother Superior you will be at once enrolled among the postulants.

"If you love Me, sell all your worldly goods, take up the cross, and follow Me." In obeying this scriptural injunction, you must take the vow of poverty before mentioned, and bring to the community a dowry which is controlled by the Mother Superior. If you are penniless, other things being equal, you will be admitted just the same as the woman of riches, and the dowry in your case will be waived. The dowry, however, for those who can afford to pay it, is a specified sum sufficient to cover the living expenses of the novitiate. Any money beyond the stipulated amount is still the sister's own to do with as she chooses. She may give it to the community, or she may give it to her family or friends. Having been admitted as a postulant, you will be allowed a period of six months' probation before making formal application to take the vows. Having proved that you have the essential, spiritual and physical qualifications for the arduous life which you wish to undertake, you then become a novitiate proper. Now you must bow your head to the shears, lose what is perhaps your crown of glory—your hair—and you must put on the cap with the deep white fluted border. Before the chapel altar, in the presence of the whole community, you take the vows—for one year. In all modern sisterhoods, indeed, both for the novice and for the professed sister, the vows are only taken for one year and renewed at the end of that time. Thus the sister may leave the community and return to the world whenever her vows expire, just as a soldier may leave the army at the end of his term of enlistment. However, very few take advantage of this privilege.

Your novitiate may last only two years, and not more than five. The ceremony at which the novice becomes a professed sister is simple but impressive.

Your life from now on will be one of constant toil. You will be required to rise every morning in winter at five, and in summer at half-past four o'clock, for this is the invariable rule for the Sisters of Charity of St. Vincent de Paul. At half-past seven your day's work begins, the mistress of the novices assigning to each postulant the day's duties. During the first months of your novitiate the duties imposed will be to test your spirit. Were you a woman of the refined world? You will be set to scrubbing floors. Have you the tapering fingers of the artist? You will be asked to wash dishes. Were you accustomed to elegant leisure? You will be sent to the laundry to labor over the wash-tub. Such will be the test of your humility and of your pliability for self-abnegation. As a postulant or as a novice, you may then be sent to a hospital, an orphanage, or a foundling asylum, or to one of the industrial schools of the order. If you are to take up hospital work, you will be sent to the training school for nurses; if your work is to be among the orphans or the outcasts, you will need no training, but will at once take up your active labors, and from that time on, until you are at last laid to rest in the little cemetery of the Mother House, you will know no idle moment.

The Jewish Church and Clergy

At the present time there are about 1,000,000 Jews in the United States, the Jewish population in this country having grown steadily since the introduction of steam navigation on the Atlantic. In 1846 there were only 10,000 Jews in New York City; to-day they number nearly 400,000. In 1877 the Board of Delegates of American Israelites, assisted by the Union of the American Hebrew Congregations, placed the total Jewish population in the United States at less than 200,000; to-day there are 200,000 Jews in Pennsylvania and Illinois alone, while every State in the Union has a Jewish population; 1,000 each in the States of Wyoming, Vermont, New Hampshire and Maine; 2,000 each in Nebraska and the Territories of New Mexico and Arizona. All the remaining States and Territories have a Jewish population of 3,000 or more.

Until within comparatively recent times the Jews of the United States received their clergy from abroad. To-day, of the two hundred Jewish ministers in this country, a large majority were trained here. The list of rabbis contains many names of men distinguished not only as pulpit orators, but as leaders in the manifold activities of the American people.

There are five hundred and fifty-seven synagogues, the total of communicants being 1,058,000. There are several seminaries conducted by the orthodox wing of the Jewish Church, for the training of young men for the pulpit. The principal departments of such institutions are the preparatory, the rabbinical and the semitic.

The only theological institution of the reform wing of the Jewish Church is the Hebrew Union College in Cincinnati. The graduates of this college now occupy pulpits in all the large cities of the Union. Tuition at this college is free to all; the average cost to a non-resident student during his college course here is from $400 to $500 per annum. "Thus far," says the dean, "we have been very successful in placing our graduates in good positions; some of them occupy the pulpits of the largest Jewish congregations in the country."

Missionaries

A survey of the practical as well as the spiritual side of the missionary field reveals the opportunities open to young men and women to devote their lives to hard work in foreign lands with little hope of material reward beyond that of a comfortable living. This survey shows that thousands of young men and women are capable of the necessary self-sacrifice and of being content with the consciousness of doing what they are able to do for the good of their fellowmen in lieu of substantial incomes.

Considering missionary work as an occupation, however, it must not be supposed from the foregoing that missionaries never rise to high positions in the actual work of the world. As a matter of fact, a number of men of exalted station in the religious field began life humbly as workers in foreign climes. Many prominent divines and certain bishops whose names are known in many countries started as missionaries. Briefly, advancement in the missionary field depends upon ability and hard work quite as much as in the other professions and in the useful arts and trades.

The foreign field needs men and women of the finest natural gifts, and highest education and training. They must have an aptitude for languages to enable them to master several dialects, and to use them with forcibleness and persuasiveness. There is little division of labor in the foreign field. The missionary must do everything that comes to his hands.

In the countries of the East, such as Japan, educational qualities are particularly necessary, as the missionary comes in contact with educated people. He must be grounded in the philosophy of religion and in comparative religion. He must develop the higher aspirations of the old faiths by revealing to his hearers the truths of Christianity.

In India, also, the policy of wise missionary effort has changed. A half-educated missionary there may do a great deal of harm, especially if of an unsympathetic spirit. Missionaries to India must be persons of the very best equipment, intellectually and socially. They must be abundantly able to meet and vanquish the modern criticism. They must face specialists in religious philosophy and religious history upon their own ground.

There is always a great need of specialists in foreign fields. Medical missionaries do an enormous amount of good. Even industrial teachers may be classed as missionaries, when they are employed in these benighted lands.

The Achievements of Missionaries

What is revealed in the survey of the distinctively spiritual side of the missionary field? We find more than 18,000 men and women devoting themselves to uplifting the lives of the ignorant and degraded in the remote and dark corners, religiously considered, of the globe. The majority of this army of workers toil with a singleness of purpose, oftentimes under circumstances of great privation, which is to be commended. In order that they may carry on their work the people of enlightened countries contribute over $20,000,000 annually. This seems like a large sum of money, but when it has been divided piecemeal among many workers the amount which each missionary has at his command is comparatively small. It should be added that the 18,000 American and European missionaries are reinforced by more than 80,000 native preachers, teachers, colporteurs and others, and that each of these receives his share of the contribution of $20,000,000.

What have all these workers accomplished? They have established permanent missions in 23,000 cities and towns; have organized 14,000 churches with 1,500,000 communicants; and from the so-called heathen countries they have created a recognized religious community of nearly 5,000,000 persons.

The Practical Side of Missionary Work

The practical side of the work has of late years been developed until it is now the side of greatest importance. This practical side includes the founding of universities, colleges, kindergartens and other educational institutions; it includes the distribution of literature; it includes the establishment of hospitals and dispensaries, medical colleges and schools for nurses; it includes the opening and maintaining of orphanages and foundling asylums, leper homes, and other reformatory and philanthropical institutions.

These departments of missionary work were formerly considered mere adjuncts of the work performed by foreign missions, were given secondary consideration by the missionary boards at home, and were hardly considered at all in the training of missionaries. To-day, however, these departments are given first consideration, and every effort is being made to develop the practical departments simultaneously with the spiritual.

The Educational Work of Missionaries

The educational features in modern missionary centres are most conspicuous. There are 94 universities and colleges, for instance, with about 36,000 students. There are included such institutions as the Wilson and Duff College in India; the Pekin University and the Canton Christian College in China; Robert College, Constantinople; Syrian Protestant College, Beyrut; the missionary schools in Japan; and similar institutions in Egypt. In addition, the 18,000 missionaries have over 1,000,000 pupils under instruction in nearly 19,000 elementary and village day schools. Again, there are about 1,000 secondary schools, which include nearly 200 training schools in the industries and arts, and about 125 kindergartens.

Considering the standing of women in Asiatic countries, it is a significant fact that one-third of the entire number of pupils who are to-day receiving instruction from missionaries are girls. The missionary boards assert that female education in Asia, Africa and the Pacific Islands is carried on entirely by missionary organizations. The mission colleges alone have over 2,000 female pupils, while fully one-half of the total number of pupils in the secondary schools are girls.

In the reformatory and philanthropic branches of the work, missionaries have established nearly 250 reformatories and foundling asylums, over 100 leper homes, 160 refuges for slaves of opium, for the insane and others, and thirty institutions for the blind and the deaf. Every department of modern effort for social improvement, indeed, is being developed by missionaries in foreign fields.

Medical Missionaries

The practical branch next in importance, and a branch which perhaps is of more real benefit to the races among which missionaries operate, is the medical department. This branch has developed a corps of workers known as "medical missionaries," and the nature of their work is thoroughly practical and humanitarian. These medical missionaries have established about 380 hospitals and nearly 800 dispensaries, in which 7,000,000 patients have been treated within the last few years. Of these hospitals and dispensaries there are nearly 400 each in China and India, and 150 in Africa, the remainder being scattered throughout the missionary centres of the world. In addition, there are nearly 70 medical colleges and training schools for nurses, with nearly 450 male and about 250 female pupils.

Missionaries as Printers and Publishers

The fourth branch of the practical work is that which makes of the missionary a printer and publisher. These printer missionaries distribute annually about three and a quarter million of volumes, consisting to a great extent of different portions of the Bible. The credit for over 450 of the 478 English and modern translations of the Bible belongs to missionaries. In the distribution of religious literature in what is known as missionary fields there are, first of all, the great tract societies, and, second, about 160 mission publishing houses, which circulate nearly 11,000,000 volumes annually.

Candidates for Missionary Work

The missionaries that the American Board of Foreign Missions appoints get their training prior to their appointment. In other words, missionaries qualify themselves as ministers or as physicians, just as men of other callings do; namely, by studies in college, theological seminaries and medical institutions. The board has nothing to do with all this educational work, either in directing it or paying for it. Usually the first the board knows of these men is when they come as graduates asking for appointment. They are appointed after due examination and ample recommendations from those who know them well. Their qualifications for particular fields of service are studied. When they go they are authorized to expect a comfortable and economical support year by year. Of course this varies in different fields. Their outfit is paid by the board. Their term of service is for life, except where unexpected circumstances arise, calling them to give up the work. It is understood that they will have a furlough after each period of eight or ten years' service. It would be impossible to go into the details here of what they do, but it may be understood that they do whatever they can in their several fields to preach the gospel of Christ, and, through that gospel, to elevate the people socially, morally, and religiously. When they become superannuated and are obliged to return to America, they have a small stipend, sufficient to support them through life.

The day was when any one who offered for missionary work would be accepted. It is past. At the present time such is the demand that is made upon them that each one who offers for a missionary service, more especially in the foreign work, must be able to do one thing exceptionally well —he must be a specialist in that line. The following facts apply especially to Episcopal clergymen. If it is a clergyman who is to do evangelistic work, the board requires a statement from a life insurance examiner of his physical soundness to live in the climate to which he purposes going. Second, evidence of a liberal education in arts and theology, stating the institutions in which he has studied or graduated, and his approximate standing. In the case of a layman—the work open to him is either as a teacher or physician. If a physician he must show evidence of considerable post-graduate work in the largest hospitals of the country. If he has not such and his other qualifications are of a high order, he is given special training without expense. If a teacher, he must show the same qualifications and have the same indorsement as would be necessary to obtain a similar position in the larger universities of this country. The women sent out go either as church workers, for which they must take a three years' training in one of the training schools, or as physicians, when they are required to show the same ability as is asked of the men; or as nurses for hospital service, when their testimonials must show the highest efficiency.

The salary of missionaries follows a fixed schedule. The only difference that is recognized is that of the increased responsibilities of a married man over a single man, and of a single man over an unmarried woman. They are all provided with house rent, or "quarters," and their medical attendance without cost. Each missionary in the foreign field is given a vacation of one year in this country after seven years of service. Their expenses are paid to and from the field. The amount of salary is sufficient to insure a comfortable living in the country in which they are at work.

Churches as Employment Agencies

Every one of the 200,000 churches in the United States is, in a sense, an employment bureau. Many churches have regularly established bureaus for the purpose of finding employment not only for applicants who are church members, but for outsiders as well. St. Bartholomew's in New York has as many as seven or eight regularly established departments for the relief of the unemployed. Churches that have no regularly established bureaus find work for the unemployed in haphazard fashion, even thus helping a large number of needy persons.

Business and manufacturing establishments frequently make a point of drawing upon the Sunday-school for employés. Not infrequently a Catholic firm recruits its force of helpers from Protestant Sunday-schools, while Protestant business establishments draw upon the Catholic and Jewish schools.

As there are 12,000 Catholic churches and nearly 600 Jewish churches, and as the Baptist churches number nearly 50,000, the Congregationalist nearly 6,000, Episcopal 7,000, Lutheran 10,000, Methodist 53,000, Presbyterian 15,000, Reformed 3,000, not to speak of the thousands of churches under such denominations as the Adventists, the Disciples of Christ, etc., and as each of these constantly finds employment for communicants, it is evident that a very large proportion of the army of workers in this country is supplied by the churches.

The Practical Work of the Salvation Army

The Salvation Army is nothing if not practical. It has opened in New York City and vicinity six workingmen's shelters, with accommodations for 736 homeless men. In these a bed may be had for ten cents and a room for fifteen cents. The manager helps the men to find employment. There are similar institutions of the Salvation Army in Chicago, Boston, Philadelphia, San Francisco, and a score of other cities, accommodating 5,000 persons in all. The Salvation Army also maintains many shelters for women in several cities.

Separate buildings are occupied in many cities as homes for artisans, the charges in these being a little higher. Homes for respectable working girls have been established and do an immense amount of good, and cheap food depots furnish the poor with food at wholesale prices, or less, meals being furnished to the extent of 1,300,000 a year. One cent meals are provided in some cities, consisting of coffee or soup with bread, to be taken home, if desired.

The Salvation Army also maintains cheap clothing stores, in which the poor may purchase supplies at nominal rates. There are also salvage brigades for the collection and sale of waste, giving employment to large numbers. In some cities contracts are taken to keep the streets in certain wards free from waste paper. As much as twenty-five tons of paper a week is handled by a single brigade. Woodyards offer some employment, but they have to compete with machine-cut wood.

The employment agencies of the Salvation Army are doing good work throughout the country, securing work for about 60,000 persons every year. In the matter of winter relief much good is done, relief funds of several cities being distributed through the officers of the Army. The doors of the Army halls are opened to the poor for shelter during periods of exceptional cold, the police gladly co-operating. Medical relief, nursing, the care of maternity cases, and work of a general medical character are now systematically conducted in many cities. Of great usefulness are the farm colonies in far Western and Central States, the only drawback to this excellent work being lack of capital. It would almost seem as if these farm colonies solved the problem of what to do with the very poor. They are not prison establishments. Family ties are not broken. Every colonist may become a home owner, and give children the hope and promise of immediate employment when arriving at the proper age. In this respect it is one of the most hopeful of charities, in that it makes men and women self-respecting and self-reliant.

The Practical Work of the Volunteers of America

General and Mrs. Ballington Booth thought that the vast sums which they had collected in this country ought to be spent here, and in view of Booth Tucker's opinion to the contrary left the Salvation Army and started another called the Volunteers of America. They have nine companies or central societies, and nearly one hundred self-supporting posts throughout the country, besides many outposts. In 1902 about 4,000,000 people attended their meetings. Among the most beneficent activities of the organization are a sociological branch for the help of destitute men; a philanthropic branch, including the Homes of Mercy for young women of all classes and conditions, providing them with shelter and securing employment for them; and a tenement branch, for work among the deserving poor. There is also a branch for work among the poor children, which conducts several homes, while much good is done by the Volunteer Prison League among prisoners, paroled prisoners and their families.

CHAPTER V

THE LEGAL PROFESSION

Conditions of Practice at the Bar—The Specialist in Law—The Law Office—Title and Guarantee Companies—"Ambulance Chasers"—Practice in the Criminal Courts—Practice in the Civil Courts—The Lawyer's Fees—Corporation Counsel—Law Schools—Law School Graduates—Studying Law in a Law Office—Studying Law at Home—Women in the Legal Profession—The Judiciary—The United States Supreme Court

Conditions of Practice at the Bar

NOTWITHSTANDING the difficulties in starting, and the number of competitors, the opportunities in the legal profession were never greater than they are to-day. Never was there a time when the services of the really good lawyer were more frequently required. This condition arises from the wider range and greater complexity of modern business affairs, the increase in the subjects of legislation, and the corresponding multitude of new enactments, and the great number of new questions as to legal rights and powers that arise in a country of swiftly increasing wealth and expanding commercial interests.

The subject of taxation, the relation of employer and employé, the innumerable questions arising from the extension of the corporate form of the employment of capital, the constant increase of State regulation as to different trades and occupations, and in the conduct of the affairs of life, from the renting of a tenement house to the cutting down of a shade tree, from the speed of an automobile to the practice of Christian Science, all give constant occasion for the services of a lawyer to advise, to consult, to prosecute or defend. All these have vastly increased the volume of business committed into lawyers' hands. Legal ability, wherever it is known to exist, is certain to be in demand. There is not only "room at the top" in the profession, but also room for those conscientious workers, who, if they can not gain that pre-eminence that places them at the top, can nevertheless reach a respectable and safe elevation.

There need be no cause for despair for the young practitioner who has the ability and is determined to become a good lawyer. But who has the ability and what are the conditions of success in this most arduous of professions? The answer is: the aspirant for a high place should possess, besides the cardinal virtues, an unlimited capacity for work, the power of concentrated and continuous attention, an avidity for cold facts, tact and a sound judgment. He must be truthful, honest, courageous, self-denying, and faithful. He should possess the qualities mentioned by Judge Stevens in dismissing the late Fosburg case, "the greatest reasoning powers, keenness, discrimination and the highest common-sense." If all these requirements set up a discouragingly high standard, be it remembered that they are requirements which are pre-eminently capable of attainment by assiduous effort and cultivation. A certain degree of natural aptitude is absolutely essential. Some men are born without the faculties needed to make a lawyer, just as some are born without the ear for music or an eye for color, and the attempt to develop such faculties will be fruitless. But, given the possession of a sound body and a sound mind and a genuine taste for the profession, hard work will do the rest.

Judges form the best estimate of character of the counsel who appear before them, and there is no influence so potent with the court as the confidence engendered by experience in the habitual truthfulness and accuracy of the advocate. There is no argument before the jury so successful in the long run as the argument that is earnest but fair, and that rests on facts and arguments rather than on mere oratory. The time was when juries were more liable to be swayed by rhetorical display than they are to-day. The community is older; juries, as a rule, are composed of those who have read more, seen more, know more, than the juries of half a century ago. They are quicker to detect insincerity, and to resent attempts to hoodwink them. Ask any one who has served upon juries what, in the summing up of the counsel, was the most effective in securing a verdict, and he will tell you that it was the actual, and not pretended, addresses to their intelligence, and the appeals to their judgment. A successful lawyer is, at least, sure of a competency. His professional earnings alone will not, it is true, amount to a fortune, as fortunes are now counted. They will rarely form the capital which speculation may so increase in bulk as to rival the wealth of the merchant or banker.

Another felicity of the lawyer's position is its independence. His capital lies in his brains, skill and character, and it is never at risk. He has none of the perils to meet that daily beset the merchant or the business man. He need fear no strikes, nor tariffs, nor changes in fashion, nor, if he is wise, the rise or fall of stocks. He takes no man's orders, is subordinate to none, but rather is intrusted with affairs of deepest moment that he may assume direction and control.

He is subject to the court and must bow to the decision of the judge, but that is a deference he gladly pays. It does not curtail his independence of action, except as his action is governed by the law itself, which it is the duty of the judge, to the best of his ability, to declare, and which is binding alike on court and counsel. Both are officers of the law, both have divided but co-ordinate duties in the administration of justice. There is no more agreeable relation than that between the bar and the bench, where the duties of both are conscientiously performed. There is no greater inspiration to duty than that which comes to the lawyer from the loyal trust of his client and the sense of all that depends upon his care and judgment. His conscience may call him to account if he fails to do his best, but, if he has done that, he is accountable to none.

But the chief advantage of the lawyer's profession is the extent of intellectual activity which its practice calls in play. In this country, where there is no artificial division between attorney and counsellor, where the lawyer deals directly with the client, is consulted at every stage of the case, is called upon to perform diverse duties, and even when his practice is limited to some special branch of the profession, must study whatever is submitted to him, or whatever he assumes direction of for himself, the widest range of intellectual faculties are brought into play, and there is no higher pleasure than such an exercise of those faculties.

No knowledge comes amiss to the lawyer. In no profession is general literary culture more productive of practical results, nay, more necessary for the best performance of its duties. The good lawyer should be a master of lucid statement and felicitous expression, and there is no better aid for the attainment of this art than the study of the classics.

The courts are the final interpreters of our constitutions, national and State, and hence questions the most momentous that can arise must be argued before and determined by them. The Supreme Court of the United States is the most august tribunal in the world. The destiny of the nation may depend upon its interpretation of our fundamental law, and in that court and all others, it falls to the advocates of the legal profession to study and present the arguments the consideration of which must govern the final decision. Cases may arise at any time in the ordinary practice of the American lawyer which present questions the solution of which may affect the interest and future of the people of a State or of the whole country. With such duties, such aims, such privileges, such influence, the legal profession yields to none in honor, in usefulness, in all that is worthy of human endeavor.

The Specialist in Law

The successful lawyer of to-day, like the successful business man, studies the market and offers for sale that which is in greatest demand. The commodity which he offers is legal information, and the kind of legal information for which he receives the highest price is one or another of the specialties. Like the manufacturer who realizes that he can not make many classes of goods as profitably as he can make one class, the lawyer finds that he can do better by making a specialty of a single branch of the law; so there are real estate lawyers and patent attorneys; and specialists in copyrights, in theatrical work and in a score of other fields.

The specialist in law must know his field as thoroughly as the business men therein engaged. The insurance lawyer needs to know the insurance business as thoroughly as he does the insurance law. One of our public prosecutors, upon whom devolved the duty of prosecuting two or three defendants charged with murders by poison, became a veritable scientist in chemistry, medicine and pathology. A lawyer who makes patent cases his specialty will find himself strongly equipped if he has a taste for mechanics and fortified impregnably if he has mastered the mechanic's trade.

The Law Office

Conditions have changed in the last thirty years in the legal world. The days of the Evarts and Choate type of lawyers have passed. The individuality of the young lawyer of to-day is lost, he is simply an integral part of a law machine called a firm or a corporation. It is known that banks, for example, in choosing counsel, first ascertain which of two or more candidates has the best financial credit, which pays his bills with the greatest regularity, which has unencumbered property, which carries the largest bank balance. And in making such choice, the banks give preference to firms rather than to individual lawyers. As the example set by the banks is followed by corporations, business houses, and even by individuals, it is manifest that the poor young lawyer, with a small office and nothing but his diploma and his ability to recommend him, stands but little chance of securing clients of high degree.

This state of affairs is the result of a common-sense business principle, the application of a business maxim that "the one who has been most successful in managing his own affairs is likely to be most successful in handling the affairs of others." Hence it has even come to pass that the mercantile agencies issue regular reports as to the financial standing of lawyers, giving the amount of their property, together with their professional standing—reports similar to those issued on dealers in butter and hardware and dry-goods.

The modern law office is a kind of law department store; that is, the office is divided into various departments, in each of which a special kind of legal information is for sale. The client or customer, upon entering, is shown into the private room of the senior member of the firm. He states the exact kind of legal information he wishes to buy, whereupon the senior member presses one of the numerous buttons that dot the rim of his desk. An electric bell rings in one of the other offices, and is responded to by one of the junior members of the firm. This junior member is the head of the department where are sold the particular legal wares the client wishes to buy. Henceforth the client transacts his business with this junior member, who acts under the general direction of the senior member.

The methods of business as carried out in a large law office of to-day are interesting. The old-time lawyer, practicing independently, kept no books, but simply sent a bill to this or that client from time to time as the money was needed. Oftentimes the fee charged was an amount of money which the lawyer judged to be consistent with the financial standing of the client. The bill, in other words, was rendered in a lump sum without regard to the actual disbursements. This haphazard method, in the best law offices, has been entirely abandoned, and charges are now made on a strictly business basis. All accounts are presented to the cashier of the firm, whose O.K. is necessary on all outgoing bills.

The heads of department receive either a salary or a percentage of the income. Each "head" is required to keep a record of the time spent on each client's affairs and of the time spent by each of the employés of his department on each particular case. A record is also kept of the time the client spends in the office. When the day of settlement comes round these records are tabulated on special blanks and given to the fee clerk. The fee clerk is thus enabled to determine just how much each case has cost in time, and just how much of the office expense the client should be charged with. To this sum is added a regular percentage of profit, the percentage depending, of course, upon the importance of the case and its value to the client. The bill is then submitted to the cashier, or auditor, above mentioned, who decides whether the result to the client justifies the charge.

Title and Guarantee Companies

The title and guarantee companies have ruined the business of a great number of the older lawyers and deprived many of the younger lawyers forever of the chance of making headway, individually, in private practice. Many old and experienced lawyers and the novices alike are now employed by the title and guarantee companies at salaries ranging from $20 to $30 a week. There are conveyancers on the pay-rolls of these companies earning $25 a week, who, twenty years ago, were classed with the ten-thousand-a-year men. The companies have so revolutionized the transfer of titles to real estate, a branch of the work of the profession that was formerly the most lucrative, that old lawyers, having lost their clients, are simply obliged to take salaried positions with the very corporations which were the cause of their ruin. There are a number of companies which make a business of furnishing bonds in cases requiring sureties. Other companies insure against accidents. Others draw wills for nothing, stipulating, however, that the company be named as executor. All these companies, too, employ lawyers on weekly salaries, the amount paid in all cases being less than the same lawyers could earn if they could practice as individuals.

"Ambulance Chasers"

With changed methods of practice have come changed methods among a certain class of lawyers in the manner of securing clients. In the old days the lawyer sat in his office, read law, and thus in ponderous dignity waited for his clients, of their own accord, to seek his counsel. To-day the lawyer must seek the client by methods as undignified as those of the office-seeker. Behold even the "ambulance chaser," that product of modern conditions, the lawyer who makes a specialty of securing retainers from persons injured in city streets, or in railway accidents.

Railway companies, especially, declare that one of the most surprising features of accidents is the presence upon the very scene of the accident of lawyers or their representatives, making bids for retainers from the injured, even before the extent of injury is known. At the time of the disaster in the New York Central tunnel, in 1901, lawyers actually offered to pay substantial sums to persons injured and take an assignment of the claim. The object of these enterprising lawyers, of course, was to obtain much larger damages on account of the public outcry against the railroad company. It is recorded that one lawyer offered a man who had lost his leg the sum of $20,000. The injured man later secured only $18,500 from the company.

This is only one phase of the general scramble for clients on the part of lawyers, which their brothers of twenty years ago would have scorned as beneath their dignity. It is understood, of course, that the business of the "ambulance chaser" is prosecuted in most cases with a view to extorting money from corporations. And it is equally understood that such lawyers are not on the road that leads to success.

The lawyer of to-day, if he would succeed, must build up, not tear down. He who makes a practice of preying upon society, by reason of its misfortunes or its crimes, will never stand high in his profession.

Practice in the Criminal Courts

Not so many lawyers as formerly are willing to appear as practitioners in the criminal court. The high-minded young man looks askance upon this branch of his profession, perhaps because of the associations it entails, or because of the uncertainty of pecuniary reward. The criminal court may sometimes prove a short cut to notoriety, especially in cases of a sensational nature. But the lawyer who defends the criminal only for the sake of the notoriety it brings soon drops out of sight. Certain it is, meantime, that criminals are entitled to counsel, and that a certain number of lawyers must appear in the criminal courts. Therefore there are lawyers who make a specialty of defending criminals, and it is these specialists who stand the best chance of success in that branch of the law business.

Practice in Civil Courts

While the practice of law in the civil courts is still essentially a profession, the methods of practice are such that it may be said of the majority of lawyers that they are in the law business. In the old days many a lawyer rose to success, as it were, on the wings of oratory as practiced in the court room. His eloquence yielded him large fees. To-day, however, the most substantial successes and the largest fees are made out of court. Formerly the chief value of the lawyer lay in his ability to extricate his client from trouble; to-day the value of the services of the member of the bar depends upon his success in keeping his client out of trouble and out of court. The process of law is so slow and the machinery of justice so unwieldy, that the modern business man is only too glad to resort to arbitration and to pay a liberal fee to counsel for "settling out of court."

While eloquence is still a commodity of which excellent use may be made in the criminal courts, the opportunities for the display of eloquence in the civil courts are few. As a rule, the courts to-day allow the shortest possible time for oral arguments, especially the civil courts. A plain, concise statement of facts is permitted, but the views of counsel are, as a rule, submitted in a written or typewritten brief.

The Lawyer's Fees

The highest fees paid to lawyers are for creative work, for skill in organization, for the formation of great combinations and consolidations. One of the largest fees on record was paid to a Western lawyer for organizing the American Tin Plate Company. It was five million dollars, partly in stock of the new company. A New York lawyer was recently paid a fee of a million dollars for reorganizing the steel combination. Another New York lawyer, practicing mostly before the United States Supreme Court, earns a hundred thousand dollars a year. Another New York practitioner, now in the diplomatic service of the government, earns a similar amount. The Northern Pacific Railroad recently paid a legal firm a fee of two hunderd thousand dollars for services rendered. The Chicago Gas Trust not long ago paid their lawyer a fee of half a million. So the American Spirits Association paid a firm of lawyers a quarter of a million recently. The Venezuelan Government paid to the late Benjamin Harrison a fee of two hundred and fifty thousand dollars as counsel in the boundary dispute. The same sum was paid to a New York lawyer for organizing the sugar combination under the laws of New Jersey.

Great fees have been earned in criminal practice. A New York firm of lawyers was paid fifty thousand dollars in the Molineux case. Special deputies to the Attorney-General of New York have been paid as much as fifty thousand dollars in certain prosecutions. Sometimes poor lawyers are taken into great firms on account of their ability to bring business, springing from their social relations or their family ties.

Corporation Counsel

One of the most lucrative fields for the lawyer of the present day is employment as counsel or as expert in some special province of jurisprudence. The growth of large business combinations fosters this development. Professionally skilled advice is necessary. Specialization is the need of the moment. Great business managers are absolutely dependent upon their legal advisers, and must adopt legal precautions to avoid civil and criminal liabilities and prosecutions.

Law Schools

Before the young man can become either a specialist or one of the partners in a law firm, or any kind of a lawyer, what must be the young man's training? There are one hundred odd law schools in the United States in which the cost of tuition ranges all the way from $100 to $250.

There are short cuts to the bar, of course, but the young man who adopts the "get-there-quick" plan soon finds himself unable to compete with his brothers who have received the proper training, and he must inevitably drop out of the race and acknowledge himself a failure. The proper training for a successful career means an investment of from seven to ten years of time and of several thousands of dollars. There is his first four years' course spent at the university in earning the degree of Bachelor of Arts. This will cost from $500 to $1,500 a year. Then comes the three years' course in the law school at an annual expense quite equal to that at the university. Then comes the final examination, which he must pass before being admitted to the bar.

The courses of study in the different law schools vary somewhat. Looking at two or three of the more prominent institutions, we find that at the Yale Law School, for instance, the aim is to give all the undergraduate students a thorough acquaintance with the general principles and rules of American law, fitting them for practice in any State; to instruct special students in their chosen branch; and to offer opportunities for study to advanced students. The course of three years leads to the degree of LL.B. Graduates of colleges and others are permitted to compress the course into two years, under certain conditions. Special students may, in three years, take the degree of Bachelor of Civil Law (B.C.L.).

Law School Graduates

Thousands of young men are graduated from the law schools of the country every year, and the number of lawyers to cases is out of all proportion. In New York alone there are eight thousand practicing lawyers. Courts the country over are so conducted that only one lawyer in five hundred is able to get the public ear as an orator, or to achieve fame as a clever practitioner.

The question, then, is: What becomes of all the young lawyers? Hundreds of them are doubtless bright men; but, shorn of their individuality, they are anonymous factors in the great law machines before referred to, for which they are working as salaried employés. The unfortunate ones are simply "lost" in law practice under modern conditions. They are eternally required to "work up details," and only the most fortunate, or those who, nothing daunted by the prevailing conditions, detach themselves from the law firms and hang out their own shingles, are given entire charge of a case.

Studying Law in a Law Office

It has been said that the law office is a poor school room. The student is told to read the law books on the shelves, without much regard to order or sequence. A systematic study of the law is out of the question. Perhaps more than any other science the study of the law requires an instructor. The average practicing lawyer is so busy that he has little time to give to the student in his office. The training in a law office must therefore be extremely superficial. The student skims through a few books, draws a few legal papers, and is admitted to the bar, without the proper systematic study of the principles and history of the law. To one who can not go to a law school the correspondence schools are a boon, supplementing in a satisfactory manner such instruction as may be obtained in a law office, and grounding the student in basic and fundamental principles.

Studying Law at Home

The establishment of correspondence schools of law has made it practicable for young men to study law at home. These correspondence schools have passed beyond the stage of experiment, and have proved their usefulness. Those whose time is partly taken up at home can pursue these courses with great advantage, gaining a good legal education. The student chooses his own time and place of study, receives individual instruction, is taught self-reliance, and may pursue his regular vocation while studying. He receives attention which the busy, successful lawyer in his office has no time to bestow upon him. His reading is properly directed. A common-school education is required of applicants for admission to the junior class. Post-graduate courses are also available. In the "Department of Practice" the every-day routine of a lawyer's office is followed, with instruction in contracts, leases, deeds, mortgages, bills of sale, bonds, notes, powers-of-attorney, wills, pleadings, affidavits, searches of title, etc. General principles are taught and applied to concrete facts and conditions.

Women in the Legal Profession

In the United States a large number of pulpits are occupied by women, the medical directories contain the names of hundreds of women in medicine, but at the bar woman has a comparatively small representation.

A prominent woman lawyer in New York who has won cases in the Court of Special Sessions was asked whether she would advise girls to become lawyers. She replied that she would not unless they were seriously in earnest and felt a special calling for it.

> "It is a hard life," she said. "The nervous strain of court practice is wearing even to men, and women are much less able to endure it. I would certainly advise girls to study law as part of a valuable practical education, but I would discourage them from attempting court practice unless it is necessary. It is useless to deny that there is a prejudice against woman lawyers. I mean among the men in the profession. When I first began to practice I had the feminine idea of the social courtesy extended by men to women, and I thought everything was going to be perfectly lovely; but I found out my mistake. If I wanted to win, I had to fight tooth and nail. I did it, but it isn't every woman who would be physically able to endure the strain."

As sentiment and impulse predominate in the feminine temperament, nothing will round out a woman's mind more fully than a legal education, enabling her to acquire a judicial way of looking at things. The cost of a legal education for women is not high. In an Eastern university the fees in the woman's law class are $6 for each course, or $20 for the four courses, besides a graduation fee of $5. There are scholarships of which ten are free and twenty half free. The advantages that come to women from studying law are numerous. Typewriters and stenographers in law offices are greatly benefited by a legal course of study. A knowledge of the principles of commercial law is a great advantage to a business woman. Women physicians find it to their interest to know something of medical jurisprudence. As the laws of many States give women, married and single, entire control of their individual estates, the more law they know the better can they manage their property.

Iowa, Michigan, California, Missouri and Illinois were among the first States to admit women to practice law. In New York State there are classes for women law students at Cornell and New York University. There are in this country several successful women lawyers. Some foreign countries admit women to the bar. Among these is France, Canada, Japan, and India.

In Wyoming women are permitted to serve on juries and to act as justices of the peace. In Chicago a woman is public guardian, having in her care the estates of more than three hundred orphans. New York and Illinois lead in the number of women lawyers. In conclusion, we may say that in thirty-four States women are admitted to practice law. In Illinois eighty-seven have been admitted; in New York, forty; in Iowa, thirty; in Massachusetts, twenty; in Missouri, twenty-five; in the District of Columbia, ten; in Nebraska, twenty-five; in Oregon, nine. Each of the other of the thirty-four States has two or three.

Wives, mothers and daughters were among the number recently graduated from a women's law course of an Eastern university. The relatives of several prominent millionaires and of men noted in their professions were included in this list. The broad-minded and philanthropic Miss Helen Gould has been very deeply interested in this legal course for women. Many women have followed the study of law, not with the intention of becoming legal practitioners, but that they might be the better prepared for the management of their estates and the control of their financial affairs, or the conduct of their business. A large number of women are taking up legal study for the broadening of their education and the fascination presented to them by the subject.

As between their brothers in the legal profession, so judges and juries will always distinguish between capable and incapable women lawyers. Prejudice against women lawyers is disappearing. Success must be a matter of personality. Business ability and personal individual magnetism will be factors in determining a woman lawyer's success. The first practitioners have been, and will continue to be, women of a very high grade of ability. Although women have not practiced in New York long enough to permit conclusions to be drawn, yet the prospect is promising that they may find legal work remunerative. One or two women lawyers have achieved signal success at the New York bar. It has been agreed that the West offers a broader field for beginners.

Two qualities are absolutely essential to a woman's success as a lawyer —perseverance and concentration. Earnestness and sincerity will, of course, be present. A sense of justice must prevail. From the bench and the bar women lawyers in New York will always receive the most courteous treatment. Respect for her ability and character each woman will win for herself. It is not yet a certainty that the average woman practitioner will make a good living by her profession. But all things must have a beginning.

The Judiciary

"When the lawyer turns from the Bar to the Bench," said a justice of the Supreme Court of New York, "it usually means that a man has added the profession of politics to that of the law. In a general way the judiciary may be said to be divided into three branches—city, State, and national. Every lawyer has it within his power to work his way up from city magistrate, through the State courts, to a place on the bench of the Supreme Court at Washington, but to do this he must not be averse to taking an active part in politics."

The salaries of the various magistrates and judges are as follows: The city magistrates of New York are paid $7,000 a year; judges of the special sessions receive $9,000 a year; judges of the general sessions, elected for a term of ten years, receive an annual salary of $12,000; the district attorney of New York receives $12,000 per annum, and the assistant district attorney $7,500. The Supreme Court justices in New York City receive $17,000, and in the remaining districts of the State $7,200 each.

It should be added that the justices of the Supreme Court of New York State are divided among eight districts, the first and second districts comprising the city and county of New York and other counties in or near Greater New York, the six remaining districts covering the entire "up State" section.

In the Court of Appeals of the State of New York the associate judges receive $13,700, and the chief judge $14,200 a year. To return again to the City Court—the judges are elected for a term of ten years at an annual salary of $10,000 a year. In the Surrogate's Court the surrogates are elected for a term of fourteen years at an annual salary of $15,000 a year.

It is impossible here to dwell at length upon the judiciary in all the cities and States of the Union. It is sufficient to say that the salaries paid to judges in New York represent the maximum earnings of the judiciary throughout the country. A study of the figures named will show that a good lawyer can earn a great deal more money than a judge in the highest court.

The United States Supreme Court

"The most respected and most powerful judicial body in the world." These words are to be found in the eulogy which Mr. Gladstone pronounced upon the Supreme Court of the United States. To become a member of this august tribunal is considered worthy of the ambition of the greatest lawyers.

A place on the Supreme Bench is supposed to be the greatest office under the government. It carries with it a power greater than that of Congress, greater than that of the President. For the Supreme Court of the United States can set aside the law of the land, a power not given to any other court in the world. Congress may pass a bill, the Chief Executive may sign it, but the Supreme Bench can render any such act null and void by declaring it unconstitutional.

A place on the Supreme Bench, therefore, means power, position, distinction. It does not mean material advantage. On the contrary, more than one member of the court has given up an income of from $30,000 to $40,000 a year as a practicing lawyer to become a member of the Supreme Court at $10,000 a year—the salary of each of the eight Associate Justices. The Chief Justice receives $10,500, a sum equal only to that which the United States pays to ministers to countries like Peru, Uruguay and Salvador. It is a sum a trifle in excess of half the amount paid to our ambassadors. It is apparent that the great and important office of Chief Justice or Associate Justice often carries with it a sacrifice in a material sense on the part of the incumbents.

A place on the Supreme Bench is supposed to be unlike political office, in that it is considered indelicate to become an avowed candidate for the position. The place, therefore, is seldom sought after through the regular channels utilized by ordinary office seekers.

An appointment to the Supreme Bench is for life, but the justices may retire at the age of seventy with pay, if they so desire. As a matter of fact, but few justices have availed themselves of this privilege until long past threescore and ten. The oldest member of the court at the present time is seventy-four years of age, while the youngest is not yet sixty.

All the justices literally burn the midnight oil. The press of the business of the court is so great that many litigants are obliged to wait two or even three years before their cases can be heard. Oral arguments are heard every week-day excepting Saturdays, during the session, from twelve o'clock to four. The time the justices spend actually on the bench, however, is only a small part of their work, just as the actual time a Senator or a Representative spends in the legislative hall represents only a small part of the time he gives to government work. The real hard work of statesmen is done in committee rooms, and the hardest work of the justices of the Supreme Court is done in the consultation room.

Every litigant, great or humble, has the opinions, not of one of the justices, but of all. Therefore, after hearing the arguments, each justice must study the case individually. On "conference day" each case is discussed, briefs examined and opinions exchanged. Then the Chief Justice names the Associate Justice who is to write the opinion of the court.

CHAPTER VI

THE MEDICAL PROFESSION

Conditions of the Practice of Medicine—Specialists in the Medical Profession—The General Practitioner—The Country Doctor—Physicians as Business Men—The Physician in Public Life—Physicians in Court—Surgeons—Electro-Therapeutics—A Medical Education—The Hospital Service—The Beginner in Medicine—Women in the Medical Profession—Organization among Physicians

Conditions of the Practice of Medicine

THAT the ranks of the profession are very much overcrowded is shown by the reports of the last census, which demonstrate that in New York State there is one physician to every five hundred and ninety-six other inhabitants, in Pennsylvania one to every six hundred and ninety-three; in Illinois, one to every five hundred and eighty-three. In a general way, the Eastern and Middle States contain the greatest number of doctors, while in the Southern and Western States, except California, the proportion is not so large. New Mexico contains one to every fourteen hundred and six, while Mississippi contains one to every fifteen hundred and forty-eight. There are most physicians to the population in the States of Vermont and California, which respectively contain one to four hundred and seventy-seven and one to three hundred and ninety-two. A practitioner, with a fair practice, must have about two thousand persons who come to him when ill for treatment.

The older general practitioners are fond of telling the youngsters that it is almost an impossibility to keep abreast with the rapid progress that is being made in all branches of the profession. This is to some extent true, and it is for this reason that physicians prefer to know one branch thoroughly rather than to have only a superficial knowledge of all the branches; therefore we have what in popular parlance are called eye doctors, nose and throat specialists, ear specialists—not to speak of bacteriologists, gynecologists, and many other specialists better known to the profession than to laymen.

It has been said that because of the great number of specialists, the general practitioner has become merely a master of ceremonies, especially the physician who counts his patients among the wealthy class. Instead of making a diagnosis and suggesting treatment himself, it appears to be the custom of the general practitioner to call in various consultants, by whom the diagnosis and treatment are furnished. In fact, specialists have so multiplied that the old-fashioned "family doctor" is not as popular in households as formerly, for patients argue that if the family doctor is not capable of handling the case himself and is obliged to call in the specialist, they might as well go at once to headquarters, and thus pay only one fee. Thus it has come to pass that in many instances the family doctor finds himself replaced, first, by the specialist, and second, by the trained nurse, who carries out the specialist's instructions.

The general practitioner must carry with him an atmosphere of cheeriness and hopefulness. The old physicians speak of this as "a good bedside manner," and it is indispensable to a doctor's success. The complete trust of the patient must be won. The personal equation of the physician counts.

A fruitful source of failure in the medical profession is the following of double callings. The physician should absolutely avoid this. Medicine is a jealous mistress, and will quickly turn from the man who courts any other profession. Even a reputation as a surgeon will militate against a practitioner, for his acquaintances soon give him a reputation for cutting, and believe that he is good for that alone. Surgery should be regarded as a specialty distinctly apart from medicine proper. Surgical work, moreover, differs widely from that of the practitioner—one cuts away and sacrifices, while the other saves and renews.

Specialists in the Medical Profession

The general tendency of the medical profession is to specialism. In becoming a specialist the young physician sometimes makes a grievous error. He chooses a specialty and practices it before he is thoroughly grounded in general practice. The specialist who is not first of all a good general practitioner, thoroughly qualified by study and experience in all branches of medicine, is a very dangerous man. He is apt to attribute all symptoms to his own specialty. Thus, if his specialty be the nasal passages and throat, he will look upon malformations of these as the cause of all human ailments, and no person will escape an operation at his hands which is designed to improve nature, but which not infrequently leaves the sufferer a victim to some chronic nasal disease. There are oculists who believe that all nervous diseases spring from ocular defects, aurists who hold the ear to be the source of nearly all human ills, gynecologists who allow no woman to escape the knife, yet these practitioners are conscientious men who would not knowingly or willingly do a wrong act.

In recent years a new specialty has opened up to medical men through the discoveries in the field of bacteriology. In this field and in that of physiological chemistry, which is so closely allied to it that the two are united, a young medical man may, without practical experience in curing the sick, find opportunities that may secure him a living. Unless, however, he can obtain a position in some medical school or in connection with some hospital or dispensary it would be better for him not to attempt to use this as a path to practice.

The specialist demands even more years of study than does the general practitioner, with a corresponding increase in cost; for the specialist, after leaving the hospital, should spend at least two years in the hospitals of Europe, and then from two to ten years as an assistant to a leading specialist. Thus the young man usually devotes at least fourteen, but as a rule sixteen, years in training for the particular branch of the profession in which he aspires to make his mark. To some patients the specialist's fee for a few moments' work may seem excessive, but it is the patient, not the doctor, who forgets the years spent in study and hard work, and the cost of preparation for the operation which perhaps has saved a human life.

The General Practitioner

In large cities it is discovered that it is not the celebrated specialists who earn the largest fees, but rather the general practitioner who has what is called a fashionable practice. This physician in ordinary to the fashionable element of society drives about in a brougham with a coachman in spick and span livery; also, he calls in specialists or scientific experts at his own discretion. The income of the fashionable physician—and there are perhaps a score of such doctors in New York alone—is larger than that of the specialist, as has been said, and is greater, perhaps, than that of physicians celebrated for their high scientific attainments. For the fashionable doctor not only charges large fees, knowing that they will be paid, and paid promptly, but the appreciation of his patients is often shown in a practical way by voluntarily sending him a check for double the amount of his bill.

It is matter of record, however, that even the wealthy sometimes refuse to be imposed upon by that class of physicians who charge according to the estimated capacity of the patient to pay. For a certain operation a physician once charged a rich man the sum of $25,000. The patient disputed the bill, and the matter was referred to a committee of doctors for settlement. The committee rendered an opinion that the maximum fee for an operation such as had been performed should be $500. Whereupon the wealthy patient sent the physician a check for $500, which was accepted—and services of that particular physician were never again required by that particular patient.

Physicians who earn large fees from private patients often give their services free to hospital patients. Some of the most celebrated general practitioners in New York, for instance, treat hospital patients gratuitously in the morning, while for the same services at their offices in the afternoon they charge a large fee. But they give as much attention to the free patient as to the one who is able to pay. Physicians say that it is only right that the rich should pay for medical attendance for the poor.

In estimating his probable income the young physician must not forget that his expenses will involve a large outlay besides that for office rent and servants. If he would keep abreast with the progress made in his profession, he must buy a great number of text books every year, and must subscribe to many periodicals and purchase dozens of new instruments. The expenses of the physician who would keep himself in the front rank are such that it is said that one New York physician who is reputed to have an income of $60,000 a year, asserts that his net income is only about $10,000 a year, the remaining $50,000 representing his annual professional expenses.

The Country Doctor

The hardest working member of the medical profession is the country doctor. Hard work in this case is not wholly in the realm of science, but rather in actual manual labor; for every country doctor passes most of his time either on horseback or in his buggy. He must drive from ten to thirty or thirty-five miles a day. After the first year of practice the country doctor no longer counts driving as a pleasure, for driving and riding have by that time become for him real hard labor. His patients are miles apart, and he must reach them somehow, winter or summer, in rain or sunshine, urging his overworked horse through snow or mud, as the case may be.

Often he is called up, like the city doctor, in the middle of the night, but there is no trolley-car for the country doctor to board, no livery stable from which he can order a cab by telephone. He must harness his horse himself and drive a number of miles, all for a fee of perhaps $2. Certain it is that physicians in the rural districts are obliged to work much harder for their $800 a year than do their city brethren who earn $1,200 a year.

Many young physicians, however, find practice in their native county, with small fees, more desirable than a larger practice with less work and larger fees in the city among strangers. If often happens that the young countryman takes over the practice of one of the old family doctors in his neighborhood, having made a bargain with the practitioner for such a transfer before going to college.

Physicians as Business Men

A physician's first aim is to relieve the suffering and to cure the sick; his second is to obtain a living for himself and for those dependent upon him. In order to perform this latter duty he must be to some extent a business man; generally, however, the physician is a very poor man of business, and it is too often the case that boys who are found wanting in business ability are, as a last resort, put to the study of medicine. At any rate, failure to acquire lucrative practice is often the result of poor business methods on the part of the physician. The first principle of all business is system. In his business relation to patients, the physician should live just as close to system as possible. He should have a fixed rate of charges and a fixed system concerning the collection of these charges, which should be followed as closely as possible.

Whenever a young physician can keep his practice on a cash basis he would best do so; a dollar in the hand is worth two on the books, and this is especially true of the early practice in the case of young men. An office practice is to be encouraged and built up as much as possible, for it is always largely cash. It is an excellent plan to render bills monthly, and no objections will be made to this if the bills bear the notice on the heading: "Bills rendered monthly." The old-fashioned long credit plan is sure to entail heavy losses.

The Physician in Public Life

In our large cities there are many salaried positions which a young physician may obtain. In New York the Health Department employs a large number of young medical men to whom it pays small salaries, but sufficient for support. The life insurance companies and many hospitals and dispensaries also pay salaries to physicians, and by receiving such an appointment a young man can tide over the period when patients come slowly. But whoever sinks into the rut of a salaried position passes a wretched existence. He is never sure of his position, especially if it be a political one; he may be torn from his place by political changes or by sickness or other misfortune, and if such an accident occur late in life he will probably not endure transplantation. Moreover, the salary of official medical men is so small as to be a disgrace to the country. While it may seem large to the beginner in medicine who is without a family, it is quite inadequate to support the latter.

Young men in official medical positions should never neglect to keep up at least a nucleus for the establishment of a practice, for if his official life is continued to old age and then terminated by the loss of his position, he is likely to become a wreck and unfitted for any avocation, least of all for the practice of medicine.

These salaried positions undoubtedly retard final and complete success even when they are used for the purpose of tiding over the period when practice is slow. There seems to be something about the holding of a salaried position that leads patients to distrust the doctor, either from lack of faith in his ability or for fear that he may not be on hand when his services are required in a case of emergency. The physician himself loses something; he lives from hand to mouth, spending his salary as soon as it is due, ofttimes before, neglecting to work up a practice. He has no time to work at the hospitals and do other work necessary for the acquirement of a practice.

Physicians in Court

Physicians are probably more frequently called into court as expert witnesses than are the members of any other profession. As alienist the doctor must represent the interests of the insane, while in accidents and murder cases his services are often required to make clear medical evidence. As an expert witness, neither the young nor the old physician can afford to be unfair to either plaintiff or defendant, regardless of the side he represents. He should never permit himself to be made use of to establish a case of doubtful character, lest sooner or later he will come to repent it.

Surgeons

It is said that the medical profession in the Nineteenth Century made greatest progress in the surgical branch. A great number of medical students nowadays prefer to train as surgeons rather than as doctors in the ordinary sense of the term. It seems that the use of the knife is considered more scientific than to prescribe medicine, and that therefore the surgeon makes more money than he who scribbles prescriptions. Meantime, when a surgical operation is to be performed, the ordinary practitioner prefers to call in the surgeon, even when the operation is of the minor sort.

To the triumph of modern surgery, says a New York surgeon, there is scarcely a limit. Nothing apparently is beyond the reach of the confident and daring hand that wields the life-saving blade. The hitherto hidden recesses of fatal disease are made into broadening highways for explorative scientific endeavor. No organ of the body, from brain to kidney, is exempt from successful operative procedure. Even a stab or bullet wound of the heart itself is boldly sutured in the short intervals between uninterrupted pulsations.

It is a proud thing to say on behalf of the medical profession, that, through its persistent efforts in the interest of radical sanitary regulations, there is not a district in all the wide territories of the United States in which any pestilential disease could take firm root or be beyond the possibility of speedy and effectual eradication.

Electro-Therapeutics

The use of electricity in all branches has been reduced to an exact practical science. Delicate instruments enable the adjustment of the voltage and current strength to the most minute degrees, to the achievement of correspondingly precise results. One of the most significant phases of electrical development is found in electro-therapeutics. Science has demonstrated the close analogy between the actions of electricity and vital forces, and it only remains for the physician to apply this knowledge accurately to the treatment of diseased and morbid physical conditions. Here, however, the all-important subject of electro-physiology, or the science of electrical effects on the human body, is necessary as defining and limiting the use of electricity, current or static, since this force which can heal so effectually can also injure, if wrongly or ignorantly applied. For this reason, the physician, who would use this latest of scientific adjuncts to his professional practice, must become an electrician to the extent at least of being an expert on electro-physiological effects.

Among the uses of the electrical current in medical practice may be mentioned its power as a sterilizer, deodorizer, bactericide or general oxidizer in sanitation, in which it is fairly incomparable. In therapy, it is useful as supplying a ready means for lighting and exploring cavities of the body, the stomach, bladder, etc.; in the electric cautery, which may be introduced cold into any passage, heated to the desired degree, applied to the diseased tissue, and withdrawn cold; in the Roentgen or X rays, by which medical and surgical diagnosis has been immensely advantaged. In all of these applications, however, especially the last, exact knowledge is necessary, in order to avoid harmful effects. The various kinds of current, intelligently used, have different physiological effects. Thus the direct current is stimulating or soothing, according to strength and polarity; induced currents are useful in treating the motor nerves and contractile tissues; sinusoidal currents can induce muscular contractions with the minimum of pain; high-tension and high-frequency alternating currents, as powerful excitants, are particularly useful in quickening metabolism; static electricity, carefully applied, is useful in a wide variety of ailments; while alternating magnetic effects are especially useful in correcting faulty nutrition. Thus a wide sphere of usefulness is opened to the physician who takes the trouble to inform himself on the exact regulation and use of electricity. In dentistry the electric current is of especial value in the electrolytic elimination of diseased tissue; in the preparation of a cavity, without needless pain to the patient; in sterilizing teeth; in short, in all operations where the allaying of pain is desirable. It is equally effective in oral surgery, accomplishing with the smallest discomfort to the patient, many things impossible to the knife or older methods of cautery.

A Medical Education

A good medical education costs a sum of money which will seem large to people in moderate circumstances. In the first place a man must be thoroughly grounded in the elementary studies before he can enter a first-class medical school. Under the existing laws enforced in all our States a knowledge of reading, writing, arithmetic, history, geography and Latin is required before matriculation.

The cost of a strictly medical education depends, of course, upon the locality in which a given medical school is situated, and will consequently vary within rather wide limits. In our large cities, such as New York, Philadelphia, Baltimore and Chicago, from six to eight hundred dollars a year will probably cover the necessary expenses. As most medical colleges now require a course of four years before conferring their degree, the total cost will be between three and four thousand dollars.

One would think that ample means would be an essential need for the medical student throughout his career, for such means would enable him to support himself without worry and embarrassment for the period of time necessary for thorough study, and for the subsequent acquirement of hospital experience and equipment which would enable him to outstrip his poorer competitors. As a matter of fact, however, a man backed by ample means seldom succeeds in the practice of medicine. It is true that some wealthy men have achieved success in branches related to medicine, such as original chemical and bacteriological research, but in the practice of medicine proper rich men are failures.

Two things are necessary for success in the profession; these operate, the one to pull, the other to push, the student. One is a pronounced taste for the calling, an overwhelming ambition to be a physician and to attain the goal of medical success; the other is the spur of necessity, or goad of pov-

AN OPERATING ROOM

TRAINED NURSES AT WORK

Vol. II., pp. 895, 902

erty, that forces a man forward and prevents him from taking a backward step.

It is impossible to advise the student with regard to the particular medical college which he should enter. He has his choice of about one hundred and twenty-five regular medical schools and about twenty-five homeopathic schools. Some young men prefer to enter medical schools near their own homes, or at least in their own States. The wise student, of course, will make every attempt to enter one of the best medical schools. If he has not money enough at the outset to pay for his training, he can work his way to a degree, and in doing so will find helping hands the rule rather than the exception.

The medical graduate, at the date of his graduation, is utterly incompetent to treat any disease. All of his studies of diseases have been from diagnosis to symptoms. For example, in the study of typhoid fever his text-book article is entitled, "Typhoid Fever; its Etiology, Symptoms and Treatment." In practice, when confronted by a patient he finds this order reversed, the symptoms are what first meet his eye, the name of the disease must be worked out from these symptoms. His text-book describes a classical case of typhoid fever, but the symptoms presented by his patient vary, as a general rule, so greatly from the classical description that he is completely at sea, and can not recognize the disease which is producing them. A young physician once confessed that when he was first called to see a case of measles he had not the slightest idea what was the matter with the patient until an old woman came into the room and said: "It's measles, isn't it, Doctor?" "Why of course it is," he replied, "and," said he later, "if that old woman hadn't helped me out, goodness knows what I would have diagnosed." The early mistakes of a physician would be ludicrous were it not for the consequences which they sometimes entail. Before it is safe for a young practitioner to undertake to practice he must have had some practical work in a hospital under the direction of an experienced physician. This hospital course should be insisted upon after graduation.

The Hospital Service

After leaving the medical school he will make every effort to secure a two years' course in a hospital. It is said that the experience acquired in two years at Bellevue Hospital, in New York, is equal to ten years of practice. In the hospital he must be content to conform to the rules, to act under the direction of his superiors, and to respond to ambulance calls night or day, in all kinds of weather.

It hardly seems possible that it is only thirty-three years since the establishment of the ambulance system. It was introduced then at Bellevue Hospital, in New York, and has been copied in all the great cities of the world. It was an enormous improvement on the old methods of transporting patients in trucks, carts or stretchers. As nearly perfect as the system now is, yet there is room for further progress in its organization. The matter of the quickness of the summons should be looked into. A moment's delay is frequently a question of life or death. Upon receipt of a certain signal, called "the hurry five," New York ambulances often start for the locality indicated in thirty seconds after the accident or disaster has happened. In former days there was often a delay of hours before succor arrived.

In New York, the fire department wires are always unobstructed, and through this department calls are made more quickly than through the agency of the police.

The police officer often has to use the public telephone service, with its incidental delays, and perhaps ten minutes elapse before the "hurry call" is received at the hospital. Or, in the excitement of the moment, a citizen calls up a hospital five or six miles distant from the scene, instead of asking for one two blocks away. Such delays must often be fatal. A law was passed by the legislature, more than twenty years ago, providing for an ambulance call in every block in New York City, but it has never been enforced. Every citizen should know the hospital districts, so that, upon emergency, he may call up the right hospital, that is to say, the nearest. Much praise is due to the system, and many an able practitioner has graduated from the rear step of an ambulance.

The Beginner in Medicine

When a young physician has obtained his degree and demonstrated to the State Examiners that he has a complete knowledge of his calling, and when he has qualified himself by experience in a hospital to treat the ills of mankind, he is met by the momentous problem: "How and where shall I start?" Frequently he rents a room containing a folding bed, a desk and some chairs, buys some surgical instruments and hangs out his shingle. His wait for patients is likely to be a long, tedious one. One young physician waited for a year, during which period he had two calls, one from the cook in the house, who had scalded her hand, and the other from a passerby who chanced to see his sign and came in to be treated for some trifling ailment. He disappeared before he paid his bill. Perhaps the best way for a young physician to succeed is to start as an assistant to some older man. If the young man is patient, well qualified by study and experience and of good judgment he is likely to succeed in time, and to acquire the practice of his patron when the latter retires or passes away.

Acquirement of a practice depends upon the personal equation of the physician, and upon the size of his acquaintanceship. If there is any human being on earth who has to hustle it is the young physician. He must make friends, keep abreast of the times in his studies and keep brushing up on his past work. His knowledge must be large and varied, and is easily forgotten, so he is doomed to be a student all his days. He must secure hospital or dispensary practice in order that his hand may not lose its cunning, and this can only be obtained through the backing of influential friends. His path is beset with pitfalls. Even in the making of friends serious dangers exist. He must avoid persons whose habits of life would tend to compromise him; he must not permit his office to become a social rendezvous; he can not afford to be a hanger-on around clubs, and never for one instant must he forget the high character of his calling. His appearance must be above reproach. Clean linen, good clothes and a neat appearance are essentials for success in all walks of life, and to no one are they more necessary than to the physician. His manners should be a perfect reflection of his character, and this character must be that of a clean-minded, polished gentleman ready to genuinely sympathize with affliction.

One of the greatest elements of success is practicality, and in this the American physicians are pre-eminently ahead of their European brethren. Just as there are men who can do a better piece of work with a jack-knife than others can do with a whole chest of tools, so some physicians, poorly equipped in the learning of the profession, may, with their slight knowledge and the application of sound common sense, do better than many of their more learned colleagues. The successful physician must be distinguished also by honesty, and that indescribable element of the personal equation which the French call savoir faire.

Women in the Medical Profession

In the profession of medicine, women take their place as naturally as in the profession of nursing. There are more women in the medical profession than in any other professions save those of literature and art. All the smaller cities have at least one "woman doctor," and every large city has two or more. Many women doctors have a large and lucrative practice. The name of at least one very prominent woman physician in each large city might be mentioned.

Women have no trials different from men in the study of medicine, except in the matter of hospital appointments after graduation, and that matter is slowly righting itself. It is of great advantage and very important for the graduate of medicine to practice in a hospital as interne. These places are secured through competitive examinations, and very few of the large hospitals allow women to compete for places. Women are admitted equally with men in most post-graduate schools. It is so in the New York Post-Graduate School and Hospital, the Polytechnic, and at Johns Hopkins, in Baltimore.

A hard course of study is essential, bringing out the faculty of patient observation, exact statement, and correct deduction. Sound judgment and common sense must form the foundation. Kindness and cheerfulness are necessary. The most careful anatomical study and extended clinical observation are obligatory. Pathology and therapeutics must be made actual and practical.

Although there is a tendency among women doctors to devote themselves to specialties, yet it would be well for them to aim at being family physicians, and not specialists. Formidable operations by great leaders need not be run after, nor isolated cases sought for. The study of the treatment of ordinary diseases, such as measles, whooping cough and scarlet fever, is of much greater practical benefit. A doctor's aim should be to extirpate these common diseases, and women physicians should cherish this object. Midwifery and sanitary, or preventive, medicine will always appeal to women doctors, and these departments of practice should be raised to a higher plane. Midwifery should not at all be looked down upon by women practitioners. Skilful services in this branch of professional work lead to the summons to attend the children and other members of the household, and the appointment as the family physician naturally follows. The broader the scope of the woman practitioner, and the wider her field of usefulness, the better for the sex and for the profession.

No practical work outside of domestic life is more in keeping with noble aspirations than is the practice of medicine. Women find in this field room for the exercise of those high moral qualities, tenderness, sympathy, and care, while their minds are broadened by the constant study incident to the preparation for the profession and to its practice. The woman practitioner must possess the essential qualities of maternity, for the sick are like children in her hands. Insight and sympathy must be present, and she must also remember that the sick-room is as sacred as a confessional. In midwifery and preventive medicine, in the care of chronic diseases, in the treatment of children and of the poor, there are enormous demands upon pity, patience and courage.

In the beginning of practice women can acquire a footing almost, if not quite, as easily as men. In the highest rank of this profession, that is as consultants, it is much more difficult, owing to the lack of hospital connections, which give great facility and skill, and consequent recognition. The courts in New York, at least, have recognized the right of women to be examined, should they so prefer, by women physicians. Women are admitted to the medical societies, write and present papers and participate in debates.

Organization Among Physicians

The principal medical associations in the United States are the American Academy of Medicine and the American Medical Association and its branches. Perhaps the latter is the most important, as it is the national society of the physicians in this country, having a membership numbering about twelve thousand. This association was reorganized at the annual meeting in June, 1901, and is now in reality the central organization, with the State societies as its branches. The State societies are in turn subdivided into county or district societies. Other medical societies are the American Electro-Therapeutic Society, American Surgical Association, Association of American Anatomists, Association of American Physicians, and the Roentgen Ray Society of America.

CHAPTER VII

NURSES, PHARMACISTS, DENTISTS AND VETERINARIANS

Nursing as a Profession—Training for the Profession of Nursing—Pharmacists—Druggists—Drug Clerks—Dentistry as a Profession—Dental Education—The Veterinary Profession—Openings for Veterinary Surgeons—The Education of the Veterinarian

Nursing as a Profession

WOMAN'S natural work in the world includes nursing, and the number of women at work as trained nurses will always exceed the number of men in the same profession. In the United States and Canada there are about 35,000 trained nurses, of whom the great majority are women. One or more nurses are employed in each of the three thousand hospitals, sanitariums, homes and asylums in the country. Some of the hospitals are so small that they employ only one trained nurse, but in such cases a number of untrained helpers are in attendance.

The commercial advantages of the profession of nursing have led many to enter the field who have no special fitness for its duties. Although there have been numerous accessions to the army of trained nurses, yet there is room for more, and the employment is fairly profitable. It is not well for a young woman to imagine that a nurse's work is easy. On the contrary, it is strenuous, confining work, with very long hours of service.

The young woman intending to become a trained nurse should, first of all, be thoroughly examined by a physician in reference to her physical fitness for the life. An organic disease of any kind ought to be a disqualification. In the training schools the work is hard, the hours being, generally speaking, from 7 A. M. to 8 P. M., or from 8 P. M. to 7 A. M., with rest periods. The novice does not at once assist at delicate operations, but is advanced step by step, as she improves.

A word of caution to young trained nurses may be added. The keynote of success in private nursing is tact. Your patient in a hospital can not discharge you. In private practice, however, incompatibility or friction between nurse and patient is sure to result in immediate discharge, in many instances. The nurse must adapt herself to conditions as they arise. She must be strict and exact, but she must also be amiable, persuasive and politic with her patients. A real interest must be taken in each case, and services must not be rendered in a careless, mechanical fashion. The nurse should carry with her an atmosphere of cheerfulness.

Very often is heard the expression: "It was the nursing that pulled him through." As a matter of fact, great as is the responsibility of the physician, and efficacious as is his skill, yet the nurse, of the present day, is almost as much a necessity in curing diseases as he is, the one being the proper complement of the other. Nurses even act as checks upon incompetent or careless doctors. The nurse should possess a great liking for the work.

The graduate nurse must put her theories into practice. The clinical classes will still be of benefit to her. Manipulative work can only be learned by actual handling. Individualism must be a factor of success in nursing, as in other callings. The personal equation always counts for a great deal with both nurse and physician.

Training for the Profession of Nursing

As there is a State board of medical examiners in many States regulating the admission to the practice of medicine, so also, many claim ought there to be State control of the education of professional nurses. The spreading of the training school for nurses throughout the country is a notable sign of progress.

Among the training schools for nurses is the Bellevue School, in New York, from which seven hundred nurses have been graduated since its opening in 1873. One of these graduates has become superintendent of a training school for nurses in Manila, and two others have similar schools in Cuba. Nurses, as a rule, are advised to return for practice to that section of the country from which they came. In a recent year this school received one thousand eight hundred and three applications for admissions. Nurses must be strong and healthy, and should be prepared to meet much that is repugnant in their daily duties at Bellevue Hospital. They must give absolute obedience to the orders of the physicians.

A woman may pass any examination prescribed by the most exacting authorities, but lacking that sympathetic quality which distinguishes the best type of womanhood, fail in the profession of nursing. The technical knowledge is most important, but alone it does not fit a woman for a good nurse. Her personality counts far more with her patients than her professional skill. Nurses, like artists, are born.

The expense of learning the profession of nursing is not great, there being some income from the first. The cost of the necessary uniform is paid by the nurse, but it is of cotton, and not expensive. Board and lodging are free. For the first year the wages are about ten dollars a month, running up to sixteen a month during the last year of the school. An application must be made in advance, as there are so many girls desiring to enter this service. After leaving school the trained nurses readily find employment, receiving twenty-one dollars a week for ordinary diseases, and twenty-five for contagious diseases, in the large cities. In the smaller towns, the prices are not so high, coming down to about ten dollars. There being less competition in the smaller towns, the nurse's income will about equal her city sister's.

In hospital work it is well for nurses to take several months of training in the medical wards first, and then in the surgical wards. Payment should begin as soon as a nurse fully enters into hospital service. Professional nursing is "an honorable calling for honorable women," and women should earn enough by its practice to live upon. It is essentially a woman's work. Cleanliness in the wards should be insisted upon by the nurse. Brightness and comfort should prevail. Proficiency in general nursing should always precede specialties.

Pharmacists

To Philadelphia belongs the credit for founding the first college of pharmacy. It seems that as far back as 1821 a little group of Philadelphia druggists recognized the necessity for the better educational qualifications of those in the drug business, and encouraged the founding of the Philadelphia College of Pharmacy. In 1826 this school graduated three students. The institution now has over eight hundred students, graduating about two hundred yearly. New York, in 1826, followed the example of Philadelphia by establishing a school of pharmacy. At about the same time Baltimore, Boston and Cincinnati also opened similar schools. To-day there are over sixty institutions in the United States and Canada where instruction in pharmacy is given, more than half of which are regular colleges and schools of pharmacy, the others being departments of pharmacy in universities. These schools employ about four hundred and fifty instructors and have nearly four thousand pupils. In recent years the graduates have numbered one thousand one hundred or one thousand two hundred annually, from fifty to sixty of whom were women.

The necessary education for a pharmacist can not be attained in a drug store alone, but must be supplemented by a systematic study of pharmacy in a properly constituted college. This college training and laboratory practice are essential. There should be a preliminary high school education. In a prominent Western college of pharmacy the tuition fee is $75 for each year, covering all drugs, chemicals and other materials needed in laboratory work.

Students are permitted to serve for part of the time in drug stores, where they may earn five or six dollars a week. In a first-class Eastern College of Pharmacy the total expenses for the two years amount to $235, including $25 worth of text-books.

The pharmaceutical course usually covers three years, and, in addition to this the laws of some States require at least four years' practical experience in a drug store, although the candidate for a license may serve part of this apprenticeship while studying. This arrangement frequently enables the student to pay a large part of his expenses, including about $100 per year as tuition fee.

Druggists

The modern apothecary must carry a stock of goods which is really surprising in variety. It is estimated that in any first-class drug store as many as 1,500 different articles or preparations can be bought. The development of the drug business in the United States has been such that the druggists of this country now supply the world with almost everything it needs in medicinal wares. American medical preparations, including so-called patent or secret medicines, have largely displaced home products in foreign lands, and the inhabitants of foreign cities are buying American goods in preference to wares made in their own country. The progress made in this country, indeed, in operative and manipulative pharmacy, has been marvellous. Our pharmaceuticals and chemicals now hold the foremost place in the list of the world's productions. The results of American inventive skill in this as in other industries, have made an impression in all countries.

We have eight large factories engaged in manufacturing fine chemicals, and a score of firms which make pills and other pharmaceutical preparations on a very extensive scale. The combined rating of 270 wholesale druggists and manufacturers of chemicals and pharmaceuticals, in 1895, was over $50,000,000, eleven of these being rated at $1,000,000 each.

New York, of course, is the largest distributing centre for the drug trade in the United States. The metropolitan firms, indeed, supply the bulk of the trade throughout the country. Here, too, are the headquarters of the various organizations of the retail and wholesale branches of the drug business. In the retail branch the leading organization is the American Pharmaceutical Association, its object being the advancement of pharmacy through increased educational facilities, and the securing of more general recognition of the professional side of the drug business in relation to the medical profession. The membership list of this organization includes the names of the ablest men identified with the scientific advancement of pharmacy.

Drug Clerks

The young man who seeks to pass his life in a drug store stands a much better chance of advancement, of course, if he happens to be a graduate of one of the schools of pharmacy. The more thorough his preliminary training the quicker he will secure recognition as a pharmacist, or, to use the old-fashioned name, apothecary. As the ordinary layman understands the situation, the distinction between a pharmacist and a druggist lies in the fact that the pharmacist is engaged professionally in preparation of drugs, while the druggist is concerned principally with drugs as considered commercially. In other words, the pharmacist makes compounds and fills the prescriptions of physicians, while the druggist is the owner of a store for the sale of drugs—a merchant dealing in hundreds of articles, many of which can not be classified as drugs.

Of all classes of retail clerks, the drug clerk works the largest number of hours per day. The drygoods store, the grocery shop, the clothing store, and the hundred and one other classes of retail establishments, are closed evenings and Sundays; but the drug store is never closed. Every night until the hour of twelve it is ablaze with light; from midnight until daylight the lights are out, but a night bell is provided, and a pharmacist sleeps in the store subject to the call of the bell. On Sundays the store is open for business as on weekdays. The drug clerk, of course, is given one day a week "off," but still the hours in many instances are unreasonably long. For several years the organizations of drug clerks have agitated the subject of shorter hours, with a view to causing legislative bodies to take action in the matter by passing laws regulating the hours of work in the drug trade.

Dentistry as a Profession

All the world hates a dentist quite as emphatically as it loves a lover. The Americans were the first people to discover that the systematic hatred of dentists was unwise. The people of this country discovered that the skill of the dentist was as necessary to perfect health as exercise, plain food and plenty of sleep. Thus as a nation we encouraged the development of the science of dental surgery to such a high degree that, by the time the first dental schools were established, dentistry was recognized as a separate profession.

The American dentist is considered the best the world over. At the same time the whole world sends students to our schools of dentistry; and these institutions, like the graduates thereof, are recognized as the best the earth affords.

In whatever country an American dentist is practicing to-day, the people prefer to intrust the care of their teeth to him rather than to the native practitioners. Hence we have the spectacle of the inhabitants of the capital cities of Europe giving their patronage to American dentists, while at the great seats of science, such as Paris and some of the German cities, the leading dental surgeons are all of them either Americans or graduates of American dental schools. It is said that in almost every city of South America there is an American dentist. At the same time the teeth of the Orientals are cared for almost entirely by dentists from the United States.

The young dentist of to-day enters upon his career as an assistant to a dental surgeon with an established practice, or as an independent practitioner. As an assistant he receives a small salary equivalent to that which the young lawyer receives in a law office, or the salary paid to the draughtsman in an architect's office. As an independent worker his earnings are more or less uncertain, for like the young independent lawyer or doctor he must wait for clients and be content to make progress slowly until he has established a practice and acquired a reputation. In either case the young dentist must apply himself with the singleness of purpose which is a requirement of success in all professions.

Sometimes the dental surgeon, like the physician, charges fees in accordance with the estimated capacity of the patient's purse. The wealthier the client the more the dentist asks for his services. In New York there are perhaps a score of dental surgeons who take care of the teeth of the rich, and who make from $10,000 to $30,000 a year. The income of the average dentist in the cities, however, is not greater than that of the average income of physicians, namely, about $1,200 a year. In the country districts dentists average about $800 a year.

A determination to succeed makes light the drudgery of preparation and the first years of practice. The profession of dentistry is, however, by no means a sinecure. Kindliness and pleasantness of manner must not be overlooked.

The dentist must be ever on the alert. The destructive forces of nature are arrayed against his work, and it must be thorough and up-to-date. But so also must his manner be gentle, and roughness must be avoided, pain being inflicted as little as possible. Some dentists, mindful only of results, are careless of methods, and have very little patience. The patient's confidence should be won. Deception should not be used with children. The dental office should be more like a parlor than a surgery, the instruments being concealed in neat cases and cabinets. Absolute cleanliness of office and instruments is assumed, as the absence of this quality in a modern dentist is inconceivable.

Dental Education

The first three schools of dentistry organized in this country were those of Harvard University, of the University of Michigan and of the University of Pennsylvania. Add the School of Dentistry, at Buffalo, and the list comprises the principal institutions of the kind in America. Previous to the opening of these schools the status of dentistry was a peculiar one. Scientists were unable to decide whether dentistry was a mere branch of medicine, or whether it was a distinct profession. As the standards were raised, however, and it became more difficult for young men to obtain the degree of Doctor of Dental Surgery, dentists insisted that theirs was a separate profession, though allied to that of medicine.

In the United States there are fifty recognized dental schools, with nearly 1,000 instructors and about 75,000 students.

Half a century ago young Americans found it not a difficult task to come into possession of diplomas as doctors of dental surgery. In many States, at that time, a young man could enter a dental school and, in a couple of years, receive his degree. Thus it was easy for blacksmiths or barbers or veterinarians to practice dentistry in addition to their regular avocations. The dental colleges even received boys fresh from school, demanding no preliminary training of a scientific nature. Now, however, in addition to the requirements exacted by the dental examiners of various States, the dean of more than one dental college has declared that a course of four years in dentistry must be adopted.

Under present conditions, the rules regarding admission to dental schools are much more severe than ever before. In New York State, for instance, only young men of good moral character can secure a license. They must be more than twenty-one years of age and must show that they have had a preliminary education equivalent to graduation from a four years' high school course registered by the State Regent, or an education accepted by the Regents as fully equivalent. Furthermore, before they are given a license, and after receiving a preliminary education as just mentioned, the dentists must show that they have been graduated with a dental degree from a registered dental school.

Several States have followed the example set by New York in exercising great care in registering acknowledged doctors of dental surgery. The organized dentists of the Empire State have driven out all charlatans, while users of fraudulent diplomas have been arrested, fined and imprisoned.

The leading school of dentistry in the United States to-day is that of the University of Pennsylvania. The plan of instruction in this school is so arranged that the branches common to both medicine and dentistry are taught concurrently. The strictly dental branch is in charge of professors especially qualified in their respective departments.

As an example of the number of foreign students in American schools of dentistry, it may be stated that the catalogue of the University of Pennsylvania, for 1902, shows fourteen students each from Austria and Canada, seven students each from Africa and Australia, two students each from China, Jamaica, Mexico and Spain, six students from England, nine from New Zealand, three from Switzerland, and others from Nicaragua, Russia, Holland and Ireland.

The Veterinary Profession

Veterinary science has for its object not only the cure of the diseases of animals, but also the protection and improvement of the domestic breeds. Losses by contagious diseases among cattle in thirty years, ending in 1870, in Great Britain, amounted to $450,584,270. In 1872, one disease alone caused a loss there of $76,000,000. At present all of these diseases are under control, one having been completely eradicated. In our own country hog cholera has occasioned to hog raisers a loss of as much as $35,000,000 in one year, and by Texas fever among cattle, $25,000,000 a year are sunk. In our Eastern States tuberculosis carries off cattle enough every year to cause a loss of many millions of dollars. Veterinary science in Germany has increased the productiveness of cattle nearly fifty per cent, without adding to the cost of production.

Veterinarians are now employed by the various municipal and general authorities. They act in the cities as milk and meat inspectors. The growth of the profession is indicated by the fact that the Bureau of Animal Industry, under the direction of the Agricultural Department, spends almost a million a year, or one-half of the entire appropriation for the department. Veterinary surgeons are employed in the army by the War Department, holding the relative rank and getting the pay of lieutenants. A pending bill establishes an Army Veterinary Corps, with rank and pay of colonels, majors, captains and lieutenants. Men will constantly have to be trained for these positions.

A veterinarian finds private practice very remunerative. Owners of fine stock can not get along without his services, and even dogs and cats of high breeding make very profitable patients. Prescriptions for medicines are often written, to be dispensed at the druggist's shop. Equine and bovine practice give rural veterinarians a good income.

One of the alluring attractions to veterinary practice is the fact that the profession is not overcrowded. There is plenty of room in it. And the outlay for the necessary preparation and training is not large. A careful choice of schools should be made by the young man. As Chicago is the greatest live stock market in the world the veterinary college of that city affords extraordinary facilities to the student, meat and dairy inspection being especially taught.

Openings for Veterinary Surgeons

The development of the appreciation of veterinary science has opened new fields for competent men. The veterinary practitioner is now employed as an inspector, or assistant, in the Bureau of Animal Industry, in Washington, with a life tenure, under Civil Service rules. The assistant inspector receives a salary of $1,200 to $1,400, sometimes more. Or he may become an instructor in an agricultural or veterinary college, where the salaries are very fair. Or he may be appointed to service at a State experimental station. He may become a veterinary surgeon in the United States Cavalry Service, earning from $1,200 to $1,400. He may join municipal boards of health. He may become State Veterinarian. He may manage a great stock farm.

The Education of the Veterinarian

The modern system of teaching veterinary surgery is not a matter of memorizing, but rather of scientific and practical methods. Anatomy is accurately taught, and not from books alone. First principles are, of course, instilled into the minds of the students, but practical demonstration is given, chemistry is studied in the laboratory, histology and microscope work are pursued, analyses are made, embryology is emphasized in the study of cells and tissues, physiology is carefully followed, and the laboratory training in materia medica and therapeutics is very thorough. Practical instruction is given in the principles of toxicology, pathology, bacteriology and meat and milk inspection. As to the department of surgery, the course is severely practical, several operations being performed daily. Students are carefully trained in diagnosis.

The courses here referred to are those of the New York Veterinary College, founded by the State. With a million farm animals in New York, and a yearly product of milk amounting to 5,000,000 gallons, it is surely a good policy to foster and develop the veterinary science. The communicableness of certain diseases, such as tuberculosis, from animals to man, is claimed to exist by many specialists. Mankind is doubly benefited by the improvement of cattle. At this college tuition is free to students who are residents of New York, others paying a fee of $100 per annum.

CHAPTER VIII

EDUCATION AND TEACHING

Schools and Colleges in the United States—The Public School System—Work of a Board of Education—Conduct of a University—University Extension—Education by Mail—Teaching as a Profession—A Teacher's Qualifications—The Training of Teachers—Cost of a Teacher's Training—How a Teacher Secures an Engagement—Earnings of Teachers—College Professors and Their Earnings

Schools and Colleges in the United States

THE number of persons in the United States of school age—from five to twenty years—is about 27,000,000, of whom 17,000,000 are enrolled in the schools and colleges. It is presumed that the remaining 10,000,000 persons of school age have finished their schooling and have begun the practical work of life. If we include the instructors and professors in colleges and universities, the number of teachers in the United States forms a vast army 500,000 strong, a number equal to that of all the inhabitants of the State of Washington.

In our common school system there are so many schools that it is impossible for a traveller to journey more than a few miles in any direction, even in the Western States, without stumbling upon a schoolhouse, while the pedestrian in the city passes a public school every few blocks. We have colleges and universities in 350 different cities and towns.

Besides the enrolment in the public and private institutions of all grades included in the above summary, there are more than 600,000 pupils enrolled in special institutions more or less educational in their character, including business schools, schools for defectives, reform schools, Indian schools, orphan asylums, private kindergartens, and schools of music, oratory, elocution, cookery and the various special arts.

The Public School System

Few people appreciate the magnitude of the public school systems of this country. Every large city has its own system, which is in itself a great business and educational institution, requiring at its head men of great ability in several directions, men who are responsible not only for the education of the boys and girls of the municipality, but for the expenditure of enormous sums of money and the care of a vast amount of property.

The pupils enrolled in the public schools of the United States number 15,500,000, requiring the services of more than 425,000 teachers. The average daily attendance is 10,500,000, so that 12½ per cent of the total population of the United States may be said to be "in school" every day. And this is exclusive of pupils in professional schools.

The common school system can not be considered as a national institution, for we have no minister of public instruction as in other countries, and unless the United States Bureau of Education may be considered as such, education has no official representation at Washington. Therefore, each city, each town, each county, or each State, as the case may be, conducts its own system in accordance with local requirements.

Work of a Board of Education

The public schools of the larger cities are in charge either of a school board or a board of education, comprising from four or five to thirty members. The New York Board of Education, established in February, 1902, numbers more than twenty members, all of whom are appointed by the mayor. The work of the New York Board, as of all others, is divided into two departments: the business and the educational. It is the duty of the business department of a board to conduct the financial affairs of the public school system, erect new school buildings, employ engineers and janitors, and see that all the schools are maintained efficiently. In the execution of these duties the business department counts money by the millions rather than by the thousands. When Greater New York came into being, the Board of Education of the combined boroughs was confronted by the necessity for expending at least $20,000,000 for new school buildings. The board carried out the work as fast as possible, purchasing or condemning school sites at the most advantageous points and erecting school buildings thereon.

The duties of the educational departments of the boards include the employment and dismissal of teachers and the general control of the educational end of the system. The educational executive of the board is the superintendent of public schools, and he is usually a man of wide learning and of great ability as an educator. It is his duty to see that teachers are appointed upon their merits and not through the exercise of personal influence.

Conduct of a University

The vast operating expenses of the modern universities and the wide variety of their financial dealings entitles them to the first rank as business institutions. The material side of university work is more closely associated with educational work than the general public imagines, for "there is no part of university life or work into which financial questions do not enter."

The business department of each of the great universities is obliged to meet material problems of management. In its dealings with the outside world, each university has activities in a score of directions, while within itself it is a colossal hotel, and, in a sense, a vast industrial plant.

In addition to the president, trustees, treasurer and finance committee, the officers of a university include the registrar, or bursar, who receives fees, collects bills for board, and rents rooms in the domitories; a manager of the printing and publishing bureau, purchasing agents in the various departments, and directors of the library, laboratories and museum work. All the expenditures must pass through the office of the auditor, who maintains a staff of accountants and stenographers fully as large as that to be found in the largest bank.

University Extension

The university extension movement, conducted by the American Society for the Extension of University Teaching, which contributes considerably to the support of its work, has a threefold object: (1) to extend higher education to all classes of people; (2) to extend education throughout life; (3) to extend thorough methods of study to subjects of every-day interest. The work is conducted by courses of lectures on a wide variety of topics, supplemented by class discussions, essays and examinations. The lectures are given by experienced teachers at the various centres of the Society's work, a class being held for questions, discussion, etc., at the close of each. These lectures also instruct students living where there is no centre, by receiving and commenting on essays and papers, written in accordance with the directions of the Society, on reading, etc., as set forth in its publications. Clubs of such students are frequently formed, which, under proper direction, are able to prove of great benefit to their members. On completing the course, each student is admitted to examination, and is awarded a special certificate on its successful completion. The centres bear their own expenses, paying a stipulated fee for the services of the lecturer and his travelling expenses, as well as providing a hall. The amount paid by each member is thus brought to a figure seldom exceeding $1.50 for a course of six lectures.

Education by Mail

Many people have availed themselves of the excellent system of direct instruction afforded by the modern method of education by correspondence. This system, which is systematically conducted by several large institutions at the present time, evades the difficulties attendant on evening schools or lectures at stated periods, while, at the same time, affording to the ambitious student a wide choice of subjects for personal study in leisure hours, under constant supervision of trained instructors. Hitherto, private study has been difficult, except for a man of exceptional ability or determination, since it affords him no stimulus in pursuing his work, and he has no person to whom he can refer the difficulties that must inevitably arise. He must, therefore, plod along, without encouragement or assistance, attempting to gain the knowledge he covets from books intended for advanced students, or made merely to sell. This condition is all changed by the correspondence method, in which every branch, including steam, electrical, civil, marine and mining engineering, navigation, industrial branches, modern languages, and even law, are now successfully pursued. In taking any such courses, the student is supplied with necessary books and materials at a stipulated rate, the work being subdivided into separate lessons, containing necessary directions and a series of questions to be answered in writing. On completing the prescribed line of work, the student is required to pass an examination on all subjects learned and is awarded a certificate of proficiency. Too much can not be said in favor of the method, which has proved of material assistance in forming many a successful career. The largest institution of the kind in the United States has nearly 350,000 students, and gives instruction by mail in more than one hundred courses.

Teaching as a Profession

Previous to the centennial year the school teacher's calling was looked upon merely as a makeshift, or as a possible stepping-stone to something better. In those days, young men who were obliged to make their way through college taught school during vacations. Many teachers roved about the country, teaching in a different school every season. In the early seventies, however, college presidents, professors, and others interested in educational methods began suggesting changes which in time created a demand for permanent and well qualified teachers. Since then hundreds of thousands of persons have adopted teaching as a life work, and we have to-day in the common schools of the United States 425,000 teachers.

Within the last twenty-five years improved educational methods have raised the teacher's calling to the dignity of a profession. To-day it is possible for a young woman or a young man to enter this profession with a reasonable certainty of advancement year by year. Indeed the profession offers a permanent career quite the same as the law or medicine or the church. Beginning as a "substitute," perhaps, or in one of the lower grades, at a few hundred dollars a year, the teacher who can successfully pass examinations from time to time can at last reach the lofty position of a principal of a high school with an annual salary of $5,000.

A Teacher's Qualifications

In order to be a successful teacher a young woman should have health, a fondness for children, patience, sympathy, tact, good judgment, and the faculty of imparting knowledge. A certain proportion of pleasures and privileges must be willingly sacrificed. The best education obtainable must be secured. A course at a training school is very desirable, and not very expensive. Sometimes the student is able to earn something by assisting in the work of the school. Kindergarten work is recommended, because the field is not at all overcrowded. Hundreds of teachers may find places in this branch of the service. The latest improvements and suggestions in the field of child-culture must be adopted. The Normal College of New York is free. It supplies the city with about ninety per cent of its teachers. The School of Pedagogy of New York grants degrees.

The Training of Teachers

Formerly the recognized method of teaching in public schools—and in most private schools also—was to require the student to memorize a daily lesson from his text-book and recite it to his best ability to a teacher whose principal function seems to have been to be a "good listener." That any but the brightest minds were educated by this method is wonderful: that the standard of popular intelligence is no higher is not remarkable. At the present day we find that a vast revolution has been wrought in educational theories and methods. The modern science of pedagogy emphasizes the need of developing the student's faculties of understanding, thinking and reasoning from the first lesson in the kindergarten, where he "learns how," to the last in the most advanced professional or special course where he "learns why." The training of teachers is equally thorough and accurate in the various State normal schools, embracing a wide range of knowledge, also dealing thoroughly with the theory and methods of pedagogics; the aim being throughout to give the teacher a grasp of the subjects he or she must teach and to develop the ability to impart information.

The typical teachers' training is that followed at the New York Normal College, where the course occupies three years of general and special work, the systematic instruction in pedagogy beginning in the second year. Important elements in the pedagogical training are instruction in logic and applied psychology, with attendance at classes in the model school, for observation and the collection of material for essays. For a short period before graduation the students are also given opportunities to teach, when chance vacancies occur. The system of licensing teachers in New York is also typical. There are in this State three grades of certificate, in addition to the life license. In order to acquire this, teachers must pass rigid examinations and comply with several conditions as to experience and proved aptitude at teaching. Only about one-sixth of the candidates are successful. The first grade certificate is for five years open to all with two years' experience and renewable, without examination, if the holder has taught under it for three years; the second grade certificate is for three years, requiring at least ten weeks' experience or one year's attendance on a training class, and is only renewable on examination; the third grade is for one year, on successful examination, and requires no experience. That it is necessary so to grade teachers' certificates is shown by the fact that over half the candidates for examination fail. Thus, according to reports, about 7,500 out of 11,500 failed in one year in New York; while, out of the successful candidates, only 243 secured first grade, 2,318 second grade, and 1,464 third grade certificates. The insistence on a high standard of qualification for teachers has, in recent years, been accompanied by a successful movement toward raising their wages to a living basis, with the result that at the present time the average salary in cities of the United States of over 8,000 inhabitants is about $640, in spite of the fact that the figures include many small, or nominal, salaries—$100 or $150—paid to licensed teachers still in training. The field of the practical educator, from the kindergartner to the high-school teacher, is thus rapidly becoming a wide and remunerative sphere of activity.

Cost of a Teacher's Training

It is true that a university training is not necessarily one of the requirements for admission to the ranks of the army of school teachers. The boards of education in the various States have provided such facilities for the training of teachers, that it is possible for a young man or woman to acquire the necessary education and training at very small cost in money. There is, first, the great public school system, including the high schools, in which tuition is free; and, second, the normal colleges. Even at the normal colleges the cost of tuition is the smallest item in the student's expense account.

How a Teacher Secures an Engagement

After years of study and training, and after securing the coveted diploma which is equivalent to a license to teach, how does the young man or woman go to work to secure a class or school? In other words, how shall a qualified candidate secure a position? There are teachers' bureaus, through the medium of which engagements may be secured. Many of these bureaus are of excellent standing, and their charges are comparatively low. But the teacher of energy and perseverance will not rely upon a bureau; the better and shorter road to an engagement is by direct application through the local school boards. If one wishes to teach in a private school or college, of course one must apply direct to the institution. And it should be added that while candidates for the position of teacher in private schools or colleges are not obliged to pass a formal examination, the character, training, experience and scholarship of such candidates are very carefully scrutinized.

Earnings of Teachers

The average salary is not always a fair test of the earnings of those in any profession; nevertheless mention of the average monthly salaries paid to teachers in various States is suggestive. The teachers' salary list reaches its lowest ebb in Alabama, where men teachers receive $25 a month and women $20. These figures apply, however, only to teachers in rural schools. The highest average salary is paid to teachers in the rural schools in Nevada, where males receive $85 a month and females $60. In Maine, Massachusetts and New York school teachers are paid an average of $37 a month.

Teachers in cities, of course, receive salaries very much higher than are paid to country school teachers. Reports of school commissioners show that the larger the city the higher the salaries paid. In New England, for example, an assistant teacher in a kindergarten receives $432 at the start and a maximum salary of $624. Principals of grammar schools receive a maximum of $3,180, and a maximum of $3,780 is paid to the principals of the high, Latin, normal and mechanical art schools.

In New York State, in the elementary schools the maximum salary paid to men principals of less than twelve classes is $2,400, and to the women principals $1,600. The minimum salary paid to men principals who have twelve classes or more is $2,750; the maximum, $3,500. To women principals of the same grade, the minimum salary is $1,750; maximum, $2,500. High school principals in New York who have supervision of less than twenty-five teachers receive $3,500; those who are paid $5,000 must have supervision of twenty-five teachers or more. The salaries of teachers in the public schools of Philadelphia, Chicago and other large cities are lower than those paid in New York—in some instances as much as twenty-five per cent lower.

College Professors and their Earnings

Unless the young professor has married in haste or is in debt an instructorship, even in one of the smaller universities, is a position which should not be declined. Such a position carries with it a salary of $1,000 a year and an excellent chance of promotion. The position is one which ordinarily should satisfy the most scholarly ambitions; and yet a number of cases are recorded in which such a position has been declined on the ground that the salary was too small. Such declinations have come from young men who have married, or have accumulated debts, and are obliged to look for less scholarly positions which will yield them a larger income.

With the sudden rise of scientific schools and their development in different parts of the country, the demand for instructors qualified to teach in such schools has exceeded the supply. Therefore the university graduate, trained in one of the branches taught in scientific schools, finds little difficulty to-day in securing a position as assistant professor at a salary of about $1,800 or $2,000 a year. It is possible to secure such appointments for five years with every promise that at the end of that time the young man will be given a full professorship with a salary of from $2,500 to $3,000 a year.

The salaries just mentioned represent perhaps the average income of college professors in this country. The minimum pay in this profession is less than $1,000 a year, but the maximum is nearer to $10,000 than to $4,000.

The professor who is earning the average salary, however, can and does add to his earnings by writing books and magazine articles. A successful text-book will yield its author from $300 to $1,500 a year until it has been supplanted by a better one. The weekly papers and magazines are always glad to have articles from college professors, provided the subject is one that has a news value and is treated in a popular and not an academic or a technical way.

CHAPTER IX

LITERATURE AND ALLIED PROFESSIONS

The Profession of Literature—The Author and the Publisher—Authors' Earnings—Book Writing—Novelists—Poetry as a Marketable Product—Short Stories and Magazine Articles—Qualifying as a Short-Story Writer—The Market for Short Stories—Special or "Hack" Writers—Literary Agencies and "Co-operative" Publishers—Libraries—Travelling Libraries—Librarians

The Profession of Literature

JUDGING from the number of persons actually engaged in earning or attempting to earn a living by writing, and by the great activity in book and periodical publication, it may be said that ours is, in a very real sense, a literary age. The calling of the professional writer is for these reasons popularly supposed to be extremely profitable, and attracts large numbers of people of both sexes, many of them possessed of no more eminent qualifications than superabundant self-confidence and the ability to write. That other things are essential the beginner very soon discovers, and, instead of the wide and open field, where his genius shall shine forth as a beacon, he finds himself an inexperienced worker at a very superior sort of trade, in which skill, experience and hard work are among the foremost components of success. Such reflections apply to all branches of the writing craft, with the exception of journalism, in which a man works up from a reporter to as high a post as his abilities and influence will allow, and of occasional writers, such as educators, scientists and others with separate means of livelihood, who step into fame and success on the strength of reputations gained in other fields. Regular workers in literature fall into two general classes: the first, authors, who write as they feel inclined on subjects that interest them—and make it pay—and special writers, or "hacks," who, from long and arduous experience, are able to "cram up" and write to order on nearly any suggested subject.

To obtain a recognized position in the first class is the hopeless ambition of the majority of writers; to obtain a competence in the second is the highest attainment of a very small minority.

A humorous periodical, commenting on the course of a certain society woman, who had gone on the stage and started out to "star" with her own company, said: "She evidently realizes that there is 'plenty of room at the top,' and that she can gradually work down to her true professional level as vacancies occur below." This cruel sarcasm, happily untrue in the particular case, supplies an eminently good description of many literary careers.

Beginners usually essay to enter the field of fiction-writing, frequently attempting short stories or, worse yet, a novel of several thousand words. A few try serious articles or treatises. Both are doomed to bitter disappointments, unless they are persons of more than usual ability and equipment, and, after the first few vain attempts, either quit writing or begin their arduous apprenticeship as literary hacks. Their failure as authors or original contributors is due as frequently to the crudities of literary style and treatment, inevitable in an untrained writer, as to the hopeless mediocrity of their talents and conceptions. These are matters which the beginner can not afford to ignore. If he attempts a line of work that is above his present abilities, it is desirable for him to know why he fails where others have succeeded. That some exceedingly inferior writers do succeed amazingly is a fact that can not be denied. Their success, however, is due either to the fact that they have paid well for the éclat of a well-advertised name—assuming the heavy risk of manufacturing and publishing their first efforts—or else that they have cultivated the friendship of some complacent editor or publisher, willing to rate the feeble output of a friend at least as highly as the finished products of a stranger. Whether the latter result always follows or not, no person with literary ambitions can dispense with the numerous professional advantages derived from forming friendly relations with editors and publishers, or with his fellow craftsmen. The conditions of the publishing business are such at the present day that employment as readers, special editors, etc., comes quite as frequently through an acceptable introduction as from recognition of good work already accomplished.

The Author and the Publisher

While in a general sense the author and the publisher may be said to be at peace, they occasionally clash. The cause of the clash, when it does come, is simply that between a theoretical view of business and a practical business experience. The ancient saying that authors are not good business men or women still holds true. There is no author's "union." Hence it is a case of each author for himself. Working alone they care little and learn little about the practical affairs of trade; they have only a hazy conception of the cost of conducting a huge publishing business with its ramifications and its many details.

Authors no less than ordinary workmen are suspicious of that which they do not understand, and certainly very few authors understand the publishing business. It is difficult, for instance, for the man behind the pen to realize that if he gets a royalty of ten per cent on the retail price, which we may assume to be $1.50, he is really getting twenty per cent of the price at which the publisher is obliged to part with the book. Therefore, not only the new author, but often the one who has published one or two successful books, haunts the publisher's office, making more or less timid suggestions to the effect that he would like to have a statement of account, or even sometimes boldly intimating that he really ought to have a royalty of thirty or forty per cent.

Despite all this, it is contended that the nature of the business is such that the author is obliged to trust the publisher entirely, possessing no means of checking accounts, no way of preventing the publisher from making an inaccurate report. But a common sense view of the situation will convince the author that flagrant dishonesty on the part of the publisher is impossible. Such dishonesty would necessitate the connivance of bookkeepers and of the entire office force of a publishing establishment.

A publisher must perforce look upon an author's manuscript strictly as an article of merchandise, just as the merchant would consider a new brand of soap, or a cloth dealer a new kind of shirt-waist. A book, from the publisher's viewpoint, is an article to be offered for sale, and his confidence in it is the result of his estimate of its selling qualities. When the publisher accepts a book and undertakes to risk his money in manufacturing it and placing it on the market, it is assumed that he believes in its character, its mission and its quality. On the other hand, if the author accepts the publisher as his intimate business partner, it is assumed that he is convinced of the integrity of the publisher, and has confidence in his enterprise. It is by such mutual confidence that friendly relations have been established between authors and publishers; and such relations make the business of publishing a profession, and the profession of authorship a business.

Authors' Earnings

Is the man of letters as well paid as men in other professions? In the days of Hawthorne, Washington Irving, Matthew Arnold, Jane Austen, George Meredith, Charles Lamb and others, the answer to this question would have been: "No."

To-day, however, a negative answer can not be given so promptly. According to the advertisements of publishers, authors are all making large incomes and are growing rich. We are informed that checks for sums of money comprising four and five figures are sent at regular intervals to the authors of novels published within the last few years. It is said that Rudyard Kipling is paid sometimes as much as $100 a line for his poems; that Conan Doyle is paid many thousands of dollars for each of his Sherlock Holmes stories; that Hall Caine's "Christian" yielded him a fortune; that the royalties on J. M. Barrie's "Little Minister" were sufficient to pay for a manor house one month and a private park the next. These statements show that men of letters at the top of the ladder can at present earn as much money as lawyers, doctors and engineers occupying similarly high places in their respective professions.

An author states that he once asked a veteran and accomplished writer for the press, who won a reputation by his first book, and has since contributed for fifty years to most of the leading reviews and magazines of the United States: "How much money can a man with a first-rate constitution, and with the very best education which America and Europe united can give, earn yearly by writing for periodicals? Can he earn $2,000?" "No." "Can he earn $1,600?" After some thought he replied: "Yes; but that is all." "An industrious writer," says a novelist, "by the legitimate exercise of his calling, can just exist, no more. No man should enter on the literary life unless he has a fortune or can live contentedly on $2,000 a year. The best way is to make a fortune first and write afterward."

But despite the fact that a number of men of letters work hard and incessantly, and earn only from $1,600 to $2,000 a year, a still greater number enjoy incomes equal to twice the amount mentioned. Even assuming that $2,000 is all that can be earned by the man of letters of to-day, he is still better off, so far as compensation goes, than the minister or the teacher. At the same time his earnings are considerably less than those of the journalist or literary "hack."

To sum up, for the man of letters, it may be said that the chief reason he is not successful from a financial point of view is because he will not, or can not, learn the ways of business and become a business man. As in the case of the journalist and the "hack," the reward of purely literary work is dependent upon the business ability of the one who offers his wares for sale.

Book-Writing

The writing of books is in some particulars akin to that of short stories and special articles, a notable exception lying in the fact that the larger expenditure of labor is rewarded by a commensurately larger chance of profits. A magazine article is paid for on the editor's terms, unless the writer be sufficiently prominent to dictate in the matter, and a check closes the transaction. With a book, however, the profits from percentages may continue for months, even years, according to its excellence or popularity; many authors having become independent on the proceeds of one single effort. However, the rule holds good that the writer of an acceptable book shall, in the publisher's estimation, be capable of handling the subject; that he understands the technique of book-writing, and that his treatment is sufficiently original and interesting to render it salable.

With these conditions observed, the unknown writer stands a far better chance in book work than as a magazine contributor. The larger book publishers are always willing to undertake a meritorious work, particularly in fiction, and expend large sums yearly in securing the services of competent readers to examine and pass on manuscripts in the hope of discovering a new author of ability. That this is the case may be readily understood from the fact that some of the most successful novels issued in recent years have been written by unknown writers, whose reputations and fortunes have thus been made by enterprising publishers willing to recognize a good thing when presented. In the matter of treatises on scientific or literary topics the same rule holds good, within limitations, all such manuscripts being submitted to specialists, who render opinions on their merits, and extensive reports on their contents. This class of writing is more limited in its significance to the literary profession in general, since the majority who follow letters as a specialty prefer the field of fiction.

Novelists

Mr. F. Marion Crawford describes the novel as a miniature theatre, and the novelist as a dramatist and theatrical manager combined, who writes pocket plays with chapters for scenes and acts, presenting the drama between two covers instead of behind the footlights. Some novels have been written by men or women advanced in years, but it is not necessary to postpone novel-writing until old age warps the mind, or even until middle age fills the mind. It seems that youth is wholly capable of producing successful novels, a fact which was proven by a number of striking examples during the year 1902. Indeed, the number of winners of literary success during the first years of this century suggests that this is the age of young men and young women in literature no less than in the industries.

All conditions in the literary field point to the fact that there is greater opportunity for the American novelist at the present time than ever before. Of the 2,000 novels published in 1902, nearly 1,000 were by American authors.

The Boer war accomplished a great deal for American novelists, in that the publishing trade in England suffered equally with other branches of business, through the general depression that prevailed. Consequently, as English publishers could not sell as many books as formerly, the production of English books steadily decreased. At the same time the production of American books quite as steadily increased. The American publishers sold over 400,000 copies of "David Harum," over 200,000 copies of "When Knighthood Was in Flower," over 300,000 copies of "Richard Carvel," and more than 200,000 copies each of "Janice Meredith" and "Mr. Dooley." All these figures were given out in 1900. While the sale of American books was at first increased by the International Copyright Law, the demand for American novels was further increased by the conditions named above. A larger number are reading books by American authors than new books by Kipling, Hope, Doyle, or Mrs. Humphry Ward. An authority states that the supply of English books, serials, magazine articles and short stories must fall below the usual average for some time to come, while for the American writer who has learned his craft, for him who has something real to say, there is now unequalled opportunity.

Poetry as a Marketable Product

Poetry long ago ceased to hold a place among the "paying" arts. While novelists have become rich, poets who have tried to make a living by poetry alone have become still poorer. Mr. Kipling is paid large sums of money for his "lines," but then, Mr. Kipling also writes prose. The same may be said of Mr. Richard Le Gallienne. Occasionally a poet writes something that gains wide popular favor and makes a trifle of money. Thus Mr. Edwin Markham has probably received more than one good sized check as his share of the sales of "The Man With the Hoe." Edmund Clarence Stedman finds time to write poetry simply because of the revenue from his banking business.

Magazines and weekly papers print poems, to be sure, but principally to fill space. When a short story or an article does not fill out a page, then and not till then does the editor open his drawer and hunt for a poem. Certain it is that to-day a man can not live by poetry alone. He must either write prose five and a half days a week, devoting himself to poetry only on Saturday afternoons and Sundays, or else engage in some kind of business or other prosaic pursuit in order that he may earn a livelihood.

Short Stories and Magazine Articles

Regarding the class of work that pays best, there is much to be said that shows the real conditions to be quite different from appearances. In point of numbers, and certainly in actual bulk of publications, short stories and general magazine contributions far exceed books, separate compositions and more extended efforts in general, yet, in spite of the greater possible activity of the short-story writer, his profits seldom, and with great difficulty, can be made to give him a living income. According to the statements of several authorities, there are scarcely a dozen persons of both sexes in the United States who can command a competence in this line, and they have built up their business through years of steady effort and hard work. Any person starting out in the hope of making a living from short-story writing, therefore, is almost certain to fail. A well-conceived short story requires, proportionately, more thought and skill in handling the plot than does a novel of 60,000 words, while the constant necessity of conceiving new plots and fresh situations is so arduous an undertaking, if persistently followed through an extended period, that the time comes, sooner or later, when the writer can simply produce no more—his mind has ceased to work easily in the line of fiction.

The same is true, in a certain sense, of the essay-writer, who expects to support himself by contributing to periodicals. It is probable that most of his articles are neither timely nor otherwise "available," and the incessant grind soon wears out his enthusiasm.

One thing to be remembered, in undertaking to contribute either fiction or essays to periodicals, is that the first step to success is to have a contribution accepted by a magazine of good standing. Several repetitions of this desirable achievement, although the profits may be small, attracts the attention of the public and of other editors, and, in case the work is meritorious, may lead to requests for contributions. Meantime, the writer, no matter how great a genius he may seem to himself and his friends, had best apply himself to some other calling, as a means of livelihood, doing his writing as a kind of "side line," in order to leave his mind free to do his best literary work. Even if each of his first few short stories requires months to prepare, it will pay in the end, in point of ability gained to conceive and develop a good plot.

These principles hold good because of the excellence of short-story work in the United States, which puts the new and untried author into the position of attempting to compete with the most experienced writers of the day in any of the several lines. The facts in the case are eminently well brought out by the result of several prize competitions in recent years, in which the larger prizes were almost invariably secured by well-known, if not distinguished, authors, leaving the obscure and struggling writers as obscure and struggling as before.

Several fiction magazines have in the past regularly employed one or two clever story-writers to fill their pages on the salary basis, thus securing their best work and having stories prepared to suit their own requirements. This plan is still followed in several publications, not only with fiction but also with special articles, leaving only a margin of opportunity for the outside worker. Indeed, a careful examination of the leading periodicals will reveal the fact that the bulk of the contents in all cases comes from the pens of distinguished writers, specialists in various lines of activity, and persons who have attained recognition in literary circles.

In spite of these facts, the great magazines are always on the lookout for new writers of merit, and it may be confidently asserted that all contributions are read and passed on by the readers. However, the standards are high and the remuneration is small. The writer of one or two successful contributions must follow up his advantage, and, rather than spend his time in writing up a plot on speculation, try to secure the advance permission of some editor to submit it.

Qualifying as a Short-Story Writer

Of the thousands who send short stories to the magazines and weeklies and Sunday newspapers only a few are trained writers. The products of these unpracticed pens are all returned. Accompanying the rejected manuscript is a stereotyped notice saying that "the return of the story herewith does not necessarily imply lack of merit." This printed form is more polite than accurate, more diplomatic than truthful. The plain fact is that the return of nine stories in every ten does imply lack of merit. The remaining one manuscript in each ten may possess merit, but is returned because it is not suited, for one reason or another, to the particular magazine or journal to which it was offered.

The trained story writer is to literature what the painter of a miniature is to art. The short-story writer is capable of presenting a great subject, as well as a trivial incident, in a small compass. He condenses a novel into four or five pages. He is master of style—his own style. His stories bear the impress of his own individuality. He begins his story in the first sentence and not in the second paragraph. Besides knowing how to write a story and the kind of tale editors want, he knows many editors personally, and has a thorough acquaintance with what may be called market conditions. Also he reads the short stories written by his contemporaries.

How is the necessary training for short-story writing to be secured? First of all, by writing; just as the painter attains success only by painting, and the musician by practicing. The novice can earn money while serving his apprenticeship by working for a daily newspaper. In this way his pen will acquire readiness and he will learn, through necessity, how to think carefully and write rapidly. To remain too long in the newspaper world, however, is usually fatal to the would-be fiction writer. In a newspaper office he has no chance to practice style; neither city editors nor news editors want literature in the columns for which they are responsible. If the novice is not confronted by the necessity of earning money during his period of training or practice, he can write stories and give them away to country dailies. If he is careful to rewrite each story over and over again, revising it, correcting it, and ultimately throwing it into the waste-basket and beginning all over again, he will in time write a story which he will not need to give away, but which he can send to market "at the regular rates."

All this, providing that the writer has the native ability, the necessary imagination, the poetic or artistic temperament, and the instincts of the natural born story teller. Above all, he must have a story to tell. Editors judge a story first of all with regard to its general interest or plot; second, with regard to its literary qualities. If ten points be accepted as the maximum number in judging the short story, the proportion in most cases will be nine points for the plot and one for the style. With certain editors, of course, if the story lacks the tenth point the other nine count for nothing, and the story is returned.

The Market for Short Stories

The market conditions are such that the story writer who is also a business man disposing of his wares as a merchant disposes of his goods, will find that the net proceeds of his year's work are far in excess of those of his brother who studies not the market. Mr. F. Hopkinson Smith says that while he is writing the story he is simply an author, but that the moment the story is ready for the market he becomes a business man, in the sense that he has something to sell and is determined to sell it at the highest prevailing market price.

How is the story writer to learn the conditions of the market? As a novice he will probably subscribe to the half-dozen so-called journals issued in the interests of literary workers, in the pages of which he will read a great number of articles written by unsuccessful authors, all replete with abuse of editors and their methods. In these journals he may also learn just which magazines are offering prizes for short stories. In the same pages he will come across essays written by novices like himself, on the proper uses of the words "will" and "shall," on the correct use of relative pronouns, and much advice as to how to transmit his manuscript to editors without rolling it. As he accumulates experience, however, the novice finds the so-called journals for literary workers utterly useless. He then begins to buy all the best magazines and weeklies, and now, instead of reading about what editors do not want, he makes himself acquainted with the kind of wares which they actually buy. In the stories of successful magazine contributors he studies composition, construction and style.

After having familiarized himself with the contents of the leading periodicals he takes the next step, which is, that of making the acquaintance of the editors and publishers themselves. Even if his home is far from the great publishing centres, the wise story writer finds it worth the cost of the railroad journey to New York, Boston, Philadelphia, Chicago or San Francisco, to call upon the editors. In meeting the editorial monarchs face to face he discovers that they are not the inhuman creatures which the "journals devoted to literary workers" have represented them to be. He finds that even the busiest editor is humane and courteous and willing to give the author a reasonable amount of his editorial time. He finds that even the greatest publishers are willing to give him a chance and to listen to his suggestions. He learns that this magazine wants only stories of life in the United States; that another magazine wants only stories in which the characters are in the smart set. He finds that a certain weekly wants stories of healthful outdoor life, stories of the plains, of mountaineers and seafarers; that another periodical wants stories of domestic life, or of college life; and that still another pays the highest prices for stories of scientific impossibilities. Above all, he learns that his story must be clean and wholesome, that American editors have no use for the suggestive or the morbid tale, or for any story that can not be read and discussed in the home circle.

Special, or "Hack," Writers

The "hack" is sometimes known as a "free lance." In point of numbers the "free lance" class of writers is a very important one. The number of free lance writers in the United States far exceeds the combined number of all our journalists and authors. It is necessary, therefore, to define exactly what is meant by a free lance. He is known to the public simply as a "writer." In this way he is distinguished from the journalist who is called the "newspaper man," and from the fictionist who is called an author. He is one who can write on any subject, at any time, for any editor or any publisher.

All of the larger magazines and reviews order articles on special subjects from writers of known competence in each several line, and this plan is largely followed in the smaller periodicals, whose editors would far sooner consider a proposed subject than read a submitted manuscript. The special writer must, therefore, be something of a "hustler," always quick to submit an idea to an editor, and, if possible, secure his order to write it up. Some such plan is followed by many of the most successful workers in this line, and their profits and popularity demonstrate its merits.

Writers of treatises are usually persons who write upon the science or occupation in which they are engaged, or else are special writers, engaged by some publisher to prepare a book along given lines. The sphere of the special writer in the preparation of books is enlarging considerably at the present time; their services being often preferred to those of experts, from the fact that they understand the method of presenting a subject in lucid and readable form, abilities which many first-hand authorities lack to a notorious extent. This is shown in the numerous books, often quoted as authoritative, that have been prepared by men whose careers in science or literature have begun as special contributors to the great daily newspapers.

Special writers are also largely employed in the preparation of cyclopædias and other books of reference, for which some notable character or other gets the credit. Apart from this policy of economy—for the "hack" will work cheaper than the notable—there is a large field in the preparation of books for wealthy men with literary aspirations but no ability, and for professional men, lacking the time to devote to writing. It is an open secret that a goodly number of high-class medical and other scientific treatises have been compiled by special writers in the employ of the reputed authors.

Literary Agencies and "Co-operative" Publishers

Numerous helps are provided for persons entering the world of literature but still unacquainted with the rules governing its affairs. Thus there are numerous authors' agencies in various parts of the country, which undertake to receive manuscripts, edit them into acceptable form and secure their publication. Most of these concerns do excellent work in revision and editing, but as a rule are of advantage to the author in securing a publisher only on account of their wider acquaintance with periodical literature and their superior judgment on fitness. There have been a few scattered attempts to establish the system of book manuscript brokerage in this country, in which the broker or middleman submits the manuscript to publishers, and obtains his remuneration in a percentage on the author's royalty, if successful. This plan has worked excellently in England, where almost all authors act through such brokers, being thus saved much trouble and anxiety in the matter of securing a publisher and arranging terms on a satisfactory basis.

Another character with whom the aspiring author is liable to come in contact is the so-called "co-operative publisher." He will manufacture any book, whose author will pay the costs, and then agrees to publish it on an exceedingly generous percentage basis, from 50 per cent to 90 per cent of the profits being promised the author. Some of these publishers make honest although largely ineffective attempts to secure recognition for books, while others do nothing whatever in the matter. On the whole, their schemes are to be avoided, since the large number of worthless books bearing their imprint is sufficient of itself to ruin the standing of a good book or a good author.

Most reputable publishers will issue good books on the "co-operative" basis, and do their best to push them, even though convinced that they can have but a limited sale. Authors possessed of sufficient means to manufacture their own books can generally make better profits and gain a wider reputation by dealing through a news company, as has been done with several very successful books, formerly refused by publishers of good standing.

Libraries

There are in the United States more than 10,000 libraries, containing in all, some 40,000,000 volumes. The United States Congressional Library stands fifth on the list of the world's great libraries; before it, in the matter of number of books, coming the National Library of France, the British Museum Library, the Imperial Library of Russia, and the Royal Library of Berlin. The Boston Library comes seventh, following Strasburg.

Before the Civil War the Library of Congress held less than 100,000 volumes, but it now contains 890,000 volumes and 250,000 pamphlets. The new Congressional Library building, with the ground, has cost $6,950,000. It is open to the public, every book being accessible under certain rules. The building is of marble, with mosaics and frescoes, the latter depicting great historical events. Fine specimens of early printing, book-making and engraving are displayed. Early American Colonial history is well represented. Engravings illustrate all the Presidential administrations. The reading-room is always filled with readers of all classes, the arrangement and delivery of books being wellnigh perfect.

A national body was organized in Philadelphia, October 6, 1876, as the immediate result of a three days' library conference held in connection with the Centennial exhibition. Its purposes are the promotion of library interests, the interchange of experience and opinion, the obtaining of larger results from library labor and expenditure, and the advancement of the profession of librarianship.

Travelling Libraries

The sending of "travelling libraries" to villages and towns, which have no public library of their own, has proved a boon to hundreds of thousands of people throughout the United States. By the introduction of these itinerant collections of books, people in the remotest sections of the country are furnished with the best reading without individual cost. This system of helping rural populations in an educational way was started in New York in 1892.

There are now about 2,500 travelling libraries, containing about 115,000 volumes, scattered in thirty States. About 1,100 of these were equipped and maintained by State aid. The remainder were purchased by private individuals or associations.

The ease with which the new plan of library extension can be adapted to meet various needs may be shown in a rapid summary of the work done by a few systems of travelling libraries. In New Jersey, they have used them to lighten the long winter days and evenings of the brave men who belong to the life-saving service, and that State has now taken up the travelling library as a definite part of the work of its State Library. Women in Salt Lake City send them regularly to remote valleys in Utah. A number of State federations of women's clubs use them to furnish books for study to isolated clubs. One woman in Georgia is devoting herself to the supervision of a system which reaches a number of small villages on the Seaboard Air Line, in five Southern States. An association in Washington, D. C., puts libraries on the canal boats which ply on the Washington and Potomac Canal in the summer, and "tie up" in small hamlets in the Blue Ridge Mountains in the winter. The colored graduates of Hampton Institute carry libraries to the schools for their own people at the base of the Cumberland Mountains, while to the "mountain whites" libraries are sent by the women's clubs in Kentucky, Tennessee and Alabama. In Idaho, California, Nebraska, Kansas, Illinois, Missouri, Minnesota, and many other States, women's clubs are doing the same work for miners, lumbermen, farmers and sailors.

Librarians

So systematized have libraries become that a librarian's profession now ranks with the others. In connection with one or two educational institutes there are training schools for librarians, the graduates of which are very successful in finding immediate employment in their chosen field, either as librarians, cataloguers or general assistants in public libraries, or those of universities and schools. There is a State Library School connected with the University of Illinois, with a four years' course. The graduates are given the degree of Bachelor of Library Science. General university studies occupy two years of the course. Every department of library administration is thoroughly exploited, attention is paid to the bibliographical methods of great libraries, and the students are encouraged to master all the technical details of the profession.

Special courses of instruction in this branch are also given in connection with several large libraries and in separate schools. The particular subjects taught relate to the classification and cataloguing of books, with special reference to cross-indexing and the subdivision of matter. All this constitutes the most recent method for securing easy access and ready reference. Of course, to fully profit by such systematic instruction, a person must have a good working knowledge of books and of the subjects treated, which involves that he has at least a high-school education, or, better still, is a college graduate. Librarians usually receive between $1,500 and $3,000 per year, and trained assistants, several hundred, at least, at the start.

CHAPTER X

THE PROFESSION OF JOURNALISM

The Newspaper Fraternity—The "New Journalism"—Journalistic Education—Reporters—Newspaper Correspondents—Staff and War Correspondents—The Local Correspondent—Special Correspondents—The Washington Correspondent—Women Reporters—The Woman Reporter's Assignments—Earnings of Women Reporters—Newspaper Editors—The Making of a Newspaper—The Day's Work in a Newspaper Office—The Night's Work in a Newspaper Office—The Evening Edition—The Sunday Edition—The Country Newspaper—The Press Associations—Operations of the Associated Press—The Circulation of a Newspaper—Weekly Journalism—Monthly Journalism—Making a Magazine

The Newspaper Fraternity

ON THE question of adopting journalism as a profession, a number of things may be said favorable and unfavorable. To be successful, a man must possess, in some measure, what is happily termed the "journalistic instinct," coupled with the ability to follow its guidance. He must have the faculty of recognizing news, or matters of general interest, and the ability to state such in the fewest words, with the greatest effect. In his career as a reporter, he must demonstrate his facility at observing conditions and extracting essential facts, with the smallest possible exercise of the "nosey" and tricky methods, popularly supposed to characterize men of his craft. In these respects, a man of trained mind and polished manners has a better chance of immediate success than one less advantaged, although his ultimate advancement depends upon his ability to develop along these lines into such mastery of his calling that he is fitted to direct others. Practical journalism has the advantages of begetting desirable rapidity in the use of the faculties of observation and in way of recording them on paper, but, as is frequently demonstrated, the speed forced under the trying conditions of modern newspaper-making can not be maintained indefinitely, a man reaching his limit and beginning to retrograde, after a number of years of incessant grinding.

While by far the fewest men who enter journalism attain to elevated and permanent positions as editors, critics, editorial writers, high-class correspondents, etc., it is still one of the most valuable trainings that can be had. In compelling a man to observe quickly, think quickly and act quickly, it so sharpens the faculties that his success in any calling, fitted to his talents, is already assured. This end is particularly assisted by the modern method of assigning reporters to permanent specialties, such as the stock market, the current political situation, the mercantile world, etc., etc., which gives them a broad grasp of the peculiar facts in their own special fields, and brings them the acquaintance of many persons capable of assisting them in other callings. Thus, for the majority of men, it is a good stepping-stone, but a poor life work. It affords great possibilities for eminent qualification, but, like the calling of general literature, leaves the majority of its workers in the position of "hacks" and "grinds"—with the exception that it generally pays them better—and offers pre-eminence to the few. It is a strenuous field, in which the law of "survival of the fittest" reigns supreme, although, as has been well said, that does not always and necessarily involve the "survival of the best."

The newspaper fraternity may be roughly divided into the following classes: Reporters, editors and editorial writers; and local, staff, and special correspondents.

In general, a reporter may be said to be one who gathers the news in a community in which his paper is published. All the news outside of such a community comes from the correspondents. Thus a man employed by the "New York Herald," who writes the story of a blizzard within or near Greater New York, is a reporter. That same man if sent to Wilkesbarre to write a story of a coal miners' strike is, for the time being, called a staff correspondent. On the other hand, if the same story had been sent in by an employé of the "Herald" living in Wilkesbarre, the writer would be known as a local correspondent. Or if the same story had been sent in by one not regularly employed by the "Herald," whether a resident or stranger in Wilkesbarre, the writer would be known as a special correspondent.

The "New Journalism"

Of late years, thanks to the mechanical and executive perfections found in the newspaper business, there has arisen a new school of journalistic policy and method, appropriately known as the "new journalism." Formerly the editor had fulfilled his mission when he had recorded the latest obtainable news, and made such comments as seemed good on current events. Now, the sphere of newspaper work has enlarged into activities for representing public interest in all branches, and for the "creation" of news. This latter term does not indicate the unworthy scheme of inventing or "faking" items, for the sake of producing sensations or for creating a temporary and doubtful interest in the paper containing them. It rather indicates precisely the policy of combining the functions of the reporter with those of the skilled detective. Its usefulness is demonstrated in the fact that, within the last few years, a number of criminals have been brought to justice through the persistent efforts of skilled newspaper sleuths, when, as is perfectly evident, they might have escaped, if only the police and public detectives had been relied on to run them down.

Many notable mysteries have been cleared up, and several worthy reforms have been carried to accomplishment by the same indefatigable agents, who, although working in the first instance for the benefit of their respective newspapers, have always borne in mind the pre-eminent value of truth. Public opinion has also been effectively molded by the enterprise of certain editors, who have sought and received expressions on current crises from distinguished personages, rulers, prime ministers, etc., or who have, at their own expense, undertaken suits, in the public behalf, against corrupt officials or oppressive corporations.

In one or two notable instances the cause of science has been immensely advanced by newspaper enterprise, as when Stanley was sent to Africa by the "New York Herald." Reporters and agents from modern newspapers have undergone dangers and hardships of remarkable variety, in the tireless and determined effort to collect the real facts on their "assignments."

Journalistic Education

There is a well-defined movement at the present time to incorporate courses of journalism with the special departments of universities, business colleges and correspondence schools. The scheme is highly approved by several prominent journalists, and seems to be meeting with some success in point of attracting students. Certain of its advocates argue that, as other professions are learned by special instruction, journalism should be no exception. This may be true, so far as concerns the acquisition of necessary knowledge of several subjects; the ability to write readily and simply on any required facts or topics, and the general theoretical understanding of the business, but a person so instructed has scarcely any advantage over another possessing only a good general education. There are numerous things that can be learned only in a newspaper office, as, for example, the ability to investigate and report on an assignment with the required rapidity, and to know news from ordinary happenings. Every newspaper office, moreover, has its own rules and practice which can be learned only by actual service; and no school course, however thorough, could possibly fit a man to take a position as city editor on any paper.

Reporters

There are several ways in which to make the start as a reporter. One way is to apply direct to the city editor and secure a trial assignment. The better way is to run down a news story, write it, and send it or hand it to the city editor. If the story is printed, the beginner should at once apply in person for an assignment. The first assignment will mean an actual start as a reporter—the real beginning of the young man's race for success in journalism. It will not be a very long race, for in the newspaper world, especially in the larger cities, the reporter finds himself an old man at forty, and the race over at about that period of life at which men in other professions are just beginning to enjoy the fruits of their labor.

From the very day of the first assignment, the life of the reporter is one of perpetual excitement, haste, and turmoil. This applies, of course, only to the larger cities where the publishing of news is a continual race with

From Stereoscopic Photograph, Copyright 1898 by Underwood & Underwood

THE WAR CORRESPONDENTS MR. RICHARD HARDING DAVIS AND MR. STEPHEN BONSAL TALKING TO COLONEL ROOSEVELT

NEWS PHOTOGRAPHERS WITH CAMERAS READY TO SNAP AT A PASSING PROCESSION

Vol. II., p. 931

time. The constant fear of being "beaten" or "scooped" by one's rivals keeps every man in the newspaper office, from the managing editor to the newest "cub" reporter, in a fever of anxiety. The beginner soon becomes conscious of the tension at which all those around him are working, and if he has the qualities of a good reporter, the excitement thrills him, he enjoys it and plunges into the fray with his whole heart. His salary, at the beginning, will probably be about $15 a week; if he has the ability, he can increase the sum to $35—actually within a few weeks. Let him get one big scoop, and he becomes the hero of the office, and as a reward he may be taken off the salary list and allowed to work at space rates. While working "on space" it is possible for him to earn from $35 to $75 a week, according to the amount of space his stories fill. A few reporters reach the $75 a week limit within a year or two after their start; the majority plod along for many years, their earnings seldom amounting to more than $50 or $60 a week.

Newspaper Correspondents

Newspaper correspondents, as previously stated, may be roughly divided into three general classes—staff, local, and special. Staff correspondents work on a salary as regular employés of their papers; local correspondents work "on space"; while special correspondents may work either on a salary which continues during the time necessary to perform a certain task, or they may receive a stated sum for each contribution, or a lump sum for a certain piece of work which may involve a period of time anywhere from one week to two or three years. In each case the travelling expenses of the correspondents are usually borne by the papers employing them.

Staff and War Correspondents

A correspondent is really a reporter, but as his reporting is done either by the telegraph or by mail, or, in other words, by correspondence, the term correspondent was applied to him in order to distinguish the out-of-town reporter from the city reporter. It is the ambition of almost every reporter working for a daily to be sent out of town on some important mission as a staff correspondent. Such a mission offers opportunities which may result in advancing the journalist a peg or two in his professional career. In the event of war the reporter may be given a chance to distinguish himself in camp and on the battlefield. After war was declared with Spain, in 1898, a legion of reporters soon reached fame as staff correspondents accompanying United States troops. They were sent to Cuba, Porto Rico, Guam and the Philippines. Later they were sent to South Africa to join either the Boer or the British armies, and send home news of the war in the Transvaal. Still later they were sent to China as the day to day historians of events taking place in Tien Tsin and Pekin. The work of many of these staff correspondents was so well done that they were given signatures in their papers. The correspondent who is permitted to sign his story can usually command higher pay than other correspondents, for it is understood that if his work is worth signing, he must necessarily command an audience; and the larger the audience the correspondent commands the better for the publisher.

For obvious reasons, either the staff or special correspondent, who is acting as war correspondent, receives higher pay than he would in time of peace. The war correspondent must necessarily soldier with soldiers. He must march with the troops shoulder to shoulder, enduring hardships, oftentimes risking his life. Certain newspapers paid the cost of insurance on the lives of the men whom they sent to Cuba, to South Africa and China. Others even insured their correspondents against accidents. The expenses of a war correspondent, too, are greater than those of the correspondents who are travelling about the world on ordinary missions. Owing to the uncertainties in the matter of expense, newspaper editors usually place several thousand dollars at the command of their correspondents as emergency funds to be drawn upon when needed.

The Local Correspondent

Though correspondents may be divided, as before mentioned, into classes known as staff, local, and special, the duties of the men in each class are about the same. The dividing lines mark a difference in the methods of pay rather than any difference in the methods of work.

The local correspondent, of course, earns less than either the staff or the special correspondent, because his work is of less importance. Take the case, for instance, of the local correspondent of the "New York Herald" in Wilkesbarre. This man is probably a reporter on the local paper of his town. When anything happens that is of interest outside of his town or State, he telegraphs the story to the "Herald," but he handles the important things only up to a certain point. When comes a strike among the coal miners, for instance, he may send in the story of the opening days of the strife between labor and capital, but if the strike spreads, or if blood is shed, or if the trouble even promises to be serious, the "Herald" sends a staff correspondent to Wilkesbarre to handle the story. The local correspondent then continues his work under the direction of the staff correspondent, merely assisting the latter in "covering" the news.

Special Correspondents

The special correspondent is employed either because of his special fitness, or because an event is important enough to justify employing an authority or a specialist. Thus a man who has built up a reputation as a political writer will be sent as a special correspondent to a political convention. When an international yacht race is to be run, the newspapers employ yachting experts as special correspondents. In order that coronations, inaugurations, or any great fête of national or international importance may be presented to their readers by the very best writers, newspapers often employ novelists or poets whose pens are trained for the descriptive writing necessary on such occasions.

The correspondent, wherever he is, is a living interrogation point. He is omnipresent and insatiable. He must gain the confidence of all the leaders of thought or action from whom it is necessary for him to get the news. If he is a one-idea man, he will never succeed. If his vision is fixed on a single point, his paper, which, in other words, means his readers, will soon discover that he is prejudiced and his value as a correspondent will dwindle to naught. It is the many-sided correspondent who gains the confidence of public men, of the reading public, and of the proprietor of the paper for which he happens to be working.

The Washington Correspondent

The Washington corps of newspaper correspondents numbers about two hundred. These are principally the representatives of daily papers throughout the country, and it is their duty to send to their papers a daily report of everything of importance that happens in the capital. The telegraph press rates are so low that even the smallest papers in the remotest sections of the country can afford to pay for the services of a special correspondent in Washington. Thus papers in the interior of Pennsylvania or in the small towns of the Northwestern States and Territories have their representatives in the press galleries of the Capitol, just the same as the metropolitan papers.

In addition to the 200 representatives of daily papers in Washington, there are fully 300 persons who write for the press as a means, or a partial means, of livelihood. These special correspondents write not only for the dailies, but for the weeklies and for the magazines. They include recognized authorities on certain subjects, Congressmen who have undertaken to act as correspondents, the heads of government bureaus, and even department clerks.

The Washington bureau of each of the great dailies of the country is maintained the year round, the busiest season of course being during the session of Congress. In every bureau there are from two to six correspondents. In many cases there is a direct wire from the bureau to the home office.

In both the House of Representatives and in the Senate, there is a press gallery, to sit in which is the right of every correspondent who sends out daily despatches. No discrimination is made in the case of women correspondents. The press gallery is an important centre of news, of course, but it is by no means the chief centre; in fact, there may be said to be no principal centre of Washington news, for the bulk of the news is secured in interviews with the legislators themselves. The Washington correspondent must be a vigilant man, for one of his principal duties is to thwart secrecy, to give publicity to matters which it is best that the public should know.

Women Reporters

Since the rise of so-called yellow journalism, the public has become familiar with the newspaper woman. She appears at great social functions, is distinctly in evidence at summer resorts, is known to the keepers and wardens of prisons, to the matrons of hospitals, and at the box-offices of theatres. She has even made a sensational tour of the world; has thrown herself in front of an onrushing trolley car in order to test the practicability of the fender; has run automobiles through Central Park at a higher rate of speed than is allowed by law in order that she might try the mettle of the mounted police. She has done many other queer, strange and wonderful things in the name of journalism. She has been sent so often to the bottom of the East River to write up the art of bridge-building, in a caisson; she has been despatched so often to other extraordinary places, that newspaper readers have ceased to wonder at her doings, and editors are now allowing her to take a normal place in the newspaper world.

If many young women made a sensational entrance into journalistic work, it was their misfortune rather than their fault; they simply had to. Editors said "Do this," and "Do that," and the newspaper woman obeyed. So for a time her salary was abnormally large and her fame spread throughout the land. But gone are the Nellie Blys, and the newspaper woman now works side by side with the men, doing the same work and earning less money.

The young woman may seek to enter daily journalism by way of the Sunday edition. She visits the editor and places before him a number of suggestions—probably on feminine topics. The editor checks off two or three of the suggestions as an indication that he would like to have the stories submitted. He invariably says that he would like to *see* the "stuff," making it plain to the candidate for Sunday newspaper honors that he has not given a positive order for the work. However, if her stories prove satisfactory, it is probable that after a time the Sunday editor will introduce the young woman into the city department and there she begins her work as a reporter.

The wisest newspaper woman of all makes application for an assignment direct to the city editor, declaring that she is ready to take her chances with the men. She makes it evident from the start that she wishes to be placed on an equality with the men. If she is fortunate enough to secure an engagement she will report the following morning at about eleven o'clock for work.

The Woman Reporter's Assignments

Now begin the real trials and struggles of her newspaper life. Every morning she is obliged to wait in the office for an assignment; sometimes she waits two hours, sometimes all day. While she is waiting she is obliged to accustom herself to a shirt-sleeve environment and a tobacco-laden atmosphere. If she is destined to succeed at all, she must not cough when the smoke from a cigarette happens to float her way, nor must she be averse to joining in the gossip of the "shop."

And then her assignments. She is obliged to approach men to whom she has never been introduced, and talk to them. She must enter the office of a busy broker, knowing that she will be treated with but scant courtesy because of lack of time. She must rush from mansion to mansion on the day of a great ball and ask for a description of the gowns to be worn. In the evening she must go to the ball in person and secure information from the secretary of the hostess. She must interview murderers and make analytical studies of criminals of the most degraded kind. In the editorial room, if she happens to have a headache, she finds that she can not make a greater blunder than to mention the fact. If the city editor says, "Take the next train for the scene of the strike," she must go, without hair-brush or powder-puff. The true woman reporter never shirks her work because of the weather. Neither blinding snow nor driving rain holds terrors for her. She dresses for all kinds of weather as appropriately as her purse will permit, and then goes forth to get her story, knowing that neither blizzard nor cyclone will be accepted as an excuse for "falling down."

Earnings of Women Reporters

Women in editorial positions—that is, editors of women's pages—earn from $40 to $50 a week. Outside of the woman's chair and a chair or two in the Sunday room, you may look in vain for a woman in an executive capacity on a great daily. It is related as an extraordinary circumstance that the Sunday editor of a daily New York newspaper not many years ago was a woman; but that paper had only a short life, and the woman who was its Sunday editor was obliged to return to earn her living once more as a contributor to the inevitable woman's page.

Of course there are a few women in New York and other large cities who earn more than $50 a week; there are perhaps three or four who draw as much as $100, but these are women who have earned a reputation for undertaking daring feats or because of a daring style.

The ordinary woman reporter while on a salary list draws only from $20 to $35 a week, though she does as much work and as good work as men who are paid more than she. When she is put "on space," or, as they say in industrial establishments, on "piece work," it is possible for her to make as much as $75 a week. The average rate per column on large dailies is about $7, and if the space writer fills one column every day she deems herself fortunate.

Newspaper Editors

Horace Greeley once said that the only way to make a newspaper editor was to feed him from earliest boyhood on printer's ink and let him sleep on newspapers. This was another way of saying that a young man who is brought up in a newspaper office makes a better editor than one who has the benefit of a college training. Mr. Greeley called college graduates "the worst horned cattle." While it may have been true in Mr. Greeley's day that college graduates were an incumbrance rather than a help in a newspaper office, conditions have changed and college graduates are now in the majority in newspaper offices.

The pace being what it is, it is natural that the men who can best meet the requirements of rapid development should enter the profession properly equipped, and the men who are best equipped are college graduates. If the graduate is fitted by nature for journalism, his advancement will be wonderfully assisted by his trained mind, the enlargement of the social horizon through close association during a period of from four to six years with a great number of men of mental ability, and his skill in the use of a broad vocabulary. Hence, more and more college graduates are entering journalism every year, and it is these men who are filling the editorial chairs of the great dailies. Newspaper publishers recognize the fact that the men of greatest value in an executive position are those who have been trained in a university.

On the great daily, an editorial staff usually consists of the editor, the managing editor, the city editor, the news editor, the telegraph editor, the Sunday editor, a number of assistant city editors, and the heads of various departments, such as the sporting editor, the financial editor, the art editor, the marine editor, the railroad editor, the real estate editor, the dramatic editor, the literary editor, and others. The relative rank of these editors is not the same on every paper. On one New York paper, for instance, the man who is nominally the city editor receives a higher salary than the managing editor. As a rule, however, the editor or managing editor receives the highest salary, while the earnings of the others are in proportion to the value of their department in the particular paper buying their services. Certain editors in the offices of the New York papers receive $15,000 a year, or more. Thus, in point of compensation, managing editors, Sunday editors and city editors are now classed with electrical experts, medical specialists and corporation officers. The average salary, however, paid to ordinary editors of ordinary papers seldom exceeds $5,000 a year.

It may be further said, relative to the rapid rise of newspaper men to high editorial positions, that, with one or two exceptions, all the managing editors of New York newspapers are under fifty years of age. One or two are only a trifle over thirty. So absorbed are these men in their work that they themselves have no real appreciation of the pressure at which their labors are carried on. The proprietor, however, truly understands the situation, for it is he who insists that managing editors shall have their understudies; that is, three or four men so trained that they can assume full charge of any edition at a moment's notice.

The Making of a Newspaper

The making of a modern newspaper is nearly the best example extant of what human energy may accomplish, under pressure, in the way of rapid and exact work. In spite of the apparently incongruous and haphazard jumble of matter of all kinds and qualities on the pages of a newspaper, which is the first thing that occurs to the average lay mind in the way of criticism, and which would be perfectly inadmissible in book work, the whole make-up is carefully and laboriously planned in advance and every detail is worked out in accordance with a system that is as perfect as it is complex. Moreover, there is little time to meditate or hesitate on what to do between the impulse and the action, since the delay of even a minute oftentimes counts seriously against the interests of the paper. The matter included in a daily paper falls under two distinct heads, city news and foreign news, the latter including all out of town items, from either foreign countries or other parts of the United States, while the city department, which is the scene of the greatest activity, deals with local news and such items from the suburbs as can be quickly and readily obtained by the reporters.

The work of the editors is arduous and constant, on account of the vast bulk of the news matter constantly pouring into the office, and forming a mass of material generally sufficient to fill ten or a dozen papers of the largest size. The selection and editing of this matter, so as to obtain all essential facts, and at the same time come within the required compass, demands not only skill at editing and ability to work with the utmost rapidity, but also a trained sense of relative values that, from the close competition between the great journals of the present day, must be as nearly unerring as possible.

The Day's Work in a Newspaper Office

The story of a day's work in the office of a great daily newspaper will give an idea of the tremendous pressure under which the modern newspaper man performs his labor. On a morning edition work begins about nine o'clock with the arrival of the paper reader. It is the duty of this man to read all the papers published in his city with a special regard for local matters, and with the object of marking everything in the newspaper, even to an advertisement, that promises to make a "story." A "story" means anything published in a newspaper. The paper reader hands over the papers he has marked to the city editor. The city editor, meanwhile, has read the papers for himself, and after assorting a number of other suggestions that may have been handed in by various members of the staff, he is able to give assignments to the few reporters who may be on duty at ten o'clock in the morning.

Meanwhile the assistant city editor, the sporting editor, and others are also reading newspapers, all looking for ideas. Each editor is constantly on the lookout for something original and striking that will make an attractive news feature. It is through reading newspapers constantly that men in executive positions in newspaper offices are able to determine just how much space any particular story is worth. It is these men who determine the relative importance of stories. Step into the office of any great morning newspaper during the daylight hours and you will find everybody reading newspapers. They may appear to be lounging, some may have their feet elevated to a desk top, a few are in their shirt sleeves—all are smoking—but each particular man present is really hard at work developing the most vital forces in newspaperdom—namely, ideas.

In the middle of the afternoon the reporters begin to arrive. Some of them have not yet breakfasted, having taken advantage of every possible moment for sleep. As a rule the reporters on the morning papers do not begin their actual day's work until about the hour when men in other professions are dining. The reason for this is that the evening editions so thoroughly cover the news of the day that it is not practicable to make up the morning editions until after six o'clock. A few of the department men, of course, such as those who cover the news of the police courts, the City Hall, Wall Street, and so on, get to work early in the day, but the main part of the reportorial staff, which, on the larger dailies numbers as many as fifty, work at nights. Meantime all routine news is covered by the local bureau of the Associated Press, the workings of which will be explained under a separate head.

The really big events are handled by the "star" reporters, each of whom is usually intrusted with a story which he is expected to play up to the very best advantage.

The ordinary reporters are sometimes sent out for as many as six or eight different stories between three o'clock in the afternoon and one o'clock in the morning. It often happens, however, that the six or eight stories written by the reporters are, all together, given less space than the one story of the star reporter. A few reporters are always retained in the office for emergencies. Nor are these emergency reporters the men of least ability, for when an editor is actually confronted by an emergency he needs a good man to meet and handle it.

We must not forget the autocrat of the newspaper—the managing editor. He is an editor of editors. It is not his business to be interested in any one department, but in all. It is he who has the last word as to the news. The city editor, in New York, for instance, is concerned only with happenings within one hundred miles of the City Hall but the managing editor is concerned with affairs the world over. He arrives at his office between three and five o'clock, and at once issues instructions not merely to the city editor and to others in the building, but to the correspondents in the capitals of Europe and on the other side of the world as well.

The Night's Work in a Newspaper Office

About six o'clock the night force arrives, headed by the night city editor, the night telegraph editor, and so on. At about this hour the result of the reaching out for news to all parts of the world begins to appear in the news home office. The news arrives by telegraph, by cable, by telephone, and reporters come rushing in to begin clicking off their stories on typewriters or writing them out in long hand.

The men employed for the purpose make up the schedule of the paper, the editors having decided upon the way in which the news will be presented. Before one o'clock in the morning, however, it is probable that the schedule will have been changed many times, for events happen so quickly that the telegraph at any moment may change the most elaborate plans for "make-up."

From nine o'clock till two o'clock at night the editorial rooms of the great dailies present scenes of mental activity where the strain is such that it has sometimes led to actual madness. More than one brilliant editorial mind has snapped during these rushing hours of the night. It is related that the city editor of a great New York daily rushed into the reporters' room brandishing "copy" in both hands and shrieking at the top of his voice. The pace at which this man had been working for years had at last had its effect. He was taken to a hospital, where he soon afterward died.

The subdivision of work in newspaper offices is now as fine as that to be found in any industrial establishment. Certain men are detailed to receive stories over the telephone; others are employed as rewriters—that is, men who take the stories of out-of-town correspondents, and select the most valuable points of the story, rewriting the entire tale in the most forcible language, infusing into it picturesque and descriptive features worthy of the novelist. Then there are men who draw large salaries for writing headlines, and yellow journalism has created a demand for ability of a high order in the matter of writing "heads." Then there are the ordinary copy readers, eight or ten of whom are required to read the city copy.

All this time the reporters have been rushing about the city, interviewing all sorts and conditions of people under all sorts of circumstances, hurrying back to the office to write the story if there is time, or telephoning it in if the time is short. Sometimes they do not reach the office until about three o'clock and are sometimes required to wait until the issues of rival papers are brought out—for even at that time in the morning somebody must read the rival newspapers and be on the lookout for any possible big exclusive story with a view to "lifting" and rewriting enough of it, as editors say, "to save ourselves."

The Evening Edition

Evening editions of newspapers have become of great importance. Formerly one, or at most two, editions of an evening paper were considered sufficient, and these editions came from the press really at eventide. In New York, however, evening editions of the "Telegram" are issued not later than noon, while the evening editions of the "World" and the "Journal" are on sale so early in the morning that they have in part taken the place of the morning edition. With the increasing importance of the evening edition came the demand for editors of more than average ability who could produce papers in successful competition with rivals; and these men were drawn from the staffs of the morning edition. So it came about that editors who had been accustomed to going to bed at four or five o'clock in the morning now found themselves getting up at that hour and arriving at the office between six and seven o'clock. Some editors and reporters on evening editions are obliged to get to work as early as five o'clock. Competition is a great deal more keen among evening than among morning editions. The most enterprising evening paper is for sale at seven o'clock in the morning, and from that time until midnight a new edition is issued every hour, or as often as the news may justify.

The tension in the office of an evening edition and the speed at which the men must work is even greater than in the morning newspaper rooms. It can at least be said that on a morning paper there are a few hours early in the day when all work has ceased; on an evening edition the work goes on, like the poet's brook, forever; there is not a single hour in the twenty-four during which some one is not on duty. Between nine o'clock in the evening and midnight, there is what is called "the dog watch," when only one or two men are on duty; after midnight comes what is called "the gas house trick," when the rewrite men appear in time to paraphrase stories from the first morning editions for the first evening edition. So precious is every second of time in the office of the evening edition that editors sometimes move their desks into the composing room in order to be as close as possible to the compositors. The paper which can give an important piece of news to the public five minutes ahead of its rivals will sell thousands of extra copies, and this means added prestige and more advertisements.

All sorts of mechanical devices have also been invented to save time. There is, for instance, what is called the "fudge" or "stop press" bulletin, printed in red ink. The time required to add a fudge to the plates already on the press is only about two minutes, for the words are inserted in actual type. The words are even called off to the compositor, who sets them up as fast as the editor or reporter dictates them—for there is not even time to write. Another device adopted by evening pepars in order to beat time is what is called the "flash." The flash is used when something is occurring which can end only in one of two ways; for example, a prize fight, or an important horse race, or boat race, in which there can be only one winner. In order to announce the result of the fight, or of the race, within the fewest possible minutes after the event is over, editors conceived the plan of printing two editions of the paper; one edition gives A as a winner, the other says that B won. Both these editions are sent out to the various news centres in the city and suburbs; the moment the result of the event is flashed over the wire, word is telephoned to the distributing centres and the proper edition is released, the other being destroyed.

The Sunday Edition

Since Morrill Goddard, the father of the Sunday newspaper, first published a Sunday edition of the New York "Herald" as a separate entity, a new class of papers has been created. The members of this class are called Sunday editors. Soon the counting-room discovered that the "Sunday" was the best paying edition of the paper. Then came the demand for Sunday editors—good Sunday editors. For a time the supply was wholly unequal to the demand; for the editing of the Sunday edition such as Mr. Goddard produced was something new in journalism. So for a time Sunday editors simply copied the ways and means adopted by Mr. Goddard.

Previous to this, the Sunday paper was nothing more nor less than a weekly edition, containing a recapitulation or an elaboration of the news of the week. It was made up haphazard fashion by the members of the daily staff, under the direction of a busy managing editor, who had very little time to give to it. Mr. Goddard, however, recognized the fact that the Sunday edition should be published in every sense as a separate paper, having nothing to do with the daily edition. Therefore, he organized his own staff of assistant editors, writers and artists, who worked for him exclusively. He arranged matters so that he had no need to call upon the members of the daily staff, but could publish his Sunday paper independently of everybody else. At this time Mr. Goddard had reached the advanced age of twenty-five years.

The Sunday editor must have all the qualifications of a magazine editor, while still possessing every qualification necessary to success as the editor of a daily paper. It is his business to give the public a magazine which is also a newspaper. In other words, he must treat news events, both in picture and story, as topics of general interest, but of no news value, as treated in the monthly periodicals. Following these lines, all the great dailies the country over now publish what is known as the Sunday magazine section, for each of which there is a special Sunday editor.

The business office recognizes the Sunday editor as a man of great importance, because the product of his establishment yields a larger revenue than either the morning or the evening editions. The daily editions give prestige, standing and influence to a newspaper property, but these editions run up mighty bills in the shape of telegraph and cable tolls, huge salaries for editors and correspondents, incurring meanwhile hundreds of other expenses. The Sunday edition can be made up at far less expense. It is said that the circulation of the Sunday edition of three New York papers amounts in each case to at least 600,000 copies. The comic supplement and other supplements, with colored illustrations and half tones, have increased the circulation of the papers which adopted them by some 50,000 copies.

The Country Newspaper

The situation facing the editor of a country or town newspaper is precisely the same as that before the manager of the greatest metropolitan daily; briefly stated, to furnish the local news in the most acceptable manner. In any large newspaper the city editor's department, with its corps of reporters, constantly waiting to be sent out on assignments, to investigate and write up the newest bit of news, before the forms are sent to press, is nearly the most important. This is true because the people of every city are more keenly interested, oftentimes, in local news than even in matters of world-wide importance. Yet, within a radius of not very much over one hundred miles from the metropolis, none but the most sensational city news is of very great interest. Also in country towns, even near the great cities, there is as real a demand for news of local interest, which the great metropolitan dailies can in no sense supply. Furthermore, these apparently insignificant, even trivial, items are of keener interest to the local public than all foreign happenings put together, and are the principal dependence of the local editor.

The founder of a local newspaper, whether his object is to seek profit, to conduct a political propaganda, or to secure his own election to some public office, must proceed along one line. He must secure such contracts for advertising as he can obtain from local tradesmen and the numerous merchants and manufacturers who advertise widely in his class of newspaper, in order to insure the financial support essential to his success. He must also canvass his own and neighboring towns, for the purpose of securing the services of regular correspondents and contributors, who generally feel amply compensated by a place on the subscription list. These persons regularly furnish the local news items, which, worked over in the chatty, popular style that all country editors eventually master, are the main dependence in obtaining and keeping a good circulation. This is on the principle, once stated by a Brooklyn editor, that he would prefer an item from Chicago, stating that some resident of his city had sprained his ankle, than another relating how that the mayor of that distant city had been assassinated by anarchists.

In addition to the local items, with special emphasis on the register of deaths and marriages, the local newspaper must include a brief summary of important world happenings and as much "local" and syndicate literary filling as the news and advertising will permit. In all things, however, the local editor must be local, understanding that his success depends on featuring the interests and doings of his neighbors, quite as truly as the New York editor is concerned with representing the doings and sentiments of the metropolis. His every effort, therefore, to create local news and to stimulate latent literary talent is sure to be repaid many fold by the increased profit and popularity of his "sheet."

The Press Associations

The most important institution in the newspaper world is the Associated Press. Were this institution suddenly to cease operations, hundreds of newspapers would have to cease publication entirely, and only the very richest newspaper publishers could hope to continue issuing their papers. The Associated Press is the gatherer of the news of the world—all the news either of local or national or international importance. It is as a gatherer of the routine news, however, that it is of greatest value to the newspapers which pay for its services.

In addition to the Associated Press, there are other press associations, the principal of which at the present time is the one conducted by the New York "Sun"—The Laffan News Bureau—and the Publishers' Press. These news associations are well called the backbone of modern journalism.

The instinct by which a man understands just what is news and whether it will interest the public is what Mr. Charles Dudley Warner called the "sixth sense." The first qualification that must be possessed by the man who seeks employment with the Associated Press is this sixth sense.

It is a well-known fact that the Associated Press pays its correspondents and managers and editors lower salaries than are paid by newspapers to men in the same position, and yet the employés of the Associated Press must possess ability quite equal to that required of employés of newspapers. On the other hand, the opportunities open to the Associated Press men to distinguish themselves are even more numerous than those afforded by newspapers. It often happens that the representatives of the Associated Press are admitted where men representing the ordinary press are excluded. During the war with Spain, for instance, the flagships could not carry representatives of all the papers; hence it was decided to carry simply a correspondent of the Associated Press. When President McKinley made his transcontinental tour he could not invite representatives of all the daily papers to accompany him; hence he confined his invitations to the men representing the three principal news associations and the three principal weekly papers; viz., "Collier's Weekly," "Harper's Weekly" and "Leslie's Weekly." These are merely illustrations of the hundreds of instances in which correspondents of the Associated Press have had an advantage over those employed by individual papers.

Among the advantages of the Associated Press comes, first, the fact that it does away with the dead weight of useless competition, which would have resulted in ruin if it had been persevered in. Another advantage is that the association makes it possible for all the news to reach the reader. It is stated by experts that were it not for the press associations even our present telegraphic facilities would prove inadequate in handling the bulk of news; for these facilities, great as they are, would be unequal to the task of transmitting news separately to each particular paper. The amount of time saved by the press associations in distributing one despatch to hundreds of papers would probably amount to thousands of hours a year.

Operations of the Associated Press

The scheme of organization of the Associated Press for administrative purposes consists of general officers and general manager, and an assistant general manager with offices in New York, four superintendents of division, a superintendent residing in New York, with a division comprising the New England and Middle States and West Virginia, called the Eastern division; a superintendent residing at Washington, in the District of Columbia, managing the Southern division, which comprises the District of Columbia, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi; a superintendent resident of the city of Chicago, managing the Central division, comprising the States of Ohio, Indiana, Michigan, Illinois, Wisconsin, Missouri, Iowa, Minnesota, Kansas, Nebraska, North Dakota, South Dakota, Arkansas, Kentucky, Texas, Oklahoma and the Indian Territory, Tennessee and Louisiana; a superintendent resident of San Francisco, managing the Western division, comprising the States of Arizona, California, Wyoming, Oregon, Colorado, Montana, Washington, Idaho, Nevada, Utah and the Territory of New Mexico.

There are about 650 salaried employés of the Associated Press, and probably about the same number of men on space rate, who are scattered all over the country. There is a list maintained, practically in each office of the Associated Press in the United States, of men who are on call at different points. They may not be used except at long intervals. Their names are on file, and in an emergency they are called upon for news which they gather and file at the nearest telegraph office to the nearest general correspondent of the Associated Press. Besides this, each member's contract obligates him to furnish the association with the news of his vicinity. In practice there is at each point where there is a paper a salaried or unsalaried representative of the association, who puts the news in shape and files it.

For the purpose of gathering foreign news it now has correspondence with the foreign news agents—the Reuter, Havas, Wolf, and the different agencies all over the world. It has contract relations with Reuter and Havas, which cover Great Britain and her colonies, France, Belgium, Switzerland, Portugal, and some parts of South America; with the Wolf Agency of Berlin, which covers Germany, Austria, and Hungary; with the Stefanie Agency, which covers Italy; with the Nordisches Telegram Bureau, which covers Russia; with the Norsky Telegram Bureau, which covers Norway; with the Svenska Telegram Bureau, which covers Sweden; and with the Agence de Constantinople, which covers Turkey.

The news of the United States chiefly originates in Washington and New York, which may be regarded as the great news centres of this country. The Associated Press has a resident bureau in each of these cities, as well as at other important points, preparing the news and transmitting it by means of leased wires or by one of the telegraph companies into the general system. The leased wires form a network across the continent from St. John, New Brunswick, to Seattle, Washington, and San Diego, California, and Duluth, Minnesota, to New Orleans, Galveston and the City of Mexico. The total mileage of this leased wire system is: Day wires, 9,345 miles; night wires, 20,461 miles.

From various points along the trunk lines the report is sent to interior cities, and at several of the larger of them the whole report is boiled down perhaps to one-tenth its volume, perhaps more, and filed (as a "pony" report) with one of the telegraph companies for delivery to papers in neighboring towns and smaller cities which could not afford nor handle the "full service." At leased wire points, the Associated Press supplies its own telegraph operators, who receive the incoming report in typewriting—making one or more carbon copies, according to the number of papers at that point taking the service.

In the larger offices many copies of the received report have to be struck off, and in several offices use is made of a device whereby the operator sitting before his key, cuts a stencil on a waxed sheet placed in his typewriter, by means of which many copies of the report can be very quickly made. These copies are sent to the various papers (in Chicago by a pneumatic system), and distributed to the various editors, whose duty it may be to refile the matter for some particular section of the country or to cut it down for "pony" report points.

The members of the Associated Press contribute a large quantity of the news thus handled by furnishing the local representative of the Associated Press their proofs, but in addition whenever special occasion requires, the association's own reporters are sent out to report specific events, and they telegraph the news they get to the nearest office of the association. Special men are employed at different places to gather market reports, to cover Wall Street and the produce markets, and men at different seaports report the arrival and departure of boats. Alliance is had also with many press associations, which gather local news, and organizations that are formed to cooperate in the business of gathering news of particular localities. For instance, there is the City Press Association of Chicago, an organization effected for the purpose of gathering routine local news; a copy of its report is furnished the Associated Press every day, and anything of general interest to the country is taken from it and transmitted to members of the association. City Press Associations are also established in New York and other cities. In short, the Associated Press aims to avail itself of every known means of getting valuable news.

The Associated Press has now about 700 members, and some 2,500 daily and weekly papers are served through minor agencies. Though the bulk of the papers getting the Associated Press service are in the United States, there are upward of fifty scattered through the various provinces of Canada, and also papers in Mexico, Cuba and Porto Rico.

The annual revenues of the Associated Press, which are derived from assessments levied upon the newspapers served, exceed $1,900,000, while the number of words daily received and transmitted at each of the more important offices is over 50,000, or the equivalent of thirty-five columns of the average newspaper.

The Circulation of a Newspaper

With newspapers, as with monthly magazines and weekly journals, the creation of a large circulation is the all-important aim. This is true, not only because it enables the exercise of a wider influence and the counting of higher profits from sales, but because it also attracts a larger quantity and a better class of advertising—and advertising is the mainstay of all classes of periodical publication. In the effort to increase circulation, therefore, many newspapers have adopted methods popularly described as sensational, using two and three-inch type for headlines, to feature the most startling news items of the day, grasping every opportunity to expand such matter, although of small importance in itself, to the disadvantage of other and more significant facts. In the long run, this procedure violences truth only to the extent of improperly estimating values and catering to the natural love of scares and sensations, which is developed to an inordinate degree in a large part of mankind. It is sound policy, however, since it involves the publication of exactly the sort of thing the people like to read, and thus achieves the desired end of increasing the demand for that particular newspaper. A similar method is found in the habit of evening papers of issuing a large number of separate editions, each with a different headline feature, announcing some new and interesting phase or development of a subject already heavily featured. The production of "extras" on the slightest provocation is another method of forcing up the circulation by spreading the impression that a newspaper has obtained important news ahead of all its rivals. Sometimes all these methods are perfectly justified, in view of the real value of the news thus featured, although following it out as a regular practice seems to attain the desired end of creating a steady demand with the public.

More "conservative" methods of obtaining a circulation consist in following out a studied policy of presenting news in forms acceptable to a given public, together with pointed editorial comments, in accord with the sentiments of a certain political party. At the present time, however, such a policy, if unaccompanied by the modern methods of "creating news," and a wise use of illustration, are of themselves capable of no more than moderate success in occasioning a general demand and a wide circulation.

Weekly Journalism

The decadence of certain weeklies has created the impression in some quarters that the monthly magazine is the only profitable field for a publisher of periodicals. While this view certainly applies as far as concerns the worn-out ideas in evidence a few years since, it is certainly true that a new régime in weekly journalism has been inaugurated. As the public takes a paper at its genuine worth, the new idea is to make the weekly paper genuinely worthy, even by a large expenditure of money, if necessary, and by employing the best talent in every department. In tracing the progress of this idea, we find that the best has supplanted the mediocre and the commonplace.

Among leading exponents of modern weekly journalism may be mentioned the "Saturday Evening Post," "Harper's Weekly," "Collier's Weekly," "The Youth's Companion," "Leslie's Weekly," "The Outlook"; and in religious journalism, "The Christian Herald." The efficiency of its principles, in creating popularity and increasing circulation, is eminently well exampled in the history of one of the foremost publications on the list, which, by the consistent observance of up-to-date methods in all departments, has increased its circulation from 36,000 in 1896 to 350,000 in 1903.

People of the highest standing in all lands and in every department of activity have written articles for this paper on current topics, phases of progress, and chapters of history, in which they themselves were factors. Correspondents of international reputation have been sent by the publishers to the ends of the earth in search of the world's great news. Were war news sought, the firing-line had no terrors for them. Were new gold fields opened, the hardships of the frozen Klondike were braved, and full descriptions of life and conditions, together with photographic illustrations, first given to the world through their efforts. In the matter of fiction, stories by the strongest writers have been regularly secured, while in the field of illustration, instead of pictures produced with ease and indifference, for small pay, the best artists of the day have been called on for their best efforts.

The enormous output, 18,000,000 copies of this weekly and 5,000,000 books every year, gives a vast importance to the saving of the smallest fraction of a second. If only the one-hundredth of a second can be saved in producing each copy of this paper forty-eight hours will be saved each week. In the pressroom of this paper word has more than once been received from the editorial realm to destroy all copies of an edition printed up to the moment. Reason: news has just come of an event of national importance and the story must go into the issue now on the press at any cost, any sacrifice. Forty or fifty thousand have been run off. Never mind—"kill" them. Hence, several times, a number of the weekly equal to an entire edition of this paper four years ago—and equal to the whole regular output of some metropolitan weeklies of the present day—have been deliberately destroyed. This in order that the paper might give its readers the story of the very latest happening, something which may have occurred on the far side of the earth.

Monthly Journalism

While the editor of a monthly magazine is spared the hurry and rush, the strain and high-pressure labor of the newspaper editor, he is faced, nevertheless, with problems of equal or greater difficulty, from the fact that his publication reaches a larger, or a wider, public, and must, therefore, deal with subjects of more general interest. In the first place, the element of news is largely limited with the magazine, since by the end of a month the most important and sensational news story has become very much like ancient history, and may not be touched upon at all, except by skilful writers, who treat it from the point of view of the largest interest, or else write up to preface and elaborate illustrations. There are, moreover, only a very few news items that may be so treated, and they touch on matters of international importance or on the deepest springs of human interest. It thus follows that the magazine editor must exercise the most rigid discrimination in the choice of subjects for his special articles, avoiding at once all matters of merely local or temporary importance. Obscure or only locally notable characters may not be featured in a magazine, except where, as occasionally happens, they possess the latent elements of a fame that the editor may "create"; but the most contemptible person of national or international reputation affords suitable material for a write-up.

Mr. Frank A. Munsey, in an article on magazine making, quotes another editor, Mr. McClure, as saying that he solves the problem by making a magazine to please himself, thinking that this method is easier than guessing at the public taste. "Other editors," he proceeds to remark, "are guided largely by the literary atmosphere in which they themselves live. This is a little world, and quite apart from the great, big, every-day world of the people." Mr. Munsey's plan is different; he has not made his magazine to please himself, nor yet to suit the taste of some literary clique or set, but to reach the common interests of human nature everywhere. "I have assumed," he says, "and I believe that I am right in the belief, that it matters little where one is . . . the human heart is pretty much the same. It follows, then, that there are certain themes on which one can depend to awaken an interest in all communities alike." Among these he mentions the "true, pure, romantic love story," which is "not a question of nationality, or of locality," but "always new, always absorbing."

Mr. John Brisben Walker, another successful magazine editor, says:

"Magazine-making . . . . is so mixed up with the business of humanity that, after a time, the editor comes to learn that other people's affairs are his. The effect of even the slightest word, scattered among a million and a half of people, is so pronounced that he comes to weigh with the utmost care every sentence and page, for which he must stand responsible."

Proceeding, he says: "It would be difficult to estimate the influence which our magazines are having on the civilization of the time. The daily newspaper is dependent but too often upon local opinion for its success. It may be ruined by opposing the popular feeling of the neighborhood. But the magazine goes into every State and Territory, every city and hamlet, and depends upon no local affiliations. The average citizen of the United States likes sincere utterance, even if it does not correspond with his own ideas. He has learned to know that truth is difficult to get at—that it is oftenest reached by the vigorous presentation of opposing views; and it is entirely in accord with his ideas of American citizenship that a man should be ready to stand up for what he thinks is right."

CHAPTER XI

ART, ARCHITECTURE, AND PHOTOGRAPHY

American Arts and Crafts—The Earnings of Artists—Portrait Painters—The Painter of Miniatures—Sculptors—Illustrators—The Mechanical Side of Illustrating—Illustrations for Advertisements—Designers—Designers of Book-Covers—Art Education in the United States—The Art Students' League and Its Branches—The National Academy and Its Schools—The Profession of Architecture—The Architect's Training—Earnings of Architects—An Architect's Expenses—Photography as a Profession—The Training of a Studio Photographer—A Photographic Studio—News-Photographers—Color Photography—Various Uses of the Camera—Artists' Models—The Life of Professional Models

American Arts and Crafts

LESS than thirty years ago, art in the United States was certainly at the lowest ebb, and artists were looked upon as non-producers, unworthy of a place in the great scheme of the country's progress. It was the usual thing at that time to inquire sneeringly, "Who buys an American picture?" The honest answer was "Almost nobody." At the same time the profession of art was not considered by the average American man or woman as thoroughly respectable. Business men placed art among the impractical trades, and as one writer says: "Like religion, art was deemed good enough for women; useful in its poor way but so little applicable to rational everyday life that a strong man was more or less belittling his power in following it."

What a change in American sentiments since those days! A change which is no way made more apparent than in a visit to the Fine Arts building in New York, where are held the exhibitions of the Art Students' League, the Society of American Artists, the National Sculpture Society and the Architectural League.

American art has been influenced, too, by changing social conditions. Statistics show that the number of people engaged in occupations of the higher grades has been constantly increasing; their wages at the same time have been growing larger, and hence the standard of living has been raised proportionately. All this means that more and more persons have become engaged in occupations requiring trained skill, higher mental qualities, and, above all, an artistic taste. While the masses developed a love for the beautiful, a love which they indulge as best they can, the American millionaire class began purchasing American pictures. Economists agree that every time a large sum of money is paid for a picture the community in which the artist lives is enriched. Thus fine art, no less than industrial art, in the United States has become a source of wealth—artists have become producers, and their profession ranks as high as in European countries.

Painters are wont to appropriate as exclusively their own the name of artists. They seem to imagine that the only art is the mixing and wielding of colors. The tendency of the age is to relieve them of this somewhat too exclusive responsibility. Claims are being put forth in behalf of sculptors, architects, designers and decorators. They, too, have a just and indisputable claim to the title of artist. The potter whose exquisite creation has been the admiration of centuries can hardly be excluded from the ranks; workers in gold and silver and iron and brass—they also may be artists from the heart to the finger tips.

The effect of this attitude on the part of the painters is hurtful in two ways. So much attention is paid to paintings that other productions of art are underrated. This has a baneful influence upon young men, and those who would make unimpeachable designers and decorators prefer to produce pictures of mediocre merit, because "pictures are the only art." And the public has wellnigh forgotten, or was in a way to forget, that art could exist in anything but paintings. There has been something like a snub in the very name of decorator or designer. The general system of art education has been so affected by this one-sidedness that there is a waste of effort in turning out thousands of pictures every year which are flat, stale and unmarketable. Young artists prefer to starve in producing pictures, when they might enter the field of mural painting, make money, and still be artists. The whole of art is not surrounded by a gilt frame. Ornament and design are prominent in architecture, sculpture, painting, and in many industrial arts. It is impossible to keep them any longer in a subordinate position. In truth, they have been kept back merely by the fact that from the despite which they have received, originality has run in other directions. Ornament has not been creative, but rather has been content to be a mere echo and copy.

The arts and crafts movement is projected with the stated purpose of arresting this harmful tendency, and of restoring design and decoration and allied arts to their proper dignity and worth.

The Earnings of Artists

The annual earnings of artists, like the income of men of letters, is represented in most cases by not more than four figures. Though connoisseurs and the American public have for some time realized that America has an Art, American artists, considering the importance of their work, earn little more than enough to support them in comfort, seldom in luxury. Many of our artists are obliged to sell an important canvas for the price of a potboiler. The picture thus sacrificed for a small sum in order that the artist may buy shoes or pay his coal bill sometimes turns up years later at a public sale, and brings a fancy price. It is related that a picture sold originally by an American artist for $75, was sold for $2,500 at an auction sale in New

York, in 1900. At that same sale, pictures which another American artist had originally sold for $150 brought thousands of dollars.

There are exceptions to the rule just mentioned, and indeed it might be said that of late years the exceptional cases have become more numerous than those under the rule. Formerly the value of an artist's work was not fully appreciated until after his death, but since painters have learned that it pays to enter into the commercial spirit of the times, they have managed to make their work yield them a proper reward while breath is still in their bodies.

Portrait Painters

There are a number of fashionable portrait painters who command a high price for their pictures and make from $20,000 to $40,000 a year.

Time being precious to sitters, especially public characters, portrait painters have to work rapidly. And yet the work of American portrait painters is characterized by fine fidelity and engaging simplicity, a carefulness of detail, freedom and smoothness. Our painters are bold draughtsmen, masters of color, close students and conscientious workers. They aim, above all, to present the subject as he or she appears in life; and yet their portraits contain no irrelevant suggestion, nothing that even pretends that they are anything more than portraits.

The Painter of Miniatures

It seems that many men and women can afford miniatures when the oil portrait is beyond their purses, and yet the miniaturist usually charges a high price for the portrait in little. Mrs. Amalia Kussner Coudert and others who lead in this field, often receive several thousand dollars for a single portrait. Until recently the status of miniaturists was similar to that of other painters in the community before they drew together and fixed a standard of work for exhibitions. The formation of a Society of Miniaturists in New York, however, will probably result in establishing certain standards in this branch of art. The association, moreover, will have the result of impressing the public with the seriousness of the aspirations of the members.

A good miniature is rare—most of them lack sentiment. "A miniature should have a quality of exquisiteness." It should not only be little, but have the special charm of littleness, a certain dainty discretion in choice of color and treatment. Broad impulsive work, while it is a merit in a large picture, acquires a kind of flippancy in the little one. Simplicity and apparent artlessness become virtues, and there is a particular charm in preserving some portions of the ivory surface undisturbed by paint. "Mere prettiness is objectionable, as is daintiness at the expense of lively reality in the face."

Sculptors

How a sculptor obtains his first commission is rather a difficult question to answer. Some do not get a single commission, but remain modellers or assistants all their lives. In competitions for government commissions many sculptors are backed up by friends and relatives. Those that are entirely self-supporting sometimes find difficulty in obtaining commissions. "There is always room at the top," but that is the apex of a pyramid. "For some years after I had made some reputation," says a New York sculptor, "I had to depend for about one-half the expenses—money to run my family and studio—upon teaching and lecturing, and also marble finishing. Success not only depends upon excellence in the work produced, but in knowing how to take advantage of opportunities."

There are various methods by which a sculptor may make a living, independent of commissions. First, in acting as a sculptor's assistant; in figure modelling; and especially in the various branches of decoration and ornament. The sculptor sketches out his ideas when the general scheme is decorative, and the specialist earns a large sum of money in carrying it to perfection. Then there is marble and wood carving and cameo cutting. The great majority of sculptors of reputation have had to resort to the above methods before attaining the point—after struggling for ten or fifteen years—when they receive commissions enough to keep their families from want. Sculptors as a body exercise considerable influence on public taste and public commissions. The future for sculptors, rank and file, looks very encouraging.

The representative organization of sculptors is the National Sculpture Society. The object of the society is to spread the knowledge of good sculpture, foster the taste for, and encourage the production of, ideal sculpture for the household and museums, promote the decoration of public and other buildings, squares and parks with sculpture of a high class; improve the quality of the sculptor's art as applied to industries, and provide from time to time for exhibitions of sculpture and objects of industrial art in which sculpture enters. There are two classes of members—sculptors and non-sculptors. No sculptor is eligible as a non-sculptor, or as a sculptor unless of approved merit as such. Subject to the foregoing, any person who is in sympathy with the objects of the society is eligible to membership. The government of the society is vested in eighteen directors, termed the council. The annual dues are ten dollars.

Illustrators

Art students and artists generally have within the last ten years discovered that one of the best paying fields for their talents is that of illustrating. The field is not as great as it would have been if photography had remained on its own side of the fence, but still a great number of artists find that the magazines and weekly illustrated papers offer a ready market for their wares. It is impossible to give a definite statement of the earnings of illustrators, because any amount from 50 cents to $500 may be paid for a single picture. A number of illustrators in New York and the other large cities are making at least $5,000 a year, while a few earn $10,000 or more.

Nearly every illustrated magazine or weekly of note employs one or more artists on a salary. The chief work of those thus employed is to retouch, so to speak, the pictures of others. Illustrators of real merit prefer to work as free lances, selling their work to the various publications, though every large newspaper has its corps of salaried artists who are obliged to make pictures to order at all hours of the day or night.

The first requisite and indispensable qualification that must be possessed by the candidate for honors and a livelihood as an illustrator, is a good knowledge of drawing. Unless the would-be illustrator has acquired the first principles of art he will not succeed in this field any more than in the higher branches. A second qualification is a knowledge of the photo-engraving process, in order that he may make pictures that can be reproduced. A picture may have artistic value, and yet the practiced eye of an editor, at a glance, will see that it can not be reproduced with good results. Every beginner in the field of illustration, therefore, should acquire a working knowledge of how drawings will come out under various conditions, and of technical details which must be regarded in order to ensure satisfactory reproduction. A very different method of treatment is required for an illustration for a magazine of the first class, which is to be printed on fine paper and on slow presses, than for a picture for a newspaper, which will be printed on very absorbent paper with ordinary printer's ink, and turned out by tens of thousands.

Educators and publishers recognize the value of illustration, as a means of increasing interest and imparting information. The field of the popular magazine and newspaper has been greatly enlarged by including profuse illustrations, representing interesting events of all varieties, diagrams, sketches and, particularly, portraits.

In a few words, the prevalence of illustration is the artist's opportunity, supplying him with a chance for greater profits and wider reputation than is afforded in any of the traditional lines of activity. A good illustrator or cartoonist may command as high an income as $300 or $400 weekly, in proportion to his skill and reputation.

The Mechanical Side of Illustrating

The increased use of illustration means that the cost and difficulty of producing plates and blocks suitable for use on the printing press have been proportionately decreased. Forty years ago, when the woodcut was the prevailing type of illustration, the cost was prohibitive, but, at the present day, with the cheaply and rapidly made photo-etchings, both line and half-tone, it is possible to make a drawing or photograph, reproduce it on zinc or copper, stereotype it, and print it in a newspaper—all on the same day at insignificant cost.

Whether such ease and cheapness of production has operated to the advantage of art is a debated question among critics: that it has increased the opportunities and the profits of professional illustrators can not be doubted.

The desire to take advantage of the cheapness of manufacture, which leads to over-using half-tone reproductions of photographs, involves a large amount of very unsatisfactory illustration, and leaves little opportunity for artistic work, except in retouching originals or engraving plates. This popularity of the half-tone involves the further evil of using inferior and poorly executed gouache and wash drawings, to the disadvantage of true art in a large number of cases. The accompanying disadvantage, as claimed by many authorities, is that the standard of illustration is consequently lower to-day than when woodcuts and line or mezzo-tint steel plates were the only methods of book illustration. Such claims seem to find support when we examine the elegant specimens of book-work often produced fifty or sixty years ago.

The first step toward the cheap illustration of to-day was found in the once famous "chalk plate," which was made by spreading a layer of chalk mixture on a smooth plate of blue steel and cutting the design through the chalk to the steel. The drawing thus made could be stereotyped and printed. The superiority of this method to the woodcut soon led to its wide adoption, and many illustrators made their first reputation by their rapid work in chalk. A modification of the process is still in use in the well-known "wax drawings." A sheet of prepared beeswax is spread upon a plate of copper, and the outlines of the design are photographed on its surface. The artist then cuts through the wax film with sharp tools, exposing the copper wherever a black line is to appear in the print. When the drawing is completed the uncut wax preparation is made to bulge by the use of heat, thus leaving an irregular surface, upon which an electrotype may be formed. This process is seldom used in artistic illustrations, finding its most general uses in reproduction of maps, machine drawings, etc.

The familiar line etching, now used for most pen drawings, is made by photographing the drawing and printing from the film on a sensitized zinc plate. After developing the print thus made, a kind of powdered resin, known as "dragon's blood," is dusted over the surface, adhering to the dark lines of the plate, and, after baking in an oven, giving them a hard surface, capable of resisting the corroding effects of the dilute nitric acid, used as an etching bath. The acid eats away the unprotected portions, leaving the lines in relief, and the plate is finished by mechanical routing and engraving. The process of making a half-tone plate is precisely similar, except for the fact that the original photograph is taken through a "screen"—a network ruled on a glass placed in front of the film—which is of varying degrees of fineness, according to the number of lines ruled to the inch. The coarser screens, having wide meshes, are used for newspaper work, while the finer ones require a high quality of coated paper. The effect of the screen is seen in the familiar dotted appearance of half-tone prints.

One excellent effect of the mechanical reproductions, made possible by the half-tone process, is that the standard of art is elevated to a close approximation to nature, wherever original drawings are demanded for illustration. The cheapness of the process contributes to increasing the profits of the artist, whose drawings may be made on paper, bristolboard or canvas, and are paid for according to their merits. Thus the distinction between art drawings and paintings, and illustrations, is less pronounced than formerly, and the illustrator has a larger field in which to express his talents. Another desirable result is that opportunities for good illustrators are immensely multiplied, ranging from the regular employment of the high-speed hack artist of the newspaper office, to the high-priced book and magazine illustrator. The pen artist may work either free-hand, or by tracing over silver prints made from photographs. The silver print, like the familiar "photo-enlargement," is taken direct upon a paper surface to any desired size, and supplies the penman with the outlines to be drawn in and shaded. When the pen drawing is finished the photograph may be bleached out with a solution of mercury bichloride, blue vitriol, muriatic acid, or other washes, leaving the India ink lines on a white background. This process is the one most widely used in line-work reproductions, although properly demanding artistic skill of the first order to achieve really good results. The work of bungling penmen has brought the silver print into disrepute in many quarters, enabling a trained eye to readily detect the evidences of inferior tracing. Skilled work, however, is fully equal to the best free-hand drawing, particularly in the intricacies of the perspective. In point of accuracy, then, the good silver-print drawing is superior to the half-tone reproduction, particularly for interior views, machine elevations, and, in very many cases, for portraits also.

Illustrations for Advertisements

The great popularity of illustration offers a wide field for well-equipped artists in the production of drawings and designs for advertising purposes. According to reports, over 1,000,000 manufacturing and mercantile concerns in the United States use illustrated advertisements to a greater or less extent, and the demand for new ideas is constant. Many manufacturers seek the services of skilled artists in preparing "birdseye" views of their plants, a work which demands, for its proper performance, a high degree of technical knowledge.

Designers

The field of the designer is essentially a skilled and technical one, depending no more upon original talent or capability than on the mastery of certain geometrical, proportional and harmonic principles, on which really effective work depends. The perfection of ornamental work is coincident with advance in civilization, which, at the same time, multiplies the opportunities for skilled designers, and demands a higher standard of accuracy in minute details and technical and historic consistency. The rules of proportion and geometric accuracy are necessary to the work of the designer, in order to enable him to produce harmonious and elegant figures, avoiding the crudities and failures of unskilled workers. In this respect, it is comparable to the work of the qualified musical composer, whose productions may be discriminated from those of amateurs by even untrained ears. In fact, artistic designs are eye-music, and the principles of harmony, consistency and compatibility apply to their parts as rigidly as to the "concord of sweet sounds."

An understanding of these technical principles also immensely increases the merit and versatility of the designer's work.

Among the fields for conventional and ornamental design at the present day may be mentioned the execution of appropriate initial letters, headpieces and tailpieces for book chapters and magazine articles; of ornamental gift cards, for Christmas, New Year, birthdays and other seasons; of special menu cards, programs for theatres, etc., and calendars; of embroidery and lace work; of china decoration; of designs for woodcarving, pyrography or painting, or for hammered brass panels; of wallpaper, calico prints, carpets, rugs, and other woven fabrics, of parquet flooring, inlaid or mosaic work, marquetry and oil-cloths; of fancy book covers; antique and decorative furniture; and as many other varieties of use and ornament.

Original designs in any field always command good prices, and are eagerly sought after by any who use or deal in such articles. It is, however, essential in all such work to understand, and carefully discriminate, historical and racial styles of decoration, and never to mingle such, unless extraordinary genius enables one to create not only designs but new styles. Thus Egyptian or oriental decorations may never be mingled with Renaissance or Byzantine patterns, any more than operatic airs and popular melodies may be combined into a pleasing musical composition—unless the magic of genius weld the two; but a genius never assumes nor presumes, and the true artist has far too exact an idea of consistency to "rush in," except where impulse leads and talent guides.

Designers of Book-Covers

Thirty years ago no publisher thought of enlisting the services of an artist in designing commercial book-covers. He depended for designs upon the binder. But since 1876 special efforts have been made to improve the general appearance of book-covers. In Centennial year a book called, "The New Day," by Richard Watson Gilder, was published with the first book-cover made wholly from an artist's design and under an artist's direction.

To write a formula for a perfect commercial book-cover is impossible. The only point upon which all agree is that the colors of the cloth used must be related to the general character of the book, and, in some degree, to the surroundings in which it will be placed; and that these colors, moreover, must be suited to the various ink stamps which are to be applied, and to gilding. These necessities being observed, the artist works out his cover according to his own conception. Some artists are impatient of the restrictions put upon space, form, texture and color by the limits of machinery. Many a beautiful design has been rejected by publishers on account of the utter impossibility of reproducing it. Sometimes an artist hits upon a capital idea of covering a book with paper, leather or cloth, only to find when the presswork begins that the brass die cuts through, that it soils too easily, that the corners look clumsy when bound, or that the material costs too much for the edition. All these things the designer must consider.

That there is money enough in book-cover designing to justify an artist in choosing the work as a specialty is generally admitted. The price paid for a single book-cover is often large, for the reason, perhaps, that first-class competition is small.

Art Education in the United States

American art schools have taken a high rank. The endowments of some of them are very liberal, the directors are capable, and the instructors painstaking and efficient. The number of scholars in art has grown to be a large one. Among the many worthy institutions is the Art Students' League, of New York City. Its methods are catholic and up-to-date, and its standard is high. It is self-supporting.

In Philadelphia there is another excellent school—the Pennsylvania Academy of Fine Arts. The notable progress and development of this school is evidence of the growth of the art spirit throughout the country. The School of Design for Women, established more than half a century ago, has done much to foster industrial art for women.

In the West, Detroit came to the front some years since with the Museum of Art, having its own building, and a gratifying attendance. Its art library is valuable. Several scholarships permit talented students to visit Europe for further study. Cincinnati has its School of Design, connected with the Cincinnati Museum Association. Each teacher goes in turn to Paris every year, and there are foreign and home scholarships for the pupils.

Of the cities of the Middle West, perhaps St. Louis is as well equipped in the way of art instruction as any. Mr. Halsey C. Ives, the Director of the Department of Art of the Louisiana Purchase Exposition of 1904, has long been the leading spirit of art interests in St. Louis. His reputation caused him to be appointed Art Director of the World's Fair in Chicago, and as director of the St. Louis School of Fine Arts he placed that city in the front ranks of art study.

Returning to the East, we find in Boston the Museum of Fine Arts, with a School of Drawing and Painting established twenty-seven years ago. There is maintained an annual course of lectures upon art themes. In the South there is one of the oldest art schools in America.

The Maryland Institute of Baltimore has classes in drawing, modelling and painting, with a library of more than twenty thousand volumes.

The Art Students' League and Its Branches

Perhaps the most important of all the art schools in America is the Art Students' League. In the days when artists in the United States were none too prosperous, a few New York art students rented a room in a building on Fifth Avenue, and founded the Art Students' League. This was in Centennial year, and among the students who thus leagued together were a number of young men and women who have since become famous. The League, indeed, has accomplished much for the good of American art, both as an educational force and as a potent element in its evolution.

The Art Students' League, together with the Society of American Artists and the Architectural League, form what is known as the Fine Arts Society, who own and occupy the structure on West Fifty-seventh Street, which was especially designed for them. This building, called the Fine Arts Building, is in the centre of the art quarter of the city. With the exception of the exhibition galleries on the ground floor and the hall of the Architectural League, the entire building is given up to the school. The studios are large and well equipped. In addition, there are a students' room and a members' room. The latter contains a small but select and valuable library, and serves as a clubroom and reading-room.

The League insists upon a thorough study of drawing and composition. A year, or even two years of work are required before the student may be admitted to the life classes. By this rule the League has established for its pupils an excellent reputation in drawing. The student's work is judged and marked by the instructors each month. The judging is rigid, and without favoritism, the students being advanced if worthy. This "*concours*" or competition day is one of great excitement in the school. The classes are formed in October, the first judging of work and the first monthly exhibition come in November.

The National Academy and Its Schools

A much older society than the League is the National Academy of Design. In the list of students of this Academy for the past seventy-five years may be found the names of nearly all of the most eminent artists of America. On the 8th of November, 1825, a number of young artists and students established the New York Drawing Association, and soon after, on the 19th of January, 1826, they resolved themselves into a new organization, to be known as the National Academy of the Arts of Design. They thereupon chose from their number fifteen artists, who were directed to choose fifteen others, the thirty thus selected to constitute the new society. The department of schools of the Academy includes the free antique schools and a number of special classes—life, painting, still life, etching, illustration, etc.

The Profession of Architecture

Architecture, the most ancient of all professions, has become recognized in this country as one of the liberal professions only in recent years. The credit for establishing architecture in its true place in the United States belongs, first, to the several universities wherein separate departments are maintained for the training of the architect, the principal of which are

IN AN ART SCHOOL—FREE-HAND CLASS AT WORK

Vol. II., p. 957

Columbia, Cornell, the Massachusetts Institute of Technology, and the University of Pennsylvania; and, second, to the American Institute of Architects and the Architectural League. The architect who is elected to membership in either of these societies has the same high standing that a diploma from a great university gives a physician or that admission to the bar gives to the lawyer.

The Architect's Training

From the day the young man first enters the department of architecture in the university to the day he is elected to membership in one of the architectural societies just mentioned, from ten to fourteen years must be spent in training. As the period of training is longer than that necessary for the doctor or lawyer, it is obvious that only the young man who is gifted with that infinite capacity for hard work which is commonly attributed to genius should choose the practice of architecture as a career. So great are the exactions of this profession, even during the period of training, that many young men abandon hope and leave the ranks of their fellow students after the fourth or fifth year of study. This dropping out of the incompetent or the lazy benefits the profession as a whole, of course, for it means the survival of the fittest.

Regarding the training of an architect, a leader in this field of work says: "Before entering upon the study of architecture the pupil should be a good writer and a fair arithmetician; that is to say, he should have a knowledge of decimals, fractions, square and cube root, and mensuration. He should be able to deal with simple equations in algebra, should have mastered the first three books of Euclid, and should possess a knowledge of practical plane and solid geometry. To these should be added free-hand drawing, elementary physics, practical mechanics, and elementary chemistry."

Equipped with this elementary knowledge the next step is to seek admission to the department of architecture in one of the universities. After the four years' course, the graduate will find little difficulty in securing a position as junior draughtsman in an architect's office, where he will learn the practice of his profession. It is at this point in the period of his training that the hardest work begins. If he has not already discovered that he must have a practical knowledge of several other professions and trades before he can enter upon the one he has chosen as a life career, a realization of requirements will be thrust upon him now.

As junior draughtsman he is treated as one who knows only the rudiments, or theory, of the profession, and has everything of a practical nature yet to learn. He finds that he must have not only an artistic temperament but must cultivate a business man's habits of mind. On one side he must deal with sculptors and painters and on the other with capitalists who know not sentiment, with engineers who will not vouchsafe him even one mistake in his plans, and with mechanics who look to him for guidance. Hence he must have a working acquaintance with all the mechanical arts, but especially those of the mason, the carpenter, the plumber, the plasterer, the tinsmith, the blacksmith, the painter and the glazier. He must make himself conversant, too, with the arts of the decorator and the carver. He must spend many months in acquiring a knowledge of the principles of engineering and mechanics, of statics, strength of materials, theory of arches, beams and columns, the flow of air and water, ventilation and drainage, and all the mathematics necessary to the treatment of things quantitatively. Besides all this, he is surrounded by a commercial world which demands of him a familiarity with business transactions of all kinds, with the law of contracts, the formulæ of estimates and of specifications, and with the various prosaic details common to the inspection of work, the settlement of accounts and the placing of responsibility. Such is the great task that confronts the young draughtsman in an architect's office. If he is first of all an artist, the acquirement of technical and mechanical knowledge will seem at first sheer drudgery, but in the end he will understand the value of such training.

Many young students of architecture, after four years in an office, go to Paris to finish their education as architects at the School of Fine Arts. Here the student spends four years, and if he succeeds in passing the final severe examination he returns to America thoroughly equipped to begin the independent practice of his profession.

It should be added that the American colleges claim only to give a thorough grounding in the principles of architecture, while the Beaux Arts completes the student's training. At least four years must be spent at the Beaux Arts, and yet in the first three of these years the student is simply required to study again what he has already learned in the American schools. The fourth and final year, however, is the one that proves of great value. Peculiarly enough, while the first three years at the Beaux Arts are of so little advantage to the American student, the entrance examination is so severe that many students are rejected and are obliged to seek instruction in private ateliers.

After working for many years in an office, many draughtsmen, usually those of a timid nature, or those who can not afford to take financial risks, prefer to remain in the office and enjoy a salary which they view in the light of a known income, rather than hazard a career as an independent architect with its accompanying uncertainty in the matter of income. The average salary paid to draughtsmen, that is those who are themselves recognized as competent architects, is $2,500. Some are paid as low as $1,800, while others receive as much as $5,000 or $6,000. It often happens that a draughtsman can add to his income by executing outside commissions, or by opening an experimental office of his own while still an employé in a large office. In architecture more than in any other of the liberal professions, the plunge into the unknown, which means branching out for one's self, is a matter of courage.

The expenses of the student, of course, range from a minimum of $500 a year to a similar sum per month. Architects, as a rule, declare that the average of expense for eight years of schooling amounts to at least $1,000 a year. In the matter of expense, the student is assisted during the period passed in an office by his earnings, which are from ten dollars to thirty dollars a week, according to the ability of the draughtsman and the size of the office.

Earnings of Architects

What are the earnings of the architect proper, that is the man in business for himself? There are 10,000 practicing architects in the United States, and their incomes vary from $1,500 to $100,000 a year. These amounts represent, of course, net incomes after all expenses have been paid. The figures just mentioned represent the two extremes of the earnings of architects, and while hundreds earn only $1,500 or a trifle more, not more than eight or ten regularly earn $100,000.

In these days of million dollar buildings, however, it often happens that an architect can earn the latter sum as a single commission. As the fixed rate, rigidly insisted upon by the etiquette of the profession, is five per cent on the total cost of the construction of the building, and ten per cent on interior decoration, furnishing and sculptural adornment, it is evident that an architect's fee on a two million dollar hotel or office building, for instance, amounts to $100,000. Fees of this magnitude are in accordance with modern conditions, hence the ambition of every architect is to gain one of the great prizes, namely, the drawing of plans for a great and costly building. The resulting competition is doing much that is good for the architects themselves, as well as enhancing the beauty of our cities architecturally.

The competing architects for an important building are chosen from among the members of the Architectural League or the American Institute of Architects. Sometimes only two are chosen, but more often three. The two who are unfortunate enough to have their plans rejected receive a nominal sum for their trouble, but such payment usually covers only a small part of the money actually paid out by the architect for help in the preparation of designs. Here, of course, is the unfavorable side of modern competition. The cost of the designs is just as great whether they happen to be accepted or rejected, and hence there is an unavoidable drain on an architect's profits. Only those who are so fortunate as to have a large practice can afford to enter competitions.

An Architect's Expenses

While in many instances the architect's fees are large his expenses are also great. The architect, indeed, is not unlike the merchant who has bought something for cash and is obliged to sell it at a larger sum for cash in order to reap a profit. He must spend a considerable sum simply in equipping his office. Two thousand dollars is the sum named as the cost of the nucleus of a first-class architectural library. Architectural books contain a great number of plates, and are therefore very expensive. One architect refers to the expenditure for books by saying: "When $10,000 have been expended for a library the average architect shudders to think of the cost of completing it." An architect's expenses otherwise are for instruments, rent, subscriptions to a great number of periodicals, both domestic and foreign; and, greatest of all, salaries for draughtsmen. In the largest office in New York one hundred draughtsmen are employed. The number of draughtsmen in other offices throughout the country varies according to the work which, in each case, the architect undertakes.

It is apparent that to furnish designs for million dollar buildings, an architect must have a large staff of draughtsmen and clerks. Capitalists look upon time as money, and demand that the plans be finished within, sometimes, a seemingly impossible limit of time; for, while the plans are being made, valuable land oftentimes yields no income to its owners. Hence large offices get the large commissions, for where the small office would require a year to prepare plans, an office that can put thirty to forty men at work can turn out plans for the same building in a few weeks.

It is matter of record that one building in the Wall street district cost for construction alone, $6,000,000. The architect's fee in this case was $300,000, but out of this he was obliged to pay the salaries of a large corps of draughtsmen. For each of New York's new school houses the city pays the architect a fee of $25,000. The architect who designed the new Hall of Records received $150,000.

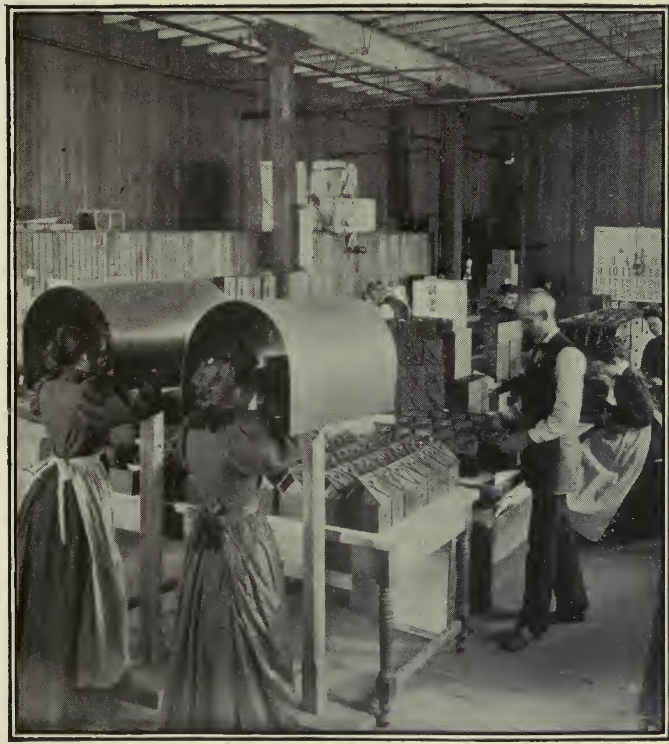
It would have been impossible for one man to complete the plans of any of the great new buildings recently erected in the United States; that is to say, capitalists could not have waited the necessary number of years for a single architect to make the drawings. To prepare the plans of even comparatively small buildings like that of the Metropolitan Club, in New York, or the Vanderbilt or Whitney houses on Fifth Avenue, would have taken all the time of one man for many years.

In building skyscrapers, architects assert that these are almost entirely engineering feats, architecture being a secondary matter. Hence it is asserted that architects of the future will have to be masters of engineering as well as of architecture.

Photography as a Profession

With the rise of the illustrated daily paper, with the impetus given to weekly journalism by the camera, with the advent of ten-cent illustrated magazines, professional photographers were divided into two great groups: the studio photographer and the newspaper photographer. The studio photographer includes the conservative element representing all the traditions of the art; the newspaper photographer scorns tradition and proceeds to take pictures at any time and at any place, by night as well as by day, making the whole world his studio.

The studio photographer takes pictures by rule. He studies lights and shadows and the pose of the sitter, and consequently his pictures may represent expression, but seldom action. The newspaper photographer has no time for rules, does not study light and shadow, has no regard for the position of the head, hands or feet of the persons whose appearance he is about to perpetuate—in short, he is the realist of photography; his pictures show



IN A CAMERA FACTORY—TESTING THE LENSES

LARGEST CAMERA IN THE WORLD—EXPOSING THE PLATE

Vol. II., p. 963

persons as they are in everyday life, in their usual pursuits or on extraordinary occasions. Many of the pictures made by news-photographers are of vastly greater importance than those made in the studios. The work of the news-photographer is of greater educational influence than all the nice, "look-pleasant," dead-calm pictures made under skylights.

The great demand for photographs by newspaper and periodical editors and publishers has caused a large number of amateurs to enter the field as professionals. Having reached a creditable degree of excellence in photographic work as a fad or as a source of amusement and pleasure, the amateurs have proceeded to master every detail of the work, and are now pursuing it as a business. Those who are ambitious, those who, as amateurs, were energetic and painstaking, are making a success as professionals. As a professional, of course, a small capital is required, but capital is not the only requisite—the professional must possess energy and enterprise and courage. He must know how to secure patrons if he is a studio photographer, and he must study the market for pictures if he is a newspaper photographer. In addition to the demand created by the illustrated papers, the scientific world makes many demands upon the camera. Physics, mechanics, astronomy, chemistry, zoology—all these branches of science give employment to enterprising photographers. Science now demands pictures of birds in flight and of animals in motion. Such pictures bring a high price.

The Training of a Studio Photographer

Until within a few years, it has been very difficult to learn the art of photography, although it is followed as a business by such large numbers of people, and is constantly progressing, in both methods and effects. There is an ever-increasing demand for skilled operators, but few, if any, opportunities to become apprenticed in a studio. With a view to providing an adequate training in the profession, several schools of photography have been opened within recent years. Here students may be fully instructed in all departments, including light arrangements and posing, to obtain desired effects, retouching of negatives and the printing and mounting of the finished pictures. According to the prospectus of one of the best-known of these schools, the course of training is divided into four classes, the lowest called "D," the highest, "A."

The principal points treated in each of these relate to the arrangement and regulation of lighting. In the lowest class, "plain" or "broad" lighting is fully mastered, as a preliminary to posing, although with none but a general reference to the effects on the human face. Similarly, in Class "C," the so-called "Rembrandt" lighting is treated, and in Class "B," the "fancy" lightings, the "Inglis" method and the various shadow and line effects. Only in Class "A" is the subject of posing treated systematically, in connection with the methods of properly lighting various faces. The numerous tricks of arranging a sitter, so that unusually long noses or necks may be made to appear normal in the picture; that thin hair or eyebrows may be duly thickened; that the ill effects of hollow cheeks, round shoulders, poor mouths or eyes, or other defective features, may be overcome, are taught in this class. That such tricks of the craft are the most essential and popular elements of the art, equal in importance with the ability to produce elegant and finished prints, is evidenced by the fact that they are nearly universally demanded, and form the foremost recommendations of successful photographers.

Another very essential factor in modern photographic practice is the art of retouching negatives, so as to eliminate, or soften, wrinkles, facial blemishes, lines and other imperfections of the skin, which are always greatly exaggerated on the developed film. This work requires, at once great skill and a trained judgment, since, while it is desirable to reduce the harsh effect of all such features, a strongly marked or aged face may be made to appear absurdly weak or juvenile, if the process is carried too far. Good retouchers are in constant demand by first-class photographers, who offer the highest remuneration for expert work.

In a large number of cases the work is given out to be done at home, thus affording opportunity for women having skill at the business. The pay ranges between 20 cents and $1 each for cabinet negatives, other sizes in proportion. A good workman can retouch eight or ten plates per day, although some of the more expert can turn out as many as twenty-five. Some expert retouchers earn as much as $65 weekly.

There is every encouragement offered for men or women to take advantage of opportunities to master the science of photography. Not only is it a pleasant and satisfactory art to practice for amusement, or for private purposes, but the demand for skilled workmen in all departments is incessant. The average photographer is far too busy to take apprentices, and the only opportunities offered to learn the business, under ordinary circumstances, can usually be found in studios of inferior grade. In these, of course, the training is insufficient. Very many practical photographers, furthermore, have "picked up" all that they know, and are unusually desirous to secure the services of people thoroughly trained in up-to-date methods.

The remuneration offered to trained employés ranges between $15 and $35 weekly, on the average, while some who have worked their way into high-class establishments, receive even higher pay. Very many of the smaller studios yield an income to their owners of $5,000 per year, while some of the more popular realize between $30,000 and $50,000.

A Photographic Studio

A photographic studio should have a slant skylight of ribbed glass, set at an angle of about sixty-five degrees, and screened with transparent white curtains, with opaque shades on rollers to regulate the amount of light. The studio should be made generally attractive. The "sitter" should be placed perfectly at ease. There should be no suggestion of stiffness nor tawdry vulgarity about the establishment. The proper equipment of a studio, with lenses, cameras, backgrounds and furnishings, costs between one and two thousand dollars, although one may make a beginning on a smaller scale. A camera, eleven by fourteen inches, with extensive bellows for the various sizes of plates; a supply of six or eight light plate holders, and a first-class lens; two or three plain backgrounds, and five or six artistic chairs, benches, and stools are requisite.

News-Photographers

The successful newspaper photographer is one who can take pictures without the accessories of the photographic gallery. He is one who can use the camera by night as well as by day, at sea as well as on land; briefly, he is one who can take a picture of anything under any circumstances, and who can sell the picture after he has made it. He must make good pictures under conditions the most unfavorable. He must be able to photograph the deck of a moving battleship from the Brooklyn bridge; he must be able to take pictures of the manœuvres of a troop of cavalry when his camera faces the sun; he must photograph the celebrity as he comes down the gangplank; the President of the United States while he is making a speech from the platform of a railroad train; the bride as she comes forth from the church.

The nature of their duties has made the leading newspaper photographers rich in experience at least. During the last four years Mr. James H. Hare, as the staff photographer of "Collier's Weekly," has been present at almost every event of national importance which has taken place in this hemisphere between San Francisco and Halifax, and between Manitoba and Venezuela. When Mr. McKinley made his transcontinental tour, Hare was on the train. When the beloved President was shot, at Buffalo, Hare was present, and it was indeed he who, in picturing Mr. McKinley as he mounted the steps of the Temple of Music, took the last photograph of the living President. Four days after the *Maine* disaster in Havana harbor, Hare was on the scene with his omnipresent camera, and that same instrument recorded all the exciting events that took place in the Cuban capital before the war. When war was declared, Hare shouldered his camera instead of a rifle, and marched with the troops to the very firing line. In camp and under fire, in the depths of the Cuban forests in search of Gomez, and on the transport on the way back to Montauk Point, Hare continually "pressed the button." Since the war, the launching of every battleship, the scenes following every flood and great fire, every wreck cast up on our shores, every international or intercollegiate athletic contest, every political convention, all the manœuvres of the army and navy, and, indeed, every event having a place in news has been pictured either by himself or by his colleagues on "Collier's Weekly." Hare's work serves as an example of what is expected of the modern newspaper photographer. The narrative of his experience, between the covers of a book, would show that the newspaper photographer's life, as well as that of the correspondent, is intimately connected with all that is picturesque and dramatic.

Color Photography and Various Uses of the Camera

The camera is supposed to be wholly truthful, and yet in the matter of colors it may be deceptive. "Three color work" has done much to solve the problem, but it has its limitations.

The camera is no longer a mere convenience for correspondents in war time. It has been raised to the importance of an instrument of value to army officers. It is now carried by scouts, and furnishes a precious record of localities and existing conditions within the enemy's lines.

Telephotographic lenses were used by the British army in South Africa. They were employed in connection with balloons, affording pictures of the surrounding country on a large scale, enabling accurate charts to be made.

The camera was of great value during the war in the Philippines. What is termed electrical photography was used both in the Philippines and in China. In case of grounding, or certain other accidents to battleships, photography under water has been found of great service.

Artists' Models

In every art centre there are a number of persons who make their living as models. In New York there are said to be ten first-class models and 490 of other classes. All models—good, bad, and indifferent, men and women—are paid a regular rate of fifty cents an hour. The difference in earnings is dependent upon the number of hours the model works; the favorites earn three or four dollars every day in the week, including Sundays.

The best models, those who earn the most, forget the commercial side of their engagement the moment they fall into position on the studio throne. The young girl who starts out to earn her living by posing, believing that a pretty face or a fine figure will be sufficient for the purpose, usually comes to grief. Posing requires intelligence and oftentimes the genuine artistic temperament, for there must be sympathy between the artist and his model. Models who have really the artistic temperament find the greatest fascination in posing, because in this way they can maintain artistic associations. Models of this class are always careful to pose only for the best artists, because of the fear that to pose for the mediocre painter or sculptor is to deteriorate.

Successful models regard their calling as an honorable one, and when a woman so regards her manner of earning her living, she is treated with the greatest respect by the artist. Men of the brush, indeed, have no use for models who are in any sense ashamed of their calling. This and the artistic temperament are the two most important qualifications of one who would succeed as a model.

In posing for the figure, the most competent models are those who are entirely unconscious of anything save that they are assisting in the creation of a work of art. Next to unconsciousness, artists most appreciate the model who has a silent tongue. Sculptors, especially, value silence.

The Life of Professional Models

Many persons outside of the artistic profession seem to have a vague impression that artists' models are not morally just exactly what they ought to be. This impression seldom has a corresponding expression, for nobody has yet ventured to criticise publicly. This calling has been termed abnormal; but it is not abnormal, because art makes professional models an absolute necessity. Reference is made to models who pose undraped. As a matter of fact, it is only in exceptional cases that such a model is not a modest and good woman. They are usually bubbling over with health and animal spirits, always radiant, buoyant, honest and happy hearted.

Models pose for the nude for the same reason that they would stand behind a drygoods counter—to earn their living. And they make more money in the studio than they would in the store.

At first a model poses only for the draped figure, or perhaps only for the head. She finds this congenial and an easy way to earn fifty cents an hour; above all, there is no publicity. Every artist holds the names and identity of all his models in sacred trust. In a short time, if the model has intelligence, she will begin to study her employer, will try to comprehend his ideas and his conceptions; eventually, she will do all she can to interpret them. Thus she comes closer and closer to the artist's work, and finding in it a personal interest, she feels that, in a measure, his success depends upon her. At the same time she learns that she is to him only a model, and he to her only an artist, and that he thinks no more of her personality than he does of the costume or other inanimate details of his picture or statue. Then one day he needs an undraped figure, and it rarely happens that she will not pose in the manner desired, as a matter of course. The artist is to her now simply what a mirror is to any woman. At the end of the sitting, when she has ceased to be the model, and is no longer required as a necessary accessory to the artist's work, she vanishes, and in a few moments goes on her way as an ordinary business woman in a work-a-day world.

From what classes are models recruited? In European countries from two classes; either from a family of models, or from a family which has met with financial reverses. The best models are found in France, Italy and America, because, in these countries, they are recruited principally from the two sources just named, and are therefore most intelligent.

In her daily life, in her home, among her friends and socially, the professional model lives quietly and happily, pursuing her way just as any other young woman earning her livelihood. It is not unusual for an artist to marry a model. There are four artists in New York City each of whom chose a wife from among his models.

CHAPTER XII

DRAMA, ENTERTAINMENT AND ALLIED PROFESSIONS

American Dramatists—The Making of a Play—The Dramatization of Novels—Women Dramatists—Theatrical Managers—Combination of Theatrical Managers—Acting as a Profession—Conditions of Stage Success—Vaudeville Managers—Continuous Performance Houses—Vaudeville Performers—Organizations of Vaudeville Performers—Dramatic Schools and Training for the Stage—The Professional Dancer—The Training of Stage Dancers—Scene Painters—Lecturers and Entertainment Bureaus—Circus Managers—Circus Performers—Circus "Followers"—The American Turf

American Dramatists

ORGANIZED in 1891 and incorporated in 1896, the American Dramatists' Club includes in its list of members all of the prominent writers for the American stage. The moral and legal rights of the author and composer are carefully guarded by this institution. Educational work was at first done until a public opinion was created which recognized that a playwright is entitled to share in the profits of the production of his piece. This paved the way for the amendment of the Federal Copyright Law.

In this country we have two ways of protecting a play or an opera; by the Federal Copyright Law and by the common law. Keeping the work in manuscript protects it under the common law, not selling printed copies of it. First, a printed copy of the title page must be filed in the office of the Librarian of Congress; secondly, the work must be printed within a reasonable time after this step; thirdly, two printed copies must be filed at the same office on the date of publication; and, lastly, a notice of the copyright must be imprinted on the title page or next page of each book. Play pirates are now liable to imprisonment just as any other thieves, and injunctions are efficacious. Heavy fines for illegal productions are also collectible.

The Making of a Play

The technicalities of stage craft must not be overlooked by the dramatic author. His manuscript ought to contain the fullest directions to stage manager, scene painter, property man, costumer, gas man, orchestra leader and actor. "The play's the thing" for the closet—the "production's the thing" for the box-office, and no dramatic effort can now be termed successful which does not fill the theatre with paying spectators. It often takes months of hard work to arrange for a "production," rehearsals being only a small part of the preliminary work. The preparation of a play for public presentation is a sort of continuous process. Not only the author, but the stage-director, the property man, the scene painters, the actors, and musicians, all have suggestions to make for its improvement.

The typewriting of a play in a duplicate set of parts is no easy task. A "book" is made for each of the characters, containing his or her "lines," stage directions, and cues. The latter are as essential to an actor as are his own lines. A part is called "fat" or "lean," according to the relative prominence it gives the actor.

The Dramatization of Novels

The latest dramatic fad has been the dramatization of novels, the plays being doubly protected. The author often reserves the right to dramatize or turns it over to his publishers, with whom the intending playwright must negotiate. In England the author must dramatize the novel himself, and publicly produce it in order to have it protected. Prior publication outside of the United Kingdom interferes with copyright there, and plays must be produced in the United Kingdom prior to their production in the United States to secure the English copyright. Stage production is considered publication in England, contrary to our rule.

Although the author of a novel knows, as a rule, nothing of stage effects, yet the dramatist is in duty bound to consult with him. The "management" must also be conferred with, and after the manager has considered the play he calls in the stage-manager. There are said to be three thousand actors in the country, and only half a dozen good stage-managers. The scene painters are next in point of importance. The designer, or inventor of costumes, comes next. The costumer takes the designs, and his work is an art by itself. The stage carpenter must now be introduced. Then the indispensable property man comes forward, and there is nothing that he will not supply upon proper notice, from a piano to a papier mache statue.

Women Dramatists

Women who set out to write plays must remember that dialogue is the smallest factor in successful production. The story and the action are the main elements to be considered. There is a tendency toward too much dialogue. The surplusage has to be cut out. In one thing women playwrights excel, and that is in the direction of the decorations and costumes. Another tendency in women play-writers is to depict men as the possessors of every virtue, making them quite impossible in the eyes of their fellowmen. The reverse of this is also true. It is undeniable that the most disagreeable, cat-like, treacherous, and altogether too unpleasant women characters in modern plays are drawn by women. Men seldom divest women of all the cardinal virtues at once. Is it a fact that women are rather severe upon each other's faults in real life, carrying this tendency into the drama?

Theatrical Managers

The theatrical manager, broadly considered, is supposed to watch all departments of the theatre, just as the head of a mercantile establishment watches each and every branch of the enterprise of which he is the head. He is presumably competent to judge of the work of a company from an artistic point of view as well as from the strictly commercial viewpoint. If the modern manager devotes a large part of his time to arranging for the comfort and safety of the patrons of his theatre, if he devotes time also to organizing the work of his assistants, with the object of keeping expenses down and pushing the receipts up, he must give quite as much time to those occupying the stage.

The sum of his attainments is supposedly comprised in his ability to develop merely the business character of the theatre. Fortunately for the theatre-going public, this is not true of all managers. Augustin Daly was, first of all, an artist; second, a critic; and, last of all, a business man. Mr. Daniel Frohman and Mr. Charles Frohman both devote as much time to the artistic side of their productions as to the commercial considerations.

Probably half of the 4,500 theatres in this country are supplied by companies fitted out under the direction of managers in the great play-producing centres, like New York, Boston, and Chicago. New York, of course, furnishes the greatest number of companies. Thus it may be said that but comparatively few theatrical managers supply the theatres of the country with entertainment.

Of recent years, however, a number of companies have brought about a revival of the stock system, and we now have stock companies playing permanently in certain cities, bringing out a new play each week, or as often as the manager judges necessary. Mr. Daniel Frohman has such a company; Mr. Charles Frohman has several stock companies; there is a very excellent stock company in Washington, producing a new play each week; another in Albany, and still others in several of the inland cities.

The relation of the theatrical manager to the theatre-going public is that of the publisher to the reader. The manager supplies plays as the publisher supplies books—according to demand. There are about 13,000 actors and actresses in the country to-day, merely counting those of the first class. Many of these are paid large salaries, and a few have become wealthy. Without the manager, however, it would never have been possible for the majority of to-day's players to come before the public. As the author needs the publisher in order to get into print, the actor requires the manager in order to take his place behind the footlights.

Managers the country over give employment to as many as 60,000 or 70,000 persons besides actors. The army of workers thus employed includes the stage hands, scene painters, travelling agents, and, in fact, all who derive their support from theatres. The number of companies "on tour" alone is fully five hundred.

It should be added, that though the old-time actor-manager was for a time replaced by the business man, a number of actors, in the course of events, taking lessons from the business men, discovered that they could manage their own affairs if they set out to do so on a business basis. The leading actor-manager of the world to-day is Henry Irving. James A. Herne was more or less successful in directing both the art and business departments, and Richard Mansfield, as actor-manager, gained and lost and again gained a fortune.

Combination of Theatrical Managers

In the theatrical world there is what is known among the player folk as the theatrical trust. Indeed there are two so-called "trusts," one in what is called the "legitimate," and the other in the realm of vaudeville. In the "legitimate," the principal managers a few years ago met in New York and agreed upon certain rules and regulations in the matter of the management of their various theatres and enterprises. Theatrical managers all over the country are now represented in this combination, or trust, and it is at the theatres thus represented that the best companies appear. Managers who hold aloof from the combination are obliged to be content with inferior productions, or they must form their own stock companies and produce plays of their own choosing from week to week. One of the managers in Washington, finding that he could not secure the best attractions unless he joined the combination, formed a stock company, and his box-office receipts are now much larger than they could possibly have been had he succumbed to the demands of the theatrical trust.

Acting as a Profession

A bill to license actors and place them on a footing somewhat similar to that of physicians and dentists was introduced into the New York State Legislature. The bill stipulates that "actors shall be subjected to an examination of their merit, and, upon giving assurance of it, may be permitted to enact parts upon the stage in this State, under a license, to be obtained upon payment of a fee of ten dollars."

The introduction of this bill resulted in the natural question as to how the merit of actors is to be determined and to whom the task of passing upon their merit shall be delegated. At the present time the managers draw largely upon dramatic schools for new talent. There are certain schools in New York, the graduates of which are presumed to be capable of playing small parts without other preliminary examination than that included in one or two rehearsals. Joseph Jefferson says that the dramatic schools teach the mechanisms and conventionalities of acting, but that the emotions by which the best acting is exhibited can not be taught in any school. Mr. Jefferson further states that the novice should serve his apprenticeship for the stage on the stage itself. He argues that the only way to learn to act is by acting, just as painters can only learn to paint by painting and authors learn to write by writing.

Meantime, however, the principals of dramatic schools are, in a large number of cases, the first to pass judgment upon the novice. Then come the managers themselves, and last and most important of all, the public.

Therefore, if the bill introduced in the New York State Legislature becomes a law, it is said that a committee to pass upon the merit of actors with a view to giving them a license to appear on the stage, should be composed of one principal of a dramatic school, one stage-manager, and one ordinary "first-nighter."

The pupils and graduates of the dramatic schools are usually serious-minded young persons, who are willing to work hard to achieve success in their chosen profession. Many of these pupils and graduates appear nightly "on the boards" in New York theatres. They usually have nothing to say, and are paid absolutely nothing for appearing "on the bill." They are eager to secure such engagements, however, for the sake of the training which they thus acquire. Even though they are seldom given speaking parts, they are able to acquire what is called "the stage presence" and to learn to be at their ease in front of the footlights.

The principal charitable and social organizations among actors are: the Actors' Fund, the Actors' Order of Friendship, the Players' Club in New York—founded by Edwin Booth—and the Professional Woman's League.

Conditions of Stage Success

After securing an engagement, and after a few months of work, the novice finds that he has entered a profession in which his whole life is passed separate and apart from the rest of the world. He finds his isolation irksome or agreeable, according to his temperament or his ability or determination to adapt himself to circumstances. At the outset he may try to mingle with people in other walks of life, to rub elbows and exchange ideas with those in the outer world, but he very soon realizes that this is impracticable and, indeed, impossible. Popular prejudice and the exactions of his calling render this isolation a necessity.

After a time the young actor realizes that he must pass his life apart from the conventional world, and so the sooner he ceases to interest himself in the outer world, or to care about it one way or the other, the better. Finally he finds that he is as clannish as those older in stage work, and that he prefers to associate with actors rather than with persons in other walks of life. He reads the newspapers only for theatrical news; he is interested only in the doings of his brothers and sisters of the stage, whose whereabouts and successes or failures are announced in dramatic weeklies.

About two-thirds of his life is passed "on the road." While thus "trouping," he works very much harder than any young man of relative standing and pay in any other profession. One-night stands try his soul. He finds his art reduced to mechanical drudgery. After the theatre he must rush to the railroad station, ride half the night, perhaps, in an ordinary day coach, or he must rise at five o'clock in the morning to make a "jump." In the theatre he must be satisfied with musty and dirty dressing-rooms, which are scarcely better than dog kennels, and in the atrocious hotels of the inland towns he must put up with all sorts of inconveniences.

Vaudeville Managers

The closest, most compact association of managers is to be found in the vaudeville field. There are nearly seventy first-class theatres in the United States devoted to vaudeville, all but a few of which are represented in the Vaudeville Managers' Association. Twelve of these vaudeville theatres are in Greater New York, thirty-four altogether are to be found in the Eastern cities, twenty-four in the Middle West, seven in Chicago, and two on the Pacific Coast.

The direct cause which led vaudeville managers to combine was the enormous salaries demanded by the performers. It seems that when the managers were working each independently of all the others, they were obliged to offer large salaries to the performers who drew the best houses. The performer who made an unexampled hit under one manager was immediately approached by another manager with offers of a larger salary. The man with the trained seals, for instance, who received $750 a week from a manager in Chicago, was offered $1,000 by a New York manager. The consequence was that when the owner of the trained seals was called upon by a third manager he demanded $1,500 a week. Thus the amount of money which for a while the managers paid out in salaries was out of all proportion to the amount of money paid in at the box-office. At last they held a meeting and formed the Association of Vaudeville Managers of the United States. Since then the top-notch salary paid to a single performer has not exceeded $1,000 a week, and it is doubtful if any performer who might now achieve even the most unparalleled success could induce the managers to pay him one cent more than the amount mentioned.

The advantages which accrued to vaudeville managers by combining were similar to those resulting from combinations in the industrial world. Prior to the formation of the Managers' Association a great number of agencies were necessary in different parts of the country. To-day all acts are booked either in the New York or the Chicago office. An act may be booked for thirty weeks, or fifty-two weeks, or only a few weeks, according to the merit or popularity of the performance. When booked for only a few weeks, the actors are obliged to play in the cheaper variety theatres, and such an engagement is called a "hide away." Once the vaudeville performer is booked, however, he knows that his salary will be paid regularly during the engagement, for, as previously explained, the managers are, first of all, business men, and the haphazard manner of conducting the theatre on chance is not known in the vaudeville field as it is in the regular field. Sometimes in the booking season, in the summer, as many as 100 acts are booked in a single day, and by the middle of October the entire complement of 1,500 players necessary for the season's work have been engaged.

Continuous Performance Houses

The business of well established vaudeville houses runs as smoothly as that of a department store. This applies in particular to the continuous performance houses. The leading manager in the "continuous" field has amassed a large fortune and passes most of his time on his yacht. He has a chain of such houses in the United States and his entire enterprise is conducted on strictly business lines, as much so as is the case in any mercantile or commercial enterprise.

"Continuous refined vaudeville" is an American institution. The traveller the world over will not find a continuous performance house outside of the United States. The bill is divided into three parts—the afternoon show, the dinner show, and the night show. The first begins at eleven or twelve o'clock in the morning and continues until five, employing the full strength of the bill. The second is from five o'clock until eight o'clock, during which hours only the less important acts are shown. The third continues during the regular theatre hours, from eight to eleven, and, like the afternoon show, employs the entire strength of the bill.

The continuous performance is made possible by the fact that dramatic sketches and acrobatic acts can alternate with the song-and-dance artists and the monologists. The latter require only the front of the stage, that is, the space between the curtain and the footlights, and while they are "on" the change of scene is arranged behind the curtain. The average weekly cost of the bill of a continuous performance house is about $2,000. The largest of such houses seats about 12,000 persons, and between the opening and the closing hour the house has, in the parlance of managers, been "turned over two and a half times." Thus in a house seating 3,000 persons it is possible that as many as 9,000 tickets have been sold at the box-office in the twelve hours during which the performance continues. Even during the dinner show, from five to eight o'clock, the audience in the continuous houses in the great cities is as large as that which may be seen ordinarily at one of the regular theatres. Certain managers claim that when the house is turned over only two and one-half times they are doing a comparatively light business. These same managers claim that it is not unusual to turn the house over three and a half times, and that on Saturdays and holidays they have as many as four or five full houses.

With the prominence given to vaudeville performers by the managers of the continuance performance houses, and by the encouragement given to vaudeville in general by the public, this division of the theatrical world is now considered the most desirable field even by some of the stars in the regular field. In the first place, an engagement in vaudeville seldom includes the terrors of one-night stands, for the houses are so situated and so conducted that an actor usually plays at least a week in each city.

A comparison of the number of hours passed in the theatre shows that work in vaudeville is less arduous than in the regular field. In vaudeville the performers must appear twice a day, to be sure, but only about one hour is passed in the theatre for each appearance; in the legitimate they must be in the theatre at least three hours each night and another three hours for each matinee. Moreover, in vaudeville the actor is exempt from the dreary weeks, or perhaps months, of rehearsals. Each act in a vaudeville show is independent of every other act, and hence the performers may rehearse when and where they choose. Then, too, the vaudeville performer usually sings the same songs, or does the same dances, or performs the same acrobatic or juggling feats throughout the season; whereas actors in the regular field are oftentimes obliged to learn the lines for several new parts and rehearse for two or three and sometimes four, new plays during the season.

There is still another feature of vaudeville that has proven exceedingly attractive. This is the great amount of advertising which accompanies an appearance in vaudeville. Hundreds of performers in vaudeville are advertised to an extent which in the legitimate is possible only for stars of the first magnitude.

Organization of Vaudeville Performers

Two or three years ago, after the vaudeville managers had combined under the name of the Association of Vaudeville Managers of the United States, vaudeville performers formed a combination among themselves, organizing under the imposing title of the White Rats of America. A similar society in London, called the Water Rats, probably inspired the name which the American performers gave their association. For a time neither the managers nor the public took the vaudevillists' association seriously. Later, however, the White Rats showed that they were really in earnest in their endeavors to help one another, though their organization was not strong enough to cope so successfully with the managers' organization as to "fix its own terms," after the manner of ordinary trades unions.

Dramatic Schools and Training for the Stage

There are two ways of going on the stage; one is the old way, which is advocated by theatrical people of the old school, who have not kept up with the developments of the day, and so still think that the only way is to apply at the stage door and to become a super and work up. Some years ago the old stock-company system afforded the young actor an education, by giving him several times a week new parts to study and rehearse under a stage manager of repute. So when an actor of the old school advises the beginner to do as he did, and go right on the stage, he does so because he does not know that there exists a new method; either he has not heard of it at all, or has heard of it only in a fragmentary and imperfect way, and so is ignorantly prejudiced against it. When finally he has occasion to seek the services of new members for his company, and turns toward the school as the readiest and surest source of supply, he opens his eyes with wonder to find that a scientific school of training can do for his grandson in two years what it took him by the old-school method from eight to ten years to accomplish.

The dramatic schools can not, of course, turn out finished actors and actresses in so short a time, but they can and do equip the student with sufficient knowledge of the art of acting to enable him or her to occupy positions on the stage that might only be attained after years of drudgery in the theatre. Naturally those players who have won their spurs by long and arduous toil are inclined to scoff at the schools. Their opposition has considerably lessened, however, in recent years, since the schools have given abundant proof of their usefulness by the legitimate success of a considerable proportion of their graduates. In this connection it may be well to point out also that the dramatic school performs a very useful function as a discourager of mistaken ambition. Formerly the aspirant, having no means of learning the true worth of his talents, risked the best years of his life upon what often proved a hopeless enterprise. Under the present system he may ascertain definitely and within a very short time whether or not he possesses the requisite qualities for the stage by entering any one of the better schools. Only those who know the bitterness of defeat in the profession can fully appreciate the value of this function of the school.

The Professional Dancer

One reason for the decline of the old-fashioned style of ballet dancing is the rigorous training necessary for its mastery. Graceful character-steps have taken the place of tiptoe pirouetting, long skirts and sleeves have supplanted the old costume. Colored lights have been brought into service, and the various "skirt dances" and "fire dances" have been evolved.

Generally speaking, the ballet dancer is not beautiful. Her figure has been so developed in one direction that it is apt to lack full symmetry. The greatest dancers have been below the ordinary size. By its devotees dancing is considered a fine art, and mere attractions of face are relegated to the second place. The really great ballet dancer must be a thorough artist, ever true to the standards of her school, filled with imagination and poetry, and not merely an exemplar of technique. A great dancer in London once drew a house of $40,000 a night.

The Training of Stage Dancers

A visit to any school for professional dancers will reveal the fact that there is a great amount of unromantic drudgery that must precede the glitter of the stage. The art of high kicking is by no means the easiest thing in the world to acquire. The limbs of beginners refuse absolutely to go beyond a certain point. Their muscles need stretching, and therefore the dancer who aspires to earn money as a high kicker must go through a tiresome treatment of oil and massage, and must continue to exercise the same step day after day. Apprentices in these schools assert that during the first few weeks they suffer the most excruciating pains. Those who have finished their apprenticeship declare that the fatigue of standing behind a counter, or the drudgery of plying the needle is easy work compared to that of making one's limbs respond to the demands of the professor of dancing.

It is apparent, then, that there is no glamour of the stage about a training school for professional dancers. Hard benches and hard work are the rule. The pupils present every variety of girls, plump and slender, tall and short, willowy and dumpy, pretty and plain. They wear shirt-waists without collars, soft skirts reaching to the knee, and light slippers. The floor is waxed, and carelessness will cause a fall. The teacher, generally a retired ballet dancer, is emulated and imitated in her object-lessons by the scholars, who at first are very mechanical. The clumsiest girls are pounced upon, and their stretching muscles none too gently assisted by the hands of the lady who is trying to make dancers out of unpromising material.

The advanced pupils fare better. Their muscles have become flexible. Various figures of the dance, difficult steps and poses are taught them, gliding, hopping, whirling, all very hard work when pursued by the hour. Not the least valuable to their success is the instruction received in the art of the manipulation of drapery, which has an entire gamut of expression, from coquetry to hatred and disdain.

Twenty lessons in modern professional dancing may be had for sixty dollars. A successful stage dancer now in vogue took two lessons a week for a year, at the cost of $350. The first lessons are similar to those in physical culture. Chair-gymnastics is practiced until the muscles of the body become supple. One hour a day is sufficient practice. The attitudes are the main thing, the steps being easily acquired. In the skirt-dancer there is complete symmetry of development.

Slim women are preferred by teachers, with a weight of about ninety-six pounds. Dieting is not necessary to produce suppleness. Even the best dancers practice half an hour a day. A skirt-dancer's costume costs from $250 to $400, and must be frequently renewed. The salaries are very good.

Fabulous sums have been paid to favorite dancers. Some have received as much as $10,000 a season. Only recently a Turkish dancer earned by her profession the sum of $62,000 in the Klondike in the course of a few months.

Scene Painters

Not so many years ago it was thought that a man who could paint a house or a fence was quite capable of painting the scenery for a theatrical production. Any theatre-goer of to-day knows that all this has been changed. Theatrical managers understand that to secure the service of true artists as scene painters is to make the theatre potent for real art. To-day not even the poorest road company would dare to produce a melodrama with inadequate and ugly scenery.

Hence it has come to pass that almost every theatrical manager employs the best artists he can find as scene painters. The Frohmans have a corps of such artists constantly at work. The manager or head of every stock company has his favorite scene painter, whose services he employs by the year. The best scene painters earn quite as much money as the best illustrators.

The painting of theatrical scenery demands, indeed, a high degree of artistic ability, together with a keen appreciation of local and historical consistency. The former is necessary, in order to produce the desired perspective and color effects, while the latter is demanded by public taste of the present day, which has been educated beyond the anachronisms and misfit effects of a generation ago. For these reasons very largely the occupation of a scene painter affords ample opportunity for artistic ambition, while the compensation is fairly high and the reputation assured by the custom of crediting the work on the programme. Such distinguished artists as Burne-Jones and Alma Tadema have found it compatible with their genius and reputation to paint scenery for Sir Henry Irving, while many artists of smaller ability have built up a wide reputation on work for far lesser actors. Indeed few branches of art have a more rigid technique, nor afford greater opportunity for skilfully-executed effects.

The stage scene, like other varieties of painting, especially those of the impressionist school, depends, for its perfect appreciation, upon distance. Thus, as has been well said, the scene painter must work as though he were at least seventy-five feet away from his picture, making what appear at close range to be mere daubs of color or hypertrophied representations of impossibly plethoric vegetation and impossible contrasts of light and shade. He calculates effects so exactly, however, that the audience sees a well-conceived landscape, with trees, shrubs, mountains, rocks, water and sky, executed as well, in color and perspective, as the daintiest gem of art ever set upon an easel. Described in a few words, scene painting is a "system of accurate exaggeration." With the recent tendency toward high color effects, there is eminent opportunity for the highest art of the landscape painter, whose effects are still further heightened by the use of electricity for stage-lighting.

The technic of scene painting is more binding than that of any other art, with the exception of architecture. It demands a high degree of mechanical knowledge, and acquaintance with the possibilities of stage-carpentry, and constant reference to the proper provisions for folding, rolling, cutting, shifting and transportation. Although painting on a sheet so large that he must stand on a scaffold, his constant problem is not to make large objects too large or small objects too small in comparison, and to keep in mind constantly the size of the actors, their distance from the scene, the effect of the stage lights on the colors, and numerous other details demanding a high degree of technical skill. In the words of a well-known scenic artist, the ideal is "to throw the mind into something that isn't before you." The construction of stage scenery approximates architecture in the sense that it follows regular requirements and specifications. Thus, the painter may be required to design a room, or even the exterior of a house, with "practicable" doors and windows, or to design an out-of-door scene with a practicable bridge. Having read the play carefully, he prepares a miniature model to set forth his designs, giving the smallest details, down to the

BEHIND THE SCENES—ACTORS AWAITING THEIR TURN

DRAWN BY EVERETT SHINN


ACT II

furniture of the room, or other properties. This having been approved, he proceeds to execute his work, directing the stage carpenter in the construction of the set pieces. The side drops representing foliage are carefully cut away between the leaves and mounted on netting, so as to allow the rear scenery to be visible through the interstices.

Lecturers and Entertainment Bureaus

Not many years ago one of the most promising fields for money-making was that of the popular lecturer. John B. Gough's price was $200 per night. Henry Ward Beecher, Wendell Phillips, and Bayard Taylor averaged the same figures. The receipts for Professor Tyndall's thirty-five lectures in this country were $23,100; and Max O'Rell earned $5,290 by his lectures during a single week in Johannesburg, South Africa. But lyceum bureaus are a thing of the past. People go to the theatres and more attractive "shows" than the platform presents. Only when something sensational is presented is the public interested. Miss Ellen M. Stone, for example, was the "star" lecturer in 1902.

A number of English authors during the last six or seven years have made tours of the States, expecting to reap large profits by reading from their own works; nearly all of them have, however, returned to their native island wiser men, having discovered that while the American public will buy thousands of copies of their books, it will not spend a few dollars to listen to the voice of the writers thereof. Hall Caine, Conan Doyle, J. M. Barrie, Ian Maclaren, and others found it difficult to obtain an audience. However, the lecture platform is still a paying venture for men and women who have something to say.

What is the cause of the "decadence" of the lyceum? The reason is obvious when we consider the make-up of the lyceum in its palmiest days—Everett, Sumner, Phillips, Gough, Mrs. Livermore, Anna Dickinson and Helen Potter—all of great power and corresponding success. So long as such forces were to be had the lyceum flourished. But celebrities have been few since those times, and the lyceum has suffered correspondingly. We must recognize another reason for this "decadence." In 1877 Wendell Phillips wrote to his friend, John B. Gough, "The successes of the lyceum can be counted on the fingers of one hand." There was then one bureau. To-day, with no more celebrities than can be counted on the two hands, there are more than seventy bureaus. There could be but one natural outcome. Mediocrity has been introduced, and an attempt been made to foist it in place of genuine worth. To these two causes—few great names and many bureaus—must this change in the lyceum be attributed.

One lecture bureau has on its lists about five hundred names of persons in all branches of entertainment. The manager charges five per cent in some of these agencies, which gives him a good return for his services.

Circus Managers

The public imagines a boss showman has nothing to do but sit in a big leather chair in a hotel corridor and decline to be interviewed, leaving all the work of the show to his lieutenants. Truth is, the proprietor must know more and work harder than any one in his employ. Even if he can not do stunts in the ring himself, he knows how each particular performer should do his act. He must be omniscient.

He must know all about wild animals, their haunts, habits, food and cost of maintenance. He must know what kind of hides different kinds of harness should be made of. He must know every point of every horse, from a draught to a thoroughbred. He must know all about painting and the values of paints and oils; must have a knowledge of foodstuffs of every description for man and beast; about municipal legislation and license laws in all cities; he must be a veterinarian, a printer, paper-maker and lithographer; must know all about crops—when harvested, when sold—in all sections of the country; must be acquainted with the industries of the different parts of every State in the Union, and know the dates on which employés are paid off; must know, for instance, that the last of May or the first of June is the only time a circus will "go" in St. Louis; must know the art of advertising in all its branches and the relative value of notices in the principal newspapers of every city and town; must know all about railroading, from the way a car is built to the science of transportation on land and sea. Above all, he must know that it is no longer possible to humbug the public.

When the Bailey Show first arrived in Europe, appearing now in the cities of England, now in those of Germany, Austria and Hungary, the phase of the American circus business which most astonished military men was not so much the show itself as the manner in which it was moved. Two or three incidents will serve to illustrate the curiosity with which the transportation department of the English and Continental armies viewed the organization, discipline and ingenuity shown in moving, without halt or hitch, such a large amount of property and so many persons.

While preparing to open at the Olympia, the Madison Square Garden of London, the Building Department of that city told the owners of the Olympia that a new proscenium arch of steel must be built. This arch was to frame a stage at one side of the edifice, and was 280 feet wide by 70 feet high. The material was brought into the building and the arch was put together, bit by bit, flat on the ground.

When completed, the British workmen were confronted by the task of lifting the heavy frame into place. Days were spent in futile attempts, until at last Mr. Bailey said that if they would turn the job over to him he would raise the thing of steel. He then called in his three hundred American workmen, and in three hours had the arch in position and secure—using for the purpose only the circus paraphernalia which he had brought with him from America.

The London "Times" printed an editorial urging the government to detail one or two officers from the Engineering Corps of the army, to travel with the circus and thus acquire knowledge that would be of practical use in moving military material. The government acted upon this advice, and throughout the tour several army officers were always present to witness the loading and unloading of the cars, the transportation to and from the grounds, and the erection and the razing of the tents.

Circus Performers

The morals of a circus do not at all accord with popular opinion. In the realm of canvas, such things as scandals, divorces, double living and elopements are rarities. Women who travel with certain shows must be accompanied by a male relative, who must also be an employé of the circus. Observance of this rule is not difficult, for circus performers run in families from one generation to another.

The acrobats, athletes, gymnasts and aerialists of to-day are sons and daughters of the acrobats, athletes, gymnasts and aerialists of yesterday.

There are the Deals, all equestriennes; the Pecchianis, all acrobats; the Potters, all aerialists. As you can tell by a name whether a person is a member of an old family of New York, Boston, Baltimore, so circus people can tell by a name whether a performer comes of old circus stock. The cosmopolitan character of circus performers is illustrated in the case of the Pecchianis, consisting of father, six daughters and three sons, each one born in a different country.

The health of his company is a consideration as important to the proprietor of a circus as to the general of an army corps. Arrangements are such that everybody, down to the humblest canvasman, is allowed eight hours' sleep.

Circus "Followers"

Another error in popular belief is that concerning drivers, hostlers, and canvasmen. People suppose these men to be mere human driftwood, homeless, without ties, and living from hand to mouth. On the contrary, most of those who handle the "rags" and tend stock are heads of families, careful with their money and temperate in their habits. Many of them have happy homes in Western cities.

Show people, as a rule, are a lot of sober men and women. A marked characteristic of all, from the *maître de cirque* to the stable-boy, is loyalty to the show, for the glory of which they will fight as if it were their very own, resenting any false aspersion upon the management as a personal affront.

In advance of the show there are about seventy-five bill-posters, whose duty is to "bill" the country for at least twenty miles in all directions from the town in which a performance is to be given. They are supplied with admission tickets, to give to farmers in exchange for "barn and fence privileges," and they guard these billets as jealously as they would so many greenbacks. The man who tries to wheedle a single ticket from a bill-poster without giving the proper *quid pro quo* is promptly and profanely rebuked.

The pay of canvasmen, bill-posters and helpers is from twenty to sixty dollars a month. Half their wages is handed to them on pay day, the other half is held back, in accordance with a contract they are required to sign, until the end of the season. Thus at the beginning of winter the men receive a sum of money which otherwise they might have spent.

Many of these men have been with one circus for twenty years or more. Circus men, fond of pseudonyms, frequently abandon their real names, signing even their contracts with their circus names.

Bill-posters are often intrusted with money for expenses, and with railroad passes covering long distances, and in twenty years only one case of dishonesty has occurred. In this instance a man ran off with passes from Portland, Oregon, to Chicago. A Pinkerton man started in pursuit, caught him in the Windy City, and landed him in the penitentiary.

The American Turf

The jockey is a money-maker. Many of these active and skilful young men earn relatively enormous sums. One or two make from sixty to seventy-five thousand dollars a year, and there are several whose salaries are $20,000. Besides the regular "retainer," or stipulated salary, each jockey gets $25 for a winning race and $10 for a losing race. The support of a racing stable, with what is called "a good string of horses," is a very expensive matter. One trainer is generally allowed to twenty horses, with two foremen, five men, and five or six exercise boys. The trainer gets two or three dollars a day for each horse trained, out of which amount he must pay his stablemen and board them, besides the feed bills for the animals. Many trainers get salaries of about ten thousand dollars a year, plus a percentage on the net winnings. So closely are the horses watched that the trainer even sleeps near them in a box stall fitted up as a bedroom, the men and boys sleeping in rooms above.

Apprentices are received in many stables, boys from twelve to eighteen years old. The time of their apprenticeship, under the laws of New York, is three years. For the first year they have two dollars a month, besides board and clothes. They receive ten and fifteen dollars a month for the second and third years, less the price of their clothes. Then they can at once secure work as exercise boys, thirty dollars and board.

Foremen earn twenty-five dollars a week or more. The "forfeit list" is a heavy tax on the owner of a stable, paid upon the withdrawal of horses before the race, after "entry" for a certain stake.

CHAPTER XIII

THE MUSICAL PROFESSIONS

American Musicians and Composers—Musical Education in the United States—Earnings of Musicians—Singing as a Profession—The Singer in Opera—Qualifying as a Prima Donna—Staging an Opera—The Chorus Girl—The Chorus Man—Writing a Comic Opera—The Singer in Concert—In the Choir—Song Writers—The Orchestra—The Band

American Musicians and Composers

THE resources of the orchestra have been greatly broadened, permitting a portrayal of every mood and emotion. Both the orchestra and the piano have gained an extraordinary increase of power, not only in Europe, but in this country as well. There is just now a lull in Italy, France and Germany. Americans have already made great progress in the lighter and popular forms of music, and in teaching the art. Very notable as teachers were Lowell Mason, Geo. F. Root, L. O. Emerson, A. N. Johnson and Eben Tourjee, while in orchestra-leading and chorus-work, Leopold Damrosch, Gotthold Carlberg, P. T. Gilmore and Anton Seidle, were veritable apostles of art. Among pianists, several Americans have taken first rank, and the number of operatic stars from this country has been phenomenal. Even of Adelina Patti, the first musical talent was developed in the United States, where she spent her childhood.

The works of many American composers are of the first magnitude, and will undoubtedly live. Among the producers of oratorios and dramatic compositions are J. K. Paine, Dudley Buck, F. L. Ritter, C. C. Converse, S. G. Pratt, J. C. D. Parker, George W. Chadwick and E. A. MacDowell. Scientific church organists include, A. W. Berg, Clarence Eddy, W. L. Carl, Frederick Archer, George E. Whiting, Louis Falk, Harrison M. Wild and H. B. Roney.

The German Saengerfests have been transplanted, and are represented by our great musical festivals. Our American schools of music, oratorio societies, musical societies, conservatories and colleges have taken root, and flourished greatly. A public benefactor endowed a symphony orchestra in Boston, which has become a leading feature in American music, improving the taste of the whole country. Sunday night concerts, at popular prices, are given in New York by members of the Opera Company, in which city the finest opera in the world may now be heard every winter. The cost of a single performance often reaches $10,000, and the receipts, $15,000. The growth of oratorio societies has developed music to a great extent. The standard of church music has also greatly improved, largely through the influence of the American Guild of Organists. In Boston, free organ recitals are given by a local club.

A score of American cities give the people music in the public parks, New York City spending as much as $30,000 a year for this educational and recreative purpose.

Musical Education in the United States

For the benefit of the young men and women of this country who intend to adopt music as a career, a bill has been introduced in the houses of Congress, at Washington, to establish a national conservatory of music and art, for the education of advanced pupils in music in all its branches, vocal and instrumental, as well as painting and drawing and etching. The bill provides for four departments of equal standard, one to be located in Washington, and one each in New York State, Illinois and California.

According to the bill, the conservatory to be located in the District of Columbia shall contain at least forty study rooms for music, capable of accommodating fifty pupils in each, and twenty art studios to accommodate thirty-five pupils each, and shall also contain one large assembly or concert-room and one art gallery, together with such other necessary offices for the convenience of the board of regents, general director, art masters, teachers, and professors, as well as the clerical force necessary to conduct and operate the said conservatory. Pupils will be entitled to attend from the District of Columbia, Delaware, Maryland, West Virginia, Virginia, North Carolina, South Carolina, Kentucky, Tennessee, Alabama, Mississippi, Georgia, Florida, Louisiana, Arkansas, Texas, and Porto Rico. An entrance fee for a term of three years not exceeding $50 shall be required from each pupil.

Aside from the financial feature, it is claimed that it would save American young men and women from exile. The majority of the young men who go abroad to study music or art never return to this country. Many of them "become inoculated with the vagrant and Bohemian habits that are prevalent in the respective Latin quarters of the big cities of Europe."

At the present time, at a conservative estimate, there are 40,000 American students abroad, scattered in the different cities of Europe. The minimum sum for which they can be maintained in the cheapest parts of European cities is equivalent to $2 per day, which means $80,000 a day of American money paid to foreigners, or $2,400,000 per month. Or, for a three years' term Americans spend $75,000,000 trying to obtain an education in music and art abroad, while here at home the four institutions proposed in the bill mentioned above can be fully equipped and conducted upon the very highest possible plane within a cost of $1,000,000 per annum.

Earnings of Musicians

While the foremost men of letters and artists are often paid less for their work than "hack" writers and sign painters, it seems to be the invariable rule that great musicians, especially operatic singers, receive compensation commensurate with their ability. Madame Patti in the days when she was considered the greatest living vocalist, was the best paid singer in the world.

She often demanded and received $5,000 for a single performance, and seldom received less than $3,000 for one appearance. Madame Melba is never paid less than $1,000, either in concert or opera, for an evening's work. Madame Nordica and Madame Eames are paid from $750 to $1,000 for each appearance at the Metropolitan Opera House, in New York. Madame Calve's voice yields her even larger returns. When any of the artists just mentioned sing in concerts they invariably charge a fee of at least $500.

Contralto singers are seldom as well paid as sopranos. Madame Scalchi seldom received more than $600 for an operatic performance, and never more than $300 for appearing in concert. Madame Braemer, when appearing in Wagnerian performances at the Metropolitan Opera House, never received more than $300 for a night's work.

Among concert singers the one who for several years earned more money than any of her sisters was Clementine De Vere (Madame Sapio). While singing in the choir of the West Presbyterian Church in New York she received a salary of $3,500. At the same time she was earning at least $15,000 more singing in concert. For each appearance in concert she charged from $200 to $350, her fee depending upon the distance which she had to travel to fill an engagement. She was constantly in demand in all parts of the country, and she usually filled at least three engagements each week.

The earnings of choir soloists, vocal teachers, pianists, violinists, harpists, etc., vary in amount from $700 per annum for the soprano singer in a small choir, to the handsome sum of $125,000 earned by Paderewski during a single tour in the United States.

Singing as a Profession

All great singers and musicians, in attempting to tell others how to succeed, agree that the voice alone is not all that is necessary. In addition to the voice there must be good health, sympathy, a fine physique, intelligence, a musical ear, and a capacity for study. In other words, to be simply a singer is not sufficient; the singer must be also a musician, an actor, an impersonator and a student.

The singer should regard the voice as a musical instrument, the proper use of which can be acquired only through practice, just as one learns to play on the violin or the harp. And while cultivating the voice, learning how to use it, one should also pursue the study of vocal musical literature. It is as important for the singer to know the literature of his art as for the musician—Paderewski, for instance—to know the literature of the piano. Only in this way can the singer approach his art with intelligence.

Again, the singer must be a linguist; she—the feminine is here used because the majority of professional singers are women—must have not only a working knowledge of Italian, French and German, as well as English, but she must realize that there is a demand to-day for perfect education in whatever language the song happens to be written. Many new opportunities have been offered to public singers in recent years. The opera and concert field has very much widened.

Our country has produced some singers of the very first rank, the State of Maine, perhaps, taking the lead in this happy eminence. Three singers of world-wide fame have come from that State.

It is not every singer, of course, who can attain the highest honors, but women of moderate talent can always earn a good living in the field of vocal music, which embraces private teaching of voice culture, teaching in the public schools, choir work, and singing in concerts and festivals.

The Singer in Opera

The singer who aspires to an operatic career must study hard and long before she can hope to secure an engagement in grand opera in New York. In France and Germany the opera houses are also schools of instruction, where students are instructed in all the details of action and interpretation. In the grand opera houses in the countries mentioned, debutantes are drilled for many months in a single role previous to their first appearance. In the United States, however, the artist must acquire her art outside of the opera house, coming to the operatic stage with all the necessary theatrical experience as well as a thorough training in the roles which she is engaged to sing.

Diction is important in opera singing. A singer should think of the words as well as of the music. Many make an error in thinking that if the right note is struck the words do not matter. The words should be carefully studied before the music is mastered. Nasal exaggeration must be avoided in singing French. In the interpretation of songs a singer must have refinement and distinction. The singer's character is revealed in his singing. A beautiful voice and perfect enunciation are not all that is necessary. Expression, feeling and character are indispensable. The sentiment and power of expression must be regarded in interpretation. The individuality of a singer must be considered in the selection of songs for concert rendering, but nevertheless songs of every style must be given, in order to avoid the danger of getting into a groove.

Qualifying as a Prima Donna

The operatic road from chorus singer to prima donna is a long, up-hill route, and has many side tracks. She who travels it must work hard and faithfully under skilled instructors. She must devote many long hours to patient study and practice. She must take herself seriously, view her undertaking as a stern reality, and give herself up entirely to it. In her art she must find her life. Regularity and simplicity of daily life, plain food, plenty of sleep, quiet habits—upon these depend health, and through health the voice. Voice, the singer's capital, must be watched closely. No one set of rules for its care can be laid down for all cases. The course to pursue is determined by individual needs and peculiarities.

Great care should be taken to keep the vocal cords in perfect condition.

All singers should avoid warping, straining, or roughening these cords; yet young women frequently invite such results by singing too much or too high. Trapeze performance with the voice is the height of folly. Vocal excellence is not conquered in a single battle; there must be a long war. High notes are not captured by assault, but by siege.

Like a locomotive, the voice should be sent, at it were, regularly to the repair shop. Seven months is the limit of time that the average voice can be used continuously with safety. Then should follow five months of rest, during the first month of which the voice should not be used at all, not even to practice. Many singers go out of training altogether between seasons. This is a step backward; for if the singer would push onward, she must keep in training during her annual halt.

There is no reason why the singer who intelligently uses these few simple precautions should not retain her voice, in all its fulness, purity and sweetness, not only for ten or twenty years, but for a lifetime. The musician becomes, by culture and practice, the artiste, and then, by hard work, the operatic star; which, continuing in the ascendant, finally attains the first magnitude, and is called prima donna.

Staging an Opera

The chorus of a grand opera company is obliged to be at the theatre half an hour before the rise of the curtain, and are carefully inspected in costume and "make-up" before the performance begins. The principals always reach the theatre an hour and a half before the curtain rises. A call boy is used, when "on the road," but in New York there are thirty-two electric bells in the opera house to do the work.

The ballet is drilled in steps, and rehearsals of the chorus are held on the stage first, then of the principals, then of all together. The orchestra is added after about a dozen rehearsals with the piano. Of course, the orchestra has practiced the music by itself previously. The entire outfit, principals, chorus, ballet, and orchestra, have final rehearsals together, lasting from 10 A. M. to 4 P. M. There are also separate "rehearsals" for the scenery, lighting and stage properties. In fact, the rehearsals are the most fatiguing part of the opera singer's work.

When the Grand Opera Company is about to start "on tour," the stage manager of the Metropolitan Opera House, in New York, has one hundred assistants simply to pack the trunks of the company. The chorus costumes, properties and electrical effects require one hundred and thirty trunks. Each of the principal singers has from twenty-five to thirty trunks. In addition to this, each member of the chorus and ballet takes one trunk. With 263 persons connected with the company it may be seen that the handling of the baggage is a difficult problem to solve. An absolutely accurate system and method are imperative. Seven wardrobe people attend the company when on tour, together with four stage carpenters, three property men, three electricians, a ballet master, and three baggage men. The principal soprano and tenor have the first choice of dressing-rooms. The chorus have to dress in squads. In each different town a new set of "supers" has to be drilled.

The Chorus Girl

It is perhaps on the comic opera stage that the conditions surrounding theatrical people are at their worst, especially for those in the chorus. The average chorus girl is paid only $15 a week, and even if she is given a small part her salary is not over $35 a week. Ordinarily, chorus girls are supposed to be beyond the pale of conventionality, creatures of vanity whose morals are not of the strictest. But as a matter of fact young women of education and refinement can be found in every chorus. They are working honestly and sincerely to succeed, for they believe that they have a future before them; but the coarseness, vulgarity, and oftentimes immorality and vice, which surround them, are almost unbearable. With stout hearts they bear all these ills, however, for they know that they must make a brave struggle against fearful odds, and endure untold hardships before success can crown their efforts.

At rehearsals, especially, they submit to downright brutality, oftentimes, on the part of foul-mouthed stage managers. But it is these earnest young girls who endure and suffer so much, who finally step out from the ranks to receive the plaudits of the audience, and a large weekly check from the managers, as prima donnas. It is said that the force of character displayed by young stage women of this sort is fully appreciated and admired by their companions—a sign which must be accepted as very encouraging for the future of the personnel of the comic opera company.

During rehearsals for a big comic opera production, the members of the company are obliged to work without pay. Sometimes the rehearsing period lasts from four weeks to two months, and from sheer lack of proper food, it is not unusual for a girl to fall in a dead faint on the stage. The other members of the company are always ready to relieve distress which they know to be genuine, and hence the girl who has fainted is often helped by the generosity of the players, rather than of the management.

One of the most trying phases of stage work for the young chorus girl, if she happens to be pretty, is the jealousy of the prima donna or one of the other female principals of the company. A case is related in which a prima donna at the Metropolitan Opera House, a singer famous the world over, ordered a chorus girl to go to the dressing-room, because she feared that when they stood near each other the chorus girl's beauty would distract the attention of the audience from herself. Professional jealousy in stage life is more dreaded by the novice than one-night stands or the harsh criticism of the stage manager. She who possesses the most talent or the greatest beauty finds herself more often the subject of jealousy on the part of the star or the principals of the company than her plainer and less talented sisters. A young actress of great promise was summarily dismissed from a company because her little act received a curtain call from the audience.

The Chorus Man

Many chorus men take to the stage after serving in clerical positions in business houses. They have fairly good voices, and prefer to earn twenty dollars a week in a chorus rather than half of that sum in a store. A chorus man, if careful of his health, can keep his voice for many years. Some have remained for fifteen years with a single company. They often marry chorus girls, and, by the exercise of thrift, are able to save a little money. Sometimes a desire "to see the country" draws a man into the chorus of an opera company. He certainly is essential to the success of a musical production, and may justly consider himself a member of a self-respecting profession.

Writing a Comic Opera

Comic operas are often written to order, and to suit the requirements of a certain manager or star performer. Subject, treatment and locality must be first determined upon by the composer and librettist. Novelty in "locale" is especially desirable, and the humor should arise naturally from the situations, not being dragged in by the comedian. Picturesque costuming is demanded by the public. After the skeleton plot of the story has been made, there must be a synopsis of the musical numbers. Much of the success of the best songs depends upon the dramatic situation in which they are introduced. Operatic tradition demands an opening chorus, a musical opening for each act, a good finale both for the first and second acts, the whole opera of three acts containing from twenty to twenty-four musical numbers, the last act always being the shortest. The numbers must be properly distributed, it not being permissible to have two duets come in juxtaposition, for example, and must illustrate the action of the story, not being interpolated merely to please a particular singer. The lyric often suggests the melody, two people who work together for some time often getting to think alike to a certain extent.

The librettist and composer are in daily consultation, and the detailed dialogue is often the last thing written. From three to six months are spent in the construction of a comic opera.

The Singer in Concert

To attain great success as a concert singer is said to be even more difficult than as an opera singer. In the concert-room the singer must fill her notes with her voice alone; she is not permitted to make gestures in order to strengthen the story she is telling; she must depend for dramatic effect upon facial expression. In concert the singer is very seldom aided by an orchestra; she must usually depend for coloring entirely upon the piano. In opera, on the other hand, the voice is not only sustained by the orchestra, but the singer is permitted to act, and acting helps to produce the desired effect upon the audience. For these reasons some musicians place successful concert singers above successful opera singers.

More singers should make the concert hall their objective point, instead of the opera. The voice which is not strong enough for the opera may be quite suitable for the concert stage. Opera choruses are filled with mediocre voices, many of which might achieve distinction if properly trained for the concert-room. With the possession of a good voice must go the capacity for hard study. Voice production needs much attention. A proper method must be attained. Young singers ought to be willing to listen to the advice of those who have won success by careful study, and reform their methods utterly, if necessary. They ought to permit the experience of older artists to benefit them, and not reject suggestions for their improvement. Praise is not so valuable to the young singer as good counsel. The beginning of wisdom in music is to learn how to study.

In the Choir

In the modern religious service music holds a very prominent position. The organist and choirmaster is a person of importance, soloists or quartets are paid extremely good salaries, and the music is most artistic and attractive.

There are several churches in New York which pay $10,000 a year for musical services, and some few which pay more than this sum. Solo singers, in some instances, are paid as much as $1,800, although $1,000 is considered a good salary. Many of these singers receive engagements for evening work at the homes of the members of the congregation, which they find very remunerative. The choirmaster of a large church receives about forty applications a day. Fine sopranos are difficult to secure. A sweet and pure lyric voice is required for church work. Mixed choirs are somewhat in vogue. The previous bad training of many singers makes some choirmasters limit their choirs to boys, whose voices can be molded and trained as the choirmaster wishes.

The number of paid choirs is increasing, as are the salaries of organists. As much as $800 a year is sometimes paid to a boy soloist. One church in New York has a choir of fifty men and boys. The choral side of church music is now receiving much attention. Vocal pyrotechnics are in very bad taste. The predilections of the congregation must be considered, and there must be hearty co-operation between the clergy and the choir.

Song Writers

A song writer must first find a publisher, and secondly, must induce some notable singer to introduce his creation to the public. As a general rule, it is wise to have a song published in New York City, as most of the "hits" are made here. The ideas may come from the West, but New York is the best place in which to launch them. A singer like Dockstader can make a song popular by using it for a week in his repertory. There is no doubt that people like to hear songs depicting the action and reflecting the atmosphere of country life, with allusions to fields of corn, and flowers, and running

THE BOY CHOIR—A RECESSIONAL

brooks. Strong situations and catchy melodies are preferred by many song writers. Hymn choruses are used sometimes with good effect. Often a happy title will sell a song. Songs that are sung only on the stage are not profitable; they must be taken into the homes of the people. Topical songs are too restricted in their scope to be productive of good financial returns. The young lady at her piano should be kept in view, and songs should contain a dash of sentiment, with the ideas of home and mother emphasized.

It may be of interest to note a few songs which have achieved phenomenal, national popularity, and made fortunes for their writers. Daniel Emmett's "Dixie" was known all over the country. "Old Folks at Home," by Stephen Foster, and "After the Ball," by Charles K. Harris, made mints of money. Fifty thousand copies of H. W. Petrie's "I Don't Want to Play in Your Yard" were sold in the first edition. Fifteen thousand dollars came to Edward B. Marks for "The Little Lost Child." It is well known that Sir Arthur Sullivan received $50,000 for his "The Lost Chord," and it is a matter of history that Balfe got $40,000 for "I Dreamt That I Dwelt in Marble Halls."

The Orchestra

While each city and town has its own brass band, only a few of the same cities and towns have their own orchestras. Attention has been so repeatedly called to this fact that a number of cities are now considering the advisability of supporting an orchestra, by appropriating municipal funds for the purpose. While the orchestra is lacking in this country as either a municipal, state, or national institution, permanent orchestras are maintained in nearly all the cities of Europe. In fact permanent orchestras are supported in European cities having a population as small as 25,000 souls. It is contended that such permanent orchestras should be maintained in American cities, as the expense where the players are engaged by the season is small when compared with that of certain other educational and pleasure-giving institutions.

But while our municipalities are backward in the matter of giving the people the highest of all music, that of the orchestra, private enterprise has encouraged music in all its forms, including that branch we are here considering. While the municipalities employ brass bands in public places and on social, ceremonial and military occasions, it has been left to private individuals to establish orchestras. Mr. Damrosch and Mr. Victor Herbert, and lately Mr. Reginald De Koven and others, are doing all they can to establish permanent orchestras. They are regularly giving the great symphonies and other concerted work, at least in the large cities.

All the theatres, of course, employ orchestras, and there are a great number of private "string" organizations, which render high-class music in public halls and at private entertainments. The Metropolitan Opera House, in New York, maintains one of the best orchestras in the country, and a very good orchestra has recently been established in Washington by Mr. Reginald De Koven, who acts as its conductor.

A good violinist, a good 'cellist or cornetist, and men proficient in playing the harp and other instruments common to the orchestra, find no difficulty in securing engagements. A great number of musicians who play in orchestras belong to an organization, or union, similar to those in ordinary trades. The compensation of the man who plays in a first-class orchestra may be any amount from $5 to $20 for each performance. Musicians who play in the orchestras of the ordinary theatres of the country are engaged by the week, and are paid salaries ranging from $15 to $35.

The Band

To secure a position in one of the great bands a musician must be skilled in the use of his instrument, be able to read and perform any music, no matter how difficult, at sight, and possess an adaptability to the ideas of the conductor, who alone fashions and molds the artistic phases of his ensemble. The work is all done in the rehearsal room, where by untiring patience and perseverance on the part of the conductor and loyal and intelligent effort from the musicians the end is accomplished that means the finished public performance.

There are approximately about 10,000 bands of all classes in this country. The country band is the backbone of it all, and it is in this rough-and-ready school that Americans are turning their attention to the study of the less conspicuous and familiar instruments gradually, but naturally the cornet and trombone remain first choice. The trombone is the hardest of all the band instruments to completely master. It is the violin of the bass, and requires something of a musical instinct as well as musical knowledge and appreciation to become perfect in the manipulation of the mechanism of it.

The American musician should turn his attention to the study of the French horn, the oboe and the bassoon, which have but few good performers in this country, nearly all of whom are foreigners. These instruments do not figure in the average band, and are therefore practically unknown to the young aspirant for band honors. The remarkable increase of amusement parks and resorts, and annual exhibitions, has greatly widened the field for bands in the United States, opening many and comparatively profitable engagements. The average weekly salary of a bandsman is difficult to estimate, falling so low in some instances as fifteen dollars, but as soon as a musician distinguishes himself above his fellows he can command a better financial return. In the military band, as in all other avocations, there is always room at the top.

The salaries of American bandsmen range from $35 to $150 per week, and they are the highest paid in the world. Salaries are regulated according to the relative value of the instrument and the skill of the performer. In New York and other cities, musicians' salaries are regulated by their union—in the smaller communities by demand and supply. A parade engagement nets a New York musician eight dollars.

PART IV

PUBLIC SERVICE AND MISCELLANEOUS PURSUITS

CHAPTER I

POLITICAL, DIPLOMATIC, AND CONSULAR SERVICE

Politics as a Profession—Politics as a Business—The Political Machine—Methods of Securing Political Office—Salaries of Federal Officeholders—Holding Office Under the Fee System—The Diplomatic Service—Method of Appointing Diplomats—The Consular Service—Method of Appointing Consuls—How the Consuls Help Business Men

Politics as a Profession

IN THE majority of professions and callings success is built upon many failures. In politics, however, success very seldom follows a failure. The politician must build his success upon success. In other callings failures at the outset do not hurt the young man, but act rather as an inspiration to further trials; but in the political arena a first defeat oftentimes means the end of a man's public career. Moreover, in the wake of defeat comes censure, sometimes justly, but more often unjustly.

Before the young man adopts politics as a career he should understand the exact conditions. It cannot be said that there is any school for the training of politicians other than that of experience. A ward leader has been elected sometimes to the Mayor's chair in municipalities, and a State Senator has often been sent to the National Senate chamber at Washington; but the men who reach the high political places have, most of them, been natural leaders of men.

The honest and sincere man in public office seldom finds that the rewards justify the struggles and the sacrifices involved. The salaries of public officials are in few instances commensurate with the services rendered. Oftentimes the salary of the officeholder is not even sufficient to pay his local expenses. What, then, is left? Simply the honor, which in most cases is fleeting and unsatisfactory.

Even the prejudiced citizen who believes that he should have nothing to do with politics excepting to drop his ballot in the box, has of late years conceded that politics is a proper and creditable profession. The concession is based upon the ground that there is no more reason why a man should not serve the people than that he should not serve an individual or corporation. The professional politician, moreover, has a higher grasp of public questions than has the private citizen, and gives better service than the non-professional politician, for the latter, not making politics his exclusive business, is obliged to give much of his time, for which he is paid out of the city funds, to his private affairs. While politics has no formal recognition as a profession, in which respect it is like journalism, yet this field is in need of young men who will enter it and follow it as a permanent career.

Politics as a Business

Corruption in politics and the frequently faulty condition of government arise from the fact that the average man is too much engrossed with his own business to pay any attention to public affairs. It is the personal selfishness of the citizen that keeps him out of politics. Politics is a sport in England, and a profession in Germany. Here it is a business. And when by chance a good man gets into office, the business men are too "busy" to go to the primaries and renominate and re-elect him. The good office-holder neglects the "business" of the politicians, and attends to the interest of business men, and they reward him by confining themselves wholly to their own private affairs and letting the politicians elect somebody else. Americans want freedom. They want to be let alone. Politicians will always cater to public opinion, if it is strong enough and active enough. Parties are established to meet some peremptory demand of the people, some principle which is in the ascendant. When the cry for good government becomes loud enough, independent organizations are formed which carry the day. But the trouble is that with security comes carelessness again, the citizen neglects his public duties and the politicians regain the ascendency.

But there is no disrepute in legitimate political work. It is erroneous to imagine that politics must consist of nothing but systematic trickery and dishonest intrigue. Shrewdness in manipulation and questionable methods are not wanted of young men.

The Political "Machine"

In the political, no less than in the industrial, world organization is the soul of success. Political leaders look upon politics as a business, even as an industry, and they know that that industry is most successful which is most highly organized. It has become the fashion, however, for certain citizens to condemn in politics what they praise in business; they declare that the present political organization is very bad and that it should be put on a business basis, but master organizers declare that it is not possible to place politics on a business basis except through organization.

It is folly for professional politicians to attempt to hold aloof from participation in party organization. The man who hopes to succeed in politics should understand the workings of every department of the organization as thoroughly as superintendents and managers and other officials understand the general scheme of organization in an industrial field while doing all they can to co-operate with it.

Methods of Securing Political Office

Nearly all the young men who enter politics belong to one of two classes; first, those whose motive is one of public spirit; second, those whose motive is only that of holding public office. In either case the young man must begin at the very bottom of the political ladder. He must join the "machine" as one of its most insignificant attachments. The political machine begins in the ward precinct at the primary elections, and ends at the Capitol in Washington with the inauguration of a President, but between the ward of the city and the steps of the national Capitol there is a vast amount of machinery, and the young man who expects to succeed in politics, either for public good or for himself, must begin in the ward precinct.

The young man who starts out properly equipped mentally, may be a student of politics, but he can hardly be termed a politician. The study of great questions of state is not sufficient; he who hopes to hold political office, or who has the public welfare at heart, must understand the mechanism of politics; he must acquire a knowledge of the workings of the political machine. Therefore, at the start, he must begin first the study of practical municipal politics.

He finds, first of all, that his party organization, in its various branches, local, state, and national, is controlled by party leaders, called the "bosses"; and he finds that party leadership begins in the precinct ward. It is said that thorough precinct organization is the foundation of party organization. There is a common saying: "Take care of the precincts and the city will take care of itself." The precinct is the smallest division of political territory; it is the primary district, and it is here that political action begins; so the young man begins his career in politics by joining the precinct club. The members of this club choose delegates to represent the ward in the city nominating convention.

As a precinct is one of the divisions of a ward, the next larger body of politicians is the ward club. The young man who by enterprise has pushed himself to the front in the precinct club, soon finds himself a member of the ward club, and if Fortune favors him, he is ultimately appointed to a place on the city central committee, the highest organized body in practical municipal politics.

It is understood, however, that the young man's work thus far has been preliminary to that of securing nomination for office. He may first of all be appointed to a minor political office either through the civil service system, or through what is known as the "spoils" system. The "spoils" system prevails wherever the civil service is not in force. The next step is an office to which he is elected by a popular vote, such as that of Alderman; after this he may become President of the Board of Aldermen, then a president of a borough of the city—and this refers, of course, particularly to New York—and ultimately he may enter the city hall as Mayor. It does not follow that every Mayor reaches the highest political office through all the minor offices just mentioned, but certain it is that every Mayor, previous to his election, was a party leader.

The young man who aspires to reach the State Capitol as Governor, or the national Capitol as Senator, and even President, must continue his study of practical politics, State and National, just as he did at the beginning, in precinct and city ward.

Salaries of Federal Officeholders

There are only 439 civilian officeholders on the pay rolls of the Federal Government who draw annual salaries ranging from $4,000 and $5,000 to $50,000, the latter being that of the President of the United States. If the fifty-seven generals and admirals and chiefs of bureaus of the active military establishment be added, the aggregate number between these limits is still no more than 496. The following is a compilation of the pay of all persons in Government employ who receive $4,000 or more per annum.

No.	Salary	Total	No.	Salary	Total	No.	Salary	Total
1	......$50,000	$50,000	19	......$10,000	$190,000	34	...... $5,500	$187,000
5	 17,500	87,500	16	 8,000	128,000	1	 5,396	5,396
1	 13,500	13,500	32	 7,500	240,000	140	 5,000	700,000
7	 12,000	84,000	16	 7,000	112,000	131	 4,500	589,500
1	 11,000	11,000	37	 6,000	222,000	2	 4,200	8,400
1	 10,500	10,500	1	 5,635	5,635	51	 4,000	204,000

Holding Office Under the Fee System

While the earnings of those who hold office under the salary system are in many cases smaller than they should be, the earnings of those "in office," under the fee system, are in many instances greater than is justified by the services rendered. This point was emphasized by a politician in the city of Brooklyn, who, in a public statement, said: "I do not know what the emoluments of any of my predecessors were, but I do know what they have been in my office during the past twelve months. After expending $20,000 more than was probably ever expended in giving the county a broad and liberal service, and after giving away upward of $8,000 for charitable purposes, there still remains to my credit more than $45,000." Thus this politician brought to light the fact that he was paid for his year's work an amount of money greater than that paid to the President of the United States, and this for services requiring only average ability.

The fee system in operation in nearly all the big cities yields such large returns to those holding positions under it, that in a number of cases the offices are controlled by politicians who form a syndicate for the purpose of dividing the fees among themselves. It is stated as a fact that in some cities the fee offices yield as much as $100,000 a year. The local laws entitle the holders of such offices to put all such fees in their own pockets.

The Diplomatic Service

In writing about what is called "ready made" American diplomats and ministers, it appears to be the fashion to begin by berating our national legislative bodies for what is called the "pauper salary list." This persistent criticism of the attitude of indifference on the part of Congress toward the diplomatic service is both natural and unavoidable. There are three defects in our diplomatic, as in our consular, system. There are: First, the low standard of salary; second, the method of appointment; and, third, the uncertainty of the tenure of office.

The mere number of persons engaged in the diplomatic service is not at all impressive, as the corps in its entirety numbers less than 200 officials. These include: At embassies, the ambassador, the first, second and third secretaries of embassy; the naval and military attachés, and interpreters; at the legations, they include the minister, the first and second secretaries, the naval and military attachés and interpreters. Therefore, the numerical strength of the corps does not count. It is the work of the corps which we must consider. Under modern conditions, the most important battles are fought in the audience chambers, drawing-rooms, chancellories and foreign offices in foreign capitals. The result of these battles often has had a more far-reaching and more beneficial effect than bloody frays on actual battlefields. More than one diplomat has prevented a great war, and has therefore saved the tax payers of this country the enormous expense which would have attended such a war.

How does Congress treat these very important representatives of the United States abroad? As mentioned above, the first defect in our diplomatic system is the low standard of salary. The highest salary paid is $17,500 a year. Only five ambassadors receive this salary, viz.: The ambassadors to France, Germany, Great Britain, Russia, and Mexico. A salary of $12,000 a year is paid to our diplomatic representative to each of the following countries, namely: Brazil, Austria-Hungary, China, Italy, Japan, and Spain. A salary of $10,000 a year is paid to our minister to each of the following countries, viz.: Argentine Republic, Belgium, Chili, Colombia, Costa Rica, Guatemala, Honduras, Netherlands, Nicaragua, Persia, Salvador, Turkey, and Venezuela. All other salaries paid are less than $10,000 a year, down to the $1,200 received by the third secretary of embassy.

The higher salaries, when considered from the point of view of the democratic American at home, may seem not only adequate, but even generous and lordly; but the stay-at-home American forgets that an ambassador is the direct personal representative of the President of the United States, and that when he enters a room in a foreign capital it is in every respect just the same as if Mr. Roosevelt himself were present. Therefore, it is necessary that the direct representatives of our chief executive should live in a style commensurate with his high place. This is especially true in Eastern countries, where the people form their ideas of the importance of a country according to the display made by its representative. In Constantinople, for example, and even in St. Petersburg, pomp and show are of importance in that they impress the people. Even in London and Paris and Berlin, if our representative is not to be overshadowed socially by the representatives of other nations, he may not live in a flat in an obscure portion of the town, but must make what is called "a showing." It happens, therefore, that the salaries paid to our ambassadors to Great Britain and France are not sufficient even to pay the house rent of the man who personifies the President of the United States.

Method of Appointing Diplomats

The second defect of our diplomatic system, namely, the method of appointment, is considered more important than that of inadequate pay. While it can not be justly said that all appointments are made through personal or political preferment, certain it is that in many instances men have been taken from small towns and sent abroad to represent us in places, where the thousand and one little things that make up what is called finesse are wholly unknown to them.

The third flaw in the system, that of the uncertainty of the tenure of office, is the most serious and the most important of all.

Most of our ambassadors or ministers at the time of their employment are wholly untried in the world of diplomacy. Upon reaching their posts they are obliged to depend upon the coaching of the secretaries or other subordinates. Even the secretaries are in many cases changed with the change of administration at Washington. The result is an untrained corps, and a service which no young man can hope to adopt as a permanent career. There is no certainty of promotion, there is not even an assurance for a secretary that he will be retained in the service beyond the term of the administration in which he has been appointed. The ambassador who has given his time and his money in patriotic service to his country has no hope of reward other than a perfunctory "well done," and a request for his resignation with the coming of a new administration.

Under the present system a young man may be appointed to the position of third secretary of embassy, at $1,200 a year, or of second secretary of legation at $1,800 a year, and become ultimately a secretary of embassy or legation at $2,600 a year. But when he has gone thus far he finds either that he has gone as high as he can in the diplomatic service, or he is dismissed and his years of training have gone to waste by chances of political favor.

The Consular Service

The entire American consular service numbers less than 1,300 men. The importance of the service, however, can not be judged by the number of men engaged in it, but rather by the benefit which accrues to many thousands of business men in the United States and to millions of invested capital the world over.

There are 318 principal consulates, nearly all of which have agencies under them. The titles of the principal positions in the service are: Consul-general, consul, and vice-consul-general, commercial agent, deputy consul, agent, interpreter, and consular clerk. Sometimes, at the small consulates, our country is represented by a citizen of the country in which the consulate is located.

Consular positions are eagerly sought by a great number of men, though just why no one can determine. Certainly the service does not attract men because of the salaries offered, nor because of the fees which it is possible to earn. The salaries paid are, in most instances, utterly out of proportion to the quality of service expected, and to the demands which are made officially upon those who in foreign countries are our commercial, often our diplomatic, representatives. Our consuls in important cities, like London and Liverpool and Paris, receive only $5,000 a year. Our consul-general in Berlin receives only $4,000 a year. These are the highest salaries paid in the consular service.

The amount of earnings of consular officers, otherwise, runs from the sums just mentioned down to no salaries at all. Where no salary is paid, the consular official must depend upon fees. That a man can not live in this service by fees alone is shown by the fact that our agent at Dover, England, earned in 1901 only $5. This represents the total amount earned in representing this government during the entire year, and yet this particular agent was appointed in 1885, and hence for nearly twenty years has continued in the service, earning each year only a few dollars. On the other hand, our consular officers sometimes earn large fees, three or four times in excess of their regular pay. Our consul at Nottingham, England, for instance, receives a salary of $3,000 a year, but in 1901 he also received $11,400 in fees.

Method of Appointing Consuls

The following order regulating the appointment of consuls, issued by Grover Cleveland, when he was President, is still in effect:

It being of great importance that the consuls and commercial agents of the United States shall possess the proper qualifications for their respective positions to be ascertained either through a satisfactory record of previous actual service under the Department of State or through an appropriate examination, it is hereby ordered that any vacancy in a consulate or commercial agency now or hereafter existing, the salary of which is not more than $2,500, nor less than $1,000, or the compensation of which, if derived from official fees, exclusive of notarial and other unofficial receipts, does not exceed $2,500, nor fall below $1,000, shall be filled, either by a transfer or promotion from some other position under the Department of State of a character tending to qualify the incumbent for the position to be filled; or by appointment of a person not under the Department of State, but having previously served thereunder to its satisfaction in a capacity tending to qualify him for the position to be filled; or by the appointment of a person who, having furnished the customary evidence of character, responsibility, and capacity, and being thereupon selected by the President for examination, is found upon such examination to be qualified for the position.

For the purposes of this order, notarial and unofficial fees shall not be regarded, but the compensation of a consulate or commercial agency shall be ascertained, if the office is salaried, by reference to the last preceding appropriation act, and if the office is not salaried, by reference to the returns of official fees for the last preceding fiscal year.

How the Consuls Help Business Men

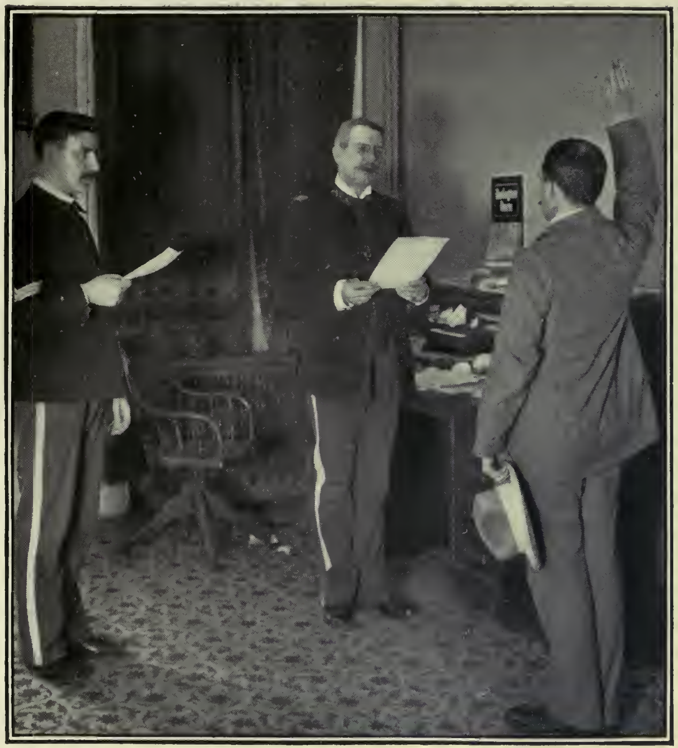
The American consular service helps American manufacturers and merchants in four ways:

First, by the gathering of data concerning the industries, prices of manufacture and markets open to American goods in foreign countries; second, by the general dissemination of that knowledge in this country; third, by response to individual inquiries containing minute information relative to an important matter of commerce or manufacture; and, fourth, by the forwarding of samples of new products or of certain kinds of merchandise particularly suited to this or that market, the establishment of sample rooms at the consulates for the exhibition of American goods, and the maintenance of agencies for the sale of American products.

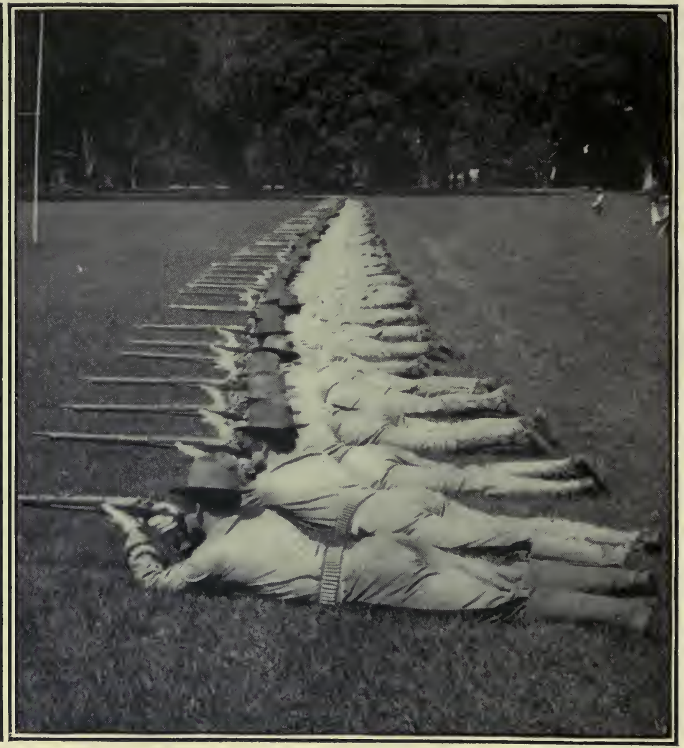
Every consular officer is expected to watch the development of trade and industry in the country to which he is assigned, and to send information concerning industrial and commercial developments to the home office as quickly as possible. In certain cases in which the information would be particularly helpful to the American business world, if such information be of a kind which should be imparted at once, the consular officers are instructed to use the cable. Hence, in addition to the data asked for by or through the State department, a great deal of valuable information is sent voluntarily.

All information coming in from the consuls is made public daily in The Consular Report. This report, therefore, may be called a daily newspaper. In it all information of immediate value and importance is thus brought to the attention of every board of trade and every chamber of commerce and every exporting house throughout the country. By application to the State Department, these reports will be mailed direct to those who may desire them. The more general manner of distributing this news, however, is through the newspaper press. Copies of the daily consular report are sent every morning to every newspaper correspondent in Washington, and at the same time copies are mailed to newspapers all over the country. Editors and correspondents are at liberty to print all or a part of the report according as the information which it contains may be of value. The result is that almost every issue of a daily newspaper contains extracts from these reports, while in hundreds of instances the reports are printed in full.

So thoroughly and intelligently does the consular service meet the demand for information concerning foreign markets that the Department, as before stated, now conducts an enormous correspondence with important business concerns, located in all parts of the United States, who have learned by experience that consular officers can be relied upon to make exhaustive reports even on scientific and other special subjects. One firm of exporters has declared that if all the consular officers were trained newspaper correspondents, the trade news in foreign countries could not be better handled.



ARMY RECRUITING OFFICE—ADMINISTERING THE OATH



CADETS AT THE WEST POINT MILITARY ACADEMY—SKIRMISH LINE DRILL

Vol. II., p. 1003

CHAPTER II

THE ARMY AND NAVY

The Regular Army—Organization of the Army—The Training of Army Officers—General Conditions at the Military Academy—The Private Soldier—Promotion in the Army—Volunteers and Militiamen—The Navy, Preparing a Warship for Service—The Personnel of the Navy—General Conditions at the Naval Academy—The Training of Naval Officers—The Enlisted Force in the Navy—The Naval Apprentice—The "Jackie" and Promotion in the Navy—The Landsman—The Marine Corps

The Regular Army

THOSE trained in the military service may be classed into three divisions, first, he who in his boyhood is reared, trained and disciplined to the profession of arms, where the influence, experience and prestige of parental or professional instructor is directed toward developing the boy's military talents, and the boy in his youth has all the advantage of acquaintance with, observation of and, possibly, experience in the actual conditions of war.

The second class includes the boy who enters the modern military academy, where the history, the theory and the technical application and illustration of the art of war are demonstrated in every possible way, and where the boy receives such instruction as enables him to apply the principles of the science to the varied conditions of actual warfare. At the same time his mental and physical instruction is of such a character as to best prepare him for the rigid and exacting requirements of the service.

The third class is composed of men who possess the courage and natural qualifications most essential for those in the military service who have not had paternal or academic instruction, yet who possess all the enthusiasm, patience, fortitude and gallantry that prompt them to seek the field of carnage and do battle for their country.

Organization of the Army

All the recognized general principles concerning the maintenance of an army apply especially to the 3,820 officers and 59,866 enlisted men comprising the regular army of the United States. The Act of Congress of February 2, 1901, provides that the total enlisted strength of the army shall not exceed at any one time 100,000 men.

The army in active service, as now organized under the above act, comprises:

First: Fifteen regiments of cavalry, 750 officers and 12,620 enlisted men.

Second: An artillery corps, 30 batteries of field artillery and 126 companies of coast artillery, 651 officers and 17,742 enlisted men.

Third: Thirty regiments of infantry, 1,500 officers and 25,345 enlisted men.

Fourth: Three battalions of engineers, 1,282 enlisted men, commanded by officers detailed from the corps of engineers.

Fifth: Staff corps, military academy, Indian scouts, recruits, etc., 2,877 enlisted men.

Sixth: A provisional force, consisting of one regiment in Porto Rico, 31 officers and 545 native enlisted men; 50 companies of native scouts in the Philippines, 100 officers and about 5,000 enlisted men.

The Training of Army Officers

In no institution in the world are the requirements greater and the discipline more exacting than in the United States Military Academy at West Point. From the establishment of the academy, in 1802, to 1811, the percentage of admitted cadets who graduated was sixty per cent. During the next ten years the percentage fell to twenty-eight per cent. In the following decade it rose to thirty-seven per cent. From 1832 to 1841, forty-seven per cent of every hundred graduates who entered secured commissions in the army. During the subsequent years up to 1851, fifty-one per cent graduated. During the decade just before the troublous days of '61 the percentage increased to fifty-two. In latter days, in a period of nearly forty years, the average percentage of cadets entered at the academy who graduated was fifty-nine.

During the academic season of the year, which extends from September to June, the cadet is allowed to sleep until 6:15 A.M. At the sound of the first call to reveille, the cadet must spring out of bed and his day's work begins at once, lasting, with time for meals and a few short periods for relaxation, until ten at night. His time is taken up with the most arduous mental work, with drills and gymnastic training at such hours that the physical work gives the best relief possible from the fatigue incident on study and recitation.

On arising, the young man must dress quickly and with absolute neatness. Exactly fifteen minutes after reveille, "police call" is heard, and the cadet must make up his room with perfect neatness, every step being according to regulation. There is an exact way of rolling the mattress at the head of the bed, and of placing the pillow over it and of folding the covering over the pillow. Every garment not in use has its exact place and must be found nowhere else. Books and papers are placed, according to rule, on the study table. The floor must be swept to a condition of absolute spotlessness.

Very little time is allowed for the "police work." Then bugle call summons the battalion to form outside of the quadrangle. The formation and marching must be carried out with as great precision as in any drill or parade. After marching into the mess-hall the cadets file to their seats, to which they are regularly assigned, according to rule. At each table there is one cadet in charge, who is held accountable for the preservation of order at that table.

Breakfast is finished at about 7.10 or fifty-five minutes after the young man was called from his night's rest. Now "sick call" is sounded by a bugler, and all cadets who feel themselves in need of medical advice or treatment report at the hospital to the surgeon-in-charge. In case of an ailment that does not interfere with the day's work, the cadet is supplied with medicine. Should he be found to be bodily unfit for recitations and drills, he is ordered to his quarters. In this case he may study if he is able to, or may rest until he is in condition to resume work. But if at "sick call" the cadet's condition is found to be serious, he is ordered into the hospital and treated there.

Punctually at eight o'clock there is another bugle call, which summons the entire battalion to the most serious work of the day. Each class is divided into sections for purposes of recitation, and each section forms and marches to the proper classroom. Each instructor is an army officer and a graduate of West Point, who has shown special aptitude in the branches he teaches. The instruction is as nearly individual as possible. There are never more than a dozen cadets in one section, while some contain as few as seven. Each military student is thus able to secure a large share of his instructor's attention, which tends, of course, to bring out special aptitude.

At one o'clock comes an intermission of an hour. The battalion again forms outside of the barracks, marches to mess, and remains there until 1.40. Twenty minutes for recreation follows, and then two hours more of hard work in the section rooms. At 4.10 P.M. the battalion turns out for drill. This is over at 5.30, but it is immediately followed by dress parade. Supper formation is made at 6.30, and the meal lasts until seven o'clock.

It would seem to a young civilian that this ought to complete a pretty fair day's work, but the mental requirements of the academic work are so exacting that the young man must now go to his room and study hard for three hours. At ten o'clock lights are out, and the cadet has eight hours and fifteen minutes absolutely to himself. During the summer encampment the cadet is required to rise at 5.30, but is free from his books. Nearly all the day is taken up with drills and guard is maintained night and day until the encampment is broken up.

General Conditions at the Military Academy

For instruction in infantry tactics and in military police and discipline, the cadets are organized into a battalion of four companies, under the Commandant of Cadets, each company being commanded by an officer of the army. The officers and non-commissioned officers are selected from those cadets who have been most studious, soldier-like in the performance of their duties, and most exemplary in their general deportment. In general the captains and lieutenants are taken from the first class. There are four cadet captains, fourteen lieutenant cadets—two of them discharging the duties of adjutant and quartermaster respectively—a sergeant-major, a quartermaster-sergeant, twenty other sergeants and twenty corporals. All cadets, without regard to class or the duties performed, receive the same pay—$540 a year. This sum, with proper care, can be made to cover all the cadet's expenses, and often leave him enough at the end of the four years' course to buy his uniform and arms when he receives his commission.

The boy who succeeds at the Military Academy is the one who is amenable to discipline. There is punishment for every delinquency, nor is this punishment ever omitted or rescinded where guilt is proven. The delinquencies not serious enough to entail suspension or dismissal are divided into seven groups. Every offence possible is in this long category, and each of the seven divisions has its own number of demerits, ranging from one for an untidy floor to ten for an offence so grave as insubordination or disobedience. There are supplementary punishments, such as "punishment tours," *i.e.,* marching across the quadrangle for a stated number of hours in full uniform and carrying rifle and bayonet. "Punishment tours" are walked Saturday afternoons after inspection, at a time when other cadets are enjoying themselves in any proper form of relaxation that they prefer. Another supplementary punishment is confinement for a stated number of weeks or months within prescribed limits, which cuts off for that time all of the cadet's opportunities for pleasant and relaxing social life.

For lying or other offences against morality the punishment is invariably dismissal, for manliness is the keynote of that for which the academy training strives. Truthfulness and obedience are treated as of prime importance in a cadet's career, and the mental and bodily training comes next.

The Private Soldier

The nation takes a great deal of pains with the new soldier. It does not coddle him to make him a child of luxury, but it improves him physically, mentally and morally by a system of training which develops the worthy characteristics of a man and makes him a better fighting unit. In the scheme of making a soldier's life agreeable to himself and the service acceptable enough to prevent him from being a deserter, the matter of physical training has developed into a business which the army surgeons conduct with a good deal of thought and care. They realize that military efficiency depends upon the strength, activity and endurance of the soldier, and that he is the better fighter in proportion to his bodily vigor, suppleness and ability to withstand the fatigue and hardship of long marches and a campaign in the field.

The recruit is selected, in the first place, with every consideration of his health and strength when he applies at the recruiting office, but naturally many men who are enrolled stand in need of further development, and this is a part of an important and systematic process to which the new soldier is promptly subjected. A man who becomes a soldier may have worked at hard manual labor and may have developed one part of his body to the sacrifice of another. He has abnormal power in one set of muscles and none in another set. Such men pass the surgeon's examination at the recruiting office, but they must be put through the regular course of gymnastic drill, which gives them a symmetry in development, and finally gives to our troops of cavalry and companies of artillery and infantry that splendid physical appearance which has been recognized as the ideal in soldierly bearing and presence.

The care of the soldier takes the form of a robust training, which neglects no part of his anatomy and no organ of his body. The nervous system and the heart are looked after quite as much as the muscles of his legs and arms, and one of the most important of the physical exercises is that which relates to his chest and lungs. He is made to run and walk and breathe—the latter function being more difficult for new soldiers than people imagine.

The military authorities make these exercises as entertaining as possible. They furnish music whenever it can be obtained. They encourage competitive tests and rivalry in the shape of athletic meets, and the officers take so great an interest in their commands as to provide prizes for those who surpass records. A part of the fund gathered by the post exchange is always used in the equipment of a gymnasium in which enlisted men take the greatest pride. In the cavalry, the animals come in for a part of the spectacular exercises which are possible by the combination of men and horses. The well-drilled troop of United States cavalry in some of its manœuvres furnishes an exhibition which rivals that of the professional riders of the best circus in the world.

One feature of serving in the army is that a man can make it a life service, and if he properly deports himself he can rest assured of a fair income until his death. Even though sickness or old age come he is provided for. There are pensions and salaries for those who have retired on account of old age or sickness. This shows that the government is more sympathetic in its treatment of employés than most private concerns.

Promotion in the Army

In the army the way for advancement is clearly defined, and if the officer performs his duties thoroughly he will gradually make his way upward according to well-established rules of promotion. There are few exceptions. A young officer who makes a special mark in any particular line will be promoted above the heads of those who have shown no such aptitude. Our late war brought out a whole crop of young West Point graduates, who distinguished themselves and were accordingly advanced rapidly. This special promotion may also follow in times of peace. A young officer in the engineering department of the army may become an authority on his particular subject. His gifts may win special rewards for him. Sometimes he receives special appointments on commissions named by the President, or he contrives inventions which the government takes from him and pays liberal compensation for. There is, indeed, opportunity for a bright, persistent student of engineering, of mechanics, or of war strategy to distinguish himself. He has the advantage of government aid, advice, and a special library of reference works to facilitate his work.

Volunteers and Militiamen

In several countries under monarchical government, especially where they are in close proximity to each other, it has been deemed for the best interests of the state to require a large portion of the able-bodied male population of a certain age to become drilled and trained soldiers. In general, where such a rule is in force, the young man is first required to serve a certain number of years with the regiments; after that he must serve a limited time during each year for several years with the colors, and from that time until he ceases to be of suitable age he continues part of the grand reserve of the military force of the nation. It has been claimed by some authorities that this experience, aside from its necessity in preserving the safety and strength of the nation, is beneficial to the man during life inasmuch as the young man is taught discipline, respect for superiors, habits of obedience to lawful authority, habits of regularity of life, and is required to exercise self-control and to practice the most rigid rules for the development of his strength and the preservation of health.

In a republic like ours, however, all of this service is voluntary, for when a man enters the military profession, whether it be to devote his life to the service, or whether he enters it at a time of great emergency for a brief period, he accepts cheerfully of his own accord the obligations imposed.

In all sections of the country the term "National Guard" is applied to the militia. The term is not strictly correct, but its use is explained as "an anticipation of a Federal reorganization of the militia of the whole United States." Until such reorganization takes place, however, our volunteer forces remain simply State troops, and we can have no national guard. Every State in the Union, meanwhile, has its militia, in which are enlisted young men of all stations in life, rich and poor, and engaged in every known trade and profession. In the ranks of the Seventh Regiment of New York, in the Twenty-third Regiment, and in Squadron A of the same State, there are millionaires as well as mechanics.

The total number of men liable to military service in the United States is about 12,000,000. The total number of militiamen authorized by the various States is less than 200,000. The total organized force, so far as the militia of the States is concerned, is only about 106,000 men. With nearly 14,000 men enlisted in New York, this State leads in point of numbers. Pennsylvania comes next with 10,000 men; then Massachusetts and Ohio each with 5,000; then New Jersey with 4,000. The smallest number of National Guardsmen is to be found in South Dakota, which has less than 100 militiamen under arms.

THE TRAINING OF A SOLDIER—UNITED STATES TROOPS ON THE MARCH

DRAWN BY FREDERIC REMINGTON

The Navy—Preparing a Warship for Service

As soon as a ship-of-war is completed she must be commissioned, which means being put in charge of her officers and crew and in all respects prepared for service. In the case of a battleship or a large cruiser, 400 or 500 men and officers must be provided. Vessels are commissioned as soon as they are completed, in order to ascertain if all the requirements of the specifications covering their construction have been complied with. These are speed; power of machinery; the installation and working of the battery; the ship's equipment, such as the working of the anchors and chains; the boats, steering-gear, compasses, electrical appliances, and many other, almost unnamable, devices now in use in modern ships-of-war. The demands upon the personnel of the Navy are further illustrated by the fact that modern ships, especially battleships and torpedo boats, should always be cared for by keeping a reduced crew on board of them, even when laid up at the Navy Yard and not commissioned for active service. A battleship is of the most complicated construction. It is filled with auxiliary engines and labor-saving machines, none of which should be neglected or allowed to deteriorate, but all kept in working order so that they may quickly be put into working condition, and when thus being looked after the ship is said to be in reserve.

Torpedo boats, many of which are supplied to all modern navies, are of especially delicate construction in hull, engines and boilers, and if not constantly cared for by trained men will rapidly go to pieces. A proper knowledge of how to handle as well as to care for torpedo boats requires their being frequently used, which of course means additional officers and men. In order to carry on the training of the personnel, the services of many officers and many of the Navy's trained petty officers and men are required.

A training ship, no more than any other ship, can be sent to sea with a crew of landsmen alone. She must have a crew of seamen sufficiently large in number to navigate her under all conditions of weather, independent of the men undergoing a course of training. At the present time the following ships of our Navy are being used to train landsmen for seamen: the *Hartford, Lancaster, Mohican, Topeka, Buffalo, Dixie, Alliance,* and the battleship *Indiana.* It is the intention to add to this number, in the near future, the *Panther* and the *Prairie.* The *Alert, Essex,* and *Monogahela* are also being used in the training of naval apprentices.

The Personnel of the Navy

The duties of a naval officer are multifarious and never-ending. The properly equipped naval officer, under modern requirements, can not be improvised; he can only be produced by a long and laborious course of study and training. To have him in time of war we must produce him in time of peace. The trained man-of-war's man is also a necessity, but the trained officer is even more essential. The demand for his services is very great;

for not only is he required on board our battleships and cruisers actually in commission, but, as already shown, a large number are employed in carrying on the training of the newly enlisted personnel.

Besides those officers required for duty on board ship (and there are now, out of the entire list of lieutenants and ensigns, 77 per cent at sea), a very considerable number are required for a proper administration of the several bureaus of the Navy Department, the administration of our Navy Yards and receiving ships, and for the inspection of the ships and their machinery under construction; also for inspection of material for ship and gun construction, for which purpose alone sixty-one officers are now employed; and, finally, at the Naval Academy, where forty-nine officers of the line are now on duty, all engaged in the very necessary service of training, drilling, and disciplining the cadets under instruction.

The Personnel bill, reorganizing the line of the Navy, passed by Congress in March, 1899, transferred all engineer officers to the line. In order to create a proper flow of promotion, this bill provided that there should be, each year, forty vacancies in the line above the grade of ensign. The graduates from the Naval Academy being our source of supply to the grade of ensign (the lowest commissioned officer), it follows, that unless the number of graduates each year exceeds forty, there will be no increase in the total number of commissioned officers. The number of graduates of the Naval Academy during the past five years has averaged below forty.

The number entering the Naval Academy each year must therefore be increased. This has been done to a moderate extent by changing the law governing admissions, so that at present each Congressional representative may always have an appointee at the Academy, provided he passes the necessary entrance examinations. Even with this change, the output of graduates will not be sufficient to meet the demands of the service, and its effect at best can not be felt for several years to come. It is suggested that each representative in Congress be given *two* appointments instead of one.

The active list of the Navy comprises 1,346 commissioned, 461 warrant, officers; and 25,258 men. By act of Congress of March 3, 1899, a force of 150 warrant machinists to perform engineer duty was also provided, and increases authorized in the medical, pay and marine corps.

The Ships of the Navy

The vessels of the Navy fit for service January 1, 1903, numbered 223; vessels under construction numbered 63; vessels unfit for sea service numbered 24; total number of vessels, 310.

The total included 19 seagoing battleships, 10 armored cruisers, 7 double-turret monitors, one ram, 9 single-turret monitors, 27 unarmored steel vessels; 23 gunboats, 3 vessels of a special class, 5 auxiliary cruisers, 37 torpedo boats, 8 submarine boats, 16 torpedo-boat destroyers, and a number of unarmored gunboats, old naval vessels, tugs, and vessels used by various State Naval militia.

General Conditions at the Naval Academy

Until very recently, no more provision for naval officers had been made for our new and more modern navy than had been necessary to officer the wooden vessels of earlier days. Congress was made finally to appreciate this fact so keenly that, in the bill approved June 7, 1900, making appropriations for the navy during the fiscal year ending June 30, 1901, provision was made for a substantial increase in the number of naval cadets allowed at the United States Naval Academy, Annapolis, Md. That act provided that:

> Whenever any naval cadet shall have finished four years of his undergraduate course of six years, the succeeding appointment may be made from his congressional district, or at large, in accordance with existing law. The appointees to follow the two classes of cadets now at sea may enter the Academy during the present year; and those to succeed the class, which is now finishing its four years of study, shall be appointed before March 4th, next, to enter the Academy during the year 1901.

This provision virtually made an increase of thirty-three and a third per cent in the number of cadets allowed at the Academy during any given time by reducing the course at the Academy from six to four years and allowing a new cadet to be appointed from each Congressional district and organized Territory, as well as from the District of Columbia and at large, every four years instead of every six years, as had been the law and practice up to that time.

The experiment of operating through the agency and under the auspices of the Civil Service Commission, was tried on August 13, 1901. It proved to be so satisfactory that, under date of September 26, 1901, the Navy Department issued a general regulation on the subject, providing in accordance with arrangements made with the Civil Service Commission, that hereafter, till further notice, all examinations will be held at various points throughout the United States, under its supervision, and that no examination will be held hereafter at the Naval Academy for admission.

Under the new arrangements, three examinations for admission into the Naval Academy will be held each year: the first on the third Tuesday in April; the second, on August 11, each year, at points designated by the United States Civil Service Commisssion nearest the homes of the candidates; the third, at Washington, D. C., only on September 15, each year, for the accommodation of all candidates who have for any reason been unable to report for examination at an earlier date. Under this arrangement, however, confusion will arise, if it is not remembered that the Civil Service Commission has nothing whatever to do with the selection or appointment of cadets.

Under the law and regulations as they now stand, each candidate for admission into the United States Naval Academy at Annapolis, Md., must be between the ages of fifteen and twenty years when he reports to the superintendent of the Academy; must be unmarried; must be of good moral character; must be almost perfect physically; must be a bona fide citizen and actual resident of the Congressional District and State, Territory, the District of Columbia or the United States at large, according to his appointment, and he must stand a satisfactory examination in reading, writing, spelling, arithmetic, geography, punctuation and use of capitals, English grammar, United States history, and the outlines of the world's history.

The Training of Naval Officers

Under the present system the cadet remains for four years at Annapolis, engaged in study. He is then sent to sea for two years, and returns for his final examination. It is only after such final examination that the cadet becomes a commissioned officer.

A very important factor in the training of the naval cadet is the summer cruise. The first week in June is the usual date of setting sail from the Academy. The "middie" packs his belongings and takes them aboard the Practice Ship, especially provided for the cadet's cruise. The U. S. S. *Chesapeake* was built for this express purpose, but in recent years the U. S. S. *Indiana* has been used in addition, owing to the increased number of cadets.

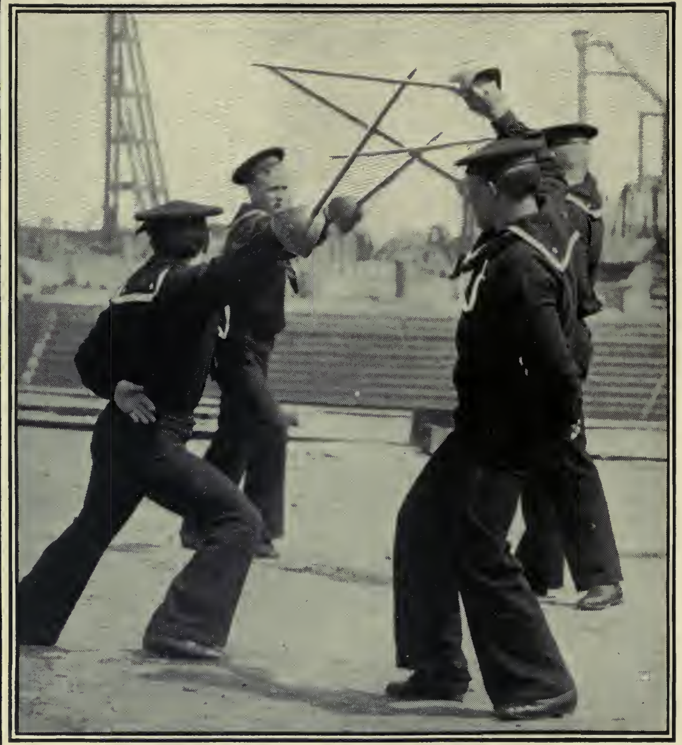
After having been at sea for some time the practice ship points her bow toward the coast, where she again comes to anchor. Selecting a long, clear stretch of water the "middies" are drilled in target practice, a floating target being previously moored 1,600 or 1,800 yards away. With the six-pounders and four-inch rapid fire guns the cadets make some remarkably fine shots, thus illustrating the value and advisability of actual gun practice. While riding at anchor the cadets have many other drills, such as unrigging the row boats and lowering them to the water. This is calculated to insure quick action and means of escape in case the practice ship should get so seriously damaged that she would have to be abandoned. Fire drills are given at the most unexpected times to further insure the proficiency of the cadets.

When six or seven weeks have been spent in training our future naval officers aboard a sailing vessel, they are transferred to a modern man-of-war. In this way the cadet becomes familiar with the construction and working of the steering-gear, anchor-hoist, and massive engines, which require days of study to thoroughly understand their intricate make-up. While the cadet has no sails to furl or loose, he must sketch and satisfactorily explain the working of these wonderful devices by which the great steel monster of the ocean is made to perform its work. The large guns of the war ship also provide ample opportunities for study. Accurate sketches have to be drawn of the various guns, boilers, and sets of machinery, showing the different parts and illustrating their use.

The Enlisted Force in the Navy

In the navy, as well as in the army, there is a shortage of both men and officers. An official of the Bureau of Navigation not long ago declared that if the government were to be suddenly called upon to man for war service all

GUN PRACTICE ABOARD A MAN-OF-WAR



BLUE JACKETS AT SWORD PRACTICE

Vol. II., p. 1011

the vessels available in the navy yards it would be confronted with a requirement impossible to meet. As the matter stands to-day, there are not even enough line officers to man the vessels already constructed. As soon as the new ships now under construction are put into commission the demand for officers and sailors will be more pressing than ever. Meanwhile the Navy Department is making every effort to secure apprentices and recruits, so that a sufficient number of trained seamen will be ready to man the new ships.

Man-of-war's men are of two kinds—the one who entered as a boy between the ages of fourteen and eighteen, and the one who entered the navy as a man. The one who entered as a boy has a very decided advantage over the one who began his naval life after his twenty-first year. The boy who began as an apprentice has the benefit of long training, and it is he who, later in life, is promoted to the higher positions on board ship. A comparison of the courses which the boy, called the apprentice, and the man, called the landsman, must pass through before becoming first-class seamen, will show why the apprentice has the advantage of the landsman, and why the landsman is still scrubbing decks or polishing brasses while the younger man has steadily advanced from 'prentice to warrant officer.

The principal recruiting station for apprentices is the old receiving ship, *Vermont,* at the Brooklyn Navy Yard. Eighty-five per cent of the apprentices who apply here for enlistment are of American birth, and only a few of them have ever seen more of the sea than that which lies between the Battery and Coney Island. Each of the lads must bring a letter of recommendation from his teacher or employer, and a letter in which consent is given for his enlistment from his parents or guardians. After he has been accepted by the sharp-eyed and long-experienced recruiting officer, he is placed in charge of the medical officer to undergo a physical examination a great deal more severe than that imposed by any life insurance company. If he passes the physical test successfully he must then sign papers, by which he binds himself to the government until he is twenty-one years of age.

The Naval Apprentice

Within a few hours after his enlistment he is fitted with a typical sailor's costume. His trousers flare at the bottom, and on the breast of his jumper appears the figure-of-eight knot. His pay is $9 a month. Not until he has reached the dignity of twenty-one years and the rank of seaman will the figure-of-eight knot be shifted from the breast to the sleeve cuff of his jumper. Meanwhile he will have passed through several periods of training, his education continuing without vacation for the entire term of his apprenticeship.

After a week or two on the *Vermont* he is transferred, in company with twenty or thirty other apprentices, to the United States training school at Coasters Harbor, near Newport. Here he begins what really may be called his college life, for now his education begins in earnest. A thousand or more other boys are here undergoing the same schooling, so the young apprentice has no chance to be lonely. The very first thing the youngster is taught is how to make himself clean, and how to stay clean. A soiled jumper, an unpolished shoe at the training school, as anywhere else in the navy, is an offence for which no excuse is accepted. Though he lives in barracks, the apprentice's daily life is regulated exactly as on board a battleship or a cruiser, excepting that in addition to ship-board duties he is trained in land evolutions. On the lawn surrounding the barracks masts are planted, each with its full complement of rigging and sails. Here the apprentice learns "rigging jumping," free from the danger of falling overboard.

A bright boy finishes his course at the training school in about three months; the dullest is supposed to get through in six months. Now comes the apprentice's baptism of salt water, for he is now put aboard a real ship, and soon finds himself actually at sea. The principal training ships are the *Essex*, which is a bark-rigged steam auxiliary, and the *Monongahela,* a full-rigged ship, depending entirely upon her sails. It is to one of these ships that the apprentice is transferred from the training school. If aboard the *Essex,* he is in the company of 200 other apprentices; or, if aboard the *Monongahela,* his shipmates number more than 300. For the training of seamen the Navy Department still adheres to the opinion that the best vessel for the purpose is one under sail. The argument is that the best way to make a sailor is to teach him how to sail. On each of the training ships a large crew of thoroughly seasoned man-of-war's men is carried. It is the duty of these man-of-war's men, or jackies, to help teach the apprentices and instruct them in the ways of the sea; hence the working of the ship is practically given over to the boys who perform their duty under the direct supervision of the jackies, and of naval officers whom the Department has chosen as specially qualified for the purpose.

At last the cruise in the training ship ends, and now the apprentice is sent to a receiving ship, there to await transfer to the first man-of-war that calls for more hands. Once aboard the battleship, the cruiser, the gunboat, the torpedo boat, or whatever class of vessel he happens to have been assigned to, the apprentice is still officially only a boy, though he now does the work of a man-of-war's man. From the very moment he steps foot upon a warship he becomes a part of the fighting force of the United States Navy, and from this moment onward his advancement depends entirely upon his own ability. It may possibly take him some months to discover just which branch of the service he is best fitted for. In making his choice, especially if he is a bright boy, he will be helped in every possible way by the officers of the ship. He may become a signal boy of the first class, or he may enter the dynamo-room with a view to becoming in later years a chief electrician; or he may prefer to become a gunner, in which case he joins one of the gun crews.

After three years on a ship of war he has become a first-class apprentice, and is paid $21 a month. If he now wishes to have certain special instruction in a particular branch of the service, he makes the proper application, and is transferred to the naval station, where he is instructed in his chosen specialty. At the age of twenty-one, however, no matter where he is, he is discharged with the title of "man." Nine out of ten of such "men," however, immediately re-enlist and become full-fledged jackies.

The "Jackie" and Promotion in the Navy

The law is now such that it is possible for a jackie to become a commissioned officer, to go forth from the fo'castle to the ward-room. Only the very brightest and smartest, however, can even hope to take advantage of the law which gives the enlisted man a chance to wear the gold braid and the sword of a naval officer. Even the smartest must have the advantage of gentle birth, for in the navy the "officer-and-a-gentleman" idea is more jealously guarded, even, than in the army. Meanwhile, if he has taken the course of instruction in gunnery at the Newport torpedo station, he can in six months hold the official rank of seaman gunner. In the next step he becomes a warrant officer with the rank of gunner, and an annual pay increasing from $75 to $150 a month.

If he is studious and a hard worker, has natural talent and the qualities of a gentleman, it is possible for him to go before an examining board before he is thirty years of age, with a view to passing an examination as an ensign. In other words, he is now a candidate for a commission.

The Landsman

Elsewhere in this chapter reference is made to the landsman—he who entered the navy at an age beyond his twenty-first year. What has the landsman been doing while the apprentice has been forging ahead? And what are the landsman's chances for advancement? The very fact that he enlisted as a grown man, as already explained, is to his great disadvantage. With probably an exceedingly limited education and with little, or, more probably, no experience at sea, he is simply regarded by officers and jackies and apprentices alike, as a land-lubber, only fit to do the menial work of the ship. On board such training ships as the *Buffalo, Hartford, Dixie, Lancaster* and *Prairie,* however, he is instructed in the duties of a seaman quite as thoroughly as are the apprentices on the *Essex* and *Monongahela;* but it must be remembered that the landsman does not receive the preliminary training which is vouchsafed to the apprentices, and therefore is handicapped throughout his career.

Though he is older than the apprentice, he will ever remain several years behind the latter in professional knowledge and skill. Even when he is transferred from the training ship to the ship-of-war, his education is not nearly as complete as that of the apprentice. His knowledge of naval, if not of nautical, affairs, is indeed so limited and superficial that only by the hardest work, and after many years of enlistment, can he hope to attain the rank of one of the more important petty or warrant officers. He may become a third-class petty officer, such as carpenter's mate or coxswain, with an annual pay of $480; or he may even become chief master at arms, with an annual pay of about $800, but because of what he lacks in the way of education it is probable that he has now reached the limit of promotion, can go no higher.

The Marine Corps

The marines are the police of the navy, or the infantry of the sea. On shore they may be called a military guard in charge of the navy yards, the marine barracks in Washington, and all other places within the jurisdiction of the Navy Department. The corps consists of a force of 212 officers and 6,000 men. The officers rank with those of the army. As the service is purely military, the marines aboard ship have nothing to do with navigation. They stand "watch and watch," not with eyes turned seaward, but ever "deckward." They are not lookouts, but watchmen.

The long period, five years, for which recruits entering the marine corps are required to bind themselves to serve, presents an obstacle to enlistment. This corps is the only branch of the military service having five-year enlistments, the army term being three years, and that of the navy four years.

The small number of officers available for recruiting duty in the marine corps makes it necessary to group the recruiting offices into recruiting districts, each district being under the direction of a commissioned officer, with headquarters at the principal recruiting office, and the substations being under the immediate charge of a non-commissioned officer, with the exception of the substation at Pittsburg, Pa., which is under charge of a commissioned officer. The recruiting officer visits the substations in a circuit to swear in recruits as often as may be warranted by the number of applicants who present themselves and pass the physical examination. The main office of the recruiting district is, for all practical purposes, permanent, being established in some large city, where a reasonable number of recruits can be counted upon each year. The substations in the various districts, however, are changed from place to place, as certain fields of recruiting become exhausted, and others are recommended by the recruiting officer. Marine recruiting posters are sent out and displayed in the towns throughout the country in the vicinity of the recruiting offices, being placed in the post-offices and other prominent places, and advertisements for recruits are also inserted in newspapers that are liable to reach the population from which recruits are drawn.

Since the passage of the act of Congress approved March 3, 1899, it has been possible for meritorious non-commissioned officers of the marine corps to be promoted to the rank of second lieutenant in the corps, and four non-commissioned officers have been so advanced.

CHAPTER III

CIVIL SERVICE AND GOVERNMENT EMPLOYMENT

Positions Under the Civil Service—Competition for Civil Service Positions—Civil Service Examinations—Prospect of Employment and Salaries—The Classified Civil Service—The Postal Service—Organization of the Postal System—Postmasters and Postmen—The Railway Postal Service—The Star Postal Routes—The Lighthouse Service—Lighthouse Keepers—The Life-Saving Service—Life-Saving Station Keepers—Life-Saving Crews—The Revenue Cutter Service—The Marine Hospital Service—The Quarantine Service—The Custom House Service

Positions under the Civil Service

AMONG the positions in the Civil Service, secured through competitive examination, the following may be mentioned as affording ready access to the service as well as opportunities for advancement: Stenographer, fourth assistant examiner in the Patent Office, scientific assistant in the Department of Agriculture, civil engineer, topographer, draughtsman, aid and computer in the Coast Supply, and other technical positions. To this list may be added the position of department assistant in the Philippines civil service, for which examinations are to be held by the United States Civil Service Commission. These examinations are intended to secure men who are fitted not only for entrance to the service in the Philippines, but who have already developed qualifications which evidence their fitness for advancement to positions of the highest responsibility in the service. With this end in view, the examinations were made to consist of a basis examination which can be passed by any man who is a good English scholar, with a knowledge of mathematics, of our history, Constitution and government, of commerce, territorial government and administration, and of political economy, as taught in the colleges of the country. Optional examinations are also provided on the subjects of finance, civil engineering, sanitary science, agriculture, municipal administration, educational methods, chemistry, botany, mineralogy, forestry, theory and practice of statistics, geology and other subjects, any number of which may be taken by any competitor, according to his inclination and ability. These optionals will be changed somewhat from time to time as the needs of the Philippines service may require. It is thought that this method of examination may be advantageously introduced into our Federal service.

While it is true that the Federal service does not hold out the large rewards offered by the great industrial and commercial enterprises, there is a growing disposition on the part of educated persons to accept service under the government at less compensation than is paid for a like service in private life. This is attributable to a growing unselfishness of devotion to public duty and to the increasing honor attached to public service as it is placed upon a basis of merit, as well as to the security of tenure, and of the emoluments of the office; the educational and other advantages incidental to residence in Washington, and to the exceptional advantages offered by the government itself in its far-reaching scientific activities, by reason of which it may be properly styled the greatest university of the world for training young men who wish to follow careers in the various branches of science.

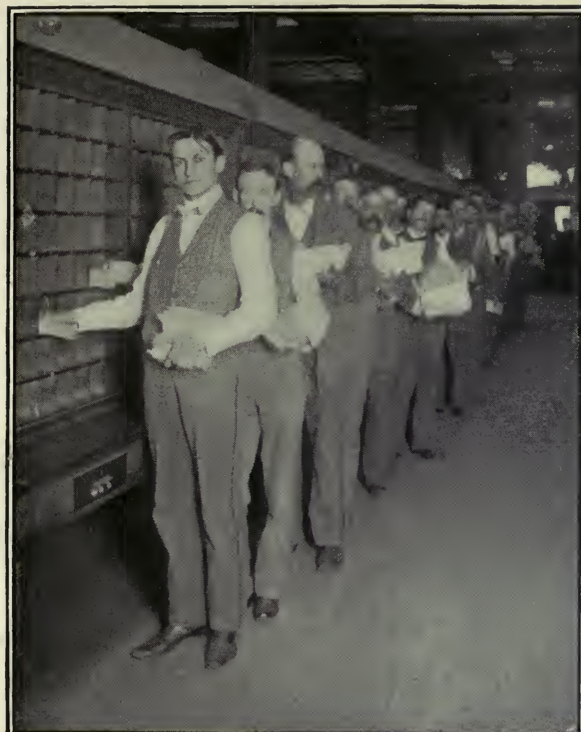
Among the educational advantages offered by the service may be mentioned also the night courses—scientific, literary and professional—offered by the several universities in Washington, by means of which many young men, while earning a livelihood in minor positions in the civil service, supplement their previous educational training by courses of study which otherwise would be beyond their reach. In this way hundreds of persons in the civil service in Washington annually secure degrees in science, arts and medicine.

Competition for Civil Service Positions

In aspiring to an appointment under the Civil Service, the applicant should remember that there are always more eligibles having ordinary qualifications than are required for appointment, and that to pass with a percentage of 70—the lowest accepted in the examinations—is no indication that an appointment will follow. On the contrary, such a low percentage should be accepted as a sign of a slim chance of receiving a position. As 100 is the highest possible mark, the nearer one can approach to that percentage in the examinations the greater will be the opportunity of receiving an immediate appointment after certification. In case of women typewriters in the departments at Washington, it is specifically announced that only those who pass a grade of 88 per cent have any prospect of appointment. Likewise the number of eligibles in the Railway Mail Service is so much in excess of the demand that few below the 88 per cent grade have any immediate prospect of employment.

Civil Service Examinations

The regular schedule examinations for the Departmental and Government Printing branches of the service are held twice a year, unless otherwise specified, in the spring and in the fall. The spring examinations occur usually in the months of March and April, and the fall examinations in the months of September and October. This paragraph does not apply to the Custom House and the Post-Office branches. The Internal Revenue examinations are held only in the fall. The application blank and Manual for the Department, Government Printing, and Internal Revenue branches of the classified service may be obtained by writing directly to the "United States Civil Service Commission, Washington, D. C."



POSTAL SERVICE—SKINNING THE CASES, CHICAGO POST-OFFICE

LIFE-SAVING SERVICE—THROWING OUT THE LIFE-LINE

Vol. II., pp. 1018, 1022

Prospect of Employment and Salaries

It is not possible to estimate the prospects for appointment. The law requires examinations to be held, but the passing of an examination does not insure appointment. The conditions of appointment in the various branches of the service are such that nothing can help and nothing can hinder the certification of a name in order of its standing on a register. As the highest possible mark is 100 and the lowest that gives eligibility is 70, it follows that the nearer a mark is to 100 the more likely it is that the person may be reached for certification within the period of eligibility. There are generally on the registers more eligibles having ordinary qualifications than are required for appointment. Under the Civil Service rules the appointing officers are the final judges of the qualifications of the persons selected for appointment, and with the proper exercise of their discretion in selecting from those certified the commission cannot interfere.

Entrance to the departmental service is in the lowest grades, the higher grades being filled generally by promotion. The usual entrance grade is about $900, but the applicant may be appointed at $840, $720, or even $600.

There are very few special appropriations for the positions of stenographers, typewriters, bookkeepers, draughtsmen, etc., and persons who pass these examinations are usually appointed with the designation of clerks or copyists. The supply of male eligibles in stenography and typewriting is hardly equal to the demand, and the male applicants proficient as stenographers and typewriters have much greater prospects of appointment than other applicants.

The Classified Civil Service

The entire classified service may be divided into three classes, with reference to the provision made for filling vacancies.

The first class includes those positions for which registers of eligibles are constantly maintained. For this class examinations are ordinarily held twice a year, on the regular schedule dates.

The second class includes positions in which vacancies occur less frequently, and for which no registers of eligibles are ordinarily maintained. Examinations for these positions are held only when eligibles are needed. It is the practice of the commission to announce such examinations through the newspapers as items of news. The announcement is made at least thirty days before the date of the examination, unless a necessity exists for filling the vacancy in less time, in which case a notice of not more than two or three weeks is sometimes given. Persons who have special or technical qualifications or who desire to compete for any position not covered by schedule examinations may obtain from the commission a blank request to be notified of special or technical examinations, and file it with the commission. Whenever one of such examinations is announced, the commission will notify all persons who have requested notification of an examination of the character of the one to be held.

The third class includes all of those positions in the classified service in which vacancies are regularly filled by transfer, promotion, or reinstatement, and not by appointment of persons outside of the service. It is becoming more and more the practice of the departments to fill the higher grade positions, such as chiefs of division, etc., by promotion or transfer instead of by original appointment.

The principal branches of the classified Civil Service, in which examinations are held regularly, are as follows: Departmental Service at Washington, Custodian Service, Custom-House Service, Engineer Department at large, General Land Office Service, Government Printing Service, Indian Service, Internal Revenue Service, Life-Saving Service, Lighthouse Service, Marine Hospital Service, Mint and Assay Service, Navy-Yard Service, Ordnance Department Service, Post-Office Service, Railway-Mail Service, Revenue Cutter Service, Steamboat Inspection Service, Sub-treasury Service.

The Postal Service

This paragraph might be headed The World's Greatest Business Concern, for the postal establishment of the United States is without equal as a business institution, public or private, in any land. Certain nations have a larger population than ours, but in no country does intercommunication cover so great an area of service and assume such magnitude of proportions as in the United States. Ex-Postmaster Charles Emory Smith himself says of the United States Postal Establishment: "It handles more pieces, employs more men, spends more money, brings more revenue, uses more agencies, reaches more homes, involves more details and touches more interests than any other human organization, public or private, governmental or corporate."

As the great postal system musters an army of more than 200,000 employés, there are a great many executive positions open to capable men, and altogether the service offers more numerous opportunities for advancement than any other branch of the government service.

The Post-Office Department is indeed one of the largest employment bureaus of the government, the majority of those engaged in this service securing their positions through competitive examinations and promotions. The postmaster and the chief assistant of each post-office in the country are exempt from the Civil Service examinations, but all other positions come under the competitive system. Thus the greater number of persons entering this service do so at the bottom of the ladder, beginning as clerks and carriers, and working up by promotions to the higher positions, passing new examinations each time they are advanced.

Carriers must be over twenty-one years of age at entrance, and not over forty; clerks, eighteen years and over. There are also examinations held in the Post-Office Department for porters, doorkeepers, janitors, stenographers and typewriters. Both in the Post-Office and Departmental service the entrance salary of typewriters is from $600 to $1,000—rather more than the average wages paid by commercial houses. Clerks who understand shorthand as well as typewriting have their names entered upon two registers, thus doubling their chance of an early appointment. Speed and accuracy in stenography and typewriting are absolutely essential.

Organization of the Postal System

The general organization of our vast postal system as it exists to-day is the result of developments during the last generation. The department is divided, first of all, into four grand divisions, or bureaus, each in charge of an assistant postmaster-general.

The division in charge of the first assistant has to do with the practical administration of the post-offices, directs the affairs of their numerous carrier and clerical forces, concerns itself generally with the actual management of the system and the multitudinous questions pertaining thereto, and in addition supervises an annual expenditure of about $45,000,000.

The duties of the second assistant's bureau include the mighty task of providing for the transportation of the mails, the annual expenditure for which is nearly $40,000,000.

The bureau of the third assistant deals with the financial side of the system, furnishing the stamps and keeping the accounts.

The fourth assistant's bureau is responsible for the appointment of postmasters whose salary is less than $1,000, and there are about 70,000 such postmasters.

The sum total of the work of these four grand divisions, which virtually comprise the entire postal system, contains a number of interesting figures: it directs nearly 74,000 post-offices, handles over six billion pieces of mail matter, of which nearly three billion are letters; manufactures and delivers yearly four billion postage stamps of a value exceeding $72,000,000. The system carries more than two billion newspapers in a year, while about 12,000 letters are dropped into the post-boxes and post-offices of the United States each minute of the day.

Postmasters and Postmen

As before stated, the number of post-offices is about 74,000, more than 70,000 of which are fourth class offices, that is, those which carry with them a salary of less than $1,000. When the salary exceeds $1,000 the President makes the appointment, and hence the 4,000 offices included in this classification are called "Presidential offices." The great number of fourth class postmasters explains in itself the reason why it is impossible for all postmasters to be appointed by a central authority located at Washington. The majority of such postmasters, therefore, are appointed by local representatives who recommend proper persons for the place. The post-office of highest rank in the United States is that of New York, the annual revenue of which exceeds $8,000,000, the net profit being fully $5,000,000.

Next to the postmaster the most familiar representative of the postal system, as far as the public is concerned, is the letter carrier. There are nearly 15,000 letter carriers, or "postmen," their pay-roll aggregating nearly $15,000,000. These carriers form a very compact army, having their own organization. Altogether the delivery system has been carried to a high state of perfection.

The Railway Postal Service

The most hazardous and most interesting feature of the service is the railway post-office—the artery of the whole system. The number of employés in this branch of the service is nearly 8,500. Practically every mile of railroad in the country is covered by this service. It is estimated that the actual distance travelled by the postal cars during a single year is about 285,000,000 miles. The total number of pieces of mail carried yearly by the railway postal system is beyond the power of imagination to appreciate, the figure being more or less than 14,000,000,000.

Each postal car is practically a fully equipped post-office, so far as the handling of the mail therein is concerned, for in these cars the mails are now handled, sorted, pouched, and delivered. Thus the work is done while travelling at the rate of more or less than a mile a minute, so that when the mail reaches the city or town for which it is designed, it is all ready for the carriers. The men employed in this service are all experts in postal matters and are otherwise men of peculiar talents. Before entering the service they are required to pass examinations by which their fitness to handle the mails correctly is determined. The most rigorous tests to which they must submit are called "case examinations," the preparation for which consists in memorizing the name and order of every post-office in a given territory, and the list of such offices must come from their lips as easily as would the alphabet. Unless they can pass the "case examination" satisfactorily they can never hope to enter the postal service.

To see the railway postal clerks at work is a revelation of the development of memory within a certain scope. Moreover, in throwing letters to the right box across the car they become as expert as magicians who handle cards on the stage. To show how few flaws there are in the memories of these men, it should be added only one error is made to every 10,000 pieces of mail distributed correctly.

The Star Postal Routes

Another interesting phase of the postal service is that embracing the "star routes." These number more than 22,000, and vary in length from a fraction of a mile to several hundred miles. The term comes from the fact that such routes are designated on the post-office registers by three stars, these stars standing for "Celerity, Certainty and Security."

The most interesting feature of the star route system is the annual "letting." For the purpose of making contracts for the 22,000 routes, the country is divided into four general contract sections; each route in each section is relet every four years, the sections being taken in turn year by year for the purpose. Thus nearly 6,000 contracts are awarded at each of the annual lettings. An idea of the fierceness of the competition may be gained from the fact that usually about forty bids are received for each route.

A number of enterprising men known as "speculative bidders" make a special business of submitting bids for practically all the star routes. This in one way accounts for the large number of bids received and for the very low figure at which the bids are placed. Sometimes the figures of these speculative bidders, even for a route covering hundreds of miles, differ by less than ten cents. They have become so expert in estimating costs that they can make "celerity, certainty and security" bids for routes in any part of the country. They set themselves the task of studying the prevailing conditions in the various sections of the country, the condition of roads, obstacles to be overcome and the cost of stock, feed and labor. The longest star route at present is from Juneau, Alaska, along the Yukon River, to Tanana—1,618 miles in all. Sometimes a single speculative bidder succeeds in getting as many as 1,000 or 1,200 contracts. These bidders, or, more properly, contractors, in turn sublet the contracts to local bidders.

The Lighthouse Service

The theory of coast lighting is that each coast shall be so set with towers that the rays from their lights shall meet and pass each other, so that a vessel on the coast shall never be out of sight of a light, and that there shall be no dark spaces between lights. This is the theory upon which the United States is proceeding, and it plants lights where they are most needed upon these lines. Hence from year to year the length of the dark spaces on its coasts is lessened or expunged entirely, and the day will come when all its coasts will be defined from end to end by a band of light by night and by well-marked beacons by day.

Under the Lighthouse Service, there come scores of positions desirable according to the ambition of the individuals and their past education and training. Keepers of lighthouses and lightships, pilots, mates, and masters of the district, and clerks, skilled laborers and workmen are all appointed by the merit system in this service, with entrance salaries ranging from $400 to $1,200 a year.

Lighthouse Keepers

The appointment of lighthouse keepers is restricted to persons between the ages of eighteen and fifty, who can read, write and keep accounts, are able to do the requisite manual labor, to pull and sail a boat, and have enough mechanical ability to make the necessary minor repairs about the premises, and keep them painted, whitewashed, and in order. After three months of service, the appointee is examined by an inspector, who, if he finds that he has the qualities needed at that especial station, certifies that fact to the Lighthouse Board, when, upon its approval, the full appointment is issued by the Treasury Department.

Although but one grade of keeper is recognized by law, usage has divided keepers into a number of grades, with different pay as well as different duties, and with promotion running through the various grades. At one lighthouse there may be but one keeper; at another, a principal keeper and an assistant; and there is a station where there is a principal keeper with four assistants, the fourth having the lowest grade and the lowest pay, and the others having been appointed at that grade, and promoted as merit was shown and vacancies occurred; or they may have been transferred and promoted from another station.

Young men who have seen some sea service are preferred as assistants at the larger stations; and at stations requiring but one keeper retired sea captains or mates who have families are frequently selected. At those stations where there are fog-signals it is customary, however, to have one assistant who is able to operate its machinery and keep it in repair; and he is usually one who has a certificate as a steam engineer, and is something of a machinist. Such persons are graded and paid at a higher rate on their original entry in the service than others.

Keepers are forbidden to engage in any business which can interfere with their presence at their stations, or with the proper and timely performance of their lighthouse duties; but it is no unusual thing to find a keeper working at his station as a shoemaker, tailor, or in some similar capacity, and there are light-keepers who fill a neighboring pulpit, who hold commissions as justices of the peace; and there are still others who do duty as school teachers without neglecting their lighthouses. As the dwellings of the light-keepers are often tastefully planned, well-built, and located on picturesque sites, people in search of summer quarters have so besought keepers for accommodation that the board has been compelled to prohibit them from taking boarders under any circumstances.

The Light-House Board has done much to make keepers comfortable. They are furnished with quarters for themselves, and in certain cases for their families, and when so far distant from market as to make its carriage equal or exceed its cost, with fuel and rations. Suitable boats are furnished stations inaccessible by land; and at those stations on shore, distant from markets, barns are built for their cattle and horses.

The Board has made no attempt as yet to pension those who become maimed or worn out in its service. Keepers are under the law paid an average sum of $600 a year; but the rates range in individual cases from $100 to $1,000 a year. In March, 1889, Congress appropriated $625,000 for the payment of its 1,150 keepers.

The Life-Saving Service

The life-saving establishment divides the coasts into thirteen districts. Each of these districts embraces a number of stations, the number varying according as the district is long or short, or as it happens to be more or less dangerous. There are two hundred and sixty-nine stations in all. The greatest number of stations in any single district is in the one which embraces the coast of New Jersey, where there are forty-two stations. The district which has the smallest number of stations is the one embracing the Gulf Coast, where there are eight stations. The Great Lakes are divided into three districts: the first includes Lakes Erie and Ontario, with a total of eleven stations; the second, Lakes Huron and Superior, with eighteen stations; the third, Lake Michigan, with twenty-nine stations. The Great Lakes are thus guarded altogether by the crews of fifty-eight stations. There is one station at Louisville, Kentucky. On the Pacific Coast, where the breakers are remarkably high, and yet where there are comparatively few disasters, there are sixteen stations. At the same time, on the Atlantic Coast, where the danger points are more numerous than on the Pacific, and where the greater number of ships are coming and going, there are one hundred and ninety-four stations.

As there are at least six surfmen employed at each station all through what is called the "active season," there are at least sixteen hundred surfmen always on duty during the dangerous months. As the regular crew at some of the stations is increased at certain seasons of the year by one, two or three men, the total number of surfmen employed at such seasons is between nineteen hundred and two thousand.

Life-Saving Station Keepers

Each station has a keeper, who has direct control of all its affairs. The position held by this officer is one of the most important in the service. He is, therefore, selected with the greatest care. The indispensable qualifications for appointment are that he shall be of good character and habits, not less than twenty-one nor more than forty-five years of age; have sufficient education to be able to transact the station business; be able-bodied, physically sound, and a master of boat-craft and surfing. He is usually nominated by the district superintendent, the initial step being left to that officer because of the extensive acquaintance he is supposed to have with the class of men from which the choice must be made by reason of long residence among them.

So much depends, however, upon the selection that an effort is made to eliminate, as far as possible, the chance that any political, social or personal interests shall enter into it. In the vicinity of nearly all the stations there are numbers of fishermen and wreckers who have followed their callings from boyhood and become expert in the handling of boats in broken water, and among these there is usually some one who by common consent is recognized as a leader. He is the man it is desirable to obtain for keeper.

A keeper's compensation does not exceed eight hundred dollars per annum. The maximum amount is paid only to one or two, whose stations are so isolated that they are obliged to secure an associate to reside with them when the crews are off duty, and to such keepers as have distinguished themselves by bravery and effective service. The usual salary paid is seven hundred dollars; to keepers of houses of refuge only four hundred dollars.

Life-Saving Crews

The number of men composing the crew of a station is determined by the number of oars required to pull the largest boat belonging to it. There are some five-oared boats in the Atlantic stations, but at all of them there is at least one of six oars. Six men, therefore, make up the regular crew of these stations, but a seventh man is added on the first of December, so that during the most rigorous portion of the season a man may be left ashore to assist in the launching and beaching of the boat, and see that the station is properly prepared for the comfortable reception of his comrades and the rescued people they bring with them on their return from a wreck; also to aid in doing the extra work that severe weather necessitates. Where the self-righting and self-bailing boat, which pulls eight oars, is used—mostly at the Lake stations—a corresponding number of men is employed.

The crews are selected by the keepers from able-bodied and experienced surfmen residing in the vicinity of the respective stations. A regulation provides that the selection of keepers and crews shall be made solely with reference to their fitness, and without regard to their party affiliations. Another important regulation forbids a keeper to take into his crew his brother, father or son, except where adherence to the rule would be detrimental to the service.

The Revenue Cutter Service

The revenue cutter service in various fields of usefulness and responsibility covers in its operations the entire coast of the United States, from the easternmost extremity of Maine to Brazos Santiago, Texas, the Great Lakes, and the Pacific Coast from San Diego, California, to the Aleutian Islands in the North Pacific, the Bering Sea and the Arctic Ocean to Point Barrow.

This service is an integral arm of the public service, and is under the control of the Treasury Department. Its office of central management is vested in a division of the office of the Secretary of the Treasury, known as the Division of Revenue Cutter Service, the chief of which is by law a captain in the revenue cutter service. The number of commissioned officers authorized upon the active list is 222, composed of 144 line and 78 engineer officers.

In the revenue cutter service cadets are employed at entrance salaries of $500 per year, with a fair prospect of being promoted to higher positions in time. Cadets must pass a good examination physically and educationally, and those who have served as deck officers of seagoing vessels receive special consideration. The marriage of a cadet in this service is equivalent to a resignation.

The enlisted force of the revenue cutter service, numbering in the aggregate about 1,000 persons of all grades or rates, is enlisted for a term of service in the same manner that men are enlisted in the army, navy and marine corps.

The Marine Hospital Service

The marine hospital service receives its name from the fact that it has charge of the marine hospitals which are located at our ports for the treatment of sick and disabled seamen of the merchant marine. It has, by law, however, many other duties and functions, particularly the conduct of quarantine, the management of epidemics, the medical inspection of immigrants, the maintenance of a hygienic laboratory, the investigation of sanitary problems and other matters concerning the public health.

The service has for many years been under the direction of Dr. Walter Wyman, the supervising surgeon-general, whose efficient management has proven satisfactory to all authorities at home and abroad.

In the service there are many employés who combine the skilled, professional knowledge of the physician with the duties of a practical man of executive ability. The acting assistant surgeons of the marine hospital service receive as entrance salaries from $300 to $1,800, and hospital stewards $600 to $864, with their board. In addition to these there are quarantine attendants, such as nurses, masters, deck-hands, pilots, seamen, cooks, cabin boys, shipkeepers, boatmen, and engineers.

The Quarantine Service

In 1902 over four hundred thousand immigrants arrived at the Port of New York and were inspected by the officers of this department. This number constitutes about four-fifths of all immigrants reaching the United States in 1900, and required an average daily examination of more than one thousand immigrants, besides the crew and passengers of many foreign vessels not carrying immigrants. In order to properly perform this duty it is imperative that Quarantine officers shall be familiar in a very practical way with infectious diseases, and with the sanitary conditions at ports of departure.

A Quarantine officer deals with two classes of vessels: first, those from non-infected ports; second, those from infected ports. The transatlantic mail and express steamships may be taken as types from the non-infected ports. The treatment of these vessels is comparatively simple, and is more or less familiar to ocean travellers. On the arrival of a ship of this class at Quarantine, it is promptly boarded by a medical officer, who is met at the gangway by the captain, or his representative, and the surgeon of the vessel. The latter presents his medical report regarding the health of the passengers and crew.

The steerage passengers are made to pass in review, with their heads uncovered. The uncovering of the head is not intended as a mark of respect, but to expose the face, which is always involved in the eruption of smallpox and some other infectious diseases. As each immigrant files by, he is closely scrutinized, and if he presents any suspicious symptoms, he is removed from the line and his case is more closely investigated after the general inspection is concluded. The steerage passengers are also carefully counted with a registering instrument, in order to insure an inspection of all of this class.

After the general inspection is completed, the sick are visited for the purpose of detecting any who may be suffering with Quarantine diseases, such as smallpox, typhus fever, etc. If all on board are found well, a pass is issued to the captain giving him authority to proceed to New York. On vessels coming from non-infected ports, saloon passengers and members of the crew are not inspected—provided that a deposition is made by the ship's surgeon that no cases of infectious diseases have occurred among them during the transit of the vessel. This difference in the treatment of saloon and steerage passengers is in a measure due to the fact that infectious diseases are almost always transmitted by the latter class.

The Custom House Service

The Custom House districts differ materially in their size and importance, and the salaries of the different officers and employés are graded according to the importance of the district. Applicants are examined for vacancies in their particular districts. Thus the New York Custom House district is the most important in the country, and the positions open there are occasionally good ones. The classifications of the positions in New York include offices with salaries ranging from $750 per annum to $2,500, and more. The higher positions are not open to outside competition, but are filled by examination from those who have served in some lower capacity. Thus the positions of gauger and weigher, with larger salaries, are filled by promotions from inspectors, assistant weighers and assistant gaugers. These latter officers are paid at the rate of $3 and $4 per day, and to secure the positions applicants must pass special technical examinations in the measurement and examination of vessels and their cargoes. Ordinary inspectors are paid $4 per day, and they are promoted in order to clerkships with salaries ranging from $1,000 to $1,500 per year. Inspectresses in the New York Custom House receive $3 per day. Examiners have more responsible positions, and they are paid $1,800 and samplers $1,000.

CHAPTER IV

POLICEMEN, DETECTIVES, AND FIREMEN

The Policeman—The New York Police Force—Occupations that Make the Best Policemen—The Mounted and Bicycle Police—Detectives and Detective Agencies—The Training of a Detective—Modern Detective Methods—The Fireman—The New York Fire Department—Methods of Promoting Firemen—The Training of a Fireman.

The Policeman

IN ALL the large cities, during the last ten or twelve years, attempts have been made to lift the police force out of politics and keep it within the bounds of the civil service law in matters of appointment and promotion. When Mr. Roosevelt was president of the New York Police Board, the police of the metropolis learned that the civil service rules were the order of the day, and that men were appointed to the force or promoted to higher places entirely on their merits, without regard to influence, creed or birthplace, rewarding the good men and punishing the bad, heeding nothing save the virtues or faults of either. In Chicago, in the last few years, the General Superintendent of Police has tried as hard as Mr. Roosevelt in New York to keep the force out of politics and conform to civil service requirements. The heads of police departments in many other cities have from time to time sought to emulate the examples of New York and Chicago, and at an annual convention of the Chiefs of Police of the United States the majority reported "progress in the attempt to 'civil service' their departments."

The New York Police Force

For various reasons the New York Police force is more interesting than that of any other city, perhaps because it happens to be the largest police force in the country. The personnel of the New York force is perhaps its most interesting feature, for it is recruited by men of all nationalities and all creeds, and from all parts of our country.

The four principal elements in the personnel of the New York police force are composed of the Irishmen, the Germans, the Americans, and the Jews.

Probably ninety per cent of the force is made up of these four elements, the foremost of which is the Irish. In our civil war, Irishmen made a fine record as fighters; they have been fighting ever since—fighting the natural enemies of society, fighting as policemen rather than as soldiers.

It can not be said that the predominance of Irishmen in the police force is due to political influence, because at the time that Mr. Roosevelt enforced the civil service law, both in letter and spirit, paying no attention whatever to the politics or religion of the applicants, giving no heed to anything save their qualification for the place they sought, the number of Irishmen appointed and promoted was maintained in the same proportion to the number of men of other nationalities, as during the years of "Tammany Police"—four members of the force in every five being of Irish parentage. This proportion holds good not only among the patrolmen, but in the higher places among roundsmen, sergeants, captains, and inspectors. It is evident that Irishmen are "born" policemen.

After the Irishmen or men of Irish parentage, in point of numbers, come the Germans or those of German parentage. The Irishman has the distinct advantage of the German in that he is not obliged to learn a new language.

After the German, numerically speaking, come the native Americans, and Mr. Roosevelt himself admits that these furnish the largest proportion of both the best and the worst men in the service. The explanation is that the Americans enrolled in the police force, are, on the average, men of superior intelligence, and this intelligence tends to make them either better or worse than their fellows, according as their course is shaped for good or for evil.

The fourth leading element, or class, is the Jewish. There are more Jews on the New York police force than the ordinary citizen imagines. A number of Hebrew policemen have been promoted for marked proficiency in the discharge of their duties and for conspicuous gallantry in saving life or in capturing armed and desperate criminals.

There are representatives of other nationalities on the force, but they are distinctly in the minority. They include men of Polish and Bohemian ancestry, several Frenchmen, and one or two Greeks and Russians.

Occupations That Make the Best Policemen

After consideration of the nationalities included in the personnel of a police force, it may be interesting to state some of the sources from which the men are drawn. The applicants most favored by the recruiting officers are those who have served a term in the army or navy. A police inspector states that the best men on the force are the honorably discharged soldiers of the United States Army and Navy. In the case of foreigners, service in their own armies counts as much in their favor as service in the American army. The same inspector, who paid a tribute to the honorably discharged soldiers on the force, says that the next best men are those who have served a term in the German army.

It is a noticeable fact that a certain proportion of men who have had neither military nor naval service, display a slight hesitancy in time of crisis —at that fatal moment which decides whether a matter shall go one way or another. This is particularly true of countrymen who have not yet become habituated to their new surroundings, who are not expert in adapting themselves to unfamiliar scenes and incidents, who are not prepared to meet the first emergencies of the life of cities, who are not ready fighters. But once these men have been thoroughly thrashed by a gang of toughs, their period of weakness ends, and thereafter they can be absolutely relied upon; he who escapes with his life from such a trial can evermore be depended upon for any kind of rough or hazardous work.

Next to those who have served in the United States Army or Navy, the best men on the force are those who have been in the railway service, especially those who have worked in the operating division as engineers, firemen, conductors or brakemen. With the railroad men, in this instance, may be included those who have worked as motormen on electric street railways.

Other applicants favored by police recruiting officers are those who have been guards on the elevated roads, drivers of express wagons, and those whose occupations have necessitated hard work out of doors.

A large proportion of the native Americans on the force are of country birth. Very few of these men, of course, joined the police force immediately upon their arrival in the city. After leaving the farm or small town they worked for a time in the city as drivers of wagons, or as mechanics, or car conductors. The countryman, however, even after a year or two of work in the city, needs breaking in when he joins the police force. If he is made of the right stuff he will probably become an excellent patrolman, and make a still better police official; but if he is lacking at all in the physical or mental essentials he will go to pieces under the strain.

A favorite source from which members of the police force are drawn, not only in New York, but in other cities as well, especially in places where the civil service laws are enforced, is from the various societies, notably the temperance societies of both the Catholic and Protestant churches.

Discriminations are made, however, in the matter of bartenders and keepers of liquor saloons. In the old days in New York, more than one-half the appointees had at one time or another served in places not approved by temperance societies. But police officials have discovered that the men who make the best policemen are those who do not crave strong drink; hence the favor with which members of temperance societies are regarded. In New York, under the reform administration, the various churches and the east side college settlements are also drawn upon for recruits.

The Mounted and Bicycle Police

The mounted policeman is even more modest than the seen-but-not-heard small boy; for the dashing cavalryman of the "Finest" is seldom either heard or seen. We hear of his heroism in seizing the bit of a runaway, but we know not the sound of his voice. We know that he saves many lives each week among riders and drivers in the Park, yet in peace times he is rarely in evidence. The cause of this is that his beat is from eight to twelve miles long, and there are not enough of his kind in Greater New York to make a regiment.

In all the boroughs there are only about six hundred guardians of the peace on horseback; of which four hundred and fifty are in Manhattan and the Bronx, and one hundred and fifty in Brooklyn. Until recently, the principal duties of the mounted policeman were to stop runaways, ride at the head of a procession, and look handsome. But now automobiles have been added to his troubles, not to speak of the new orders by which he is required not only to patrol the driveways, but to watch all the side streets, and even leave the saddle, if necessary, to capture violators of the law.

Though the pay of a mounted policeman is no higher than that of the patrolman afoot—eight hundred dollars the first year up to fourteen hundred dollars the fifth year—yet the majority of sidewalk pacers envy the horseman. For the mounted man is the aristocrat of the service. He has certain advantages, in the way of having a pleasant beat instead of being obliged to take his chances of passing his days among the sweltering hordes of the foreign quarters. Each member of the mounted squad is responsible for the health and appearance of his mount, though he is allowed the services of a stableman to groom and feed. Horses for the squad are selected with the utmost care, Kentucky thoroughbreds occupying nearly all the stalls. And the man who wants to ride these animals must first qualify, not only as a horseman, but as a rough rider.

The principal difference between the mounted and the bicycle squad is the difference in the mount. The pay is the same.

The Detective and Detective Agencies

The organization of private detective agencies began just after the Civil War. Messrs. Pinkerton and Bangs were the original founders. Next came Ruffin, Hazen, and Flannery, not as a firm, but working individually.

Detectives have become a recognized factor in judicial processes, for previous to the establishment of criminal hunters as a class, people depended upon the sheriff, the chief of police, or the city marshal to ferret out crimes. To-day, where investigation and elaborate preparation for trials are required, attorneys employ private detectives on the preliminary work of corralling witnesses, and so on.

The five chief causes of crime to-day are: love of revenge, avarice, temptation unresisted by those in position of trust, strong drink, and women—chiefly the last named.

The great number of detective agencies now doing business in various States, have, as their principals, either men who have followed the duties of a policeman or detectives in some municipal department; or who entered the profession as young men, and, by dint of perseverance and honorable dealing, have established a reputation, and sustained it until their names were sufficiently well known to justify them in organizing an agency of their own.

" 'Tis the chase that pleaseth." This may have been applied to the professional detective, for it is in the pursuit of some inhabitant of the Under World that the Sleuth finds the great pleasure of existence; just as the bloodhound, perhaps, is happiest when following a scent. Private detectives may be said to act as first aides to counsellors and attorneys. In the performance of duties previous to a trial, the detective may even be called an assistant attorney or coacher.

The Training of a Detective

As to the men who are employed by an agency—the best assistants are those who entered the profession as office boys or as young men, and who have grown up in the harness, as it were. These are the tried and the true. For their loyalty has been put to the test almost daily, and if they had at any time been found wanting, they would not still be following the career of a detective. Others, employed as assistants, are men who hail from smaller cities or "off a farm." When an assistant proves to be apt and quick-witted, the superintendent encourages the development of these qualities in every practical way, and the newly employed operator or agent soon finds that his good or bad points are being included in the superintendent's reports to his chief.

The novice is required to observe certain rigid rules, the individuality of which depends upon the kind of man who is at the head of the establishment. The young agent is shown the importance of telling the whole truth under all circumstances, to beware of the curse of whiskey, and, above all, to train his memory, making it not only retentive, but absolutely reliable. It has been noticed, in some instances, where young private detectives have been employed to work up cases of divorce, that the agents themselves have fallen off in the matter of morals. Hence the operating department of many agencies refuses to accept tasks involving private family affairs, and thus the moral standing of employés in these agencies is equal to the average to be found in any business office.

Modern Detective Methods

First-class agencies resort to no questionable methods to obtain results, do nothing but that which is within the bounds of the law; and to prove that this is so, and at the same time to show that the detective, like the laborer, is worthy of his hire, a written report in detail is submitted almost daily to clients.

The movements of dishonest persons being thus recorded, the reports are brought forward at the proper time to outweigh the verbal statements of suspected and guilty persons. And it might be stated that nine-tenths of the time of a private detective is spent in noting the actions of persons who handle money, jewelry, or other valuables for other people. If the honest man, holding a position of trust, sometimes finds himself shadowed, he need have no fear; for if his own conscience is not sufficient security, he may rest assured that the private detective is not anxious to make the mistake of bringing the wrong person to the attention of his home office.

The principal uses which clients find for a detective agency are, first, to know whether they are being deceived, and, second, to what extent the information gained can be used legally. In many instances, the attorneys for the prosecution or the defence frame the case ready for court, only to find, at the last moment, that certain things are either not clear or not positive, or else that witnesses are not to be found. Word is then sent to a detective agency, and an agent who is fitted both as to appearance and ability is selected to find the missing witnesses, or to secure the proofs necessary to complete the case in question.

Then comes the "missing person" who, demented, strays away from his home, or who, having domestic troubles, leaves his family either to commit suicide, or to do the Enoch Arden act of going West or abroad, to return, after years of suffering, to immediate relatives. Cases of this kind are hard to solve, mainly for the reason that the whole truth is seldom told. The skeleton in the closet is only partly revealed, family pride or delicacy withholds important facts, and for these very reasons the "missing person" case is frequently left on the files to gather the dust of years. Such cases are rounded up eventually, only when "eternal vigilance" is the order left with the agency.

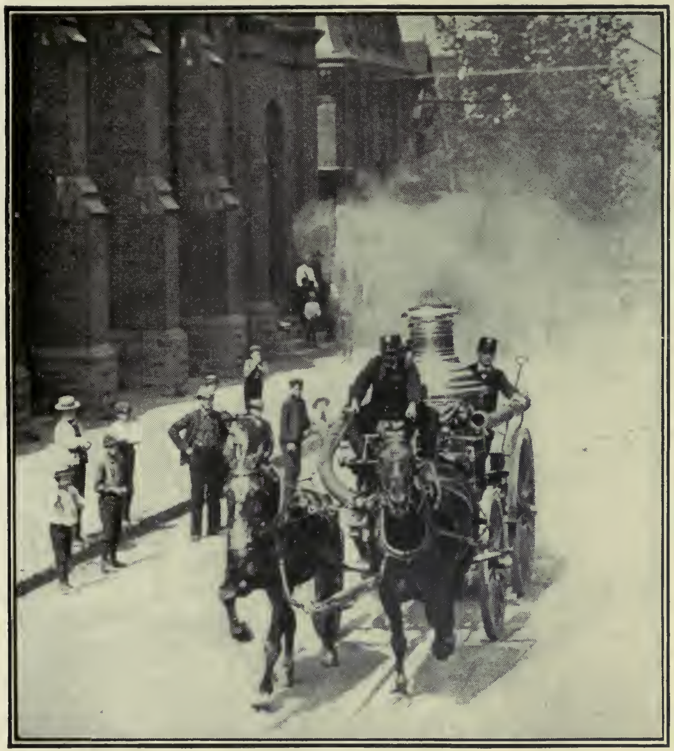
Other "missing persons" are those who flee from creditors. These are easily traced by their various questionable enterprises, which they invariably start anew in foreign countries. Such a case was that of a Hebrew, who, in 1893, fled from his creditors after having signed his brother-in-law's name to notes amounting to $50,000. He went to Brazil, having forty-eight hours' start of the detectives. He was found and settlements were made. But, even so, this man was "missing" for four years.

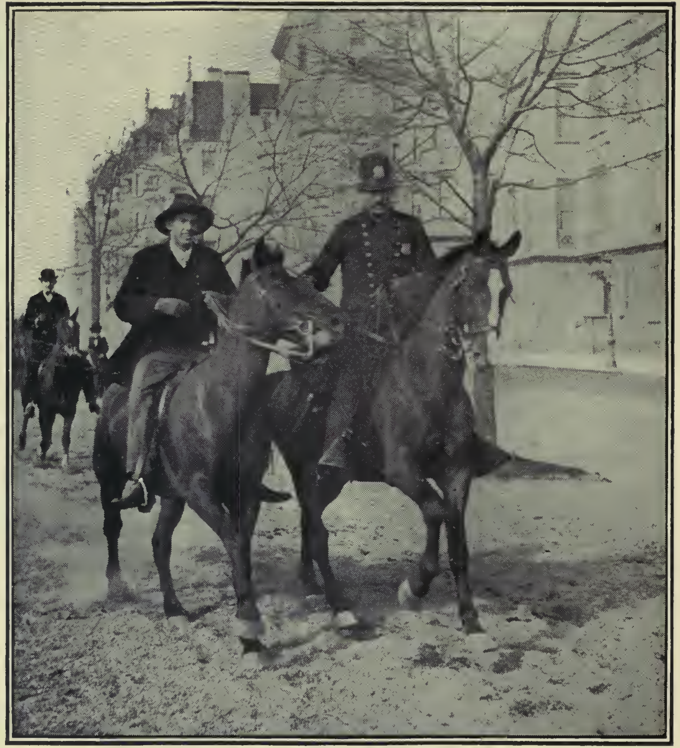
A great many private detectives are employed by men representing the vast commercial interests of this country. It is in this field that the so-called "gentleman thief" abounds. Small salaried young men, who are in daily contact with associates who wear fine clothes and jewelry, and are perhaps land owners, become dissatisfied with their lot. In their desire to dress as well as their associates, and to enjoy the advantage of an income greater than they are receiving legitimately, they steal from their employers. The firm is kept in ignorance of the drain upon cash sales, or upon certain shipments which, as the result of collusion with truckmen, never reach the consignee. The firm keeps its eye on the bookkeeper and the cashier, but the other end of the establishment, the shipping department, is overlooked. The drain still continues, and it is then that the aid of a detective agency is sought; and from that time on all the clerks and employés are "shadowed."

The Fireman

During the last twenty-seven years the property losses in the United States by fires amounted to more than $3,000,000,000. In 1900 the loss was $160,000,000, and in 1901 nearly $150,000,000. Had it not been for the various paid and volunteer fire departments of the cities and towns, the loss, it is estimated, would have been twenty times as great.

In all cities men are taken into the paid fire service on probation.


STEAMER GOING TO FIRE


MOUNTED POLICEMAN STOPPING RUNAWAY

Vol. II., p. 1034

Thirty days is the time the probationer is allowed in which to find out, or for the instructor to find out, whether he is made of the right "stuff." He must not only be "chesty," which is to say, physically perfect, but he must possess nerve and the spirit of dare. He must not be one who will turn dizzy when at a lofty height.

Every city fire department maintains what is known as a School of Instruction. One of the first things a beginner is taught, is how to climb a scaling ladder. Perhaps for the first two days the novice is allowed to do nothing but clamber up and down a ladder from the ground to the first story. He becomes at last so sick of the monotony of the first lesson, that he only too gladly obeys the order to climb to the second story. Two days are thus spent by the new man on each story, which means that not until the twelfth day does he reach the roof.

Then he begins straddling sills and passing ladders up or down to his mates; then how to come down life-lines, not only alone, but with a dummy hanging around his waist. Saving the life of the dummy is one of the hardest things to learn. The new men first take down a stuffed image weighing only seventy-five pounds, but gradually the weight is increased until at last the image tips the scale at one hundred and fifty. Mighty pleased the fireman is when at last he is allowed to take down a real live man.

Thus every man in the paid fire department, in whatever city, is drilled; nor does his drilling end with his first months as a fireman. He must come to school regularly three or four times a year. For the training school in each city is not only for new men to drill in, but for veterans to practice in.

The New York Fire Department

The paid Fire Department of New York City was organized April 30, 1865, and the expense connected with it during the first year of its existence was about $560,000. Since the taking effect of the Greater New York Charter, on January 1, 1898, there has been but one Commissioner (annual salary $7,500) for the entire municipality. The department numbers 2,588 officers and men.

The qualifications necessary for membership in the uniformed force are as follows:

> No person shall be appointed to membership in the fire department or continue to hold membership therein, who is not a citizen of the United States, or who has ever been convicted of a felony; nor shall any person be appointed who can not read and write understandingly the English language, or who shall not have resided within the State one year immediately prior to his appointment, or who is not over the age of 21 and under the age of 30 years. Every member of the uniformed force shall reside within the limits of the City of New York.

The rules of the Municipal Civil Service Commission contain the additional requirement that the applicant must not be less than 5 feet 6½ inches in height, nor less than 136 pounds in weight.

Methods of Promoting Firemen

Promotions to the rank of officer in the uniformed fire force are held yearly, or more frequently should the exigencies of the service require, and the questions asked on the examination relate to their knowledge of the rules and regulations and of the duties they would be called upon to perform in the position to which they seek advancement. There is also forwarded to the Municipal Civil Service Commission, signed by the Commissioner and the Chief of Department, the record of the applicant in the Department as to character, efficiency and conduct, which counts in making up the final rating, prior to the preparation of the eligible list.

The Training of a Fireman

In the School of Instruction of the fire department of the larger cities, every member of the force is taught to save life with the same precision of movement and the same amount of drilling by which a soldier learns to be a life destroyer.

During ordinary drills, especially when new hands are scaling the walls, a rope net, like that used in a circus, is put up to catch any who may fall. With certain injury, or possibly death, waiting for them below in case of a fall, the men illustrate how a building may be scaled and life saved under every possible condition.

Suppose the building beneath the men on the roof to be in flames. They could reach earth quicker by life lines, certainly, than by the ladders. But unless they happen to have carried rope with them, slung over their shoulders, as firemen do in San Francisco and other cities, how are they to get the necessary life line? Have you ever seen the life savers of the seacoast throw a rope to a sinking ship? They shoot it from a mortar. Firemen shoot a life line to the men on the roof in the same way, only instead of a mortar, they use what seems to be an ordinary rifle, a weapon, however, that will throw a projectile upward two or three hundred feet. The projectile carries the rope with it, as a kite carries a string. For very high buildings, there is another kind of weapon, one that looks like the long musket of the Arab, and which will send a projectile as high as eight hundred feet.

In descending by the life lines, the firemen illustrate how human life is saved by carrying persons down with them. When a fireman comes to rescue you from a burning building, the best thing for you to do is to grip the fireman around the waist; that is, grasp the handles of his belt, or simply wind your arms around him, and yield yourself to his keeping. You hang on, he does the rest. Don't volunteer to assist him.

Sometimes the firemen jump from the fifth or sixth story into a net, just for practice. The net is a device recently adopted by the departments. It is superior to the old rope nets, which seldom sustained the weight of a person jumping from a lofty height, while oftentimes the sudden jar of the fall pulled down those holding it, thus causing injury to all.

CHAPTER V

DOMESTIC SERVICE AND MISCELLANEOUS PURSUITS

Domestic Service as an Occupation—Wages of Servants—General Conditions of Domestic Service—Disadvantages of Domestic Service—Instructions in Domestic Science—Dangerous Occupations—Employment Agencies—The Auctioneer—The Pawnbroker—The Undertaker

Domestic Service as an Occupation

IT is estimated that between 11,000,000 and 12,000,000 persons, mostly women, are engaged at domestic service in the United States. The latest census returns give the number of married women in the country at about 12,000,000. Of these we may safely say that at least 10,000,000 do their own housework, or a part of it, which allows ample opportunity for the 1,450,000, or more, persons, reported as domestic servants—over 1,200,000 being women.

These figures seem surprisingly small, although, with the increase of population, the "servant girl question" is constantly assuming aggravated importance, and the number of available women willing to accept general domestic service is perceptibly decreasing. From the standpoint of the employer these symptoms seem to indicate a "growing independence," which is both annoying and incomprehensible. The scarcity of general servants, however, is largely explained by facts noted in connection with the conditions of employment. Thus, a canvass among the "intelligence offices" in several large cities reveals the fact that, of all women seeking domestic service, only about one-fourth will accept general service, the remainder being "specialists"—cooks, waitresses, parlor maids, etc., etc. This fact obtains, not only because employment at a special line involves less work and relatively higher pay, but because the position of a general house servant, who is supposed to cook, wait, do chamber and parlor work and other "chores," all equally well, is so arduous and confining as to discourage and repel the majority of women.

The one-servant plan, adopted in the large proportion of American homes, seems, therefore, to impose conditions that would be entirely inadmissible in any other branch of industry, particularly in view of the fact that most employers insist on maintaining a degree of style compatible with the employment of several servants. These facts, taken in combination with the increasing demand for competent cooks, waitresses, etc., to work solely at their specialties, with consequently shorter hours and larger pay, naturally operate to increase the distaste for general service, and encourage women to wait for such favorable opportunities. Naturally, also, the more competent workers will obtain good positions, leaving only incompetents available for general service, except where smaller exactions or higher wages are offered as inducements.

Thus, the employer has the choice of paying more or demanding less.

Wages of Servants

Although the wages paid in domestic service are relatively high, with board and lodging provided, there is a growing tendency among young girls to prefer employment in shops or factories, at even lower wages. Furthermore, very few such girls, when out of positions, will accept domestic service, even with the most alluring inducements. This is the experience of philanthropic workers and associations who come into constant contact with them, and make every effort to provide them with work. The conclusion is inevitable, therefore, that there are facts and conditions connected with such service, which, in the minds of even the unemployed, more than counterbalance the advantage in wages. Although most employers treat their domestics with consideration and kindness, very many are most unreasonably exacting, and quite careless of their comfort. Thus many servants are obliged to sleep in poorly lighted, poorly heated, or poorly ventilated apartments, sometimes in closets or garrets, and, occasionally, on the kitchen floor. Often, also, wages are withheld for no good reason, or in conditions that would justify no other industrial employer. On this point, the Legal Aid Society of New York reports that out of 2,000 such complaints of domestic employés, 75 per cent proved meritorious claims, more than one-half of these showing grave mistakes as to mutual rights and duties on the part of the employers. In the remaining 25 per cent the trouble was proved due to similar errors on the part of the employés.

General Conditions of Domestic Service

Under the best conditions, the life of a domestic servant is quite devoid of the social element, upon which all human beings depend so largely. Her hours of work are indefinite, with no extra pay for overtime, while those free for leisure and amusement are rare, uncertain and often interrupted. Especially strong is the objection to the fact that her evenings are not her own, and that a close, and often, unreasonable, supervision is exercised over her right to entertain callers. Recently, statistics were gathered by representatives of several benevolent organizations, regarding the opinions of shop and factory girls on the subject of domestic service.

Out of 100 shop girls in Boston, 35 objected to the long hours, and 33 to the isolation of the life; while, out of 100 factory employés, 56 made the first complaint, and over 30, the second. In both cases, the companionship of fellow-workers, even with lower wages, seemed to more than counterbalance other disadvantages. According to the findings of the Michigan Bureau of Labor Statistics, only 51 domestic servants, out of 2,300 interviewed, belonged to fraternal societies of any kind. In Boston, only 20, out of 231 interviewed, belonged to clubs of any sort, and only 15 attended classes for instruction in cooking, sewing, singing, or evening schools. During the course of an extended investigation throughout the country, only one association of domestic workers came into prominence. This is a union formed in Syracuse, N. Y., with a membership of 500, the primary object being to found and maintain two free beds for members, in a hospital, should the funds for the purpose be realized.

Disadvantages of Domestic Service

Among the shop and factory girls interviewed by the Boston society and others, there seemed to be strong sentiments against domestic service, on the grounds of the restrictions imposed, particularly as to associates, and of the "drudgery" of the life. By this latter expression they meant to indicate the constant calls for every variety of work, at any and all hours, day and night, without reference to their comfort or ability, and without extra pay. A notable instance of the sort of thing objected to once occurred in New York City, when a woman was sought for general housework; to cook, wash and perform all other duties, except sweeping, for a family of "only nine," in addition to tending the "two younger children," whenever the mistress was out, all for $18 per month—and that under protest.

All things taken together, the conviction seems to be gaining ground that domestic service is a badge of "social inferiority." Not only is the servant, by the very nature of her engagement, debarred from social relations with her employer's family, but even persons in "her own walk of life" seem to consider her calling, in a very real sense, lowering and degrading. Thus, the head of a certain "settlement" in New York relates, that a girl, belonging to one of their working girls' clubs, being out of work, was employed to keep the kindergarten room in order. Immediately she was ridiculed and practically ostracized by her fellow-members. This social stigma seems to affect the minds of men as well as of women. Consequently, girls looking forward to marriage naturally hesitate to enter an occupation which is liable to cut them off from association with such men as they would naturally choose for husbands.

Instruction in Domestic Science

The large proportion of foreign-born servants are, of course, incompetent, being unaccustomed to the ideas and requirements of American life. Thus, many a housekeeper complains that she is obliged to take a "greenhorn," and, after instructing her in all the essentials of a good servant, finds that she leaves, "ungratefully enough," to accept an offer of higher wages. Other housekeepers find their high ideals severely jarred by the "foolish, skittish and unreliable character" of the average run of servants, until reminded by some wiser friends that "this is the reason that they are servants."

Other persons, taking a more serious and practical view of the matter, have attempted to meet the demand for competent domestic workers, by founding schools for training them. Some of these institutions also offer systematic courses for housekeepers, one in Boston giving such thorough instruction in such appalling subjects as "home sociology," "bacteriology, with laboratory work," sanitation, "chemistry of foods," dietaries, hygiene of childhood, and numerous other subjects, including plain and fancy cookery and first aid to the injured. The training given to women desiring to prepare themselves for domestic service, however, is most thorough and excellent, barring the initial error of using high-sounding names for subjects, and the result must be in most cases that very competent workers are produced. Upon the completion of a course in such a school, the student receives a certificate, and after three months' satisfactory service on probation, is awarded a diploma. Such diplomas are graded, according to the competence of the student, and fix the rate of wages to be received from grade A, specifying $4.00 weekly for chambermaids and $5.00 for cooks, to grade D, specifying $3.25 for maids and $3.50 for cooks.

The Young Women's Christian Association in Boston, and several other cities, conducts courses of instruction in cooking and domestic service of all varieties. The women's clubs of Chicago conduct a school in which waiting, laundry and chamber work are taught by lectures and demonstrations, in which several hundred employés, mostly cooks, are annually instructed.

The various settlements in large cities conduct cooking, and other domestic-service classes, although, according to reports, most of the students make use of their knowledge in their own homes, rather than as servants. It has been found, however, that such instruction must be given mostly to younger women, since such as can obtain employment at reasonable wages are not inclined to pay for further training. In such schools as the Pratt Institute, Brooklyn, N. Y., the Drexel Institute, Philadelphia, the Armour Institute, Chicago, and the Teachers' College, New York City, systematic instruction is given in domestic science, especially for persons desiring to fit themselves to teach these branches. The people seem to be awakening to the necessity of such instruction, and many young ladies' schools of high class are offering courses in cookery and general housekeeping. Indeed, the greater part of the work in this line is done with persons of the employing class or those who desire to fit themselves for housekeepers' positions.

The demand for teachers comes from colleges, normal schools, public and private schools, industrial institutes, hospitals, reformatories, Christian Association branches, settlements and numerous other educational and benevolent sources. None of the graduates find difficulty in obtaining employment. A movement was inaugurated recently among the women's clubs of New York, to have the public school system regularly adopt and conduct the domestic instruction of the State. As yet the success of this attempt has not been what its projectors desired.

Dangerous Occupations

That peaceful, no less than warlike, pursuits have their victims, is made apparent by the loss of health, and even of life among artisans who work at certain trades. There are occupations that kill. The word kill is here applied more particularly to the spirit. Life may be sustained in the bodies of those engaged in such vocations, but the spirit dies. To one of the operatives in a sweat-shop a visitor remarked:

"Why, you are working here without fresh air and without sunshine. You come to your work at sunrise, you work all day by gaslight, and you leave the shop after nightfall. I should think you would die."

"I am dead," replied the operator, "but no one has time to bury me."

In the foregoing pages of this work it is shown that in various trades dangers to health and even to life are encountered—notably the metal polisher, the match-maker, the worker in the chemical factory, the bridge builder and the steeple-climber. These can all be classed as dangerous occupations, to which many others may be added.

Under modern industrial conditions manufacturers are making every effort to minimize the dangers to health and life that are encountered in their establishments, but it is impossible to remove such dangers entirely; they are inseparable from certain callings, and to those engaged therein the dangers are regarded as a matter of course. Nevertheless it seems that many articles of manufacture, things which we class among the necessaries of life, are produced at a frightful cost of bodily suffering and peril. "But," say the manufacturer and the operator, "some one must make these things; why not we?"

The natural presumption is that high wages are paid in these dangerous callings; on the contrary wages are no higher than in other trades—and yet for every vacancy in establishments in which the work is known to constitute a menace to life and health, a number of persons are ever ready to fill the gap. These applicants, though they know they are simply to fill the place of those who have succumbed, still offer themselves for voluntary martyrdom. Doubtless within their breasts lies ever the hope that they will escape in this battle for bread, just as the soldier of another kind of battlefield believes that while bullets lay low those around him, he will pass on unscathed.

What are these dangerous callings? We will mention first one of the least dangerous—that of the stone cutter. Can science devise a way by which the stone cutter may pursue his trade without inhaling mineral dust? At present it is stated as a fact that sandstone cutters, constantly inhaling mineral dust, rarely live beyond two-score years and ten and that the majority of stone cutters die of lung troubles.

Many grinders suffer from what is known as "grinder's asthma." This used to be a common complaint among needle grinders, but in this industry machinery has been introduced in needle works, so that the danger is now done away with.

Consumption annually carries off thousands of file cutters, sieve makers, grindstone makers, and others. In such occupations the introduction into the lungs and bronchial tubes of mineral dust, soon causes a painful cough, and the results are usually so serious that workmen cannot long pursue labor of this kind. Even grinders and polishers of cut glass quickly contract a disease which resembles lead poisoning; their teeth break off at the stumps, and the majority of them die before they have reached the age of forty.

The many trades in which artisans are afflicted with "the dust disease" include diamond cutting. One of the most unpleasant features of the "dust disease," occurring among those engaged in preparing the precious stones just mentioned for personal adornment, is known as "wrist drop." This is the direct outcome of lead poisoning, resulting from contact with the lead used in the solder by which the rough gems are attached to copper rods when the worker is getting the stone ready for cutting.

Women workers, too, suffer from the "dust disease," especially those who work in feather factories. In such establishments the atmosphere is charged with almost invisible particles of feathers, which causes inflammation in the eyes and congestion in the lungs of the workers. The sensitive mucous membrane of the lungs and bronchial tubes becomes so coated with the particles of feathers that within three years after entering such factories, the women who prepare these ornaments for cvilization's "birds of a feather" find their health seriously, if not fatally, impaired.

Lace makers also invariably have chronically inflamed eyes. Employés of lace-making establishments are often obliged to wear colored spectacles, and their eyes are frequently bloodshot and inflamed about the lids.

Among other callings which may be regarded as more or less dangerous is that of the chimney-sweep. After a few years' work those engaged in this occupation contract what is known as "chimney-sweep's cancer."

Even the butcher suffers more or less from the dangerous ills to which the flesh is heir, as the result of day by day exposure to draughts and dampness and cold. Your butcher, florid and robust as he is, may have the appearance of perfect health, but one day without warning he fails to appear at the shop—he is at home suffering from an attack of rheumatism.

Employment Agencies

The working people have long considered the private employment agency as their especial enemy. They claim that it very often robs them. So frequent have been their complaints that several States have been led to make official investigations, reports of which have been printed by the Labor Commissioners. It was found in New York, for example, that thieving employment agency keepers would continue advertisements day after day for different classes of workmen when they had no places for them, thus robbing the workmen of the money paid for fees. In Ohio cities, before the free public employment offices were opened, there were similar dishonest employment agencies, charging men and women from one dollar to fifteen dollars for securing them a place, and extorting a heavy fee whether the place was secured or not. In St. Louis and Kansas City there were thirty alleged labor agents who charged from fifty cents to twenty dollars. To use an old phrase, "The profits were small but the swindle was sure." The so-called labor agents had the audacity to sue their victims in court to recover money for no service rendered, having the cases postponed till the workman was tired out and thus forced to submit to their extortionate demands. Frequently these private labor agents have their offices in saloons. When in response to one of their lying advertisements fifty or a hundred laborers appear and register, paying a fee of one dollar, they are told to remain near at hand, and that they will be sent away in the evening by free transportation. The free transportation, of course, does not come. The men are kept hanging on until the next day, when the same story is told them about the free transportation not having arrived, and they are thus tricked until they have spent all their money in the labor agent's saloon.

This abuse became so flagrant that a demand for free public employment offices arose. These bureaus now exists in many States, under the supervision of the State government, in connection with the State Labor Bureaus, being free alike to employers and to workmen. Such free bureaus have long existed in England, France, Germany, Russia, and Australia. In 1890 Ohio initiated the custom here by opening free employment offices in Cincinnati, Cleveland, Columbus, Toledo, and Dayton, which are still running. New York came next, in 1896, with one State Free Employment Office in New York City. Other States followed, and there are now employment agencies in Seattle, San Francisco, St. Louis, Kansas City, St. Joseph, Chicago, and in the State of Montana and elsewhere. The recently established free labor office in Chicago is said to be the most successful. The proof of the utility of the bureaus is the diversity of their patrons. Orders for help are received from private homes, State institutions, hotels, boarding houses, stores, and factories. Investigations of the character and ability of the applicants for work are invariably made. The status of employers is also scrutinized. Many trades unions now have their own regular employment bureaus.

The Auctioneer

There are between 20,000 and 30,000 auctioneers in the United States, and probably 5,000 auction houses. Auctioneers employ very little help, while auction houses average only *three* employés each, with salaries ranging from $10 to $50 per week. The duties of these employés vary. Some of them do nothing but sell, others assist in various ways. Many of the employés are not auctioneers but helpers and general utility men. The amount of the bond required of an auctioneer or an auction house differs in different cities. It runs from $200 to $5,000, occasionally $10,000. The bond is placed with the city authorities who issued the license, and it must be signed usually by holders of real estate.

When auctioneers are men of ability, they often earn large incomes.

Many fine "stock" auctioneers, who make sales for others, command $100 per day and expenses; hundreds of them get $50 per day and expenses, and thousands of them get $25 per day and expenses. The best auctioneer is naturally the one who has the ability to bring the highest prices. He should be an educated man, possess a strong constitution and an amiable disposition; he should dress well; he should be a natural talker, a lightning tactician, a good judge of human nature and quick at repartee. He should thoroughly understand values and qualities of everything he sells. He should so conduct himself as to carry conviction of his honesty and sincerity. He should understand how to protect property he is selling without the aid of by-bidders or stool pigeons. Rates of commission for selling property run all the way from one-half of one per cent to ten per cent. All depends upon kind and amount of property sold—each auctioneer fixes the rate as best he can.

In New York, a $10,000 bond is required of every auctioneer for good faith. Such bond costs about ten dollars, and can be had at any Security Company's office. The percentages differ according to the importance of the sale and the quality of the goods offered. The total charge is usually 15 per cent. Some auctioneers will take a sale for nothing, for the prestige. The amount of fine art works and furniture sold at auction, varies. Sometimes a single sale brings as much as $500,000, and these sales of chattels in New York City, alone, amount on an average to about $5,000,000 per annum.

The Pawnbroker

In New York, Chicago and San Francisco there is one pawnbroker for every 15,000 or 16,000 inhabitants. Boston has the greatest number of pawnbrokers in proportion to its inhabitants—one for every 5,000. Wide as is the range of articles accepted in pawn, a marked preference is shown for those of gold and silver, rings and jewelry as a rule comprising about eighty per cent of all pawn received. Clothing forms a very important item of the trade, though the tendency of the brokers is to confine their trade to jewelry and kindred articles. This is of course due to the extra amount of work and storage room required for the care of clothing, and the possibility of loss in its sale arising from changes in fashion, etc. For these reasons the amount advanced on such pawn is extremely low.

The Undertaker

The undertaker is always in one place—he is ever at the end. Even the man who dies in mid-Atlantic may not avoid the wares of the undertaker. Lead coffins are carried by ocean liners.

As an occupation, that of undertaker requires a solemn nature, a sympathetic manner, a subdued voice, and above all, nerves of steel, or no nerves at all. Many a medical student, failing in his chosen career, turns undertaker, turning to account his class-room practice of seeing and handling the gruesome without flinching. The great majority of boss undertakers do business in a small way, making not more than $4,000 to $5,000 a year.

A large undertaking establishment, conducted on a scale equal to that in other lines of business, is a rarity. In New York, however, there is one establishment on Eighth Avenue occupying the whole of a large building. In the basement are vaults, in the niches of which the dead may be placed previous to the funeral. On the ground floor is a huge salesroom, where every possible kind of casket is exhibited. On the main floor above is an auditorium, larger than a village church, fitted with pews and an organ. Here, funeral services may be held, the auditorium being rented for the purpose. A quartet of mixed voices is ever in attendance to sing hymns at funeral services. A florist in one of the upper stories supplies set-pieces on short notice. Three or four funerals are often held in this auditorium during a day, and a fifth in the evening. On the upper floors, the coffins and caskets are manufactured. The president of this undertaking establishment is an ordained minister of the Gospel, so that this company can supply even an officiating clergyman for the last rites. The services over, the deceased is then lowered on an elevator to the ground floor, and carried out to the hearse.

The hearse generally used by this company is the most remarkable one outside of India. It is as long as the longest electric street-car, and is drawn by eight horses. It constitutes in itself a complete funeral procession, and no extra carriages are needed. The casket, instead of being placed inside, as in an ordinary hearse, is in this instance placed on the roof. The mourners then take their places inside the hearse, sitting on long side seats, as in a street-car.

There are about 6,000 funerals a day in the United States, which figure suggests the number of undertakers. In burying the dead of the country, not less than $100,000,000 a year is spent by the survivors.

The business is divided into several branches. The drygoods branch, including seven or eight firms, with a total capital of $1,000,000, furnishes yearly about $10,000,000 worth of trimmings. Another branch, embracing about eighty-five manufacturers, supplies handles and plates. Two hundred concerns make a specialty of the manufacture of coffins, or caskets. Twenty firms prepare embalming fluids and implements; and seven or eight concerns build nothing but hearses.

Even to the very end, business enterprise makes us a ready-made people. In life, ready-made shoes, hats, clothing; in death, ready-made coffins. The undertaker need have nothing made to order. He can fit every tall or short, stout or thin, person out of the stock on hand. Li Hung Chang, when he visited the United States, brought his own coffin with him. That coffin was unnecessary impedimenta—at any moment he could have had his choice of a million coffins. Manufacturers of caskets have their "combinations"; the National Casket Company, with headquarters at Oneida, New York, controls eleven plants, and has a capital of $6,000,000.

APPENDIX

TABLES OF STATISTICS

COMPILED FROM THE LATEST AVAILABLE SOURCES

SUMMARY OF INDUSTRIAL STATISTICS, JANUARY 1, 1903 1046
TOTAL NUMBER OF PERSONS IN GAINFUL OCCUPATIONS 1046
SUMMARY OF STATISTICS OF THE MANUFACTURING INDUSTRIES IN THE UNITED STATES IN 1900 1046
RELATIVE AVERAGE PAY IN ONE HUNDRED OCCUPATIONS 1047
THE FIFTEEN GROUPS OF MANUFACTURING INDUSTRIES—COMPARATIVE SUMMARY, 1890 AND 1900 1048
THREE HUNDRED AND FIFTY SPECIFIED INDUSTRIES 1050
SUMMARY OF STATISTICS OF INDUSTRIAL COMBINATIONS IN 1900 1065
SUMMARY AND DETAILS OF ONE HUNDRED AND FORTY GROUPS OF OCCUPATIONS . . 1066
VALUE OF ELECTRICAL AND AUXILIARY MANUFACTURES IN THE UNITED STATES . . 1072
THE EXTENSION OF BANKS AND BANKING—1892-1902 1072
NUMBER AND CAPITAL OF ALL BANKS IN THE UNITED STATES, MARCH 1, 1902 . . 1073
COST OF TUITION AND OTHER EXPENSES AT THE PRINCIPAL COLLEGES AND UNIVERSITIES IN THE UNITED STATES 1074
STATISTICS OF NEW BOOKS PUBLISHED IN THE UNITED STATES 1076
NUMBER OF PERIODICALS PUBLISHED IN THE UNITED STATES, TERRITORIES AND CANADA 1077
SPECIALIZATION OF CITIES BY INDUSTRIES 1078
LOCALIZATION OF INDUSTRIES BY CITIES 1079
LIST OF THE PRINCIPAL INDUSTRIAL COMBINATIONS IN THE UNITED STATES IN 1900 . 1080
SUMMARY OF AGRICULTURAL STATISTICS, 1900 1082
SUMMARY OF FARM CROP STATISTICS FOR 1899 1083
MEMBERSHIP OF LABOR ORGANIZATIONS IN THE UNITED STATES 1084
LIFE INSURANCE STATISTICS 1086

Summary of Industrial Statistics, January 1, 1903

Population	79,003,000
Wealth	$94,300,000,000
National Bank individual deposits	$3,209,273,894
Deposits in savings banks	$2,750,177,290
Number of savings bank depositors	6,666,672
Deposits in state banks	$1,698,185,287
Deposits in private banks	$131,669,948
Loan and trust company deposits	$1,525,887,943
Total bank and trust company deposits	$9,315,193,912
New York bank clearings	$74,753,189,436
Total bank clearings	$116,021,618,003
Gold, including certificates, in circulation	$938,793,298
National bank notes out October 31 (1902)	$380,476,334
Money in circulation	$2,249,390,551
Circulation per capita	$28.43
Gold in Treasury	$559,302,051
Railway freight carried one mile, tons	150,000,000,000
Value farms and farm property	$20,514,001,838
Value farm products	$3,764,177,706
Value of all farm animals	$2,981,722,945
Wheat, bushels	626,947,007
Corn, bushels	2,[illegible]45,366,379
Wool, pounds	316,341,032
Value of wool manufactures	$316,800,000
Cotton, bales	10,680,680
Value of cotton manufactures	$345,000,000
Value of silk manufactures	$107,256,258
Gold production	$78,666,700
Sugar production, tons	473,126
Petroleum production, gals.	2,914,346,148
Copper production, tons	272,264
Coal production, tons	280,000,000
Pig iron production, tons	17,782,000
Steel production, tons	13,473,595
Manufactories, number	512,734
Manufactures, value of product	$13,039,279,566
Factory employes, average number	5,719,137
Factory wages paid	$2,735,430,848
Value of m'dise imports	$903,320,948
Value of m'dise exports	$1,381,719,401
Value of agric'l exports	$851,465,622
Value of manuf'd exports	$403,641,401
Comm'l failures, number	11,002
Liabilities failures	$113,092,376

Total Number of Persons in Gainful Occupations

The number and proportion of males and females engaged in gainful occupations and in each class of occupations in 1900, are shown in the following summary:

Classes of occupations	Total	Males		Females	
		Number	%	Number	%
All occupations	29,074,117	23,754,205	81.7	5,319,912	18.3
Agricultural pursuits	10,381,765	9,404,429	90.6	977,336	9.4
Professional service	1,258,739	828,163	65.8	430,576	34.2
Domestic and personal service	5,580,657	3,485,208	62.5	2,095,449	37.5
Trade and transportation	4,766,964	4,263,617	89.4	503,347	10.6
Manufac'ring and mechanical pursuits	7,085,992	5,772,788	81.5	1,313,204	18.5

Summary of Statistics of the Manufacturing Industries in the United States in 1900

Number of establishments	512,726
Capital	$9,874,664,087
Salaried officials, clerks, etc., number	397,730
Salaries	$404,837,591
Wage-earners, average no.	5,321,087
Total wages	$2,330,273,021
Men, 16 years and over	4,120,716
Wages	$2,022,899,275
Women, 16 yrs. and over	1,031,747
Wages	$281,705,586
Children, under 16 years	168.624
Wages	$25,668,160
Miscellaneous expenses	$1.028,855,586
Cost of materials used	$7,360,954,597
Value of products, including custom work and repairing	$13,040,013,638

Relative Average Pay in One Hundred Occupations

The following table is compiled from numerous government reports. The average pay, it will be seen, is surprisingly low, owing to the great number of unskilled hands in each industry. The table is not given as an indication of what a person can earn in a particular occupation, but to show the relative earnings per capita in the various occupations when compensation is averaged for the total number engaged. They are thus reasonable approximations. Some of the figures seem wholly out of proportion—some too high, some too low. But this is understood when we remember that where a great number of persons of all grades are included in the industry or occupation the average is lower than where comparatively few are employed. Thus, the average earnings of textile designers, of whom there are comparatively few, are higher than the average earnings of merchants, of whom there are many—the majority being small dealers:

Wood engravers	$1,650	Photographers	$700
Surgeons	1,625	Typewriters	700
Theatrical managers and showmen	1,600	Cigarmakers	675
Bankers and brokers	1,600	Coopers	675
Electricians	1,550	Printers	670
Saloon keepers	1,500	Millwrights	660
Textile designers	1,400	Harnessmakers	650
Stone and china decorators	1,300	Soapmakers	645
Hotel keepers	1,250	Upholsterers	645
Lawyers	1,200	Quarrymen	640
Architects	1,200	Sawyers	635
Teachers	1,150	Tailors	630
Dairymen	1,150	Locksmiths	625
Merchants	1,150	Machinists	625
Dentists	1,100	Pressfeeders	625
Engineers	1,050	Foremen	625
Draughtsmen	1,050	Sailmakers	625
Furniture workers	1,050	Coachmen	620
Physicians	1,050	Barbers	620
Dyers	1,000	Clerks	610
Furriers	1,000	Cutlers	600
Metal engravers	1,000	Moulders	600
Actors	1,000	Dressmakers	595
Livery stable keepers	1,000	Boilermakers	590
Journalists	950	Cabinetmakers	575
Clergymen (house rents not included)	950	Tinsmiths	570
Meat dealers	950	Carriagemakers	570
Painters (house)	925	Draymen	525
Grocers	925	Butchers	520
Gunsmiths	925	Soldiers	520
Restaurant keepers	925	Authors	510
Masons, bricklayers and plasterers	920	Agents	500
Plumbers	920	Millers	500
Electrotypers	910	Waiters	500
Hatters	900	Lumbermen and raftsmen	490
Musicians	900	Brewers	485
Miners	890	Tanners	470
Bookbinders	890	Farm laborers (besides board)	460
Goldbeaters	850	Weavers	450
Watchmakers	840	Pedlers	440
Door, sash, and blind makers	790	Bartenders	425
Glass workers	780	Hunters, trappers and guides	420
Boot and shoemakers	775	Gardeners	390
Blacksmiths	750	Laborers	390
Carpenters	750	Sailors	375
Farmers (including living)	750	Confectioners	350
Conductors and motormen	725	Stevedores	340
Telegraphers	725	Nurses (besides board)	290
Cooks	725	Hostlers (besides board)	175
Artists	720	Servants (besides board)	144

THE FIFTEEN GROUPS OF MANUFACTURING INDUSTRIES—COMPARATIVE SUMMARY, 1890 AND 1900

GROUPS	Year	Number of establishments	Capital	SALARIED OFFICIALS, CLERKS, ETC.		AVERAGE NUMBER OF WAGE EARNERS AND TOTAL WAGES	
				Number	Salaries	Total number	Total wages
United States	1900	512,254	$9,817,434,799	396,759	$403,711,233	5,308,406	$2,322,333,877
	1890	355,415	6,525,156,486	461,009	391,988,208	4,251,613	1,891,228,321
Group 1.—Food and kindred products	1900	61,302	940,889,838	46,732	39,313,664	313,809	129,910,070
	1890	41,296	507,678,328	48,113	33,354,171	249,321	90,373,450
Group 2.—Textiles	1900	30,048	1,366,604,058	44,502	49,982,357	1,029,910	341,734,399
	1890	16,847	1,008,050,268	33,971	35,496,486	824,138	278,167,769
Group 3.—Iron and steel and their products	1900	13,896	1,528,979,076	49,828	58,090,781	733,968	381,875,499
	1890	11,169	997,872,438	30,943	36,583,536	531,823	285,351,714
Group 4.—Lumber and its remanufactures	1900	47,079	946,116,515	31,110	28,982,927	546,953	212,201,768
	1890	35,586	844,418,472	41,292	30,863,184	547,776	201,558,706
Group 5.—Leather and its finished products	1900	16,989	343,600,513	14,036	14,186,690	238,202	99,759,885
	1890	12,918	246,795,713	17,782	15,348,267	212,727	98,432,593
Group 6.—Paper and printing	1900	26,747	557,610,887	48,183	48,974,138	297,551	140,092,453
	1890	20,160	344,003,723	35,543	34,625,986	225,645	117,611,864
Group 7.—Liquors and beverages	1900	7,861	534,101,049	10,899	16,893,405	63,072	36,946,557
	1890	4,219	310,002,635	8,407	11,118,673	48,358	29,140,916
Group 8.—Chemicals and allied products	1900	5,444	498,390,219	22,318	26,335,164	101,522	43,870,602
	1890	5,642	322,543,674	13,469	14,171,587	76,535	33,872,540
Group 9.—Clay, glass, and stone products	1900	14,809	350,902,367	13,571	13,718,996	244,987	109,022,582
	1890	11,711	217,386,297	13,511	11,370,622	221,367	90,541,771
Group 10.—Metal and metal products other than iron and steel	1900	16,305	410,646,057	13,973	16,059,194	190,757	96,749,051
	1890	10,019	204,285,820	14,824	14,924,917	123,239	64,055,644
Group 11.—Tobacco	1900	15,252	124,089,871	8,262	8,951,534	142,277	49,852,484
	1890	11,643	96,094,753	13,152	10,241,271	122,775	44,550,735
Group 12.—Vehicles for land transportation	1900	10,113	396,778,672	16,369	15,191,444	316,214	164,614,781
	1890	10,175	248,224,770	13,251	11,172,134	221,125	118,212,379
Group 13.—Shipbuilding	1900	1,116	77,362,701	1,407	2,008,537	46,781	24,839,163
	1890	1,010	53,393,074	1,123	1,194,870	24,811	14,833,977
Group 14.—Miscellaneous industries	1900	29,479	1,348,920,721	53,227	49,199,283	483,273	202,746,162
	1890	19,304	768,870,920	33,192	33,363,252	302,649	136,643,444
Group 15.—Hand trades	1900	215,814	392,442,255	22,342	15,823,119	559,130	288,118,421
	1890	143,716	355,535,601	142,436	98,159,252	519,324	287,880,819

GROUPS	Year	AVERAGE NUMBER OF WAGE-EARNERS AND TOTAL WAGES (*continued*) Men, 16 years and over	Women, 16 years and over	Children under 16 years	Miscellaneous expenses	Cost of materials used	Value of products, including custom work and repairing
United States	1900	4,110,527	1,029,296	168,583	$1,027,755,778	$7,345,413,651	$13,004,400,143
	1890	3,327,042	803,686	120,885	631,225,035	5,162,044,076	9,372,437,283
Group 1.—Food and kindred products	1900	237,950	64,639	[illegible],220	77,9[illegible],185	1,839,256,143	2,277,702,010
	1890	191,200	49,021	9,100	52,936,982	1,318,963,830	1,636,197,191
Group 2.—Textiles	1900	440,175	512,712	77,023	128,481,214	895,984,796	1,637,484,484
	1890	356,071	421,550	46,517	78,404,675	705,004,909	1,261,672,504
Group 3.—Iron and steel and their products	1900	712,195	13,777	7,996	91,492,127	987,198,370	1,793,490,908
	1890	517,092	7,804	6,927	57,694,853	617,554,226	1,144,056,537
Group 4.—Lumber and its remanufactures	1900	521,177	13,678	12,[illegible]8	42,142,321	561,501,302	1,030,906,579
	1890	524,133	13,337	10,306	45,510,782	462,658,350	877,954,920
Group 5.—Leather and its finished products	1900	175,926	55,970	6,306	22,942,594	395,551,232	583,731,046
	1890	163,398	45,786	3,543	18,587,831	294,446,011	487,556,030
Group 6.—Paper and printing	1900	211,560	73,922	12,069	76,069,663	214,158,423	606,317,768
	1890	165,451	50,831	9,363	59,524,277	149,597,579	445,587,430
Group 7.—Liquors and beverages	1900	60,608	1,095	1,369	188,754,387	122,218,073	425,504,167
	1890	47,134	437	787	117,046,590	109,830,410	341,155,361
Group 8.—Chemicals and allied products	1900	86,384	14,310	828	49,825,945	356,192,334	552,891,877
	1890	66,572	8,649	1,314	29,508,992	239,915,794	380,056,497
Group 9.—Clay, glass, and stone products	1900	225,007	9,336	10,644	19,185,657	94,615,281	293,564,235
	1890	204,284	4,551	12,532	14,094,740	68,990,146	229,806,003
Group 10.—Metals and metal products other than iron and steel	1900	158,984	26,975	4,798	21,295,406	496,979,368	748,795,464
	1890	104,329	16,157	2,753	14,731,078	179,169,940	316,908,150
Group 11.—Tobacco	1900	80,990	53,374	7,913	79,495,422	107,182,656	283,076,546
	1890	78,198	36,419	8,15[illegible]	37,561,681	92,304,317	211,746,623
Group 12.—Vehicles for land transportation	1900	312,651	2,239	1,324	19,842,332	268,278,205	508,649,129
	1890	218,437	1,542	1,146	9,460,374	174,624,639	344,476,243
Group 13.—Shipbuilding	1900	45,744	34	1,003	3,685,661	33,486,772	74,578,158
	1890	24,628	9	174	1,392,551	16,925,109	40,342,115
Group 14.—Miscellaneous industries	1900	383,684	89,999	9,590	81,933,611	490,073,705	1,004,092,294
	1890	236,852	60,537	5,260	49,025,323	300,231,851	645,574,453
Group 15.—Hand trades	1900	457,492	97,236	4,402	124,623,253	482,736,901	1,183,615,478
	1890	429,263	87,056	3,005	45,744,306	431,826,965	1,009,347,226

Three Hundred and Fifty Specified Industries

Summary, 1890–1900

Group Number.	INDUSTRIES.	Year.	Number of establishments.	Capital.	Salaried officials, clerks, etc.: Number.	Salaried officials, clerks, etc.: Salaries.	Average number of wage-earners and total wages: Total: Average number.	Total: Wages.	Average number: Men, 16 years and over.	Average number: Women, 16 years and over.	Average number: Children, under 16 years.	Miscellaneous expenses.	Cost of materials used.	Value of products, including custom work and repairing.
				$		$		$				$	$	$
	All industries.	1900	512,254	9,817,434,799	396,759	403,711,233	5,308,406	2,322,333,877	4,110,527	1,029,296	168,583	1,027,755,778	7,345,413,651	13,004,400,143
		1890	355,415	6.525,156,486	461,009	391,988,208	4,251,613	1,891,228,321	3,327,042	803,686	120,885	631,225,035	5,162,044,076	9.372,437,283
14	Agricultural implements.	1900	715	157,707,951	10,046	8,363,210	46,582	22,450,880	46,174	214	194	11,394,656	43,944,628	101,207,428
		1890	910	145.313,997	3,717	3,704,667	38,827	18,107,094	38,327	288	212	11,129,548	31,603,265	81,271,651
14	Ammunition.....	1900	33	6,719,081	204	370,568	5,231	2,560,954	3,163	2,028	40	1,078,803	7,436,748	13,027,635
		1890	35	4,368.529	109	140,531	2,158	969,951	1,381	754	23	292,856	2,759,782	6,538,959
14	Artificial feathers and flowers.	1900	227	3.633,869	285	291,449	5,333	1,561,763	671	4,192	470	405.349	2,765,151	6,297,805
		1890	251	3,081,828	478	555,279	6,357	2,125,906	979	5,319	59	320,446	4,645,850	9,078,683
4	Artificial limbs....	1900	87	290,104	81	57,651	249	146,620	234	11	4	92,326	126,062	749,854
		1890	59	186,896	88	86,932	162	102,438	151	4	7	40,170	93,795	475,977
14	Artists' materials..	1900	21	376,736	32	37,858	200	79,267	120	74	6	29,418	249,107	497,046
		1890	39	361,460	64	63,145	242	102,196	210	23	9	45,400	190,850	531,785
2	Awnings, tents, & sails.	1900	858	4,342,728	450	347,357	4,400	2,038,613	2,604	1,761	35	523,961	6,480,685	11,728,843
		1890	581	3,063,009	737	626,506	3,135	1,581,729	1,979	1,133	23	325,853	4,150,180	7,829,003
14	Axle grease	1900	29	577,195	85	82,966	127	55,238	111	16	....	67,885	360,411	718,114
		1890	31	451,228	86	73,467	126	61,642	113	9	4	50,158	401,897	846,459
10	Babbitt metal and solder.	1900	51	3,115,568	145	172,423	535	294,584	530	4	1	182,246	7,998,369	9,191,409
		1890	36	954,654	88	103,946	173	84,283	170	3	....	49,866	2,385,894	2,905,102
2	Bags, other than paper.	1900	78	7,696,732	342	386,055	4,039	1,133,128	1,260	2,625	154	546,135	16,849,311	20,123,486
		1890	80	9,347,787	285	317,385	6,633	2,049,839	2,892	3,347	394	469,161	15,178,265	20,207,805
6	Bags, paper......	1900	63	6,900,291	394	415,500	2,029	683,783	1,076	935	18	282,133	4,659,001	7,359,975
		1890	56	2,321,797	182	180,378	1,200	399,714	536	653	11	216,584	3,167,717	5,023,793
8	Baking and yeast powders.	1900	191	8,337,723	749	835,281	1,938	717,000	959	946	33	2,432,306	7,126,967	14,568,380
		1890	150	3,587,919	426	426,889	1,441	574,241	873	543	25	705,991	4,273,796	7,406,806
4	Baskets, rattan and willow ware	1900	550	2,989,568	185	142,921	4,396	1,280,511	3,138	920	338	177,129	1,398,374	3,851,244
		1890	403	2,702,713	429	265,114	3,303	1,004,021	2,355	657	291	250,471	1,398,483	3,633,592
10	Bells	1900	23	1,038,305	73	62,382	663	307,991	593	65	5	97,265	602,856	1,247,730
		1890	22	590,420	58	43,447	372	193,780	355	14	3	36,658	389,701	823,010
5	Belting and hose, leather.	1900	105	7,410,219	443	484,874	1,667	913,937	1,605	28	34	418,155	7,500,413	10,623,177
		1890	93	4,973,420	279	334,139	1,342	780,615	1,286	36	20	268,278	6,132,704	8,633,634
2	Belting and hose, linen.	1900	7	526,059	34	43,932	254	64,102	65	184	5	64,802	452,430	717,137
		1890	9	795,909	19	29,842	273	123,524	101	168	4	46,332	427,865	777,942
14	Belting and hose, rubber.	1900	18	3,493,885	197	336,319	1,771	918,191	1,500	197	74	234,730	4,075,702	6,169,044
		1890	17	5,270.068	110	160,748	1,835	883,020	1,734	91	10	282,543	3,479,538	5,512,840
15	Bicycle and tricycle repairing.	1900	6,328	6,760,070	296	145,558	5,749	2,505,974	5,432	33	284	1,184,155	5,224,886	13,766,033
		1890	83	172,070	94	59,542	212	102,141	207	....	5	24,067	67,332	301,709
12	Bicycles and tricycles.	1900	312	29,783,659	2,034	1,753.235	17,525	8.189,817	16,700	517	308	2,252,604	16,792,051	31,915,908
		1890	27	2,058,072	128	123,714	1,797	982,014	1,747	15	35	242,018	718,848	2,568,326

4	Billiard tables and materials.	1900	75	884,901	89	105,276	455	278,218	419	32	4	196,477	730,046	1,650,868
		1890	57	1,456,624	140	165,280	1,017	705,200	1,013	3	1	142,431	1,295,942	2,823,278
14	Blacking........	1900	121	2,718,504	459	507,094	1,250	424,174	445	764	41	617,009	2,186,809	4,504,965
		1890	71	1,403,087	207	230,412	832	331,232	409	357	66	264,715	1,484,203	2,900,402
15	Blacksmith'g and wheelwright'g.	1900	51,771	54,976,341	339	217,718	36,193	17,974,264	35,713	1	479	3,610,401	4,701,632	85,971,630
		1890	28,000	34,500,139	24,328	13,297,189	26,539	13,499,738	26,332	11	196	2,510,586	14,645,096	54,304,639
14	Bluing	1900	65	415,119	54	41,000	220	79,380	96	107	17	50,552	244,970	575,804
		1890	53	184,472	77	56,561	155	47,633	107	33	15	21,736	186,588	457,251
8	Bone, ivory and lamp black.	1900	15	782,247	21	23,650	85	46,107	85	....	......	75,678	105,712	359,787
		1890	24	1,627,651	62	64,247	323	152,041	302	....	21	84,872	485,867	1,031,030
6	Bookbinding and blank book making.	1900	954	12,744,628	1,076	1,077,790	15,971	6,671,666	7,592	7,872	507	1,575,936	7,702,543	20,790,858
		1890	805	10,062,034	1,342	1,395,468	12,473	5,508,483	6,484	5,752	237	1,214,297	6,007,417	17,067,780
5	Boot and shoe cut stock.	1900	342	7,003,080	342	302,889	6,155	2,230,691	3,784	2,212	159	490,548	17,800,282	23,242,892
		1890	344	5,401,834	511	432,240	4,992	1,891,031	3,152	1,738	102	411,472	13,744,655	17,903,846
5	Boot and shoe findings.	1900	186	3,277,958	211	177,929	2,993	1,127,784	1,759	1,176	58	233,353	4,627,048	7,145,820
		1890	138	1,793,123	202	175,864	2,081	596,073	990	1,022	69	163,865	1,965,173	3,459,328
5	Boot and shoe uppers.	1900	133	273,796	16	7,897	256	125,627	220	34	2	27,429	401,680	700,225
		1890	317	1,216,026	355	289,012	1,353	609,324	727	604	22	125,707	1,902,926	3,346,002
15	Boots and shoes, custom work and repairing.	1900	23,560	9,262,134	133	81,864	9,698	4,128,361	7,444	126	128	2,429,529	8,288,664	26,550,678
		1890	20,803	14.230,081	18,467	9,328,352	16,981	7,422,377	16,452	405	124	2,786,701	10,403,383	34,856,651
5	Boots and shoes, factory product.	1900	1,600	101,795,233	7,843	7,757,749	142,922	59,175,883	91,215	47,186	4,521	10,766,402	169,604,054	261,028,580
		1890	2,082	95,282,311	5,643	5,707,931	133,690	60,667,145	91,406	39,849	2,435	9,217,519	118,785,831	220,649,358
14	Boots and shoes, rubber.	1900	22	33,667,533	483	597,239	14,391	6,426,579	8,248	5,942	201	2,089,154	22,682,543	41,089,819
		1890	11	17,790,970	130	153,802	9,134	3,813,073	5,126	3,924	84	943,918	11,650,787	18,632,060
7	Bottling..........	1900	2,064	16,620,152	987	917,038	7,680	3,589,447	7,135	136	409	2,471,707	28,087,823	41,640,672
		1890	716	5,656,705	885	759,677	3,044	1,511,678	2,904	58	82	728,173	7,937,001	13,583,418
4	Boxes, cigar......	1900	315	3,288,272	216	172,014	4,609	1,439,599	2,137	2,255	217	245,853	3,061,193	5,856,915
		1890	291	3,374,451	412	331,717	5,125	1,802,666	2,771	2,133	221	337,496	3,567,320	7,091,948
6	Boxes, fancy and paper.	1900	729	14,979,305	1,368	1,269,358	27,653	8,151,625	7,739	18,192	1,722	1,507,391	11,765,424	27,316,317
		1890	588	9,277,973	1,005	1,042,801	18,949	5,827,099	5,567	12,866	516	941,498	7,893,941	18,805,330
4	Boxes, wooden packing.	1900	896	21,952,757	1,043	979,632	22,034	7,827,955	19,331	1,207	1,496	1,553,710	22,807,627	38,216,384
		1890	636	13,018,456	916	861,418	13,006	5,615,707	11,240	947	819	1,011,900	14,244,503	25,513,180
10	Brass	1900	10	503,367	27	38,680	162	98,796	159	....	3	34,863	1,152,635	1,419,817
		1890	14	1,208,619	39	35,334	780	401,235	780	....	......	53,046	1,765,605	2,549,860
10	Brass and copper, rolled.	1900	19	15,629,766	351	524,899	6,759	3,512,781	6,380	352	27	798,432	30,000,632	37,536,325
		1890	16	8,041,593	103	197,400	2,698	1,380,378	2,394	252	52	321,793	5,493,231	8,381,472
10	Brass castings and brass finishing.	1900	442	21,925,039	860	1,044,546	11,964	6,070,762	11,055	765	144	1,222,263	18,871,141	30,343,044
		1890	453	18,663,286	960	1,164,156	10,943	5,758,333	10,277	549	117	1,222,989	12,249,607	24,344,434
10	Brassware........	1900	204	12,194,715	502	596,412	7,668	3,550,074	5,879	1,479	310	822,162	9 830,319	17,140,075
		1890	113	10,866.001	361	499,989	7,157	3,557,069	5,293	1,748	116	844,475	7,089,202	13,615,172
1	Bread and other bakery products	1900	14 917	81,049,553	9,177	6,067,103	60,271	27,893,170	47,926	10,452	1,893	10,427,891	95,221,915	175.657,348
		1890	10,484	45,758,489	13,921	9,668,788	38,841	19,120,259	33,345	4,672	824	6,388,722	72,507,579	128,421,535
9	Brick and tile	1900	5.423	82,086,438	2,426	2,024,683	61,979	21,883,333	59,956	76	1,947	3,584.319	11,006,148	51,270,476
		1890	5,828	82,578,566	4,975	2,985,832	104,176	29,709,357	99,198	212	4,766	5,108,769	12.639,597	67,770,695
14	Bridges	1900	196	16,768,948	716	860,774	12,181	6,711,260	12,152	1	28	1,240,399	16.258,561	30,161,624
		1890	137	10,960,218	539	730,231	8,382	4,951,133	8,359	....	23	652.947	12,770,146	21 868,068
10	Bronze castings...	1900	21	881,769	74	93,131	621	372,797	616	1	4	76,565	1,339,722	2 229,329
		1890	14	710,190	40	58,300	271	195,535	265	3	3	68.001	695,485	1.165,163
14	Brooms and brushes.	1900	1,526	9,616,780	900	757,631	10,349	3,788,046	7,433	2,452	464	864,094	9,546,854	18,490,847
		1890	1,235	7,743,832	1,428	1,017,633	9,556	3,299,393	7,145	1,786	625	611,554	6.900,553	14,156,383
1	Butter, reworking.	1900	10	255,525	29	30,319	148	67,747	141	4	3	31,032	1,345,418	2,114,935
		1890	......	....	......	....	......	....	......	....	......	....	....	....
14	Buttons.........	1900	238	4,212,568	339	296,358	8,685	2,826,238	4,086	4,131	468	393,862	2,803,246	7,695,910
		1890	106	3,089,265	205	262,787	3,831	1,411,089	1,544	2,176	111	256,846	1,551.603	4,216,795
14	Calcium lights ...	1900	19	95,114	6	6,192	55	24,418	52	....	3	11,888	34.982	118,666
		1890	15	73.402	17	15,418	08	34,152	80	....	......	6,696	35,048	110.062

Group Number.	INDUSTRIES.	Year.	Number of establishments.	Capital.	Salaried officials, clerks, etc. Number.	Salaried officials, clerks, etc. Salaries.	Average number of wage-earners and total wages. Total. Average number.	Total. Wages.	Average number. Men, 16 years and over.	Women, 16 years and over.	Children, under 16 years.	Miscellaneous expenses.	Cost of materials used.	Value of products, including custom work and reparing.
				$		$		$				$	$	$
6	Cardboard	1900	5	1,168,495	59	102,644	626	264,427	344	218	64	82,532	705,527	1,270,416
		1890	5	616,548	17	35,010	206	104,772	142	64	....	38,281	701,764	1,070,805
6	Card cutting and	1900	43	337,642	25	21,727	325	135,139	216	54	55	39,358	312,760	618,488
	designing.	1890	26	89,584	34	30,035	180	76,548	141	29	10	9,789	88,186	243,070
15	Carpentering	1900	21,315	71,327,047	2,701	2,228,434	123,985	71,049,737	123,728	56	201	48,840,671	142,419,410	316,101,758
		1890	16,917	81,542,845	17,069	15,169,168	122,952	79,355,029	122,723	39	190	10,945,617	137,847,002	281,195,162
2	Carpets and rugs,	1900	133	44,449,299	687	881,398	28,411	11,121,383	13,860	12,468	2,083	2,751,879	27,228,719	48,192,351
	other than rag.	1890	173	38,208,842	385	510,857	28,736	11,122,259	13,655	13,076	2,005	1,819,441	28,644,905	47,770,193
2	Carpets, rag	1900	1,014	975,190	61	32,929	1,504	492,656	1,099	348	57	110,991	681,311	1,993,756
		1890	854	975,381	782	339,631	982	310,488	745	191	46	78,132	726,419	1,714,480
4	Carpets, wood ...	1900	31	412,357	49	34,950	608	362,112	603	4	1	67,403	418,343	1,056,702
		1890	6	333,000	19	18,464	309	136,932	305	4	....	41,781	210,814	511,700
12	Carriage and wag-	1900	588	19,085,775	1,023	1,002,199	15,387	5,987,267	14,949	233	205	1,202,666	13,048,608	25,027,173
	on materials.	1890	539	13,028,161	932	842,194	9,996	4,366,233	9,532	236	228	821,743	7,387,904	16,262,293
12	Carriages & sleds,	1900	77	2,906,472	172	158,916	2,726	1,090,296	2,481	164	81	399,142	1,996,070	4,289,695
	children's.	1890	87	3,158,412	210	176,050	2,726	1,154,905	2,391	280	55	248,126	1,900,907	4,094,255
12	Carriages and wag-	1900	7,632	118,187,838	4,302	4,073.932	62,540	29,814,911	61,281	846	413	6,261,469	56,676,073	121,537,276
	ons.	1890	8,614	104,210,602	9,194	7,533.221	64,259	32,665,301	63,070	627	562	6,022,972	49,889,173	114,551,907
12	Cars & general shop	1900	1,296	119,580,273	7,096	6,210,247	173,652	96,062,329	173,209	364	79	6,293,987	109,539,013	218,238,277
	construction & repairs by steam railroad co's.	1890	716	76,192,477	1,953	1,584,242	106,632	60,213,433	106,448	128	56	95,054	66,561,526	129,461,698
13	Cars, railroad and	1900	193	106,721,188	1,711	1,966.310	44,063	23,342,763	43,710	115	238	3,390,922	70,046,354	107,186,359
	street, and repairs, not including establishments operated by steam railroad companies.	1890	166	48.460,687	781	866,394	35,148	18,579,304	34,689	256	203	1,944,336	47,528,561	76,352,199
14	Celluloid and cel-	1900	......	....	......	....	....	....	....	....	......	....	....	....
	luloid goods.	1890	12	3,158,487	84	172,341	939	447,120	687	250	2	482,016	856,180	2,575,736
4	Charcoal	1900	183	811,225	23	15,986	1,786	431,381	1,784	....	2	70,150	405,339	1,133,638
		1890	......	....	......	....	....	....	....	....	......	....	....	....
1	Cheese, butter and	1900	9,355	36,508,015	2,828	915,442	12,865	6,170,670	11,694	1,049	122	1,590,766	109,151,205	131,199,277
	condensed milk.	1890	4,712	16,624.163	2,320	968,604	12,601	4,422,101	11,775	725	101	875,182	51,364,574	62,686,043
8	Chemicals	1900	459	89,091,430	2,123	2,923,033	19,054	9,401,467	18,132	856	66	4,363,868	34 564,137	62,676,730
		1890	563	55,032,452	1,914	2,383,432	15,038	7,308,411	11,911	2,995	132	4,413,170	33,694,927	59,352,548
9	China decorating.	1900	169	372,017	38	26,346	360	148,004	153	186	21	52,786	261,819	693,800
		1890	78	499,647	114	91,904	353	162,620	206	141	6	47,879	364,778	817 555
1	Chocolate & cocoa	1900	24	6,890,732	289	371,063	1,314	525,875	688	592	34	773,527	6,876,682	9,666.192
	products.	1890	11	2,630,067	70	140,557	893	456,047	544	343	6	232,891	2,892,219	4,221.675
14	Cleansing and pol-	1900	154	934,328	227	205,410	508	209.438	342	153	13	194.489	965.242	2,193.019
	ishing preparations.	1890	56	304,160	89	74,689	301	102,260	207	86	8	40,801	382,120	865,904

10	Clocks	1900	46	8,792,653	260	352,536	6,037	2,650,703	4,519	1,371	147	382,846	3,028,606	7,157,856
		1890	27	5,727,202	94	127,500	3,491	1,808,025	2,942	510	39	272,984	1,457,778	4,228,846
2	Cloth, sponging	1900	46	288,894	39	34,924	534	268,191	525	2	7	93,295	17,490	566,000
	and refinishing.	1890	23	229,335	42	43,672	354	200,630	348	4	2	40,493	34,132	399,814
2	Clothing, horse. . . .	1900	26	653,545	55	47,012	575	176,687	178	339	58	83,246	847,846	1,305,164
		1890	31	1,028,523	71	74,231	881	239,074	265	523	93	57,894	777,570	1,572,265
2	Clothing, men's . .	1900	28,014	173,034,543	14,150	13,723,046	191,043	79,434,932	97,251	89,874	3,918	52,234,824	197,742,067	415,256,391
		1890	18,658	182,552,938	26,587	23,675,358	217,270	87,714,314	119,112	96,077	9,081	28,419,424	179,425,661	378,022,815
15	Clothing, women's,	1900	14,479	13,815,221	908	750,658	45,595	14,352,453	4,379	40,835	381	3,342,143	16,503,754	48,356,034
	dressmaking.	1890	19,587	12,883,079	18,985	9,227,902	48,613	13,145,734	1,056	47,164	393	3,177,570	23,393,829	57,071,732
2	Clothing, women's,	1900	2,701	48,431,544	6,715	6,573,618	83,739	32,586,101	26,109	56,866	764	11,733,695	84,704,592	159,339,539
	factory product.	1890	1,224	21,259,528	2,859	3,384,515	39,149	15,428,272	12,963	25,913	273	3,620,042	34,277,219	68,164,019
	Coffee & spice, roast-	1900	458	28,436,897	2,749	2 951,460	6,387	2,486,759	3,455	2,809	123	3,435,257	55,112,203	69,527,108
	ing & grinding.	1890	358	16,996,009	1,356	1,447,385	3,766	1,815,634	2,751	941	74	1,229,926	65,961,465	75,042,010
15	Coffins and burial	1900	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
	cases, trimming and finishing.	1890	1,368	6,016,385	1,408	1,052,712	1,826	946,441	1,778	42	6	44[illegible],832	3,656,859	7,783,140
4	Coffins, burial	1900	217	13,585,162	948	1,023,393	6,840	3,077,481	5,581	1,179	80	832,644	6,945,348	13,952,308
	cases, & under-takers' goods.	1890	194	11,097,736	673	712,812	5,751	2,842,444	4,806	858	87	822,312	5,547,082	12,230,554
14	Coke	1900	241	36,502,679	915	797,296	16,999	7,085,736	16,932	. . . .	67	2,184,968	19,665,532	35,585,445
		1890	218	17,462,729	161	113,632	8,998	4,072,632	8,942	. . . .	56	394,784	11,509,737	16,498,345
6	Collars and cuffs,	1900	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
	paper.	1890	3	237,764	9	13,512	82	35,125	53	29	. . . .	7,627	223,077	301,093
14	Combs.	1900	34	832,791	71	57,541	1,399	572,467	1,174	198	27	112,243	951,514	1,976,129
		1890	31	742,200	65	68,321	742	364,715	602	123	17	61,133	344,120	1,020,835
1	Confectionery. . . .	1900	4,297	35,155,361	5,628	4,171,191	33,583	10,867,687	15,855	15,849	1,879	6,011,512	45,534,153	81,290,543
		1890	2,921	23,326,799	5,487	3,850,441	21,724	7,783,007	11,882	9,254	588	3,302,708	31,116,629	55,997,101
4	Cooperage.	1900	2,146	22,568,873	838	843,668	22,938	9,200,303	22,264	76	598	1,375,524	23,299,312	40,576,462
		1890	2,652	17,806,554	2,097	1,609,117	22,555	10,056,249	22,031	194	330	1,269,618	20,636,911	38,617,956
10	Copper, smelting	1900	47	53,063,395	488	954,905	11,324	8,529,021	11,272	4	48	1,522,[illegible]25	122,174,129	165,131 670
	and refining.	1890	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
2	Cordage and twine	1900	105	29,275,470	436	666,936	13,114	4,113,112	7,341	4,797	976	1,716,205	26,632,006	37,849,651
		1890	150	23,351,883	414	560,639	12,385	3,976,232	6,412	5,010	963	1,020,697	24,051,666	33,312,559
1	Cordials and sir-	1900	39	1,153,006	112	120,994	362	116,917	228	130	4	158,157	1,505,096	2,107,132
	ups.	1890	40	783,567	106	121,874	281	111,114	202	58	21	121,207	1,231,141	1,903,200
4	Cork, cutting	1900	62	2,683,683	136	195,468	2,340	687,796	1,013	1,144	183	329,081	2,403,829	4,392,364
		1890	65	1,869,360	119	125,649	2,019	636 869	842	884	293	119,710	1,501,902	2,840,359
14	Corsets	1900	216	7,481,048	842	986,424	12,729	3,791,509	1,276	11,096	357	1,030,745	6,555,467	14,878,116
		1890	205	6,640,056	442	553,776	10,928	3,509,039	1,731	9,093	104	908,510	5,662,140	12,401,575
2	Cotton, cleaning	1900	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
	and rehandling.	1890	13	116,210	14	10,820	196	43,248	88	100	8	12,026	415,005	525,595
2	Cotton, compress-	1900	111	8,323,558	407	346,321	2,742	738,288	2,725	5	12	442,645	353,910	2,629,590
	ing.	1890	52	7,864,373	215	187,811	2,785	1,040,808	2,778	. . . .	7	324,469	254,309	2,624,027
2	Cotton, ginning. . .	1900	11,369	23,228,130	1,174	129,964	14,135	1,930,039	14,083	11	41	571,692	3,912,303	14,748,270
		1890	1,637	3,221,987	740	130,913	6,920	650,885	6,721	93	106	176,004	542,481	2,367,450
2	Cotton goods	1900	1,055	467,240,157	4,902	7,350,199	302,861	86,689,752	135,721	126,882	40,258	22,112,678	176,551,527	339,200,320
		1890	905	354,020,843	2,709	3,464,734	218,876	66,024,538	88,837	106,607	23,432	16,716,524	154,912,979	267,981,724
2	Cotton waste	1900	26	2,560,759	65	93,505	1,116	336,827	570	546	. . . .	177,604	4,950,490	5,880,024
		1890	31	711,956	50	51,216	279	103,041	198	76	5	55,700	1,592,041	1,906,622
9	Crucibles.	1900	11	1,843,616	89	154,050	671	250,654	402	269	. . . .	198,029	1,673,290	2,607,308
		1890	10	908,152	24	38,960	230	110,250	218	6	6	77,354	396,296	726,708
3	Cutlery and edge	1900	309	16,532,383	805	928,764	12,069	5,673,619	11,158	649	262	945,805	5,116,042	14,881,478
	tools.	1890	474	12,082,638	779	717,219	8,708	4,200,933	8,348	248	112	790,045	3,465,124	11,110,614
15	Dentistry, me-	1900	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
	chanical.	1890	3,214	4,019,637	3,251	2,712,788	1,486	768,401	1,235	195	56	870,592	1,475,255	7,864,299
14	Dentists' mater-	1900	68	2,112,236	182	184,494	1,017	508,603	631	351	35	134,046	2,109,231	3,721,150
	ials.	1890	24	2,908,113	203	324,978	1,011	542,648	772	188	51	406,125	993,855	2,594,888

Three Hundred and Fifty Specified Industries

Group Number.	INDUSTRIES.	Year.	Number of establishments.	Capital.	Salaried officials, clerks, etc. Number.	Salaried officials, clerks, etc. Salaries.	Average number of wage-earners and total wages. Total. Average number.	Total. Wages.	Average number. Men, 16 years and over.	Average number. Women, 16 years and over.	Average number. Children, under 16 years.	Miscellaneous expenses.	Cost of materials used.	Value of products, including custom work and repairing.
				$		$		$				$	$	$
8	Druggists' preparations, not including prescriptions.	1900	250	16,320,120	2,046	2,274,940	5,766	2,041,061	2,600	3,110	56	3,360,429	11,022,417	23,192,785
		1890	1,805	4,624,814	1,909	1,099,014	2,031	839,686	1,773	209	49	663,883	2,411,851	6,659,797
14	Drug grinding ...	1900	26	2,837,911	102	126,623	644	291,823	545	88	11	224,335	3,315,228	4,308,144
		1890	13	337,885	25	28,883	148	74,711	132	15	1	37,213	192,321	436,766
15	Dyeing and cleaning.	1900	1,810	4,673,211	595	292,460	5,424	2,271,066	3,167	2,128	129	959,067	1,434,292	7,567,358
		1890	976	3,041,178	1,198	820,169	3,991	1,717,387	2,313	1,618	60	525,052	1,103,556	5,267,819
2	Dyeing and finishing textiles.	1900	298	60,643,104	1,318	2,267,128	29,776	12,726,316	24,419	4,253	1,104	4,137,947	17 958,137	44,963,331
		1890	248	38,450,800	666	805,291	19,601	8,911,720	16,510	2,298	793	3,131,081	12,385,220	28,900,560
8	Dyestuffs and extracts.	1900	77	7,839,034	229	312,109	1,647	787,942	1,607	35	5	458,212	4,745,912	7,350,748
		1890	62	8,645,458	191	252,336	2,111	1,037,651	2,099	4	8	380,030	6,500,928	9,292,514
14	Electrical apparatus and supplies	1900	580	83,130,943	4,987	4,563,112	40,890	20,190,344	34,150	6,158	582	6,788,314	48,916,440	91,348,889
		1890	189	18,997,337	683	849,138	8,802	4,517,050	7,289	1,469	44	1,154,462	8,819,498	19,114,714
14	Elect'cal construction and repairs.	1900	1,162	5,438,087	799	624,965	5,949	3,312,126	5,785	98	66	875,207	7,673,507	15,907,420
		1890	......	....	......	....	......	....	....	....	......	....	....	....
14	Electric light and power.	1900	......	....	......	....	......	....	....	....	......	....	....	....
		1890	144	33,838,549	210	271,381	1,794	1,285,242	1,791	1	2	755,201	1,155,789	4,783,224
10	Electroplating....	1900	422	1,460,692	123	98,076	2,275	1,036,750	2,061	108	106	221,674	836,726	3,007,455
		1890	313	2,051,134	397	368,723	1,765	891,752	1,602	95	68	182,826	1,048,057	3,121,642
9	Emery wheels....	1900	34	1,489,527	125	126,577	546	303,071	544	2	......	133,466	508,753	1,381,675
		1890	17	823,059	47	47,244	245	135,356	241	2	2	81,148	186,579	726,425
14	Enameling and enameled goods.	1900	129	9,184,178	303	304,950	7,675	2,259,003	5,686	1,675	314	338,992	5,466,971	9,978,509
		1890	46	422,715	70	72,464	508	224,133	371	115	22	39,607	171,658	626,884
14	Engravers' materials.	1900	12	104 741	13	22,154	79	46,064	79	....	......	18,690	143,270	289,339
		1890	16	139,920	22	20,889	139	76,450	137	1	1	13,959	61,985	203,764
6	Engraving and die-sinking.	1900	414	790,461	68	63,773	1,034	572,874	904	59	71	147,578	225,637	1,683,690
		1890	382	794,554	467	472,422	1,168	696,651	1,105	39	24	150,239	434,506	2,187,157
6	Engraving, steel, including plate printing.	1900	286	5,061,520	313	338,347	3,299	2,006,824	2,114	1,085	100	434,629	1,206,462	5,068,558
		1890	134	2,924,125	264	305,178	2,296	1,576,405	1,384	883	29	155,902	742,765	3,347,804
6	Engraving, wood.	1900	145	231,817	22	22,630	337	206,737	309	6	22	57,638	63,272	616,166
		1890	285	480,990	341	355,913	945	600,453	904	8	33	106,791	157,656	1,555,418
6	Envelopes........	1900	51	5,612,509	313	316,360	2,984	1,150,463	906	2,040	38	430,915	3,665,275	6,299,330
		1890	41	3,218,466	176	246,007	2,325	612,544	598	1,707	20	346,129	2,530,793	4,855,680
8	Explosives	1900	97	19,465,846	768	914,447	4,502	2,383,756	4,349	117	36	1,096,604	10,334,974	17,125,418
		1890	69	13,539,478	197	309,008	2,353	1,240,502	2,281	39	33	1,168,920	5,481,723	11,352,615
14	Fancy articles not elsewhere specified.	1900	392	5,081,806	714	614,732	5,718	1,921,578	2,417	3,056	245	719,716	4,061,400	9,046,342
		1890	377	2,386,317	558	444,836	3,396	1,234,982	1,327	1,995	74	276,390	1,844,556	4,810,450
2	Felt goods........	1910	36	7,125,276	136	231,065	2,688	1,024,835	1,957	658	73	356,164	3,801,028	6,461,691
		1890	34	4,460,621	124	157,916	2,142	883,380	1,474	506	162	232,871	2,809,937	4,654,768
8	Fertilizers	1900	422	60,685,753	1,712	2,124,972	11,581	4,185,289	11,435	131	15	3,734,285	28,958,473	44,657,385
		1890	390	40,594,168	1,132	1,253 961	9,026	3,417,870	8,863	88	75	2,790,082	25 113,874	39 180,844

3	Files	1900	86	3,857,647	127	153,875	3,160	1,277,199	2,649	340	171	229,076	1,166,414	3,403,906
		1890	140	2,991,988	231	228,365	2,435	1,217,576	2,258	74	103	130,310	1,038,943	3,179,649
3	Firearms	1900	32	6,916,231	228	243,206	4,482	2,254,366	4,402	33	47	561,590	1,305,421	5,444,659
		1890	34	4,672,424	99	124,274	2,660	1,575,931	2,637	14	9	202,656	485,946	2,922,514
14	Fire extinguishers, chemical.	1900	17	136,933	47	39,348	64	32,828	63	1	......	23,134	70,874	217,833
		1890	9	405,733	26	32,284	56	25,594	55	1	......	18,859	57,736	195,834
14	Fireworks	1900	46	1,086,133	136	145,570	1,638	506,990	880	606	152	81,530	627,761	1,785,271
		1890	22	507,266	39	47,805	518	165,298	289	197	32	25,483	188,938	592,542
1	Fish, canning and preserving.	1900	348	19,514,215	618	585,160	13,410	4,229,638	9,731	2,533	1,146	883,363	13,232,001	22,253,749
		1890	110	3,186,975	182	120,253	5,020	1,128,143	3,787	841	392	280,660	4,710,709	6,972,268
2	Flags and banners	1900	36	666,033	62	63,764	509	148,933	166	311	32	76,370	547,165	1,038,052
		1890	29	376,130	43	46,436	321	96,189	135	180	6	20,098	195,587	455,849
1	Flavoring extracts	1900	352	3,319,716	594	654,225	1,254	478 975	653	573	28	461,462	3,294,380	6,314,552
		1890	148	1,361,800	262	233,071	507	208,715	341	150	16	153,406	1,430,120	2,614,514
2	Flax, dressed	1900	4	71,496	12	6,589	211	46,000	177	9	25	2,481	91,032	158,650
		1890	6	1,361,635	20	28,400	497	198,723	217	255	25	45,567	638,285	981 283
1	Flouring and grist mill products	1900	25,258	218,714,104	5,790	5,404,750	37,073	17,703,418	36,419	497	157	10,325,588	475,826,345	560,719,063
		1890	18,470	208,473,500	16,078	8,897,340	47,403	18,138,402	46,889	308	206	13,162,037	434,152,290	513,971,474
1	Food preparations	1900	644	20,998,102	1,472	1,422,182	8,154	3,051,718	5,259	2,619	276	3,567,186	23,675,165	38,457,651
		1890	302	6,715,535	674	593,922	3,478	1,222,913	2,236	1,150	92	881,628	8,129,925	14,105,485
3	Foundry and machine shop products.	1900	9,324	665,058,245	27,451	31,663,481	350,327	182,232,009	345,058	2,633	2,636	41,103,995	286,357,107	644,990,999
		1890	6,500	383,257,473	16,651	19,242,145	231,331	129,282,263	228,577	1,206	1,548	24,659,543	171,363,925	413,197,118
14	Foundry supplies.	1900	30	981,817	75	79,445	278	135,877	272	4	2	42,084	628,160	1,128,856
		1890	21	679,817	49	61,140	163	91,633	163	....	......	53,282	357,874	672,440
1	Fruits and vegetables, canning and preserving.	1900	1,808	27,743,067	1,741	1,277,028	36,401	8,050,793	13,542	19,699	3,160	2,423,673	37,524,297	56,668,313
		1890	886	15,315,185	1,117	592,390	49,762	4,651,317	18,469	25,714	5,579	1,289,681	18,665,163	29,862,416
14	Fuel, artificial	1900	......	....	......	....	....	....	....	....	......	....	....	....
		1890	......	....	......	....	....	....	....	....	......	....	....	....
14	Fur goods	1900	994	13,373,867	1,211	1,042,392	8,588	4,273,192	4,241	4,280	67	2,007,034	5,113,365	27,735,264
		1890	484	11,115,840	1 128	1,272,043	6,947	3,477,148	2,986	3,920	41	864,506	11 742,508	20,526,988
2	Furnishing goods, men's.	1900	470	20,163,222	1,135	2,160,142	30,216	9,680,077	4,311	25,283	622	2,460,838	23,404,969	43,902,162
		1890	586	12,299,011	1,433	1,511,323	20,778	6,078,026	4,152	16 415	211	2,330,360	15,280,572	29,870,946
4	Furniture, including cabinet making, repairing & upholstering.	1900	7,972	117,982,091	7,235	7,042,172	100,018	42,638,810	93,323	3,742	2,953	10,724,283	65,499,877	153,168,309
		1890	5,973	93,642,147	8,917	7,976,186	83,587	40,816,566	77,437	3,800	2,350	7,935,924	55,125,830	135,627,332
14	Furs, dressed	1900	92	798,030	46	49,124	835	478,190	750	82	3	49,291	519,699	1,400,455
		1890	6	266,921	37	48,618	400	238,890	391	4	5	13,294	203,199	651,296
10	Galvanizing	1900	28	1,775,770	52	46,522	535	229,406	523	5	7	47,355	1,677,584	2,470,703
		1890	27	1,301,973	85	111,233	761	361,878	746	4	11	99,192	1,940,712	2,957,143
10	Gas and lamp fixtures.	1900	223	10,009,239	875	992,003	7,642	3,504,301	5,582	1,754	306	1,023,036	5,013,597	12,577,806
		1890	108	7,218,964	516	712,699	5,014	2,879,813	4,743	233	38	793,283	2,208,124	7,825,672
3	Gas and oil stoves	1900	35	3,766,065	191	231,436	2,471	1,138,442	2,458	8	5	274,242	2,501,568	4,579,700
		1890	24	1,199,528	108	122,047	923	506,726	918	5	......	118,617	840,126	2,137,944
14	Gas, illuminating and heating.	1900	877	567,000,506	5,904	5,273,500	22,459	12,436,296	22,446	10	3	14,769,022	20,605,356	75,716,693
		1890	742	258,771,795	1,864	2,143,169	12,796	8,499,625	12,952	....	44	7,799,385	14,037,087	56,987,290
3	Gas machines and meters.	1900	114	4,605,624	257	251,382	2,167	1,185,959	2,093	64	10	191,058	1,943,769	4,392,730
		1890	38	1,603,426	73	83,627	998	625,902	979	19	......	105,209	675,542	1,838,644
9	Glass	1900	355	61,423,903	2,268	2,792,376	52,818	27,084,710	42,173	3,529	7,116	3,588,641	16,731,009	56,539,712
		1890	294	40,966,850	1,095	1,232,561	44,892	20,885,961	36,064	1,885	6,943	2,267,696	12,140,985	41,051,004
9	Glass, cutting, staining and ornamenting.	1900	417	4,013,534	475	487,270	4,931	2,403,591	4,303	507	121	652,726	3,540,097	8,776,009
		1890	279	2,504,089	474	541,860	3,320	1,954,560	3,107	155	58	272,138	2,188,287	6,090,378
14	Gloves and mittens.	1900	394	9,089,809	659	547,320	14,345	4,182,518	4,365	9,703	277	567,697	9,483,130	16,926,151
		1890	324	5,977,820	482	438,664	8,187	2,670,344	2,998	5,091	98	426,937	5,021,144	10,103,826

Group Number.	INDUSTRIES.	Year.	Number of establishments.	Capital.	Salaried officials, clerks, etc.: Number.	Salaried officials, clerks, etc.: Salaries.	Average number of wage-earners and total wages: Total: Average number.	Total: Wages.	Average number: Men, 16 years and over.	Average number: Women, 16 years and over.	Average number: Children under 16 years.	Miscellaneous expenses.	Cost of materials used.	Value of products, including custom work and repairing.
				$		$		$				$	$	$
1	Glucose	1900	8	41,011,345	147	280,284	3,288	1,755,179	3,266	22	......	645,804	15,773,233	21,693 656
		1890	7	5,991,023	35	72 320	1,724	902,086	1,719	5	......	923,429	5,029,131	7,756,686
14	Glue	1900	61	6,144,407	159	192,147	1,618	685,096	1,462	120	36	341,170	3,767,023	5,389,006
		1890	62	4,859,266	139	147,363	1,697	676,089	1,580	50	67	420,913	2,510,927	4,270,460
10	Gold and silver, leaf and foil.	1900	93	1,086,854	35	35,996	1,163	498,692	592	545	26	37,677	1,604,013	2,666,224
		1890	81	1,105,198	94	102,629	1,405	698,167	724	663	18	46,863	1,834,716	2,977,791
10	Gold and silver, reducing and refining, not from the ore.	1900	57	1,944,124	76	83,484	219	141,400	217	1	1	87,878	10,932,361	11,811,537
		1890	38	4,763,397	83	145,422	883	625,608	879	2	2	354,113	30,005,096	32,035,520
14	Graphite & graphite refining.	1900	11	114,128	16	20,750	137	64,376	137	....	......	16,038	216,560	429,173
		1890	3	38,614	3	1,434	18	9,008	17	1	......	4,999	26,380	54,605
14	Grease and tallow	1900	289	7,080,692	256	265,863	2,046	1,069,683	2,031	9	6	515,767	8 761,857	11,969,821
		1890	233	4,336,193	317	285,396	1,470	793,888	1,439	7	24	278,334	5,135,901	7,474,911
9	Grindstones	1900	25	903,348	60	57,805	1,167	407,153	1,163	....	4	35,391	263,811	1,088.909
		1890	9	78,750	8	5,204	124	51,776	123	....	1	5,799	34,742	122,240
14	Hairwork	1900	397	1,009,908	59	37,948	1,101	375,156	157	938	6	238,703	673,004	1,952,792
		1890	492	1,362,993	548	380,347	1,397	490,254	284	1,089	24	282,152	846,045	2,489,061
2	Hammocks	1900	13	308,254	21	16,100	339	101,626	84	172	83	24,432	242,950	480,114
		1890	6	65,525	6	3,755	80	14,604	16	64	......	3,369	26,535	60,254
2	Hand knit goods	1900	86	205,488	22	13,362	304	75,870	43	260	1	27,859	124,009	352,226
		1890	28	78,468	38	26,138	186	35,851	29	149	8	20,352	88,280	205,775
10	Hand stamps	1900	268	1,203,710	137	118,960	1,052	490,036	860	130	62	216,202	522,659	1,937,628
		1890	234	998,873	363	306,558	705	344,089	597	67	41	126,548	432,687	1,583,872
3	Hardware	1900	381	39,311,745	1,844	2,054,704	26,463	11.422,758	22,850	2,492	1,121	2,612,416	14,605,144	35.846,656
		1890	350	26,271,840	1,176	1,255,419	18,495	8,656,067	16,252	1,532	711	2,400,827	10,186,442	26,726,463
3	Hardware, saddlery.	1900	80	3,335,274	222	247,117	2,940	1,217,202	2,663	210	67	334,350	1,690,168	4,149,489
		1890	102	3,376,356	262	286.970	2,917	1,260,325	2,594	258	65	250,668	1,624,849	4,118,195
14	Hat and cap materials.	1900	70	1,744,419	50	60,408	1,371	434,148	774	549	48	103,505	2,797,756	3,849,116
		1890	73	1,709,650	116	145,897	1,589	698,455	1,100	476	13	146,073	2,059,001	3,465,524
2	Hats and caps, not including wool hats.	1900	816	25,095,798	1,369	1,618,791	31,425	14,144,552	19,406	11,642	377	2,440,343	24,421,052	49,205,667
		1890	705	13,724,002	1,262	1,460,830	25,931	12,650,917	16,465	9,205	261	1,651,268	16,160,802	37,311,599
14	Hay and straw baling.	1900	......	....	......	....	......	....	......	......	......	....	....	....
		1890	72	416,541	59	25,327	718	124,326	594	114	10	30,430	729,195	1,058,142
9	Hones and whetstones.	1900	18	216,836	19	5,907	189	72,879	182	6	1	13,614	64,278	196.323
		1890	9	97,935	14	9,219	57	18,754	47	10	......	1,918	6,332	54,136
10	Hooks and eyes	1900	9	1,382,394	34	20,453	300	127,518	169	129	2	31,907	255,427	499,543
		1890	10	449,618	25	42,373	218	106,071	119	96	3	33,008	325,615	593,604
3	Horseshoes, factory product.	1900	6	344,151	13	25,957	167	90,527	149	....	18	10,997	172,237	387,619
		1890	4	1,299,065	19	40 976	474	241,894	394	....	80	42,019	519,449	1,110,032
2	Hosiery and knit goods.	1900	921	81,860,604	2,809	3,124,798	83,387	24,358,627	21,154	53,565	8,668	6,599,865	51,071,859	95.482,566
		1890	796	50,607,738	1,621	1,685,153	59.588	16,578,119	14,846	40,826	3,916	3,627,245	35,861,585	67,241,013

14	House-furnishing goods, not elsewhere specified.	1900	210	10,638,248	584	628,314	5,212	1,837,552	3,034	2,066	112	739,841	9,198,803	14,280,575
		1890	133	6,939,659	250	272,824	3,417	1,506,929	2,515	818	84	366,750	4,832,791	8,347,285
14	Ice manufacture.	1900	775	38,019,507	1,531	1,226,331	6,880	3,402,745	6,838	8	34	1,773,692	3,312,393	13,780,978
		1890	222	9,846,468	439	345,191	2,826	1,095,996	2,811	....	15	477,485	940,699	4,900,983
14	Ink	1900	104	3,821,514	401	478,316	787	412,140	636	143	8	417,607	2,109,142	4,372,707
		1890	73	2,655,219	263	336,962	761	420,228	585	164	12	210,230	1,664,785	3,504,979
14	Instruments, professional and scientific.	1900	265	4,491,627	398	408,314	2,786	1,433,715	2,313	423	50	485,988	1,385,292	4,896,631
		1890	233	2,996,021	393	414,596	1,978	1,191,598	1,806	149	23	203,937	698,352	3,271,616
3	Iron and steel	1900	668	573,391,663	9,211	11,737,488	222,490	120,820,276	219,518	1,071	1,901	32,274,100	522,398,932	803,968,273
		1890	645	372,678,018	3,820	5,687,606	148,715	78,977,900	147,357	2	1,356	16,918,753	295,777,843	430,954,348
3	Iron & steel, bolts, nuts, washers, and rivets.	1900	72	10,799,692	420	571,073	7,660	2,991,857	6,436	701	523	531,095	8,071,071	13,978,382
		1890	82	10,789,821	386	467,748	6,955	3,004,454	6,087	310	558	597,605	6,746,304	12,373,031
3	Iron and steel, doors and shutters.	1900	13	261,958	20	19,452	117	85,683	113	1	3	24,298	115,718	319,629
		1890	7	42,550	7	7,625	46	30,764	44	....	2	4,210	29,792	88,515
3	Iron and steel, forgings.	1900	91	9,677,193	322	410,845	4,688	2,559,433	4,582	23	83	425,596	5,213,550	10,439,742
		1890	90	7,152,145	240	324,527	4,208	2,314,114	4,111	11	86	366,812	4,875,697	9,042,563
3	Iron & steel, nails & spikes, cut & wrought, including wire nails.	1900	102	10,751,359	431	444,301	4,477	2,042,250	3,569	794	114	614,761	8,561,571	14,777,299
		1890	138	24,334,549	516	672,741	16,600	7,144,253	14,967	879	754	1,244,624	22,960,737	34,227,517
3	Iron and steel, pipe, wrought.	1900	19	18,343,977	193	266,319	5,536	2,495,898	5,486	....	50	241,091	15,523,858	21,292,043
		1890	22	22,622,367	371	447,747	11,693	5,397,715	11,403	5	285	1,095,805	25,988,798	37,906,801
3	Ironwork, architectural and ornamental.	1900	672	33,062,409	1,867	2,034,417	20,646	11,111,226	20,451	70	125	2,874,291	31,140,636	53,508,179
		1890	724	21,968,172	1,514	1,715,756	17,158	10,235,701	16,999	9	150	1,344,813	18,620,510	37,745,294
14	Ivory and bone work.	1900	70	939,714	90	67,127	1,334	529,051	1,041	253	40	66,540	930,224	1,873,357
		1890	64	1,894,549	105	95,493	1,240	591,867	1,061	160	19	111,293	921,975	1,918,607
14	Japanning.......	1900	38	117,639	4	3,900	160	75,453	144	6	10	16,030	55,305	215,506
		1890	39	285,794	49	51,004	243	105,197	167	64	12	21,941	120,184	350,819
10	Jewelry	1900	908	28,120,939	1,817	1,852,449	20,676	10,746,375	13,957	6,319	400	2,094,069	22,356,067	46,501,181
		1890	783	22,246,508	1,881	2,232,066	13,880	8,038,327	10,696	2,968	216	1,493,545	16,110,219	34,761,458
14	Jewelry and instrument cases.	1900	63	547,753	52	34,886	819	322,566	385	399	35	81,194	435,717	1,156,977
		1890	76	634,900	128	140,647	910	446,927	620	272	18	70,679	483,441	1,454,053
2	Jute and jute goods.	1900	18	7,027,293	88	147,313	4,506	1,181,790	1,611	2,064	831	574,986	3,015,362	5,383,797
		1890	7	1,645,636	18	23,001	1,194	368,585	307	720	167	168,258	501,909	1,120,121
9	Kaolin and other earth grinding.	1900	145	12,212,341	232	256,584	2,094	820,678	2,089	2	3	270,436	1,651,335	3,722,151
		1890	95	3,334,575	190	195,250	1,271	548,879	1,266	....	5	222,527	1,330,290	2,846,862
4	Kindling wood ...	1900	85	1,775,272	68	55,527	1,525	566,635	1,209	283	33	87,128	735,844	1,784,690
		1890	136	1,299,533	188	156,283	1,617	616,094	1,402	148	67	173,298	1,187,460	2,401,873
6	Labels and tags ..	1900	47	848,115	96	119,889	754	289,273	464	261	29	99,478	387,517	1,104,652
		1890	47	646,815	92	90,937	618	288,960	415	149	54	60,882	402,371	1,048,304
10	Lamps and reflectors.	1900	156	6,375,474	499	568,516	4,725	2,076,980	3,604	1,011	110	692,459	3,497,236	8,341,374
		1890	93	2,550,214	220	284,313	2,066	1,035,960	1,870	144	52	197,759	1,542,092	4,039,356
14	Lapidary work ...	1900	60	3,087,390	43	50,967	498	498,715	469	18	11	78,899	4,655,765	5,786,281
		1890	29	100,635	37	40,844	92	58,642	87	....	5	13,294	124,852	315,604
1	Lard, refined	1900	19	1,335,759	54	79,675	499	237,930	438	20	41	127,500	7,496,845	8,630,901
		1890	17	3,898,910	130	187,940	888	460,102	686	141	61	845,116	12,654,360	15,474,848
4	Lasts	1900	65	1,484,966	97	108,250	1,131	649,654	1,108	3	20	142,006	526,670	1,879,742
		1890	52	906,820	78	85,989	696	485,743	694	....	2	62,192	331,225	1,239,065
10	Lead, bar, pipe, and sheet.	1900	34	3,949,330	151	201,619	605	321,598	602	2	1	222,135	6,279,497	7,477,824
		1890	28	4,892,525	143	169,133	637	383,188	635	2	....	208,645	6,882,157	8,351,794
10	Lead, smelting and refining.	1900	39	72,148,933	425	754,913	8,319	5,088,684	8,312	....	7	1,166,210	144,195,163	175,466,304
		1890	....	....	....	....	....	....	....	....	....	....	....	....

GROUP NUMBER.	INDUSTRIES.	YEAR.	Number of establishments.	Capital.	SALARIED OFFICIALS, CLERKS, ETC. Number.	SALARIED OFFICIALS, CLERKS, ETC. Salaries.	AVERAGE NUMBER OF WAGE-EARNERS AND TOTAL WAGES. Total. Average number.	Total. Wages.	Average number. Men 16 years and over.	Women 16 years and over.	Children under 16 years.	Miscellaneous expenses.	Cost of materals used.	Value of products, including custom work and repairing.
				$		$		$				$	$	$
5	Leather board ...	1900	3	49,500	4	2,900	71	24,350	20	51	....	3,440	49,451	108,734
		1890	8	445,743	22	20.711	163	71,452	161	2	....	30,166	211,936	463,705
5	Leather goods	1900	313	5,467,294	635	559,740	6,253	2,256,280	3,611	2,367	275	867,151	6,162,148	11,717,401
		1890	156	3,126,104	341	360.472	2,834	1,166,135	1,837	903	94	204,529	3,112,892	5,827,802
5	Leather, tanned, curried, and finished.	1900	1,306	173,977,421	2,442	3,158,842	52,109	22,591,091	50,402	1,173	534	7,023,416	155,000,004	204,038,127
		1890	1,787	98,088,698	2,635	2,735,890	42,392	21,249,989	41,733	264	395	5,397,672	122,946,721	172,136,092
9	Lime and cement.	1900	1,000	48,833,730	1,408	1,417,185	19,107	7,749,815	18,952	35	120	2,293,268	11,041,577	28,689,135
		1890	873	18,752,396	667	528,909	13,043	4,944,313	12,947	7	89	984,009	5,667,863	15,741,801
2	Linen goods......	1900	18	5,688.999	117	142,941	3,283	1,036,839	1,044	1,787	452	387,095	2,550,517	4,368,159
		1890	3	908,589	9	13,070	574	167,134	218	295	61	65,583	268,907	547,273
7	Liquors, distilled.	1900	967	32,551,604	661	889,606	3,722	1,733,218	3,623	81	18	73,218,227	15,147,784	96,798,443
		1890	440	31,006,176	581	568,825	4,762	2,246,064	4,753	3	6	65,179,927	14,909.173	104,197,869
7	Liquors, malt	1900	1,509	415,284,468	7,153	13,046,540	39,532	25,826.211	38,385	504	643	109,329,231	51,674,928	237,269,713
		1890	1,248	232,471,290	4,543	7,669,161	30,257	20,713,383	29,491	250	516	48,276,290	64,003,347	182,731,622
7	Liquors, vinous ..	1900	359	9,838,015	344	365,498	1,163	446,055	1,099	61	3	552,338	3,689,330	6,547,310
		1890	236	5,792,783	234	181,280	1,048	299,453	1,016	26	6	270,377	1,318,012	2,846,148
6	Lithographing and engraving.	1900	263	22,676,142	1,497	1,968,388	12,994	6,882,168	10,446	2,146	402	2,590,544	7,886,045	22,240,679
		1890	219	15.490,127	934	1,291,844	9,656	5,855,330	7,851	1,496	309	1,155,653	6,265,464	17,988,157
15	Lock and gun-smithing.	1900	2,103	2,250,300	69	41,695	1,553	769,351	1,408	59	86	377,989	929,700	3,703 127
		1890	1,308	1,867,220	1,318	846.455	1,242	655,861	1,195	2	45	278,516	822,557	3,153,834
4	Looking-glass and picture frames.	1900	1,629	7,747,382	1,182	934,129	7,712	3,370,072	6,743	600	369	1,151,653	6,887,331	15,570,293
		1890	1,290	8,554,995	1,736	1,410,696	7,928	3,846,857	6,937	585	406	1,019,920	7,069,115	16,376,173
4	Lumber and timber products.	1900	33,035	611,611,524	12,530	11,260,608	283,260	104,640,591	277,900	1,748	3,612	17,731,519	317,923,548	566,832,984
		1890	22,617	557,881,054	20,375	11,203,757	311,964	87,934,284	306,177	2,501	3,286	25,324,063	242,562,296	437,957,382
4	Lumber, planing mill products, including sash doors and blinds	1900	4,204	119,271,631	5,682	5,249,632	73,627	32,685,210	72,003	238	1,386	7,289,615	99,927,707	168,343,003
		1890	3,670	120,271,440	6,965	6.748,224	79,923	42,221,856	78,293	141	1,489	6,594,958	104,926,834	183,681,552
7	Malt............	1900	146	39,288,102	290	471,316	1,990	1,182,513	1,986	4	....	916,866	14,816,741	91,373,600
		1890	202	24,293,864	366	513,025	3,328	1,590,175	3,328	....	....	1,305,246	17,100,074	23,442.559
9	Mantels,slate,marble, & marbleized.	1900	36	811,995	72	69,591	449	291,050	448	....	1	107,094	487,965	1,153,540
		1890	90	1,854,759	184	207,742	1,520	953,119	1,512	4	4	108,899	1,254,667	3,127,662
9	Marble and stone work.	1900	6,070	67,509,533	3,306	3,003,875	54,370	28,663,241	54,141	70	159	4,666,095	30,443,297	85,101,591
		1890	3,373	37,115,193	4,261	4,020,898	31,728	21,342,623	31,583	61	84	2,742,375	23,868,904	62,595,762
15	Masonry,brick and stone.	1900	8,333	48,070,239	2,386	2,352,394	93,568	53,152,258	93,368	85	115	31,238,845	87,280,964	203,593,634
		1890	7,715	54,969,408	8,411	8,216,204	110,618	69,311,083	110,413	27	178	6,000,666	96,207,162	204,165,642
4	Matches	1900	22	3,893,000	66	87,115	2,047	612,715	1,054	793	200	463,045	3,420,740	6,005,937
		1890	27	1,941,092	59	70,655	1,696	473,556	780	847	69	124,800	935,008	2,193,638
2	Mats and matting.	1900	9	994,155	42	31,060	1,197	237,282	896	288	13	46,538	516,137	1,165,330
		1890	24	392,639	40	39,607	383	172,874	343	33	7	26,651	301,591	608,625
14	Mattresses and spring beds.	1900	797	8,298,772	869	778,817	7,959	3,213,268	6,152	1,603	204	1,049,118	10,444,009	18,643,704
		1890	696	6,662,929	1 019	896,344	6,318	2,763,953	,9406	1,149	263	680,386	8,727,380	15,683,932

2	Millinery and lace goods.	1900	591	10,764,813	1,592	1,392,904	16,871	5,817,855	2,654	14,035	182	1,545,167	15,654,295	29,469,409
		1890	278	6,630,210	709	926,408	11,118	4,526,021	2,524	8,552	42	742,153	8,588,342	18,047,066
15	Millinery, custom work.	1900	16,151	27,740,386	3,723	1,508,987	33,298	9,570,536	436	32,487	375	4,943,340	36,455,043	70,363,757
		1890	5,999	16,309,220	6,904	3 703,738	17,072	5,241,401	401	16,457	214	2,620,266	18,756,776	36,983,082
9	Millstones	1900	3	49,238	7	7,816	37	20,957	37	......	......	5,273	30,995	75,922
		1890	4	49,450	4	5,100	24	12,764	24	......	......	1,628	18,294	47,152
7	Mineral and soda waters.	1900	2,816	20,518,708	1,464	1,203,407	8,985	4,169,113	8,380	309	296	2,266,018	8,801,467	23,874,429
		1890	1,377	10,781,817	1,798	1,426,705	5,919	2,780,163	5,642	100	177	1,286,577	4,562,803	14,353,745
9	Mirrors	1900	103	3,184,426	269	277,419	2,555	1,231,689	2,293	173	89	323,798	4,995,671	8,004,301
		1890	45	1,695,772	138	190 828	1,404	842,407	1,346	45	13	169,594	3,274,131	6,000,533
2	Mixed textiles ...	1900	......	......	......	......	......	......	......	......	......	......	......	......
		1890	......	......	......	......	......	......	......	......	......	......	......	......
14	Models and patterns.	1900	532	2,250,484	118	113,413	2,608	1,565,728	2,400	157	51	245,643	825,111	3,836,518
		1890	456	1,594,804	525	490,112	1,627	1,005,145	1,536	50	41	158,814	510,636	2,734,352
14	Mucilage and paste.	1900	117	1,265,426	170	164,328	480	205,082	341	117	22	161,143	1,657,342	2,629,299
		1890	55	748,826	95	79,629	309	119,782	258	48	3	67,581	755,034	1,276,611
14	Musical instrum'ts and materials not specified.	1900	229	3,896,101	158	141,745	2,405	1,232,039	2,144	226	35	271,093	1,205,337	3,394,734
		1890	293	1,329,329	326	257,067	1,056	605,110	981	54	21	178,488	510,664	1,888,613
14	Musical instruments, organs and materials.	1900	129	5,011,987	274	299,435	3,435	1,720,727	3,271	92	72	603,785	2,220,165	5,691,504
		1890	145	9,890,288	381	422,286	4,608	2,674,191	4,469	117	22	821,315	3,454,920	9,213,188
14	Musical instruments, pianos and materials.	1900	261	38,790,494	1,244	1,715,191	17,869	9,818,996	16,978	463	428	2,908,386	15,147,520	35,324,090
		1890	236	18,430,872	625	978,382	12,432	8,369,347	12,211	181	40	1,394,513	10,470,779	25,766,368
10	Needles and pins .	1900	43	3,235,158	101	126,754	2,353	939,846	1,193	1,019	141	215,322	972,570	2,738,439
		1890	45	1,820 089	71	78,518	1,609	649,484	898	691	20	71,674	450,442	1,515 865
2	Nets and seines . .	1900	19	1,160,782	41	63,545	748	222,146	83	646	19	81,428	865,908	1,476,022
		1390	22	1,135,764	32	27,864	618	190,121	104	514	......	53,920	634,634	1,002,196
2	Oakum	1900	7	416,199	10	16,922	171	51,343	141	26	4	16,067	283,862	440,237
		1890	7	275,675	9	10,300	142	46,816	124	4	14	6,579	231,733	363,400
8	Oil, castor	1900	3	539,221	12	17,320	49	29,068	48	1	......	13,839	293,408	395,400
		1890	7	621,798	24	25,599	77	44,532	77	......	......	28,314	431,231	573,363
8	Oil, cottonseed and cake.	1900	369	34,451,461	1,569	1,579,252	11,007	3,143,459	10,936	54	17	2,433,912	45,165,823	58,726,632
		1890	119	12,808,996	395	414,047	5,906	1,493,780	5,814	55	37	1,163,586	14,363,126	19,335,947
8	Oil, essential......	1900	70	612.657	42	25,523	199	69,100	191	7	1	49,762	596,112	850,093
		1890	67	102,223	23	8.568	197	28,924	197	......	......	34,462	129,735	255,847
8	Oil, lard.........	1900	7	369,773	24	24 426	78	42,205	77	1	......	47,182	971,647	1,221,841
		1890	7	481,526	26	29,024	94	53,208	94	......	......	102,663	920,650	1,181,613
8	Oil, linseed.......	1900	48	15,460,512	285	446,247	1,328	693,311	1,321	6	1	659,606	24.395,775	27,184,331
		1890	62	14,003,358	187	308,718	1,886	977,344	1,882	4	......	1,321,461	19,374,543	23,534.306
8	Oil, not elsewhere specified.	1900	194	9,549,984	788	967,015	1,386	700,050	1,230	51	5	2,048,845	9,848,409	17,183,799
		1890	129	4,652,653	380	463,526	758	467,362	720	32	6	944,198	5,403,522	9,256,250
8	Oil, resin	1900	......	......	......	......	......	......	......	......	......	......	......	......
		1890	8	284,110	27	29,056	90	53,596	90	......	......	20,890	535,320	738,680
2	Oilcloth, enameled	1900	9	1,702,904	48	100,584	512	300,878	512	......	......	88,889	2,696,412	3,595,515
		1890	9	772,820	26	29,702	341	182,759	335	4	2	66,929	983,518	1,603,265
2	Oilcloth, floor	1900	18	7,176,198	105	193,939	2,718	1,327,235	2,626	49	43	433,068	4,853,260	7,807,105
		1890	19	3,704,436	62	92,203	1,521	745,766	1,477	4	40	195,764	2,380,295	3,877,822
1	Oleomargarine ...	1900	24	3,023,646	394	412,012	1,084	534,444	1,007	65	12	2,489,784	7,639,501	12,499,812
		1890	12	634,532	64	91,752	264	154,138	252	11	1	385,563	2,175,264	2,988,525
14	Optical goods	1900	350	5,567,809	568	447,743	4,341	1,935,219	3,084	1,062	195	684,682	3,233,430	7,790,970
		1890	191	2,608,176	387	290,078	2,507	1,010,374	1,868	507	132	228,028	1,324,305	3,505,973
3	Ordnance and ordnance stores....	1900	4	3,468,713	81	96,001	989	615,280	977	12	......	277.268	802,706	2,239,797
		1890	4	7,639,991	31	34,888	1,428	1,064,418	1,425	2	1	18,885	743,348	2,424,662
1	Oysters, canning and preserving.	1900	39	1,240,966	119	112.879	2,779	630,016	1,355	1,123	301	93,707	2.608,757	3.670.134
		1890	16	1,106,962	6	69.891	3,453	642,610	1,482	1 702	269	80,199	2,088,867	3 260,766

Group Number.	INDUSTRIES.	Year.	Number of establishments.	Capital.	SALARIED OFFICIALS, CLERKS, ETC.		AVERAGE NUMBER OF WAGE-EARNERS AND TOTAL WAGES.					Miscellaneous expenses.	Cost of materials used.	Value of products, including custom work and repairing.
							Total.		Average number.					
					Number.	Salaries.	Average number.	Wages.	Men, 16 years and over.	Women, 16 years and over.	Children, under 16 years.			
				$		$		$				$	$	$
14	Painting and paper hanging.	1900	16,939	27,217,086	2,204	1,478,024	59,191	34,822,819	58,579	281	331	3,876,483	26,304,784	88,596,852
		1890	10,043	23,135,781	10,945	8,935,219	45,336	28,787,331	44,830	249	257	2,632,571	23,110,359	74,067,998
8	Paints	1900	419	42,501,782	2,512	3,077,318	8,151	3,929,787	7,357	744	50	3,430,061	33,799,386	50,874,995
		1890	382	34,009,203	1,693	2,036,869	7,044	3,568,757	6,460	519	65	3,039,427	24,930,532	40,438,171
6	Paper and wood pulp.	1900	763	167,507,713	2,935	4,500,911	49,646	20,746,426	41,547	7,930	169	10,184,106	70,530,236	127,326,162
		1890	649	89,829,548	1,348	1,770,657	31,050	13,204,828	24,015	6,767	268	6,770,681	44,228,480	78,937,184
6	Paper goods, not elsewhere specified.	1900	190	11,370,585	720	922,689	6,117	2,242,702	3,135	2,835	147	1,042,923	9,819,820	16,785,266
		1890	66	2,922,449	128	153,828	1,519	611,353	971	439	109	234,325	2,627,454	4,179,235
6	Paper hangings	1900	51	8,889,794	512	816,852	4,172	2,074,138	3,380	492	300	711,100	6,072,809	10,663,209
		1890	27	5,709,909	230	302,634	2,584	1,172,154	2,063	243	278	660,117	3,572,027	7,431,726
6	Paper patterns	1900	16	256,075	92	72,048	836	262,559	109	719	8	29,295	124,854	563,653
		1890	27	156,106	39	45,212	409	108,526	47	361	1	54,857	85,269	377,456
8	Patent medicines and compounds.	1900	2,026	37,209,793	5,419	5,330,121	11,809	4,407,988	5,598	6,001	210	18,028,546	18,185,313	59,611,335
		1890	1,127	18,596,823	2,332	2,138,819	7,058	2,955,383	4,231	2,670	157	7,063,311	11,030,916	32,620,182
14	Paving and paving materials.	1900	1,729	37,888,412	1,520	1,493,757	34,090	14,570,408	34,010	5	75	2,149,511	20,152,477	46,447,719
		1890	704	12,648,093	1,010	1,025,672	21,720	9,425,298	21,703	1	16	1,147,235	13,891,005	30,644,072
14	Pencils, lead	1900	7	2,227,406	81	111,890	2,162	683,281	758	1,087	317	278,176	1,030,917	2,222,276
		1890	5	3,100,836	64	130,300	1,388	450,450	483	632	273	154,528	796,378	1,687,560
14	Pens, fountain and stylographic.	1900	23	590,629	84	80,808	318	141,012	241	66	11	113,334	351,932	906,454
		1890	15	142,265	24	28,902	152	73,897	128	24	......	12,380	123,214	351,775
10	Pens, gold	1900	22	496,246	62	67,522	378	229,679	337	38	3	42,740	312,537	799,078
		1890	18	473,964	62	75,124	301	185,545	277	23	1	82,753	235,628	718,070
3	Pens, steel	1900	3	357,460	13	21,416	473	138,433	65	371	37	37,405	52,466	294,340
		1890	3	399,182	15	20,143	496	132,032	141	322	33	6,295	56,630	268,259
8	Perfumery and cosmetics.	1900	266	3,499,168	808	757,695	1,768	569,286	520	1,209	39	1,184,501	3,136,853	7,095,713
		1890	157	2,238,901	359	376,159	1,396	501,520	542	838	16	421,335	2,128,420	4,630,141
8	Petroleum, refining	1900	67	95,327,892	1,201	1,811,400	12,199	6,717,087	11,935	66	198	3,330,851	102,859,341	123,929,384
		1890	94	77,416,296	1,068	1,117,011	11,403	5,872,467	10,885	2	516	2,069,268	67,918,723	85,001,198
14	Phonographs and graphophones.	1900	11	3,348,282	144	179,145	1,267	608,490	1,114	146	7	215,401	827,529	2,246,274
		1890	......	......	......	......	......	......	......	......	......	......	......	......
14	Photographic apparatus.	1900	48	1,849,724	165	129,618	1,961	779,890	1,662	230	69	229,886	595,925	2,026,063
		1890	25	362,834	43	46,184	506	262,755	436	58	12	28,263	164,620	624,342
14	Photographic materials.	1900	105	3,668,026	304	323,676	1,483	662,958	994	450	39	453,092	2,782,285	5,773,325
		1890	45	1,172,640	116	118,018	783	420,248	587	194	2	91,356	1,107,269	2,121,387
14	Photography	1900	7,553	13,193,589	1,063	664,083	8,911	4,013,018	5,580	3,118	213	2,577,308	6,841,853	23,238,719
		1890	3,105	7,804,532	3,465	2,933,228	6,967	3,472,643	4,786	2,063	118	1,592,786	3,892,196	15,488,324
6	Photo-lithographing and photo-engraving.	1900	204	1,999,921	485	450,720	2,698	1,756,578	2,529	117	52	400,873	728,743	4,226,106
		1890	89	1,134,873	207	228,279	1,145	760,619	1,056	73	16	145,059	541,395	2,071,580
1	Pickles, preserves, and sauces.	1900	474	10,656,854	1,845	1,652,051	6,812	2,161,962	3,606	3,081	125	2,254,583	12,422,432	21,507,046
		1890	316	4,913,459	675	608,427	3,577	1,158,892	1,964	585	28	528,283	5,328,541	9,790,855
14	Pipes, tobacco	1900	98	1,111,144	120	108,890	1,585	737,647	1,284	212	89	125,189	1,106,299	2,471,908
		1890	69	1,432,753	139	159,181	1,206	571,815	1,024	163	19	95,545	626,668	1,881,262

10	Plated and britannia ware.	1900	66	16,486,471	477	702,635	6,392	3,088,224	5,349	979	64	768,939	5,875,312	12,608,770
		1890	68	13,150,990	302	420,045	6,617	3,355,260	5,480	974	163	1,276,431	4 647,890	11,502,966
10	Plumbers' supplies	1900	174	13,598,528	917	987,282	8,024	3,930.594	7,639	245	140	847,094	7,289,867	14,771,185
		1890	122	9,678,107	538	646,629	4,947	2,657,585	4,759	73	115	550,938	5,853,709	11,960,464
15	Plumbing, and gas and steam fitting.	1900	11,876	47,111,264	3,730	2,593,594	53,916	31,873,866	53,336	64	516	4,609,906	65,334,689	131,852,567
		1890	5,327	29,335,247	7,056	6,847,297	35,457	21,915,314	34,915	67	475	2,492,884	37,735,671	80,905,925
5	Pocketbooks.....	1900	68	991,876	124	146,219	1,653	588,595	958	596	99	115,913	1,278,226	2,495,188
		1890	62	1,121,834	140	170,081	1,208	491,911	730	406	72	101,933	968,948	2,165,462
9	Pottery, terra cotta, and fire-clay products.	1900	1,000	65,951,885	2,777	3,011,512	43,714	17,691,737	38,171	4,481	1,062	3,260,721	11,915,236	44,263,386
		1890	707	26,127,104	1,316	1,269,111	18,980	8,869,032	16,402	2,023	555	2,003.007	5,618,401	22,057,090
6	Printing and publishing.	1900	22,312	292,517,072	37,799	36,090,719	162,992	84,249,954	125,964	28,765	8,263	55,897,929	86,856,290	347,055,050
		1890	16,566	195,387,445	28,391	26,272,756	136,836	78,810,319	110,434	19,026	7,376	46.971,768	68,858,915	275,452,515
6	Printing materials	1900	70	905,603	64	64,063	560	232,799	503	32	25	98,984	406,357	1,088,432
		1890	64	1,370,487	151	148.010	715	338,096	519	180	16	121,874	567,638	1,459,434
14	Pulp, from fiber other than wood	1900	3	479,158	6	7,200	121	28,462	103	17	1	13,191	42,204	103,204
		1890	7	583,837	16	24,350	152	68,906	150	....	2	33,202	126,902	524,243
4	Pulp goods.	1900	22	2,316,985	75	91,685	691	283,835	638	44	9	76,271	646,639	1,267,013
		1890	9	418,045	24	27,550	252	111,484	228	17	7	46,228	122,851	352,582
4	Pumps, not including steam pumps.	1900	130	1,260,710	95	83,677	632	247,193	620	....	12	80,380	637,768	1,341,713
		1890	256	3,540,097	386	317,571	1,754	827,574	1,740	1	13	225,377	1,681,275	4,103,410
5	Packing hose	1900	......	....	......	....	....	....	....	....	......	....	....	....
		1890	......	....	......	....	....	....	....	....	......	....	....	....
4	Refrigerators.....	1900	95	4,782,110	237	239,953	3,329	1,287,488	3,229	6	94	406,159	2,476,518	5,317.886
		1890	82	3,367,329	195	218,933	2,178	1,033,832	2,022	57	99	295,322	2,377,958	4,513,616
2	Regalia and society banners and emblems.	1900	120	1,795,858	248	196,982	1,586	476,580	420	1,128	38	355,117	1,608.415	3,077,945
		1890	137	1,841,193	299	306,869	2,080	737,853	675	1,391	14	247,882	1,246,906	3,203,890
3	Registers, car fare.	1900	5	104,408	14	15,354	52	25,775	51	1	......	9,822	17,403	80,865
		1890	7	74,725	10	9,926	91	54,148	90	....	1	13,098	32,618	141,320
3	Registers, cash ...	1900	13	5,137,965	313	313,405	2,015	1,223,966	1,829	186	......	919,540	903,834	5,594,500
		1890	5	292,150	45	37,858	697	396,282	588	99	10	16,805	222,576	1,281,500
1	Rice, cleaning and polishing.	1900	80	2,601,352	169	182,033	651	265,585	639	....	12	230.203	7,575,522	8,723,726
		1890	32	2,073,884	96	96,160	647	223,433	630	9	8	147.992	5.601,206	6.693,196
14	Roofing and roofing materials.	1900	2,162	17,594,162	1,198	1,051,983	15,362	6,996,810	15,138	18	206	1,587,639	14,624,759	29,916,592
		1890	2,140	13,303.597	2,396	2,088,512	10,937	6,469,514	10,803	27	107	1,117,670	14,712,379	29,412,813
14	Rubber and elastic goods.	1900	262	39,304,853	1,825	2,215,597	20,405	8,082,738	12,561	7,317	527	2,805.470	33,485,694	52,627,030
		1890	139	13,703,787	619	852,290	9,183	3,663,976	4,509	4,296	378	1,133,182	11,113,528	.18,708,917
14	Rubber, vulcanized.	1900	......	....	......	....	....	....	....	....	......	....	....	....
		1890	......	....	......	....	....	....	....	....	......	....	....	....
4	Rules, ivory and wood.	1900	11	202,724	14	11,986	213	66,732	150	50	13	16,694	72,657	207,757
		1890	16	172,918	27	22,194	136	51,933	101	28	7	11,183	34,325	154,173
5	Saddlery and harness.	1900	12,934	43,354,136	1,976	1,587,651	24,123	10,725,647	22.352	1,147	624	2,996,787	33,127,926	62,630,902
		1890	7,931	35,346,620	7,654	5,121,927	22,672	10,908,918	21,376	962	334	2,666,690	24,674,225	52 970,801
3	Safes and vaults...	1900	35	5,479,879	272	283,111	2,033	1,017,237	2,018	1	14	300,620	1,689,148	3,927,867
		1890	39	4,603,118	315	265,210	3,816	2,129,615	3,776	1	39	564,756	2,635,313	6,641,844
8	Salt............	1900	159	27,123,364	406	499,748	4,774	1,911,140	4,337	378	59	760,539	3,335,922	7,966,897
		1890	200	13,437,749	200	189,049	4,255	1,593,442	4,055	148	52	674,183	1,826,770	5,484,618
14	Sand and emery paper and cloth.	1900	9	1.372,307	63	97,846	274	144,183	250	16	8	57,878	681,240	1,175,895
		1890	9	705,957	47	52,263	206	104,226	189	17	......	111,073	781,505	1,249,647
3	Saws............	1900	96	8,508,487	312	329,402	3,215	1,692,757	3,012	71	132	347,209	2,600,217	4,443,748
		1890	95	6,313,373	267	276,168	2,676	1,583,526	2,462	46	168	435,625	2,346,401	5,572,992
3	Scales and balances.	1900	86	6,307.576	305	297,166	2,775	1,436,839	2,748	16	11	369,999	1,533,379	5.239,788
		1890	76	1,658,655	150	145,078	1,350	692,497	1,335	2	13	108,056	867,955	2,322.744
3	Screws..........	1900	33	7,931,457	247	294,876	3,527	1,423,836	2,584	879	64	375,974	1,720,455	4,658.467
		1890	27	7,244,580	149	146,232	2,615	1,014,178	1,810	754	51	384,465	1,232,377	3,509,986

Three Hundred and Fifty Specified Industries

Group Number.	INDUSTRIES.	Year.	Number of establishments.	Capital.	Salaried officials, clerks, etc.: Number	Salaried officials, clerks, etc.: Salaries.	Average number of wage-earners and total wages: Total: Average number.	Total: Wages.	Average number: Men, 16 years and over.	Average number: Women, 16 years and over.	Average number: Children, under 16 years.	Miscellaneous expenses.	Cost of materials used.	Value of products, including custom work and repairing.
				$		$		$				$	$	$
4	Sewing-machine cases.	1900	7	1,333,341	58	66,497	2,653	1,065,180	2,474	12	167	81,772	1,533,880	2,815,142
		1890	7	1,430,403	20	34,122	1,822	952,603	1,657	11	154	81,396	990,437	2,249,551
15	Sewing-machine repairing.	1900	396	331,433	29	18,067	310	154,036	289	15	6	73,753	220,537	710,123
		1890	166	192,593	142	89,209	193	111,857	177	15	1	47,942	86,816	385,941
3	Sewing machines and attachments.	1900	58	18,739,459	624	842,468	10,635	6,213,938	10,118	455	62	864,451	7,809,796	18,314,419
		1890	59	16,043,136	284	420,231	8,837	4,750,324	8,049	536	252	1,865,050	3,502,173	12,823,147
13	Shipbuilding.....	1900	1,116	77,362,701	1,407	2,008,537	46,781	24,839,163	45.744	34	1,003	3,685,661	33,486,772	74,578,158
		1890	1,010	53,393,074	1,123	1,194,870	24,811	14,833,977	24,628	9	174	1,392,551	16,925,109	40,342,115
2	Shirts	1900	986	20,312,412	2,041	1,734,814	38,492	11,425,101	6,604	31,074	814	4,918,576	23,662,317	49,022,845
		1890	869	14,273,611	1,543	1,511,108	31,207	9,193,495	5,437	25,563	207	2,188,265	15,704,353	33.638,593
2	Shoddy	1900	105	5,272,929	139	166,704	1,926	748,948	1,425	480	21	293,149	4,875,192	6,730,974
		1890	94	3,754,063	144	149,483	2,155	707,099	1,252	865	38	238,094	6,003,035	7,887,000
4	Show cases.......	1900	102	1,152,898	106	88,155	1,363	708,211	1,323	10	30	152,336	1,057,666	2,467,901
		1890	99	1,208,022	169	158,048	1,331	718,102	1,261	4	66	147,134	1,077,345	2,569,557
2	Silk and silk goods	1900	483	81,082,201	2,657	3,134,352	65,416	20,982,194	24,206	34,797	6,413	10,264,208	62,406,665	107,256,258
		1890	472	51,007,537	1,531	1,917,877	49,382	17,762,441	17,602	28,914	2,866	4,259,623	51,004,425	87,298,454
10	Silversmithing ...	1900	44	1,999,921	105	118.047	1,437	803,662	1,215	196	26	91,012	1,229,158	2,936,462
		1890	21	410,773	40	59,874	274	193,778	257	13	4	20 755	204,237	621,567
10	Silverware	1900	59	12,142,008	547	636,342	4,376	2,639,480	3,999	318	59	818,794	4,554,487	10,569,121
		1890	30	5,317,641	161	223,456	2,145	1,394,973	2,003	130	12	633.891	2,129,344	5,813,737
1	Slaughtering and meat packing, not including retail butchering.	1900	1,134	190.706,927	10,290	10,178,773	69,441	33,923,253	64,810	2,960	1,671	24,199,833	686,860,891	790,252,586
		1890	1,367	118,016,066	4,240	4,735,047	44,812	24,668,202	43,097	1,011	704	15,832,255	482,897,381	564,667,035
10	Smelting and refining, not from the ore.	1900	61	5,200,523	203	229,244	983	532,068	927	54	2	270,359	5,899,935	7,784,695
		1890	50	9,425,912	119	171,053	1,646	951,300	1,639	1	6	472,996	25,285,191	28,188,826
14	Soap and candles.	1900	558	38,068,334	2,738	2,777,071	9,487	3,754,767	6,794	2,066	627	6,237,893	33,143,230	53,231,017
		1890	578	24,821,069	1,484	1,534,794	7.821	3,416,854	6,125	1,182	514	3,355,625	28,687,412	43,600,285
14	Soda water apparatus.	1900	30	4,202,452	227	243,710	963	549,939	942	20	1	452,339	997,436	3,015,493
		1890	12	3,354,928	154	181,041	839	547,080	806	22	11	381,110	1,016,202	2,711,879
14	Sporting goods ...	1900	144	2,018,737	168	167,509	2,230	810,943	1,189	989	52	194,748	1,802,903	3,633,396
		1890	136	1,693,776	191	176,059	2,008	705,911	1,044	852	112	101,709	1,119,806	2,709,449
3	Springs, steel, car and carriage.	1900	48	4,684,278	166	275,205	2,102	1,061,006	2,094	2	6	337,000	3,024,656	5,690,499
		1890	57	3,459,422	158	211,828	1.734	962,942	1,700	....	34	178,290	2,219,408	4,331,571
10	Stamped ware....	1900	139	13,954,176	590	667,825	10,002	3,730,241	6,921	2,429	652	785,219	7,333,028	14,546,191
		1890	104	9,718.585	346	424,798	7,281	2,834,809	5,258	1,543	480	664,570	5,505,632	11,277,508
8	Starch	1900	124	11,671,567	406	451,334	2,655	1,099,696	2,088	535	32	700,277	5.806,442	9,232,984
		1890	80	4.929,155	218	229,909	2,903	959,108	2,307	484	112	1,108,135	5,153,677	8,934,517
14	Stationery goods, not elsewhere specified.	1900	113	4,494,507	453	411,792	3,032	958,471	1,327	1,508	197	584,081	2,128,445	5,065,869
		1890	206	5,438,934	564	643,629	4,315	1,684,868	2,157	1,971	187	431,473	5,328,252	9,456,467

3	Steam fittings and heating apparatus.	1900	227	18,233,173	1,215	1,477,115	9,252	4,982,857	9,073	141	38	1,349,694	10,219,506	22,084,860
		1890	217	17,017,364	1,134	1,390,062	10,645	6,204,333	10,345	188	112	1,485,212	10,628,314	23,147,434
14	Steam packing ...	1900	97	2,691,304	290	325,877	1,147	525,332	1,034	101	12	290,067	1,546,398	3,493,710
		1890	34	538,564	103	77,192	315	151,982	276	29	10	101,192	357,819	1,003,372
3	Stencils and brands	1900	92	532,528	34	21,974	418	206,231	374	28	16	53,128	140,711	673,784
		1890	106	445,165	142	135,895	357	209,482	319	24	14	58,839	167,590	732,611
6	Stereotyping and electrotyping.	1900	140	2,389,215	330	311,980	2,408	1,458,977	2,210	121	77	402,592	766,603	3,772,025
		1890	81	1,332,129	186	245,106	1,289	823,885	1,166	67	56	161,924	500,744	2,183,909
14	Straw goods not elsewhere specified.	1900	4	25,070	3	1,800	54	14,381	22	29	3	847	12,933	36,985
		1890	6	106,750	9	15,340	424	105,048	116	306	2	13,685	134,945	329,987
1	Sugar and molasses, beet.	1900	30	20,141,719	350	356,675	1,970	1,092,207	1,951	4	15	441,384	4,803,796	7,323,857
		1890												
1	Sugar and molasses, refining.	1900	832	184,245,519	1,881	1,696,824	14,262	6,945,811	13,644	222	196	7,034,637	222,503,741	240,969,905
		1890	393	24,013,008	486	429,621	7,043	2,385,654	6,697	246	100	5,920,763	107,758,811	123,118,259
14	Surgical appliances.	1900	219	2,487,494	359	356,216	1,539	620,801	755	686	98	772,197	1,291,580	3,932,358
		1890	155	856,396	300	248,514	612	300,804	355	233	24	184,749	524,488	1,650,033
15	Taxidermy	1900	147	366,077	9	5,998	180	91,140	148	28	4	40,387	177,038	513,112
		1890	63	293,112	65	55,875	90	46,362	79	7	4	20,361	37,727	231,773
14	Teasels..........	1900												
		1890	5	61,400	3	1,040	69	20,544	56	10	3	1,088	50,362	84,700
2	Thread, linen.....	1900												
		1890												
3	Tin and terne plate.	1900	57	6,650,047	333	291,323	3,671	1,889,917	3,014	625	32	236,456	26,728,150	31,892,011
		1890												
10	Tinfoil	1900	15	2,094,327	45	59,041	582	227,774	285	258	39	166,053	1,074,192	1,593,169
		1890												
10	Tinsmithing, coppersmithing, & sheet iron working.	1900	12,466	55,703,509	3,115	2,596,695	45,575	22,155,039	41,227	2,597	1,751	4,770,702	50,329,282	100,310,720
		1890	7,002	38,434,900	7,065	5,426,110	31,377	15,610,265	29,081	1,285	1,011	3,029,860	31,217,522	66,653,746
11	Tobacco, chewing, smoking, & snuff.	1900	437	43,856,570	3,368	3,884,071	29,161	7,109,821	14,124	11,590	3,447	47,533,705	35,038,287	103,754,362
		1890	395	30,841,316	1,477	1,620,913	29,790	6,947,158	14,942	10,564	4,284	19,463,749	29,192,249	65,843,587
11	Tobacco, cigars and cigarettes.	1900	14,539	67,706,493	4,470	4,712,786	103,462	40,925,596	62,168	37,762	3,532	31,436,701	57,946,020	160,223,152
		1890	10,956	59,517,827	11,156	8,292,929	87,000	36,475,060	59,452	24,214	3,334	17,673,063	50,298,960	129,693,275
11	Tobacco, stemming and rehandling.	1900	276	12,526,808	424	354,677	9,654	1,817,067	4,698	4,022	934	525,016	14,198,349	19,099,032
		1890	292	5,735,610	519	327,429	5,985	1,128,517	3,804	1,641	540	424,869	12,813,108	16,209,761
3	Tools, not elsewhere specified.	1900	448	13,690,047	665	678,674	7,615	3,781,763	7,104	421	90	807,160	4,657,200	13,360,920
		1890	462	11,376,622	685	662,786	6,410	3,482,052	6,127	182	101	835,443	3,517,269	10,528,025
14	Toys and games.	1900	170	3,289,445	206	185,734	3,330	1,123,593	2,229	815	286	314,690	1,668,199	4,024,999
		1890	139	2,781,185	292	271,421	3,148	1,075,429	2,211	704	233	283,592	1,453,738	3,749,755
14	Trunks and valises	1900	391	7,046,649	714	694,349	7,084	2,834,892	6,169	547	368	816,913	6,045,387	12,693,225
		1890	395	6,900,756	753	722,999	6,032	2,790,750	5,555	301	176	663,762	4,703,982	10,821,621
14	Turpentine and rosin.	1900	1,503	11,847,495	1,889	778,694	41,864	8,393,483	41,375	173	316	476,171	6,186,492	20,344,888
		1890	670	4,062,375	49	26,944	15,266	2,906,547	15,031	141	94	178,662	2,874,693	8,077,379
10	Type founding.	1900	22	2,269,370	183	210,426	1,424	803,470	1,071	305	48	241,134	863,689	2,842,384
		1890	38	4,968,309	222	280,238	1,950	1,121,511	1,245	605	100	236,907	1,434,092	3,916,904
15	Typewriter repairing.	1900	85	134,123	32	23,690	185	116,220	176	5	4	39,694	110,603	367,176
		1890												
3	Typewriters and supplies.	1900	47	8,400,431	532	480,468	4,340	2,403,604	3,979	294	67	714,721	1,402,170	6,932,029
		1890	30	1,421,783	104	132,727	1,631	945,476	1,472	157	2	119,773	632,723	3,630,126
14	Umbrellas and canes.	1900	261	4,677,917	590	505,330	5,695	1,889,673	2,281	3,171	243	621,057	8,457,167	13,855,908
		1890	435	5,646,289	841	768,937	6,022	2,435,860	2,959	2,924	139	961,328	7,562,921	13,771,927
2	Upholstering materials.	1900	270	7,593,598	358	363,926	5,098	1,715,073	2,911	1,919	268	503,438	5,881,621	10,048,164
		1890	152	4,427,354	248	232,148	3,231	1,221,914	2,168	892	171	244,043	3,013,253	5,733,039

Three Hundred and Fifty Specified Industries

Group number.	INDUSTRIES.	Year.	Number of establishments.	Capital.	Salaried officials, clerks, etc.: Number.	Salaried officials, clerks, etc.: Salaries.	Average number of wage-earners and total wages: Total: Average number.	Total: Wages.	Average number: Men, 16 years and over.	Average number: Women, 16 years and over.	Average number: Children, under 16 years.	Miscellaneous expenses.	Cost of materials used.	Value of products, including custom work and repairing.
				$		$		$				$	$	$
8	Varnish	1900	181	17,550,892	1,198	1,939,333	1,546	995,803	1,479	62	5	1,616,642	10,939,131	18,687,240
		1890	140	11,308,943	706	1,016,346	1,145	732,715	1,116	19	10	1,310,811	7,805,663	13,795,510
3	Vault lights and ventilators.	1900	14	120,750	11	12,775	138	81,184	138	....	......	14,792	140,719	338,111
		1890	15	175,225	31	44,814	174	115,780	172	1	1	25,388	185,529	455,413
1	Vinegar and cider	1900	1,152	6,187,728	456	391,541	1,801	720,316	1,643	136	22	379,336	3,272,565	6,454,524
		1890	694	5,858,395	751	428,388	2,637	720,681	2,452	155	30	355,334	3,268,455	6,649,300
14	Washing machines and clothes wringers	1900	118	2,404,569	104	104,264	1,509	548,707	1,419	7	83	129,929	2,174,762	3,735,243
		1890	163	1,712,953	209	158,635	1,030	430,888	938	25	67	82,444	1,354,550	2,489,175
10	Watch and clock materials.	1900	20	367,291	16	20,461	331	152,234	186	145	......	9,015	105,549	345,347
		1890	36	705,647	48	54,763	547	258,422	417	116	14	31,407	326,398	831,348
10	Watch cases	1900	30	8,119,292	235	289,366	3,907	1,924,847	2,929	866	112	317,902	4,393,647	7,783,960
		1890	45	4,727,100	190	219,699	3,679	1,896,587	2,944	710	25	443,175	5,022,455	8,618,479
15	Watch, clock, and jewelry repairing.	1900	12,229	12,741,973	330	181,018	8,380	4,683,086	7,831	234	315	2,276,804	4,432,108	20,235,039
		1890	4,502	6,057,125	3,828	2,655,475	4,819	2,861,120	4,632	71	116	1,047,575	2,225,888	10,704,477
10	Watches	1900	13	14,235,191	165	294,449	6,880	3,586,723	3,381	3,473	26	572,080	1,291,318	6,822,611
		1890	19	10,106,114	80	101,119	6,595	3,587,808	3,935	2,640	20	733,404	995,740	6,051,066
14	Whalebone and rattan.	1900	3	56,200	......	....	14	7,856	13	1	......	4,657	98,875	135,000
		1890	9	221,358	10	15,700	69	38,013	48	21	......	13,297	555,173	682,977
12	Wheelbarrows	1900	15	513,467	31	26,605	321	127,398	321	....	......	41,542	180,036	454,441
		1890	26	1,116,359	53	46,319	567	251,189	560	....	7	86,125	637,720	1,185,565
14	Whips	1900	60	1,893,703	228	245,596	1,287	478,176	853	358	76	277,599	1,278,324	2,734,471
		1890	81	1,632,404	143	141,380	944	403,142	668	268	8	245,962	821,614	2,153,818
14	Windmills	1900	68	4,308,666	281	249,684	2,045	940,474	2,027	10	8	314,628	2,172,098	4,354,312
		1890	77	2,463,231	185	135,808	1,110	555,775	1,099	4	7	171,781	1,123,947	2,475,050
14	Window shades	1900	207	5,507,842	314	335,233	2,012	871,532	1,477	507	28	400,710	6,046,062	8,868,259
		1890	182	4,167,457	374	421,516	2,025	1,016,255	1,644	364	17	1,298,181	5,341,874	9,239,669
3	Wire	1900	29	4,242,173	94	136,327	1,603	859,645	1,561	23	19	213,419	7,014,319	9,421,238
		1890	24	11,607,685	208	327,685	7,596	3,856,522	7,547	48	1	447,480	15,038,540	22,012,804
3	Wirework, including wire rope & cable	1900	597	16,374,629	995	939,904	9,255	3,934,525	7,821	1,162	272	1,014,708	10,858,229	19,942,882
		1890	569	11,757,902	963	897,618	6,954	3,085,591	5,809	870	275	858,877	8,325,435	15,552,857
4	Wood, preserving	1900	21	1,229,746	54	56,670	478	205,105	477	....	1	61,763	1,825,355	2,395,748
		1890	4	262,718	15	12,692	80	29,317	80	....	......	13,385	50,697	143,475
4	Wood, turned and carved.	1900	1,171	10,278,418	564	487,862	11,569	4,375,345	10,909	364	296	617,365	5,835,492	14,338,503
		1890	872	7,825,668	1,028	893,370	7,402	3,333,553	6,874	290	238	624,837	3,947,227	10,939,647
4	Woodenware, not elsewhere specified.	1900	104	3,824,512	160	137,981	3,206	1,073,303	2,823	223	160	210,789	1,468,383	3,585,542
		1890	167	2,711,609	220	186,221	2,881	1,050,413	2,607	131	143	200,961	1,498,773	3,597,602
2	Wool hats	1900	24	2,050,802	57	66,766	2,108	937,855	1,358	651	99	185,644	2,042,202	3,591,940
		1890	32	4,142,224	92	113,968	3,500	1,249,976	2,220	1,121	159	249,568	2,802,041	5,329,921
2	Wool pulling	1900	34	944,715	35	35,422	475	247,950	475	....	......	47,395	53,975	531,287
		1890	......	....	......	....	......	....	......	....	......	....	....	....

2	Wool scouring ...	1900	25	1,061,123	45	72,011	720	338,606	646	74	....	102,039	193,826	889,809
		1890	......	....	......	....	....	....	....	....	......	....	....	....
2	Woolen goods.....	1900	1,035	124,386,262	2,246	2,934,048	68,893	24,757,006	40,601	24,535	3,757	7,268,634	71,011,956	118,430,158
		1890	1,311	130,989,940	2,436	2,339,737	76,915	26,139,194	42,130	30,159	4,626	8,402,623	82,270,335	133,577,977
2	Worsted goods ...	1900	186	132,168,110	1,369	2,342,218	57,008	20,092,738	25,595	25,829	5,584	6,767,611	77,075,222	120,314,344
		1890	143	68,085,116	615	935,217	42,978	14,944,966	19,071	20,082	3,825	4,917,760	50,706,769	79,194,652
10	Zinc	1900	......	....	......	....	....	....	....	....	......	....	....	....
		1890	8	1,007,320	30	38,270	1,052	614,826	1,049	....	3	76,723	2,005,682	2,976,730
10	Zinc, smelting and refining.	1900	31	14,141,810	208	440,200	4,869	2,355,921	4,843	8	18	399,472	13,286,058	18,188,498
		1890	......	....	......	....	....	....	....	....	......	....	....	....
	All other industries.	1900	4	447,959	22	30,680	132	58,661	87	45	....	56,325	299,339	503,449
		1890	12	2,952,222	49	62,448	1,699	559,632	735	926	38	219,518	1,773,808	3,142,145

Summary of Statistics of Industrial Combinations in 1900

In the following summary of statistics, given by the census, the capital mentioned includes only the actual investment, the total of the authorized capital as given in the complete list being more than twice as much as the amount given by this table :

	Number of combinations.	Number of plants.	Capital Invested.	Salaried officials.		Wage-earners.		Value of products.
				Number.	Salaries.	Average number.	Total wages.	
Total	183	2,029	$1,433,804,920	24,585	$32,653,628	399,192	$194,534,715	$1,661,295,364
Iron and steel and their products	40	447	341,779,954	6,075	7,462,386	145,609	81,098,583	508,626,482
Food and allied products	21	273	246,623,633	4,002	4,417,444	32,958	12,326,601	282,408,081
Chemicals and allied products	14	248	175,002,887	3,015	4,364,704	27,754	12,746,006	182,391,744
Metals and metal products other than iron and steel	11	89	118,519,401	1,047	1,571,414	20,522	12,356,772	180,154,703
Liquors and beverages	28	219	118,489,158	1,151	2,406,096	7,624	4,869,457	93,432,274
Vehicles for land transportation	6	65	85,965,683	1,967	1,940,778	34,422	17,571,613	85,985,533
Tobacco	4	41	16,191,818	1,410	2,064,926	17,661	5,278,151	74,063,029
Textiles	8	72	92,468,606	1,095	1,841,913	37,723	13,297,357	71,888,202
Leather and its finished products	5	100	62,734,011	343	663,570	9,898	4,070,641	45,684,829
Paper and printing	7	116	59,271,691	1,165	1,831,528	16,706	7,478,962	44,418,417
Clay, glass and stone products	15	180	46,878,928	1,001	1,301,159	20,294	10,994,488	23,258,182
Lumber and its remanufactures	8	61	24,470,281	615	756,793	10,778	4,389,944	20,378,815
Miscellaneous industries	16	118	45,408,869	1,699	2,030,927	17,243	8,056,140	48,605,073

Summary and Details of One Hundred and Forty Groups of Occupations

Occupations.	Males.	Females.	Total.
All occupations	23,956,115	5,329,807	29,285,922
Agricultural pursuits	9,458,194	980,025	10,438,219
Agricultural laborers	3,793,555	665,791	4,459,346
Farm and plantation laborers	1,825,061	222,597	2,047,658
Farm laborers (members of family)	1,925,247	441,066	2,366,313
Garden and nursery laborers	43,247	2,128	45,375
Dairymen and dairywomen	10,035	896	10,931
Farmers, planters, and overseers	5,373,469	307,788	5,681,257
Farmers and planters	5,197,653	291,243	5,488,896
Farmers (members of family)	154,343	14,710	169,053
Farm and plantation overseers	16,517	1,584	18,101
Milk farmers	4,956	251	5,207
Gardeners, florists, nurserymen, etc	59,556	2,862	62,418
Gardeners	35,981	1,200	37,181
Florists, nurserymen, and vinegrowers	15,711	1,137	16,848
Fruit growers	7,864	525	8,389
Lumbermen and raftsmen	72,090	100	72,190
Stock raisers, herders, and drovers	83,522	1,947	85,469
Stock raisers	36,628	1,081	37,709
Stock herders and drovers	46,894	866	47,760
Turpentine farmers and laborers	24,456	281	24,737
Wood choppers	36,152	113	36,265
Other agricultural pursuits	5,359	247	5,606
Apiarists	1,324	51	1,375
Not specified	4,035	196	4,231
Professional service	833,584	431,153	1,264,737
Actors, professional showmen, etc	28,013	6,910	34,923
Actors	8,392	6,418	14,810
Professional showmen	16,228	397	16,625
Theatrical managers, etc	3,393	95	3,488
Architects, designers, draughtsmen, etc	28,518	1,042	29,560
Architects	10,504	100	10,604
Designers, draughtsmen, and inventors	18,014	942	18,956
Artists and teachers of art	13,875	11,027	24,902
Clergymen	108,537	3,405	111,942
Dentists	28,896	787	29,683
Electricians	50,373	409	50,782
Engineers (civil, etc.), and surveyors	43,451	84	43,535
Engineers (civil)	20,113	40	20,153
Engineers (mechanical and electrical)	14,410	30	14,440
Engineers (mining)	2,905	3	2,908
Surveyors	6,023	11	6,034
Journalists	27,905	2,193	30,098
Lawyers	113,693	1,010	114,703
Literary and scientific persons	13,140	5,989	19,129
Authors and scientists	3,442	2,616	6,058
Librarians and assistants	1,059	3,125	4,184
Chemists, assayers, and metallurgists	8,639	248	8,887
Musicians and teachers of music	39,887	52,377	92,264
Officials (government)	82,164	8,126	90,290
Officials (national government)	34,159	6,436	40,595
Officials (state government)	4,070	275	4,345
Officials (county government)	22,054	723	22,777
Officials (city or town government)	21,881	692	22,573
Physicians and surgeons	124,826	7,399	132,225
Teachers and professors in colleges, etc	118,748	328,049	446,797
Teachers	111,936	327,586	439,522
Professors in colleges and universities	6,812	463	7,275
Other professional service	11,558	2,346	13,904
Veterinary surgeons	8,176	14	8,190
Not specified	3,382	2,332	5,714
Domestic and personal service	3,592,581	2,099.165	5,691,746
Barbers and hairdressers	125,801	5,582	131.383
Bartenders	88,497	440	88,937
Boarding and lodging house keepers	11,860	59,511	71,371
Hotel keepers	46,386	8,545	54.931

SUMMARY AND DETAILS OF ONE HUNDRED AND FORTY GROUPS OF OCCUPATIONS

OCCUPATIONS.	MALES.	FEMALES.	TOTAL.
Domestic and personal service—Continued.			
Housekeepers and stewards	8,421	147,103	155,524
Janitors and sextons	48,585	8,035	56,620
Janitors	43,282	7,944	51,226
Sextons	5,303	91	5,394
Laborers (not specified)	2,516,263	124,157	2,640,420
Elevator tenders	12,661	30	12,691
Laborers (coal yard)	9,361	12	9.373
Laborers (general)	2,464,207	124,076	2,588.283
Longshoremen	20,916	18	20,934
Stevedores	9,118	21	9,139
Launderers and laundresses	51,302	335,711	387,013
Laundry work (hand)	39,278	325,778	365.056
Laundry work (steam)	12,024	9.933	21,957
Nurses and midwives	12,291	108,978	121.269
Nurses (trained)	758	11,134	11.892
Nurses (not specified)	11,533	92,214	103,747
Midwives	....	5,630	5,630
Restaurant keepers	29,162	4,861	34,023
Saloon keepers	81,789	2,086	83,875
Servants and waiters	280,409	1,285,031	1,565.440
Servants	215,818	1,242,192	1,458,010
Waiters	64,591	42,839	107,430
Soldiers, sailors, and marines (U. S.)	126,744	....	126,744
Soldiers, (U. S.)	103.902	....	103,902
Sailors, U. S.)	18,450	....	18,450
Marines, U. S.)	4,392	....	4,392
Watchmen, policemen, firemen, etc	130 312	879	131,191
Watchmen, policemen, and detectives	115,736	879	116,615
Firemen (fire department)	14,576	....	14,576
Other domestic and personal service	34,759	8,246	43,005
Bootblacks	8,158	85	8.243
Hunters, trappers, guides, and scouts	10,020	1,320	11,340
Not specified	16,581	6,841	23,422
Trade and transportation	4,274,659	503,574	4,778,233
Agents	230,773	10,560	241,333
Agents (insurance and real estate)	117,142	2,141	119.283
Agents (not specified)	113,631	8,419	122.050
Bankers and brokers	73,086	298	73.384
Bankers and brokers (money and stocks)	65,794	253	66.047
Brokers (commercial)	7,292	45	7,337
Boatmen and sailors	79,870	154	80,024
Boatmen and canalmen	13,093	82	13,175
Pilots	4,971	5	4,976
Sailors	61,806	67	61,873
Bookkeepers and accountants	181,340	74,186	255,526
Clerks and copyists	546,830	85,269	632,099
Clerks and copyists	485,793	84,312	570,105
Clerks (shipping)	32,923	693	33,616
Letter and mail carriers	28,114	264	28,378
Commercial travelers	91,990	946	92,936
Draymen, hackmen, teamsters, etc	540,209	906	541,115
Draymen, teamsters, and expressmen	503,458	863	504,321
Carriage and hack drivers	36,751	43	36,794
Foremen and overseers	54,085	1,418	55,503
Foremen and overseers (livery stable)	3,236	2	3,238
Foremen and overseers (steam railroad)	35,205	12	35,217
Foremen and overseers (street railway)	1,021	2	1,023
Foremen and overseers (not specified)	14,623	1,402	16,025
Hostlers	65,302	79	65,381
Hucksters and peddlers	73,935	2,937	76,872
Livery stable keepers	33,490	190	33,680
Merchants and dealers (except wholesale)	758,755	34,132	792,887
Boots and shoes	14,812	427	15,239
Cigars and tobacco	14,273	1,094	15,367
Clothing and men's furnishings	17,805	292	18,097
Coal and wood	20,606	260	20,866

SUMMARY AND DETAILS OF ONE HUNDRED AND FORTY GROUPS OF OCCUPATIONS

OCCUPATIONS.	MALES.	FEMALES.	TOTAL.
Trade and transportation—Continued			
Drugs and medicines	56,168	1,178	57,346
Dry goods, fancy goods, and notions	41,487	4,353	45,840
General store	32,089	942	33,031
Groceries	146,887	9,670	156,557
Liquors and wines	12,928	191	13,119
Lumber	16,692	82	16,774
Produce and provisions	33,525	669	34,194
Not specified	351,483	14,974	366,457
Merchants and dealers (wholesale)	42,049	261	42,310
Messengers and errand and office boys	65,032	6,663	71,695
Bundle and cash boys	6,116	4,392	10,508
Messengers	43,159	1,301	44,460
Office boys	15,757	970	16,727
Officials of banks and companies	72,975	1,271	74,246
Bank officials and cashiers	14,024	271	14,295
Officials (insurance and trust companies, etc.)	5,227	112	5,339
Officials (trade companies)	20,002	477	20,479
Officials (transportation companies)	33,722	411	34,133
Packers and shippers	39,781	19,988	59,769
Porters and helpers (in stores, etc.)	53,708	566	54,274
Salesmen and saleswomen	462,531	149,256	611,787
Steam railroad employees	580,783	1,688	582,471
Baggagemen	19,075	10	19,085
Brakemen	67,461	31	67,492
Conductors	42,928	7	42,935
Engineers and firemen	107,105	45	107,150
Laborers	248,628	948	249,576
Station agents and employees	45,371	621	45,992
Switchmen, yardmen, and flagmen	50,215	26	50,241
Stenographers and typewriters	26,306	86,158	112,464
Stenographers	23,553	75,274	98,827
Typewriters	2,753	10,884	13,637
Street railway employees	68,890	46	68,936
Conductors	24,025	13	24,038
Drivers	1,366	....	1,366
Laborers	4,632	12	4,644
Motormen	37,434	2	37,436
Station agents and employees	1,433	19	1,452
Telegraph and telephone linemen	14,765	....	14,765
Telegraph and telephone operators	52,502	22,578	75,080
Telegraph operators	48,656	7,229	55,885
Telephone operators	3,846	15,349	19,195
Undertakers	15,876	324	16,200
Other persons in trade and transportation	49,796	3,700	53,496
Auctioneers	2,810	3	2,813
Decorators, drapers, and window dressers	2,757	296	3,053
Newspaper carriers and newsboys	6,835	69	6,904
Weighers, gaugers, and measurers	6,491	179	6,670
Not specified	30,903	3,153	34,056
Manufacturing and mechanical pursuits	5,797,097	1,315,890	7,112,987
Building trades.			
Carpenters and joiners	602,196	545	602,741
Carpenters and joiners	586,557	525	587,082
Ship carpenters	12,281	6	12,287
Apprentices and helpers	3,358	14	3,372
Masons (brick and stone)	160,881	167	161,048
Masons	149,191	155	149,346
Masons' laborers	9,274	10	9,284
Apprentices and helpers	2,416	2	2,418
Painters, glaziers, and varnishers	276,231	1,759	277,990
Painters, glaziers, and varnishers	257,396	1,713	259,109
Painters (carriages and wagons)	17,316	34	17,350
Apprentices and helpers	1,519	12	1,531
Paperhangers	21,763	241	22,004
Paper hangers	21,572	236	21808
Apprentices and helpers	191	5	196

Summary and Details of One Hundred and Forty Groups of Occupations

Occupations.	Males.	Females.	Total.
Manufacturing and mechanical pursuits—Continued.			
Plasterers	35,661	45	35.706
Plasterers	35,302	44	35,346
Apprentices and helpers	359	1	360
Plumbers and gas and steam fitters	97,758	126	7[illegible] 884
Plumbers and gas and steam fitters	92,192	123	92,315
Apprentices and helpers	5,566	3	5,569
Roofers and slaters	9,066	2	9.068
Roofers and slaters	8,930	2	8,932
Apprentices and helpers	136		136
Mechanics (not otherwise specified)	9,396	41	9,437
Chemicals and allied products.			
Oil well and oil works employees	24,573	53	24,626
Oil well employees	18,001	10	18,011
Oil works employees	6,572	43	6,615
Other chemical workers	12,035	2,779	14,814
Chemical works employees	5,687	1,053	6,740
Fertilizer makers	1,308	2	1.310
Powder and cartridge makers	2,745	1,391	4,136
Salt works employees	1,671	195	1,866
Starch makers	624	138	762
Clay, glass, and stone products.			
Brick and tile makers, etc	49,456	478	49,934
Brick makers	45,468	127	45.595
Tile makers	2,667	350	3,017
Terra cotta workers	1,321	1	1,322
Glass workers	47,378	2,621	49,999
Marble and stone cutters	54,382	143	54,525
Potters	13,200	2,940	16,140
Fishing and mining.			
Fishermen and oystermen	72,005	1,805	73,810
Miners and quarrymen	569,625	1,370	570.995
Miners (coal)	343.668	624	344.292
Miners (gold and silver)	59,036	59	59.095
Miners (not otherwise specified)	132,386	624	133,010
Quarrymen	34,535	63	34,598
Food and kindred products.			
Bakers	75,061	4,346	79,407
Butchers	113,834	378	114,212
Butter and cheese makers	18,613	648	19,261
Confectioners	22,023	9,219	31.242
Millers	40,390	186	40,576
Other food preparers	27,269	5,173	32,442
Fish curers and packers	3,674	147	3.821
Meat and fruit canners and preservers	5,985	3,266	9,251
Meat packers, curers, and picklers	12,799	977	13,776
Sugar makers and refiners	3,320	31	3,351
Not specified	1,491	752	2,243
Iron and steel and their products.			
Blacksmiths	226,880	196	227,076
Blacksmiths	218,400	185	218,585
Apprentices and helpers	8,480	11	8,491
Iron and steel workers	287,427	3,370	290.797
Iron and steel workers	200,253	3,040	203,293
Molders	87,174	330	87,504
Machinists	282,861	571	283,432
Machinists	266,338	508	266,846
Apprentices and helpers	16,523	63	16.586
Steam boiler makers	33,079	8	33,087
Steam boiler makers	31,183	8	31,191
Helpers	1,896		1,896
Stove, furnace, and grate makers	12,430	43	12,473
Tool and cutlery makers	27,376	746	28,122
Wheelwrights	13,529	10	13,539
Wire workers	16,701	1,786	18,487
Leather and its finished products.			
Boot and shoe makers and repairers	169.537	39,519	209,056
Boot and shoe factory operatives	69,320	37,425	106,745

SUMMARY AND DETAILS OF ONE HUNDRED AND FORTY GROUPS OF OCCUPATIONS

OCCUPATIONS.	MALES.	FEMALES.	TOTAL.
Leather and its finished products—Continued.			
Shoemakers (not in shoe factory)	99,635	2,008	101,643
Apprentices	582	86	668
Harness and saddle makers and repairers	39,598	595	40,193
Leather curriers and tanners	40,925	1,759	42,684
Curriers	15,068	702	15,770
Tanners	25,800	1,051	26,851
Apprentices	57	6	63
Trunk and leather-case makers, etc	5,472	1,579	7,057
Trunk makers	3,470	187	3,651
Leather-case and pocketbook makers	2,002	1,392	3,394
Liquors and beverages.			
Bottlers and soda water makers, etc	9,752	794	10,546
Bottlers	8,942	776	9,718
Mineral and soda water makers	810	18	828
Brewers and maltsters	20,709	275	20,984
Distillers and rectifiers	3,115	30	3,145
Lumber and its manufactures.			
Cabinet makers	35.574	67	35,641
Coopers	37,113	113	37,226
Saw and planing mill employees	161,314	373	161,687
Saw and planing mill employees	150,259	353	150,612
Lumber yard employees	11,055	20	11,075
Other wood workers	104,609	7,079	111,688
Basket makers	4,463	2.336	6,799
Box makers (wood)	7,699	1,177	8,876
Furniture manufactory employees	21,842	1,236	23,078
Piano and organ makers	6,021	199	6,220
Not specified	64,584	2,131	66,715
Metals and metal products other than iron and steel.			
Brass workers	25,870	890	26,760
Brass workers	19,806	847	20,653
Molders	5,947	43	5,990
Helpers	117	....	117
Clock and watch makers and repairers	19,373	4,815	24,188
Clock factory operatives	2,618	862	3,480
Watch factory operatives	12,163	3,907	16,070
Clock and watch repairers	4,592	46	4,638
Gold and silver workers	19,766	6,380	26,146
Gold and silver workers	8,222	1,208	9,430
Jewelry manufactory employees	11,544	5,172	16,716
Tin plate and tinware makers	68,838	1,775	70,613
Tin plate makers	6,954	277	7,231
Tinners and tinware makers	60,713	1,487	62,200
Apprentices (tinsmiths)	1,173	11	1,182
Other metal workers	54,308	2,320	56,628
Copper workers	8,177	11	8,188
Electroplaters	6,146	241	6,387
Gunsmiths, locksmiths and bell-hangers	7,406	46	7,452
Lead and zinc worker	5,238	97	5.335
Molders (metals)	2,925	236	3,161
Not specified	24,416	1,689	26,105
Paper and printing.			
Bookbinders	14,651	15,635	30,286
Box makers (paper)	3,796	17,302	21,098
Engravers	10,703	453	11,156
Paper and pulp mill operatives	26,905	9,424	36,329
Printers, lithographers, and pressmen	139,344	15,989	155,333
Printers and pressmen	98,050	5,805	103,855
Lithographers	7,503	453	7,956
Compositors	27,232	9,617	36,849
Electrotypers and stereotypers	3,145	27	3,172
Apprentices (printers)	3,414	87	3,501
Textiles.			
Bleachery and dye works operatives	20,503	1,786	22,289
Bleachery operatives	3,739	646	4,385
Dye works operatives	16,764	1,140	17,904
Carpet factory operatives	10,371	9.017	19 388
Cotton mill operatives	125,788	120,216	246,004

Summary and Details of One Hundred and Forty Groups of Occupations

Occupations.	Males.	Females.	Total.
Textiles—Continued.			
Hosiery and knitting mill operatives	12,630	34.490	47,120
Silk mill operatives	22,023	32,437	54,460
Woolen mill operatives	42,566	30,630	73,196
Other textile mill operatives	53,437	51,182	104,619
Hemp and jute mill operatives	1,577	1,942	3.519
Linen mill operatives	835	1,265	2,100
Print works operatives	4,963	1,093	6,056
Rope and cordage factory operatives	4,592	2,999	7,591
Worsted mill operatives	2,901	4,140	7,041
Textiles not specified	38,569	39,743	78,312
Dressmakers	2,128	344,948	347,076
Dressmakers	2,116	342.703	344,819
Apprentices	12	2,245	2,257
Hat and cap makers	15,110	7,623	22,733
Milliners	1,739	86,142	87,881
Milliners	1,718	84,155	85,873
Apprentices	21	1,987	2,008
Seamstresses	4,837	146,542	151,379
Shirt, collar, and cuff makers	8,491	30,941	39,432
Tailors and tailoresses	161,299	68,978	230,277
Tailors and tailoresses	160,025	68,684	228,709
Apprentices	1,274	294	1,568
Other textile workers	8,941	21,105	30,046
Carpet (rag) makers	1,916	5,700	7,616
Lace and embroidery makers	2,007	7,316	9,323
Sail, awning, and tent makers	3,183	409	3,592
Sewing machine operators	736	5,036	5,772
Not specified	1,099	2,644	3,743
Miscellaneous industries.			
Broom and Brush makers	8,644	1,578	10,222
Charcoal, coke and lime burners	14,433	43	14,476
Engineers and firemen (not locomotive)	224,369	177	224,546
Glove makers	4,503	7,773	12,276
Manufacturers and officials, etc	240,525	3,438	243,963
Manufacturers and officials, etc	155,240	2,883	158,123
Builders and contractors	56,785	150	56,935
Publishers of books, maps, and newspapers	10,667	303	10,970
Officials of mining and quarrying companies	17,833	102	17,935
Model and pattern makers	14,879	204	15,083
Photographers	23,442	3,587	27,029
Rubber factory operatives	14,492	7,374	21,866
Tobacco and cigar factory operatives	87,966	43,498	131,464
Upholsterers	28,681	2,158	30,839
Other miscellaneous industries	380,949	91,062	472,011
Apprentices and helpers (not specified)	29.652	2,045	31,697
Artificial flower makers	437	2,338	2,775
Button makers	3,834	3,019	6,853
Candle, soap, and tallow makers	3,291	731	4,022
Corset makers	815	7,201	8,016
Cotton ginners	1,381	14	1,395
Electric light and power company employees	5,858	303	6,161
Gas works employees	6,940	15	6,955
Piano and organ tuners	4,251	44	4,295
Straw workers	929	3,068	3,997
Turpentine distillers	7,022	77	7,099
Umbrella and parasol makers	1,331	1,911	3,242
Well borers	6.650	11	6,661
Whitewashers	3,376	65	3.441
Not specified	305,182	70,220	375,402

Value of Electrical and Auxiliary Manufactures in the United States

(An estimate by "The Western Electrician.")

Articles.	For the Year— 1900.	1901.
Arc lamps, enclosed	$1.200,000	$1,600,000
Arc lamps, open	125,000	125,000
Auxiliary steam plant for electrical installations, such as pumps, condensers, separators, feed-water heaters, injectors, piping, etc	1,500,000	1,850,000
Bells, buzzers, push-buttons, call-boxes, annunciators	600,000	720,000
Belting used in electrical plants	550,000	600,000
Boilers for electrical plants (water-tube)	4,000,000	6,000,000
Boilers for electrical plants (other than water-tube)	1,100,000	1,850,000
Cables, underground, aerial and submarine	15,000,000	18,000,000
Carbons for lamps, batteries, brushes or other electrical purposes	1,625,000	1,985,000
Cars and trucks for electric railways	3,000,000	3,700,000
Circuit breakers	....	230,000
Conduits (underground) and similar material	1,600,000	1,700,000
Conveyors, coal and ash, used in electrical plants	350,000	650,000
Cranes and hoists, electrically operated	2,400,000	2,730,000
Dynamos and motors, including parts of machines, boosters, rotary converters, etc., and all motor applications, such as automobiles, not specifically enumerated in this list	36,000,000	41,500,000
Electroplating and other electrolytic apparatus not elsewhere specified	250 000	325,000
Electrostatic machines, induction coils, medical sets, etc	150.000	250,000
Elevators, electric (mechanism only)	2,500 000	1,800,000
Engines, gas, gasoline or oil, used to drive electrical machinery	900.000	950,000
Engines, steam, used to drive electrical machinery	15,000,000	16,425,000
Fans, electrically operated and direct-connected	1,100,000	1,350.000
Fire-alarm apparatus, also burglar alarms, crossing indicators, etc	700,000	800,000
Fixtures for electric lighting	3,850,000	4,200,000
Fuses	....	175,000
Heating and cooking apparatus, electrical	225,000	285,000
Incandescent lamps	3,400,000	4,150,000
Instruments for measurement and meters of all kinds; also ground detectors, scientific and laboratory appartus, photometers, Leyden jars, X-ray outfits, etc	2,500,000	3,250,000
Insulating material, fiber, tape, etc	1,200,000	1,135,000
Insulators (glass and porcelain)	1,325,000	1,600,000
Interior wiring supplies, as tubing, interior conduit, molding, junction boxes, rosettes, outlet boxes, etc	850,000	1,050,000
Lightning arresters	310,000	390,000
Poles, cross-arms, brackets and pins	2,900,000	3,875,000
Primary batteries	450,000	550,000
Railway supplies, electric, such as trolleys and other contact devices, strain insulators, cross-overs, rail bonds, etc	950,000	1,575,000
Rheostats, car controllers, motor starters, etc.	775,000	1,050,000
Shafting, pulleys, clutches, etc., used in electrical generating plants	500,000	475,000
Sockets, switches, cutouts	1,500,000	1,850,000
Storage batteries, including those used on automobiles	3,500,000	4,500,000
Telegraph instruments and apparatus	115,000	120,000
Telephones and telephone supplies, including telephone switchboards	17,500,000	18,750,000
Third rail for electric railways	....	300,000
Transformers, stationary	2,600,000	3,250,000
Waterwheels, used to drive electrical machinery	850,000	1,125,000
Wire, bare	7,250,000	16,200,000
Wire, rubber covered	3,100,000	5,750,000
Wire, weatherproof	6,250,000	8,500,000
Wire, all other electrical	1,250,000	1,725,000
Miscellaneous, including switchboard panels, sign flashers, automatic stokers for electrical plants, wire guards, electrical tools and toys, projectors, solenoids. etc	200,000	1,500,000
Total	$153,000,000	$192,470,000

The Extension of Banks and Banking—1892-1902

	1892.	1902.
Individual Deposits in National Banks	$1,764,456,177	$3,209,273,894
Deposits in Savings Banks	1,712,749,026	2,750,177,290
Number of Depositors in Savings Banks	4,781,605	6,666,672
Deposits in State Banks	648,513,809	1,698,185,287
Deposits in Private Banks	*93,091,148	131,669,948
Deposits in Loan and Trust Companies	411,659,996	1,525,887,943
Deposits in all Banks and Trust Companies	4,630,490,156	9,315,193,912
New York Bank Clearings	36,279,905,236	74,753,189,436
Total Bank Clearings	60,883,572,438	116,021,618,003
Money in Circulation	1,601,347,187	2,249,390,551
Circulation Per Capita	24.60	28.43
Number of National Banks	3,773	4,423
Total Capital and Surplus of National Banks	925,444,439	1,132,161,907

* Includes only those reporting, estimated at about one-fourth of all.

Number and Capital of All Banks in the United States, March 1, 1902

(From the American Bank Reporter)

State.	Total State Banks and Trust Co.'s.	Total Priv. Banks.	Total Sav. Banks.	Total Nat. Banks.	Total All Banks.	Total Capital All Banks.
Maine	28	12	51	85	176	$12,347,800
New Hampshire	11	3	52	56	122	6,352,000
Vermont	21	2	23	48	94	7,502,800
Massachusetts	51	*18	187	242	498	*88,850,500
Rhode Island	25	*1	26	37	89	*18,622,250
Connecticut	30	29	90	83	232	26,287,244
Total New England States	166	65	429	551	1,211	$159,962,594
New York State (city excepted)	214	149	102	305	770	$61,917,544
New York City	122	.....	27	45	194	177,607,600
New Jersey	76	11	28	130	245	28,378,850
Pennsylvania	251	*131	46	558	986	*161,287,385
Delaware	17	4	3	21	45	3,968,975
Maryland	48	*12	40	82	190	37,206,040
District of Columbia	6	6	5	12	29	7,860,900
Total Middle States	734	313	259	1,153	2,459	$478,227,294
Virginia	143	48	...	48	239	$15,136,952
West Virginia	111	9	...	51	171	9,709,340
North Carolina	94	32	...	39	165	5,900,415
South Carolina	118	20	...	20	158	8,032,679
Georgia	204	56	...	39	299	18,495,302
Florida	36	13	...	19	68	2,693,250
Alabama	70	42	...	41	153	9,232,100
Mississippi	135	8	...	17	160	6,972,400
Louisiana	85	8	...	29	122	9,993,300
Texas	47	228	...	325	600	32,987,940
Arkansas	142	17	...	9	168	5,563,387
Kentucky	260	32	...	89	381	27,662,120
Tennessee	160	14	...	60	234	14,960,660
Total Southern States	1,605	527	...	786	2,918	$167,339,945
Ohio	307	314	...	315	936	$90,073,610
Indiana	154	273	...	141	568	31,347,935
Illinois	218	*595	...	276	1,089	*91,749,150
Michigan	234	267	...	85	586	30,220,812
Wisconsin	178	151	...	101	430	19,871,890
Iowa	579	557	...	232	1,368	49,247,451
Minnesota	259	282	...	116	657	26,832,800
Missouri	611	127	...	73	811	71,404,120
Kansas	406	64	...	128	598	16,881,000
Nebraska	413	70	...	119	602	19,707,850
Colorado	65	74	...	50	189	9,647,100
Total Western States	3,424	2,774	...	1,636	7,834	$456,983,718
North Dakota	165	9	...	44	218	$4,135,500
South Dakota	191	61	...	40	292	5,376,364
California	203	34	64	51	352	92,044,158
Oregon	45	23	...	30	98	14,977,700
Washington	68	46	...	35	149	7,981,700
Nevada	7	5	...	1	13	727,000
Arizona	19	6	...	7	32	999,300
Indian Territory	38	22	...	67	127	3,739,500
Oklahoma	174	4	...	66	244	3,502,800
Idaho	23	14	...	15	52	1,802,165
Montana	23	20	...	24	67	4,618,505
New Mexico	11	8	...	13	32	1,308,800
Utah	21	12	...	13	46	5,061,800
Wyoming	11	11	...	14	36	1,328,867
Alaska	3	2	...	1	6	225,000
Total Pacific States	1.002	277	64	421	1,764	$147,829,159
Recapitulation.						
6 New England States	166	65	429	551	1,211	$159,962,594
6 Middle States	734	313	259	1,153	2,459	478,227,294
13 Southern States	1,605	527	...	786	2.918	167,329,945
11 Western States	3,424	2,774	...	1,636	7,834	456,983,718
15 Pacific States	1,002	277	64	421	1,764	147,829,159
Grand Total, United States	6,931	3,956	752	4,547	16,186	$1,410,342,710

*Bankers and brokers at Boston, New York City, Baltimore, Philadelphia, Chicago and Providence not ncluded.

Cost of Tuition and Other Expenses at the Principal Colleges and Universities in the United States

Colleges.	Tuition; Cost per annum.	Living Expenses, Board, etc.	Other Expenses; Fees, Books, etc.
Adelphi College	$180	$200	$10
Adrian College	15	156	18
Albion College	24	160	30
Alfred University	38	150	25
Allegheny College	45	150	46
Alma College	50	160	20
American Univ. of Harriman	40	150	15
Amherst College	110	300	50
Andover Theol. Sem.	None	250	..
Antioch College	30	100	80
Arkansas College	50	120	18
Armour Inst. Technology	75	200	35
Asheville College	150	300	15
Atlanta University	16	80	8
Auburn Theological Sem.	None	150	None
Baker University	30	144	56
Baldwin University	36	101	18
Barnard College	150	450	25
Bates College	50	140	40
Baylor University	60	150	20
Bellevue College	80	120	10
Beloit College	36	250	55
Biddle University	None	64	40
Boston University	125	270	25
Bowdoin College	75	450	..
Brown University	105	400	..
Bryn Mawr College	150	350	20
Buchtel College	40	152	..
Bucknell University	50	250	150
Burritt College	40	150	18
Butler College	45	120	20
Carleton College	40	150	20
Carson and Newman Col.	35	120	15
Carthage College	32	125	35
Case School Appl. Science	100	216	25
Catawba College	40	150	10
Catholic University	75	330	..
Cedarville College	22	110	16
Central Univ. of Iowa	24	120	30
Central Univ. of Ky.	50	170	31
Central Wesleyan College	36	120	15
Charles City College	42	120	20
Charleston College	40	90	15
Claflin University	16	50	10
Clark University (Ga.)	None	80	10
Clark University (Mass.)	100	200	None
Clemson Agri. College	40	100	..
Coe College	37	150	20
Colby College	60	135	25
Colgate University	60	160	50
College of City of N. Y.	None	None	None
Colorado College	35	250	25
Columbia University	200	340	42
Columbian University	100	240	20
Concordia College	40	72	10
Converse College	55	180	20
Cornell University (N. Y.)	150	350	15
Creighton University	75	160	12
Cumberland University	70	128	10
Dakota University	30	100	15
Dartmouth College	110	300	100
Davidson College	60	170	60
Defiance College	40	100	15
Delaware College	60	200	100
Denison University	39	250	..
Denver University	33	180	25
De Pauw University	None	200	60
Des Moines College	36	200	18
Dickinson College	6	100	125
Doane College	24	114	30
Drake University	45	189	50
Drew Theol. Seminary	None	143	15
Drury College	48	125	30
Earlham College	65	150	25
Elmira College	$75	$245	$35
Emory and Henry College	50	155	25
Emory College	60	150	30
Emporia College	30	200	None
Fairmount College	36	180	5
Fargo College	30	150	30
Findlay College	32	120	5
Fisk University	14	90	10
Fort Worth University	50	137	..
Franklin College (Ohio)	40	95	10
Franklin & Marshall Col.	None	129.50	80
Furman University	50	75	25
Gale College	33	150	20
Gen'l Theol. Sem. (P. E.)	None	225	None
Geneva College	42	108	100
Georgetown College (Ky.)	45	160	20
Georgetown Univ. (D. C.)	100	312	35
Girard College	None	None	None
Granbury College	45	120	10
Grant University	50	150	25
Greensboro Female Col.	50	130	15
Greenville and Tus. Col.	38	105	10
Greer College	30	96	5
Grove City College	45	135	..
Guilford College	52	90	10
Gustavus Adolphus Col.	60	200	20
Hamilton College	75	350	50
Hamline University	36	126	12
Hampden-Sidney College	50	175	35
Hampton Nor. & A. I.	100	100	10
Hanover College	None	200	50
Hartford Theol. Sem.	None	125	100
Harvard University	150	700	25up
Haverford College	150	350	30
Heidelberg University	50	200	75
Hendrix College	60	125	20
Henry College	50	100	10
Highland University	25	108	11
Hillsdale College	1.50	117	123
Hiram College	45	150	25
Hobart College	80	140	45
Holy Cross College	60	185	12
Hope College (Mich.)	18	175	..
Howard College (Ala.)	60	100	35
Howard University (D. C.)	..	90	40
Howard Payne College	50	100	10
Huron College	30	125	15
Illinois College	50	150	15
Illinois Wesleyan Univ.	39	250	25
Indiana University	None	350	50
Iowa College	55	185	30
Iowa State College	None	175	..
Iowa Wesleyan Univ.	41	110	20
John B. Stetson Univ.	66	156	10
Johns Hopkins Univ.	200	175	20
Kalamazoo College	30	150	50
Kansas Wesleyan Univ.	38	120	10
Kentucky University	22	102	15
Kentucky Wesleyan Col.	30	100	75
Kenyon College	75	225	50
Keuka College	36	100	30
Knox College	50	350	60
Lafayette College (Pa.)	100	156	30
La Grange College	40	150	15
Lake Forest College	40	500	25
Lane Theological Sem.	None	130	..
La Salle College	100	..	20
Lawrence University	6	130	15
Lebanon Valley College	40	146	15
Lehigh University	125	320	50
Leland Stanford, Jr., Univ.	20	200	..
Lenox College	30	100	12
Liberty College	40	120	30
Lima College	40	150	20

Cost of Tuition and Other Expenses at the Principal Colleges and Universities in the United States

Colleges.	Tuition; Cost per annum.	Living Expenses, Board, etc.	Other Expenses; Fees, Books, etc.
Lincoln College (Ill.)	$10	$230	$12
Livingston College	8	64	10
Lombard College	35	175	30
Macalester College	40	250	8
Manhattan College	100	250	20
Marietta College	30	175	30
Maryville College	18	74	10
Mass. Agricultural Col.	80	300	..
Mass. Inst. Technology	200	280	35
McCormick Theol. Sem.	None	200	25
McKendree College	36	126	50
McMinnville College	30	115	25
Mercer College	50	125	10
Miami University	10	108	23
Michigan Agri. College	15	150	125
Middlebury College	80	145	45
Midland College	40	125	40
Milligan College	36	90	20
Mills College	400	..	25
Milton College	36	116	6
Mississippi College	35	130	20
Missouri Valley College	50	120	66
Monmouth College	40	125	15
Morningside College	33	130	35
Morris Brown College	9	58	15
Mount Angel College	50	150	10
Mount Holyoke College	100	180	..
Mount St. Mary's College	300	..	14
Mount Union College	42	99	20
Muskingum College	41	115	18
Nebraska Wesleyan Univ.	20	125	25
Nevada State University	None	150	30
Newberry College	40	100	30
New Orleans University	..	88	8
Newton Theol. Inst.	None	100	30
New York University	180	400	55
Niagara University	200	100	20
North Carolina College	40	200	20
Northern Illinois College	40	135	10
Northwestern Univ. (Ill.,)	78	300	35
Norwegian Luther Col.	20	80	10
Oberlin College	75	250	75
Ogden College	25	135	20
Ohio State University	..	225	126
Ohio Univ. (Athens, O.)	None	200	15
Ohio Wesleyan Univ.	46	350	50
Oregon Agri. College	None	90up	30
Ottawa University	30	200	20
Oxford College	50	230	150
Pacific College (Ore.)	35	115	12
Pacific University	55	180	25
Park College	30	220	..
Parsons College	41	300	15
Peabody Normal College	25	144	25
Penn College (Iowa)	40	110	40
Pennsylvania College	30	244	26
Pennsylvania College	110	290	40
Pennsylvania State Col.	100	200	50
Philander Smith College	12	72	6
Pike College	40	160	20
Pomona College	60	175	60
Pratt Institute	150	304	25
Presbyterian Col.of S.C.	40	63	15
Princeton Theol. Sem.	None	120	12
Princeton University	160	500	..
Pritchett College	46	140	20
Purdue University	25	300	55
Radcliffe College	200	300	..
Randolph-Macon College	30	162	31up
Randolph (Woman's)	75	160	45
Rensselaer Poly. Inst.	200	370	31
Richmond College (Va.)	70	175	15
Rio Grande College	28	100	40
Roanoke College	50	150	40

Colleges.	Tuition; Cost per annum.	Living Expenses, Board, etc.	Other Expenses; Fees, Books, etc.
Rock Hill College	$60	$260	$50
Rutgers College	75	216	54
San Francisco Theo. Sem.	None	125	25
Shaw University	22	58	20
Shuurtleff College	36	100	24
Simpson College	32	133	12
Smith College	100	300	..
South Carolina College	40	133	75
Southern Bapt. Theol. Sem.	None	105	20
Southern University	50	120	25
S'thwestern Univ. (Tex.)	60	350	..
Southwest Kansas College	36	110	10
State College of Kentucky	20	200	50
State Univ. of Iowa	75	300	..
State Univ. of Kentucky	16.50	75	30
Stevens Institute Tech.	..	350	45
St. Anselm's College	50	150	..
St. Benedict's College	40	160	..
St. Francis Xavier Col.	60	..	..
St. John's College (D. C.)	100	..	15
St. John's College (Md.)	75	170	30
St. John's College (N. Y.)	60	290	20
St. John's Univ. (Minn.)	50	150	20
St. Lawrence University	50	160	25
St. Louis University	60	200	7
St.Mary's College)Kan.)	..	225	..
St. Mary's College (Ky.)	30	140	15
St. Olaf College	15	80	..
St. Stephen's College	None	225	None
St. Thomas Villanova Col.	50	200	..
St. Vincent's College	50	200	25
Swarthmore College	..	400	50
Syracuse University	135	400	50
Tabor College	42	130	50
Taylor University	36	72	15
Trinity College (Ct.)	100	300	250
Trinity College (D. C.)	100	300	..
Trinity College (N. C.)	50	150	37
Trinity Univ. (Tex.)	50	125	40
Tufts College	100	250	35
Tulane University	85	148	27
Union College (Ky.)	38	110	10
Union College (Neb.)	36	100	25
Union College (N. Y.)	75	220	50
Union Christian College	30	75	15
Union Theological Sem.	None	100up	35
Univ. of Alabama	40	130	30
Univ. of Arizona	None	250	..
Univ. of Arkansas	30	150	33
Univ. of California	None	250	50
Univ. of Chicago	120	555	..
Univ. of Cincinnati	75	120up	125
Univ. of Colorado	..	200	25
Univ. of Georgia	50	100up	25
Univ. of Idaho	..	150	25
Univ. of Illinois	..	233	50
Univ. of Kansas	None	320	..
Univ. of Maine	30	171	25
Univ. of Michigan	..	165	..
Univ. of Minnesota	..	250	200
Univ. of Mississippi	..	160	65
Univ. of Missouri	None	..	5
Univ. of Montana	..	180	12
Univ. of Nashville	25	200	35
Univ. of Nebraska	None	300	50
Univ. of New Mexico	..	225	5
Univ. of North Carolina	60	135	35
Univ. of North Dakota	..	120	15
Univ. of Notre Dame	100	200	35
Univ. of Oklahoma	None	85	43
Univ. of Omaha	100	120	50
Univ.of Oregon	None	150	20
Univ. of the Pacific	50	200	25
Univ. of Pennsylvania	200	500	..

Cost of Tuition and Other Expenses at the Principal Colleges and Universities in the United States

Colleges.	Tuition; Cost per annum.	Living Expenses, Board, etc.	Other Expenses; Fees, Books, etc.	Colleges.	Tuition; Cost per annum.	Living Expenses, Board, etc.	Other Expenses; Fees, Books, etc.
Univ. of Rochester	$60	$185	$50	Washington University	$150	$300	$50
Univ. of the South	100	200	30	Waynesburg College	30	175	25
Univ. of South Dakota	48	300	25	Wellesley College	175	225	20
Univ. of S. California	62	250	30	Wells College	100	300	110
Univ. of Tennessee	60	145	175	Wesleyan University	75	300	60
Univ. of Texas	None	180	120	Western College	36	175	..
Univ. of Utah	10	200	30	Western Maryland Col.	45	180	10
Univ. of Vermont	60	200	45	Western Reserve Univ.	85	250	200
Univ. of Virginia	..	225	40	Western Univ. of Penn.	100	200	25
Univ. of Washington	None	125	50	Westminster Col. (Mo.)	50	150	25
Univ. of Wisconsin	..	200	25	Westminster Col. (Pa.)	42	150	15
Univ. of Wooster	60	140	..	West Virginia University	..	200	..
Univ. of Wyoming	None	225	25	Wheaton College	39	200	25
Upper Iowa University	30	150	12	Whitman College	50	240	20
Vanderbilt University	85	200	60	Wilberforce Univ.	29	89	18
Vassar College	115	300	None	Wiley University	10	84	10
Vincennes University	24	150	15	Willamette University	45	140	5
Virginia Military Inst.	75	165	125	William & Mary College	35	108	31
Virginia Polytechnic Inst.	30	106	35	William Jewell College	40	50	25
Wabash College	24	125up	40	Williams College	105	481	..
Washburn College	40	300	30	Wilmington Col. (Ohio)	39	100	15
Washington Col. (Md.)	50	105	10	Wilson College	60	190	20
Washington Col. (Tenn.)	27	65	15	Woman's Col. (Balt.)	125	250	20
Washington & Lee Univ.	50	180	50	Yale University	150	1,000	100

Statistics of New Books Published in the United States

(From "The Publishers' Weekly.")

Classes.	1900.		1901.				
	New Books.	New Editions	New Editions.	New Books.	Books by American authors, incl. new eds. manuf. in U. S.	Books by English and other foreign authors, incl. new eds. manuf. in U.S	Books by English authors, imported in editions.
Fiction	616	662	1,320	914	981	1,028	225
Literature and Collected Works	187	356	423	297	218	309	193
Juvenile	482	45	161	434	400	133	62
Education	431	210	31	529	366	136	58
Law	513	30	60	480	534	....	6
Theology and Religion	411	37	57	476	305	109	119
Poetry and Drama	192	208	174	274	235	125	88
Biography Correspondence	225	49	88	340	170	126	132
Medicine, Hygiene	146	72	106	186	253	17	22
Physical and Mathematical Science	160	24	42	250	215	21	56
History	221	36	19	264	204	24	55
Political and Social Science	258	11	13	244	210	15	32
Description, Geography, Travel	150	42	18	202	911	19	85
Fine arts: Il. Gift Books	145	22	59	157	119	30	67
Useful Arts	122	31	37	160	131	10	56
Philosophy	91	10	18	96	78	11	25
Sports and Amusements	44	7	6	64	54	1	15
Domestic and Rural	64	12	8	57	44	5	16
Humor and Satire	32	2	4	42	40	2	4
Works of Reference	......	.....	1	30	28	1	2
Totals	4,490	1,866	2,645	5,496	4,701	2,122	1,318
		4,490		2,645			2,122
							4,701
		6,356		8,141			
							8.141

Number of Periodicals Published in the United States, Territories and Canada

(From the Annual Report of N. W. Ayer & Son.)

States, Territories and Canadian Provinces.	Issues. Daily.	Tri-Weekly.	Semi-Weekly.	Weekly.	Fort-nightly.	Semi-Monthly.	Monthly.	Bi-Monthly.	Quarterly.	Miscel-laneous.	Total—all issues.
New England States.											
Connecticut	40		10	109	2		17	2	4	1	185
Maine	16		6	99		3	36		2		162
Massachusetts	76	1	3	452	6	11	136		22	1	708
New Hampshire	15	2	1	128			9				155
Rhode Island	15	1	3	38	1		5				63
Vermont	9		1	80	1		11		1		103
New York.	171	4	24	906	10	14	214	2	29	2	1,376
New York	191	7	53	1,126	12	31	542	17	33	3	2,015
Middle States.											
Delaware	6			27			4				37
District of Columbia	4			28		3	38	1	3		77
Maryland	16		2	148	1	3	29	1	5	1	206
New Jersey	55		2	294	1	2	20	1	1		376
Pennsylvania	20	4	36	932	5	12	217	9	19		1,434
Southern States.	281	4	40	1,429	7	20	308	12	28	1	2,130
Alabama	20		4	205	2	4	13				249
Arkansas	22		4	228		5	16				275
Florida	15		3	134		1	17				170
Georgia	23		8	269		10	36	1	1		348
Kentucky	27	1	19	239		8	24		4		322
Louisiana	27		4	157		4	6				198
Mississippi	15	1	5	207		3	9				240
North Carolina	32		15	184	1	6	19		1	1	259
South Carolina	10		18	107	1	1	5	3		1	146
Tennessee	16		4	237	1	10	35	2	10		315
Texas	91		12	698		5	46	1	2		855
Virginia	36	4	5	165		2	33	3	3		251
West Virginia	23		4	158	2	1	8				196
Western States.	358	6	105	2,988	7	60	267	10	21	2	3,824
California	112	3	21	464		8	78	1	1	1	689
Colorado	43	1	5	285		4	20				358
Idaho	5	1	4	72		1	2				85
Illinois	183	4	45	1,199	8	23	249	4	14		1,729
Indiana	152	3	29	612		8	60	1	4		869
Iowa	65	5	48	915	1	8	86	1		1	1,130
Kansas	51	1	4	624	2	3	34		2		721
Michigan	83	4	23	609	1	7	71		4		802
Minnesota	39		3	619	1	16	56		1		735
Missouri	85	1	11	773	3	14	113	2	7		1,009
Montana	13		6	72		1	6				98
Nebraska	27	2	15	561	1	1	28				635
Nevada	9	1	3	19							32
North Dakota	8		3	173			4				188
Ohio	166	5	40	820	5	14	134	3	19		1,206
Oregon	20		8	169	1	1	24				223
South Dakota	17		1	258		3	15				294
Utah	6	1	7	52		4	6				76
Washington	19		2	193		1	23		1		239
Wisconsin	62	1	14	551	2	2	46			1	679
Wyoming	4		3	35			1				43
Territories.	1,169	33	295	9,075	25	119	1,056	12	53	3	11,840
Alaska	5			8			1				14
Arizona	11		2	40			1				54
Hawaii	7	1	3	16			8				35
Indian Territory	13			105			2				120
New Mexico	5			59			2				66
Oklahoma	21			180		2	11				214
Porto Rico	17			3							20
Canadian Provinces.	79	1	5	411		2	25				523
British Columbia	11		6	39			2				58
Manitoba	6		2	73		1	10				92
Northwest Territories	3		7	38		1	1				[illegible]
New Brunswick	9		8	28		1	7				53
Nova Scotia	10	3	4	55	1	3	4				80
Ontario	57		13	441	3	10	84		5	1	614
Prince Edward Island	3		1	11			1				16
Quebec	15	1	4	97	1	6	29		2		156
Newfoundland	3		1	7			2				13
	117	4	46	789	5	22	140		7	1	1,131

Specialization of Cities by Industries

Summary, 1900

Specified industries.	Specialized centres.	Average number of wage-earners in specialized centers: All industries.	Specified industry.	Per cent. of specialization.
Slaughtering and meat packing, wholesale	South Omaha, Neb.	6,606	5,938	89.9
	Kansas City, Kan.	10,544	7,664	72.7
Iron and steel	McKeesport, Pa.	7,605	6,753	88.8
	Youngstown, Ohio	9,150	6,644	72.6
	Newcastle, Pa	4,992	3,320	66.5
	Johnstown, Pa	6,116	3,871	63.3
Pottery, terra cotta, and fire-clay products	East Liverpool, Ohio	4,473	3,908	87.4
Fur hats	Bethel, Conn	780	671	86.0
	Danbury, Conn	4,296	3,113	72.5
	Orange, N. J	2,712	1,497	55.2
Glass	Tarentum, Pa.	1,420	1,152	81.1
	Charleroi, Pa	1,270	983	79.1
	Millville, N. J.	2,290	1,463	63.9
	Gas City, Ind.	1,427	890	62.4
	Alexandria, Ind.	1,903	985	51.8
Cotton goods	Fall River, Mass.	32,780	26,371	80.4
	Warwick, R. I.	5,544	4,361	78.7
	New Bedford, Mass.	16,409	12,286	74.9
	Lewiston, Me.	7,159	4,604	64.3
	Manchester, N. H.	19,032	10,616	55.8
Boots and shoes	Brockton, Mass.	10,986	8,498	77.4
	Haverhill, Mass.	10,600	7,376	69.6
Silk and silk goods	West Hoboken, N. J.	3,028	2,306	76.2
	Patterson, N. J.	30,190	15,943	52.8
Gloves, leather	Gloversville, N. Y.	8,111	6,075	74.9
	Johnstown, N. Y.	3,884	2,316	59.6
Jewelry	North Attleboro, Mass	2,162	1,550	71.7
	Attleboro, Mass.	5,106	2,886	56.5
Collars and cuffs	Troy, N. Y.	21,564	14,822	68.7
Worsted goods	Lawrence, Mass	22,358	10,998	49.2
Hosiery and knit goods	Cohoes, N. Y.	8,673	3,685	42.5
Agricultural implements	Springfield, Ohio	6,638	2,359	35.6
Plated and britannia ware	Meriden, Conn.	7,531	2,048	27.2
Brassware	Waterbury, Conn.	14,914	2,616	17.5
Corsets	Bridgeport, Conn.	19,301	2,984	15.5
Leather, tanned, curried and finished	Wilmington, Del.	16,055	2,454	15.3

Localization of Industries by Cities

Summary, 1900

Industries.	Value of products in the United States.	Cities.	Value of products in the city named.	Per cent. of the United States in the city named.
Collars and cuffs	$15,769,132	Troy, N. Y.	$13,460,196	85.3
Oysters, canning and preserving	3,670,134	Baltimore, Md.	2,364,968	64.4
Coke	35,585,445	Connellsville, Pa	17,128,112	48.1
Brassware	17,140,075	Waterbury, Conn.	8,188,492	47.8
Carpets and rugs, other than rag	48,192,351	Philadelphia, Pa	21,986,062	45.6
Gloves	16,721,234	Gloversville, N. Y.	6,487,227	38.8
	16,721,234	Johnstown, N. Y.	2,576,048	15.4
	16,721,234	Chicago, Ill	2,209,529	13.2
Silverware	10,569,121	Providence, R. I	3,834,408	36.3
	10,569,121	Manhattan and Bronx boroughs, N. Y.	2,741,994	25.9
Slaughtering and meat packing, wholesale	698,206,548	Chicago, Ill	248,811,997	35.6
	698,206,548	Kansas City, Kans.	73,205,027	10.5
Plated and britannia ware	12,608,770	Meriden, Conn.	4,129,896	32.8
Jewelry	46,501,181	Providence, R. I.	12,719,124	27.4
	46,501,181	Manhattan and Bronx boroughs, N. Y.	9,172,849	19.7
	46,501,181	Newark, N. J.	7,364,247	15.8
	46,501,181	Attleboro, Mass	5,701,802	12.3
Agricultural implements	101,207,428	Chicago, Ill.	24,848,649	24.5
Silk and silk goods	107,256,258	Paterson, N. J	26,006,156	24.2
Tobacco, chewing, smoking and snuff	103,754,362	St. Louis, Mo	24,411,307	22.7
Corsets	14,878,116	Bridgeport, Conn.	3,224,198	21.7
	14,878,116	New Haven, Conn	1,893,956	12.7
Worsted goods	120,314,344	Lawrence, Mass	24,678,138	20.5
	120,314,344	Providence, R. I	16,603,252	13.8
	120,314,344	Philadelphia, Pa	16,242,250	13.5
Fur hats	27,811,187	Danbury, Conn	5,007,095	18.0
	27,811,187	Newark, N. J.	3,453,619	12.4
	27,811,187	Philadelphia, Pa	3,075,470	11.1
Brass castings and brass finishing	30,343,044	Waterbury, Conn.	5,050,539	16.6
Woolen goods	118,430,158	Philadelphia, Pa	18,340,012	15.5
Fruits and vegetables, canning and preserving	56,668,313	Baltimore. Md.	8,477,178	15.0
Hosiery and knit goods	95,482,56[illegible]	Philadelphia, Pa	13,040,905	13.7
Iron and steel	803,968.273	Pittsburg, Pa	90,798,086	11.3
Pottery, terra cotta, and fire-clay products	44,263,386	Trenton, N. J	4,785,142	10.8
Leather, tanned, curried and finished	204,038,127	Philadelphia, Pa	18,187,231	8.9
Cotton goods	339,200,320	Fall River, Mass.	29,286,526	8.6
Boots and shoes, factory product	261,028,580	Brockton, Mass	19,844,397	7.6
Glass	56,539,712	Pittsburg, Pa	2,429,686	4.3

List of the Principal Industrial Combinations in the United States in 1900

Name of combination.	Number of pants controlled.	Authorized Capitalization.
Iron and Steel and their Products.		
		$
Alabama Consolidated Coal and Iron Co.	4	5,000,000
American Axe and Tool Co	6	2,000,000
American Bridge Co	24	70,000,000
American Iron and Steel Mfg. Co	5	20,000,000
American Ordnance Co.	2	2,500,000
American Radiator Co	9	10,000,000
American Sheet Steel Co	29	53,000,000
American Steel and Wire Co. of New Jersey	42	90,000,000
American Steel Casting Co.	6	4,200,000
American Steel Hoop Co	15	33,000,000
American Tin Plate Co	65	50,000,000
American Wood Working Machine Co	8	4,000,000
Atlas Tack Co.	4	700,000
Central Foundry Co	14	14,000,000
Continental Gin Co	6	3,000,000
Empire Steel and Iron Co.	10	5,000,000
Federal Steel Co	17	200,000,000
Herring-Hall-Marvin Co	2	3,300,000
International Heater Co.	2	1,800,000
International Power Co.	2	8,000,000
International Steam Pump Co.	6	27,500,000
National Enameling and Stamping Co	10	30,000,000
National Malleable Castings Co.	4	3,000,000
National Saw Co.	4	1,000,000
National Shear Co.	3	3,000,000
National Steel Co	22	59,000,000
National Tube Co.	26	80,000,000
Niles-Bement-Pond Co.	4	8,000,000
Ohio Tool Co., of Auburn, N.Y.	2	350,000
Otis Elevator Co.	6	11,000,000
Pittsburg Stove and Range Co	8	2,000,000
Republic Iron and Steel Co	35	55,000,000
Shelby Steel Tube Co.	14	15,000,000
Standard Chain Co.	11	3,000,000
Steel Tired Wheel Co.	5	4,000,000
Susquehanna Iron & Steel Co.	7	1,500,000
United Shoe Machinery Co	5	25,000,000
United States Cast Iron Pipe and Foundry Co.	17	30,000,000
Virginia Iron, Coal, and Coke Co.	21	10,000,000
Wheeling Steel and Iron Co.	7	5,000,000
Total iron and steel and their products	489	952,850 000
Food and Allied Products.		
American Beet Sugar Co.	4	20,000,000
American Caramel Co.	2	2,000,000
American Cereal Co.	6	3,400,000
American Chicle Co.	6	9,000,000
American Pastry and Manufacturing Co.	6	3,000,000
American Preserve Co	1	125,000
American Sugar Refining Co.	5	75,000,000
California Fruit Canners' Ass'n	20	3,500,000
Columbia River Packers' Ass'n	4	2,000,000
Continental Biscuit Co	5	500,000
Continental Creamery Co.	13	500,000
Glucose Sugar Refining Co.	5	40,000,000
National Biscuit Co	95	55,000,000
National Rice Milling Co.	5	5,000,000
National Sugar Refining Co	3	20,000,000
Pacific Coast Biscuit Co.	12	4,000,000
Pillsbury-Washburn Flour Mills Co., Ltd.	5	4,850,000

Name of combination.	Number of plants controlled.	Authorized Capitalization.
		$
Royal Baking Powder Co.	3	20,000,000
Seacoast Packing Co.	36	8,000,000
Standard Sardine Co.	25	5,000,000
United States Flour Milling Co.	16	25,000,000
Total food and allied products	277	305,875,000
Chemicals and Allied Products.		
American Agricultural Chemical Co	27	40,000,000
American Cotton Oil Co	57	34,799,400
American Linseed Co.	47	33,500,000
Barrett Manufacturing Co., The	12	5,000,000
Celluloid Co., The	1	6,000,000
Continental Cotton Oil Co.	7	6,000,000
Fisheries Co., The	5	3,000,000
General Chemical Co.	17	25,000 000
Grasselli Chemical Co	7	7,500,000
National Salt Co.	31	12,000,000
National Starch Manufacturing Co.	22	10,500,000
Standard Oil Co	26	110,000,000
United Starch Co	3	6,000,000
Virginia-Carolina Chemical Co	33	50,000,000
Total chemicals and allied products	295	349,299,400
Metals and Metal Products Other Than Iron and Steel.		
Amalgamated Copper Co	4	75,000,000
American Brass Co.	4	20,000,000
American Shot and Lead Co	12	3,000,000
American Smelting and Refining Co.	18	65,000,000
American Type Founders' Co.	12	4,000,000
Cherokee-Lanyon Smelter Co.	14	600,000
International Silver Co.	13	20,000,000
Magnus Metal Co.	5	3,000,000
National Lead Co	17	30,000.000
New Jersey Zinc Co.	8	10,000,000
Standard Sanitary Manufacturing Co	6	5,000 000
Total metals and metal products other than iron and steel	113	235,600,000
Liquors and Beverages		
American Distributing Co.	2	5,000,000
American Malting Co.	36	30,000,000
American Spirits Manufacturing Co	13	35,000,000
California Wine Association	9	10,000,000
Chicago Breweries, Ltd	2	3.000,000
Chicago Consolidated Brewing and Malting Co	4	5,000,000
Cleveland and Sandusky Brewing Co	9	6,000,000
Connecticut Breweries, Ltd.	2	700,000
Consumers Brewing Co.	5	3,800,000
Erie Brewing Co	4	1,500,000
Evansville Brewing Ass'n	2	400,000
Indianapolis Brewing Co.	3	....
Kentucky Distilleries and Warehouse Co	50	32,000,000

List of the Principal Industrial Combinations in the United States in 1900

Name of Combination.	Number of plants controlled.	Authorized Capitalization.
Liquors & Beverages—Con.		$
Maryland Brewing Co	16	6.500 000
New Orleans Brewing Co	4	2,790,000
New York and Kentucky Co	3	2,000,000
Paterson Brewing and Malting Co	6	3,000,000
Pennsylvania Central Brewing Co	12	5,600,000
Pittsburg Brewing Co	18	13,000,000
St. Louis Brewing Ass'n	11	5,250,000
San Francisco Breweries, Ltd.	6	1,023,300
Seattle Brewing & Malting Co.	3	1,000,000
Springfield Breweries, Ltd	2	509,250
Springfield Breweries Co	3	1,375,000
Standard Distilling and Distributing Co	10	24,000,000
United Breweries Co	12	5,600,000
United States Brewing Co., Ltd	5	3,500,000
United States Brewing Co	6	5,000.000
Total liquors and beverages	258	212,547,550
Vehicles for Land Transportation.		
American Bicycle Co	35	30,000.000
American Car and Foundry Co.	17	60,000,000
Pressed Steel Car Co	4	25,000,000
Pullman Co., The	5	74,000,000
Standard Wheel Co	6	1,000,000
Southern Car and Foundry Co.	5	3,000,000
Total vehicles for land transportation	72	193,000,000
Tobacco.		
American Snuff Co	9	25,000,000
American Tobacco Co	15	70,000,000
Continental Tobacco Co	9	100,000,000
Havana-American Co., The	8	10,000,000
Total tobacco	41	205,000,000
Textiles.		
American Felt Co	5	5,000,000
American Grass Twine Co	3	15,000,000
American Thread Co	10	12,000,000
American Woolen Co	30	65,000.000
Mt. Vernon-Woodberry Cotton Duck Co	7	9,500,000
New England Cotton Yarn Co.	9	11,500,000
Standard Rope and Twine Co.	5	12,000,000
Union Tanning Co	18	10,000,000
United States Finishing Co	3	3,000,000
Total textiles	72	133,000,000
Leather and its Finished Products.		
American Hide and Leather Co	30	35,000,000
Elk Tanning Co	23	13,500,000
Penn Tanning Co	14	13,500,000
Union Tanning Co	18	10,000.000
United States Leather Co	23	128,000,000
Total leather and its finished products	108	199,000,000

Name of Combination.	Number of plants controlled.	Authorized Capitalization.
Paper and Printing.		$
American Lithographic Co	1	4,0.00000
American Straw Board Co	17	6.000,000
American Writing Paper Co	25	25,000,000
International Paper Co	32	45,000,000
National Wall Paper Co	18	30,000,000
Union Bag and Paper Co	17	27,000,000
United States Envelope Co	9	5,000,000
Total paper and printing	119	142,000,000
Clay, Glass, and Stone Products.		
American Cement Co	3	500,000
American Clay Mfg. Co.	28	10,000.000
American Window Glass Co	39	17,000,000
Baltimore Brick Co	28	2,100.000
Illinois Brick Co	36	9,000,000
International Pulp Co	1	5,000,000
Macbeth-Evans Glass Co	7	2,200,000
National Fire Proofing Co	5	2,000,000
National Glass Co	19	4,000,000
Pittsburg Plate Glass Co	10	10.000,000
Surburban Brick Co	5	200,000
Trenton Potteries Co	6	3.000,000
United States Clay Manufacturing Co	2	240,000
United States Glass Co	13	5,000,000
Western Stone Co	1	2,250,000
Total clay, glass, and stone products	203	72,490,000
Lumber and its Manufactures.		
American School Furniture Co.	17	10,000,000
Brunswick-Balke-Collender Co.	2	1,500,000
Diamond Match Co.	9	15,000,000
Heywood Bros. & Wakefield Co.	4	6,000,000
National Casket Co	11	6,000,000
National Cooperage and Woodenware Co	6	500,000
United States Bobbin and Shuttle Co	7	2,000.000
Yellow Pine Co	3	2,500,000
Total lumber and its manufactures	59	43,500,000
Miscellaneous Industries.		
American Glue Co	6	1,800,000
American Hard Rubber Co	3	2,500,000
American Ice Co	7	40,000,000
American Shipbuilding Co	11	30,000,000
American Soda Fountain Co	7	3,750,000
Central Fireworks Co	6	3,500,000
Commonwealth Roofing Co	6	500,000
Consolidated Ice Co	7	4,000,000
Consolidated Railway Electric Lighting and Equipment Co.	3	16,000,000
Electric Boat Co	3	10,000,000
General Aristo Co	5	5,000,000
National Carbon Co	5	10,000,000
Pittsburg Coal Co	5	64,000,000
Rubber Goods Mfg. Co	14	50,000,000
United States Rubber Co	5	50,000,000
United States Whip Co	4	2,200,000
Total miscellaneous industries	97	293,250,000
Total for all groups	2,203	$3,337,411, 950

Summary of Agricultural Statistics, 1900

	States and Territories.	Number of Farms. Total.	Number of Farms. With buildings.	Acreage, June 1, 1900. Total.	Acreage, June 1, 1900. Improved.	Acreage, June 1, 1900. Per cent. improved.	Value of Farm Property, June 1, 1900. Total.	Value of Farm Property. Land and improvements (except buildings).	Value of Farm Property. Buildings.	Value of Farm Property. Implements and machinery.	Value of Farm Property. Live stock.
							$	$	$	$	$
1	The United States	5,739,657	5,537,731	841,201,546	414,793,191	49.3	20,514,001,838	13,114,492,056	3,560,198,191	761,261,550	3,057,050,041
2	North Atlantic division.......	677,506	666.832	65,409,089	38,920,614	59.5	2,950,532,628	1,503,388,893	973,876,795	152,805,090	320,461,850
3	South Atlantic division........	962,225	931,320	104,297,506	46,100,226	44.2	1,454,031,316	899,820,936	306,528,682	53,318,890	194,362,808
4	North Central division	2,196,567	2,120,726	317,349,474	222,314,099	70.1	11,504,919,848	7,865,901,053	1,697,979,385	364,062,060	1,576,977,350
5	South Central division	1,658,166	1,586,829	257,738,845	80,007,867	31.0	2,815,823,403	1,661,939,013	410,732,878	126,692,285	616,459,227
6	Western division.............	242,908	229,904	93,796,860	27,155,681	29.0	1,714,593,969	1,126,958,100	167,521,756	52,897,645	367,216,468

	Value of Products, 1899. Total.	Value of Products, 1899. Fed to live Stock.	Value of Products, 1899. Not fed to live Stock.	Value of Products, 1899. Per cent. not fed to value of property.	Expenditures, 1899. Labor.	Expenditures, 1899. Fertilizers.	Average Values per Farm. Farm property, June 1, 1900. Total.	Farm property. Land and improvements (except buildings).	Farm property. Buildings.	Farm property. Implements and machinery.	Farm property. Live stock.	Products, 1899. Total.	Products, 1899. Not fed to live stock.	Average value per acre of products of 1899 not fed to live stock.	Average Expenditures per Farm. 1899. Labor.	Average Expenditures per Farm. 1899. Fertilizers.
	$	$	$		$	$	$	$	$	$	$	$	$	$	$	$
1	4,739,118,752	974,941,046	3,764,177,706	18.3	365,305,921	54,783.757	3,754	2,285	620	133	536	826	656	4.47	64	10
2	666,347,164	171.925,080	494,422,084	16.8	71,197,870	15,641,995	4,355	2,219	1,437	226	473	984	730	7.56	105	223
3	465.492,097	61,970,640	403,521,457	27.8	37,086,040	22,732,670	1,511	935	319	55	202	484	419	3.87	39	4
4	2,360,011,670	568,622,050	1,791,389,620	15.6	143,320,980	7.273,695	5,238	3,581	773	166	718	1,074	815	5.64	65	3
5	888,572,699	124,525,261	764,047,438	27.1	49,446,641	6,711,824	1,698	1,002	248	76	372	536	461	2.96	30	4
6	336,646,343	47,897.585	288,748,758	16.8	56,340,399	1,070,726	7,059	4,639	690	218	1,512	1,386	1,189	3.08	232	4

Summary of Farm Crop Statistics for 1899

(From the latest available tables.)

CROPS.	Acres.	Unit of measure.	Quantity.	Value.
Corn	94,916,911	Bushels	2,666,440,279	$828,258,326
Wheat	52,588,574	Bushels	658,534,252	369,945,320
Oats	29,539,698	Bushels	943,389,375	217,098,584
Barley	4,470,196	Bushels	119,634,877	41,631,762
Rye	2,054,292	Bushels	25,568,625	12,290,540
Buckwheat	807,060	Bushels	11,233,515	5,747,853
Broom corn	178,584	Pounds	90,947,370	3,588,414
Rice	351,344	Pounds	283,722,627	7,891,613
Kafir corn	266,513	Bushels	5,169,113	1,367,040
Flaxseed	2,110,517	Bushels	19,979,492	19,624,901
Clover seed	....	Bushels	1,349,209	5,359,578
Grass seed	....	Bushels	3,515,869	2,868,839
Hay and forage	61,691,166	Tons	84,011,299	484,256,846
Cottonseed	....	Tons	4,566,100	46,950,575
Cotton	24,275,101	Bales	9,534,707	323,758,171
Tobacco	1,101,483	Pounds	868,163,275	56,993,003
Hemp	16,042	Pounds	11,750,630	546,338
Hops	55,613	Pounds	49,209,704	4,081,929
Peanuts	516,658	Bushels	11,964,957	7,271,230
Peppermint	8,591	Pounds	187,427	143,618
Dry beans	453,867	Bushels	5,064,844	7,634,262
Castor beans	25,738	Bushels	143,388	134,084
Dry pease	968,371	Bushels	9,440,269	7,909,074
Potatoes	2,938,952	Bushels	273,328,207	98,387,614
Sweet potatoes	537,447	Bushels	42,526,696	19,876,200
Onions	47,983	Bushels	11,791,121	6,637,625
Chicory	3,069	Pounds	21,495,870	73,627
Miscellaneous vegetables	2,115,570	....	....	113,871,842
Maple sugar	....	Pounds	11,928,770	1,074,260
Maple sirup	....	Gallons	2,056,611	1,562,451
Sugar cane	452,673	Tons	....	....
(a) Cane sold	....	Tons	1,298,620	4,611,239
(b) Cane kept for seed	....	Tons	1,453,447	5,018,469
(c) Sugar made	....	Pounds	664,020,814	24,584,459
(d) Molasses made	....	Gallons	10,379,210	796,990
(e) Sirup made	....	Gallons	12,293,032	4,293,475
Sorghum cane	293,152	Tons	291,703	815,019
Sorghum sirup	....	Gallons	16,972,783	3,288,083
Sugar beets	110,170	Tons	793,353	3,323,240
Small fruits	309,780	....	....	25,030,877
Grapes	282,473	Centals	13,010,134	14,090,937
Orchard fruits	6,064,887	Bushels	212,366,646	83,751,840
Subtropical fruits	165,858	....	....	8,549,863
Nuts	....	....	....	1,950,161
Forest products	....	....	....	109,989,868
Flowers and plants	9,314	....	....	18,759,464
Miscellaneous seeds	10,106	....	....	826,019
Nursery products	59,492	....	....	10,123,873
Willows	521	....	....	36,523
Miscellaneous	23,793	....	....	1,452,613
Total	289,821,559	....	....	$3,020,128,531

Membership of Labor Organizations in the United States

Name of Organization	Present membership
Amalgamated Association of Elastic Web Weavers	355
Amalgamated Association of Street Railway Employés of America	4,500
Amalgamated Brotherhood of Painters, Decorators and Paperhangers	32,000
Amalgamated Carpenters and Joiners	3,000
Amalgamated Lace Curtain Operatives of America	1,000
Amalgamated Society of Engineers (machinists, etc.)	2,500
Amalgamated Woodworkers' International Union of America	17,000
American Federation of Musicians	6,500
American Flint Glass Workers' Union	9,000
American Wire Weavers' Protective Association	235
Association of Iron, Steel and Tin Workers, Amalgamated	8,500
Boot and Shoe Workers' Union	13,500
Brickmakers' National Alliance	3,000
Brotherhood of Boilermakers and Iron Ship Builders	5,400
Brotherhood of Locomotive Engineers	35,000
Brotherhood of Locomotive Firemen	36,600
Brotherhood of Railroad Trainmen	45,000
Brotherhood of Railway Trackmen	4,500
Chain Makers' National Union of United States of America	400
Coopers' International Union of North America	4,500
Coremakers' International Union	4,000
Cotton Spinners' Association	2,850
Federal (American Federation of Labor) Labor Unions	235,000
Glass Bottle Blowers' Association of the United States and Canada	4,000
Glass Workers' National Union	500
Granite Cutters' National Union	12,000
International Association of Allied Metal Mechanics	2,200
International Association Amalgamated Sheet Metal Workers	3,500
International Association of Machinists	45,000
International Association of Operative Plasterers	7,120
International Association of Watch Case Engravers	500
International Broommakers	1,000
International Brotherhood of Blacksmiths	10,000
International Brotherhood of Bookbinders	4,000
International Brotherhood of Oil and Gas Well Workers	500
International Brotherhood of Stationary Firemen	2,600
International Carriage and Wagon Makers	2,000
International Cigar Makers' Union of America	35,000
International Jewelry Workers' Union of America	1,200
International Ladies' Garment Workers' Union	2,000
International League of Hotel and Restaurant Employés	10,100
International Longshoremen's Association	20,000
International Mosaic Tile Layers' Union	800
International Printing Pressmen's Union	10,000
International Protective Union of Building Laborers	10,000
International Seamen's Union	9,515
International Tinplate Workers' Protective Association of America	2,500
International Typographical Union	32,900
International Union Bricklayers and Masons	45,000
International Union of Journeymen Barbers	6,900
International Union of Laundry Workers	5,000
International Union of Steam (stationary) Engineers	7,500
International Union of United Brewerymen	22,500
International Union of Wood, Wire and Metal Lathers	1,000
Iron Molders' Union of North America	20,000

Journeymen Bakers and Confectioners' International	9,000
Journeymen Tailors' Union of America	9,000
Knights of Labor	120,000
Meat Cutters and Butcher Workmen of North America	8,320
Metal Polishers' and Brass Workers' Union of North America	19,000
National Alliance of Stage Employés	3,800
National Association of Steam Fitters and Helpers	2,000
National Brotherhood of Coal-Hoisting Engineers	950
National Brotherhood of Electrical Workers of America	8,000
National Brotherhood of Operative Potters	2,500
Order of Railroad Telegraphers	15,000
Order of Railway Clerks of America	9,000
Order of Railway Conductors	25,280
Pattern Makers' League of North America	2,400
Plate Printers' Union of United States	1,000
Progressive Union of Mine Workers (iron)	4,500
Retail Clerks' International Protective Association	30,000
Stove Mounters' International Union	1,400
Switchmen's Union of North America	5,000
Table Knife Grinders' National Union	600
Team Drivers' International Union	5,000
Threshermen's Protective Association of America	
Tobacco Workers' International Union	7,000
Trunk and Bag Workers' International Union	320
Union of Horse Shoers of United States and Canada	4,600
United Association of Plumbers, Gas and Steam Fitters, etc	15,000
United Brotherhood of Carpenters and Joiners of America	70,000
United Brotherhood of Leather Workers on Horse Goods	3,700
United Brotherhood of Paper Makers of America	1,000
United Garment Workers of America	22,000
United Hatters of North America	7,500
United Metal Workers' International Union	1,500
United Mine Workers of America (coal)	275,000
United Textile Workers of America	4,000
Upholsterers' International Union of North America	1,800
Window Glass Cutters' League of America	900
Window Glass Flatteners' Association of North America	500
Western Federation of Miners (gold, silver, copper)	40,000
Wood Carvers' Association of North America	2,000
Total	1,550,245

Life Insurance Statistics

Although possibly the most prosperous and powerful business organization in the country, American life insurance is of comparatively recent date.

In 1898, there were sixty companies, and they held insurance in force in the enormous total of $6,800,000,000. Of this $1,100,000,000 was what is known as industrial insurance.

In 1899, there were sixty-nine companies, with a total of insurance in force of $7,774,000,000.

In 1900, the grand aggregate of insurance in force held on the lives of persons in the United States by seventy-six American companies was more than $8,500,000,000. In 1902, the amount exceeded eleven billion—including both industrial and ordinary insurance.

The vast growth of the business may be better appreciated when it is compared with the development of life insurance in Great Britain. Although the English life insurance companies have been in the field for about two centuries, or four times as long as the American, the insurance in force held by them amounts to about $3,500,000,000, or much less than half the total held by the companies of the United States.

The total "admitted" assets of the American companies is some $1,595,000,000.

The profit in insurance may be inferred from the fact that the total yearly income is about $365,368,000.

Since 1871, the insurance companies of the United States have paid out to their policy-holders more than the national debt, even at its highest point.

The Superintendent of Insurance of New York gives the following summary concerning insurance companies doing business in the Empire State, April 30, 1901:

COMPANIES.	No.	Assets.	Liabilities, except capital	Capital.	Surplus.	Risks in force.
Fire	169	$313,875,420	$148,200,737	$79,259,239	$107,034,939	$22,423,334,216
Marine	13	17,407,568	4,612,549	200,000	12,595,019	621,263,991
Life	40	1,723,737,723	1,565,459,781	10,340,500	158,277,942	8,345,379,153
Casualty ...	31	47,326,359	18,865,766	14,894,000	13,566,592	4,416,101,854
Totals....	253	$2,102,347,070	$1,737,138,833	$104,693,739	$291,474,492	$35,806,079,214

INDEX

Abattoir, by-products of the, 203; waste, fertilizer from, 503
Academy, for Brewers, an, 235; of Fine Arts, Pa., 957
Academy, United States Naval, 1009
Academy, West Point, the, 1002; conditions at, 1003
Accountants, expert, 474; women as, 473
Accumulators, electric, 110
Acting as a profession, 971
Actors, American, number of, 970; as professionals, 971, conditions of success, 972; Fund, the, 972; "hide away" engagements of, 973; Order of Friendship, 972; vaudeville, 974
Addressing machine, the, 8
Advertisement writers, 455; pay of, 456; women as, 457
Advertisement writing, schools to teach, 456
Advertisements, illustrated, 955; newspaper, 192, 193; value of, 405; "want," 450
Advertising, agents and agencies, 453-5; bulletin-board, 451; business, the, 449; department, newspaper, 454; in periodicals, 452; local and general, 450; man, the, 453; managers, demand for, 456; newspaper, 449, 452; professional side of, 453; representative, the, 453; street car, 451; supplementary, 451; trade-papers, 453; women in, 457; yearly expenditure for, 449
Agencies, literary, 925
Agents, advertising, 453, 455; book, 465; business house, 463; commission, 464, 697; express, 613; general freight, railway, 521; general passenger, railway, 521; insurance, 440, 441, 442, 443, 447; labor, 1041; real estate, 465; real estate, women as, 466; station, railway, 536, 539, 547; subscription, 465; supply, 465
Agricultural machinery, 71; exports of, 14
Agriculture. See also Farming
Agriculture, chemists in, 840; college of, 693, 704, 706; department of, 861; experts in, demand for, 708; government aid to, 693, 706, 707; graduates in, outlook for, 705; instruction in, 704, 705, 706, 707; in the United States, 690; modern, 692; persons engaged in, 6, 690; products of, exports, 690; students in, employment for, 707
Air, compressed, industrial use of, 62, 101, 135; locomotive, 131
Air-brake, the, 510, 530; instruction cars, 533, 538; Westinghouse, the, 532
Ale Brewers' Association, 234
Alewives, annual catch of, 805
Alumina, increased demand for, 618
Aluminium, 54; culinary utensils, 54; electrolytic, 104; horseshoes, 54; in lithography, 168, 173; in the pin industry, 493; ore mining, 618; output of, in 1902, 618; sheet, 56, toilet articles, 54; total production, 857; vs. silver leaf, 54; wire, 104
Ambassadors, American, 997
Ambulance, chasers, 882; system, the, 897
American Dramatists' Club, 968
American, Express Company, the, 614; Federation of Labor, 26, 27, 603; Newspaper Publishers' Association, 193; Press Association, 194; Smelting and Refining Co., 19; Thread Company, the, 300; Window Glass Company, the, 325
Angora goat hair, 782, 784
Animals, domestic, 777
Anthracite. See Coal
Apartment houses, rents of, 466
Apiculture. See Beekeeping
Apothecary. See Pharmacist
Apple exports in 1902, 749; growing, centres of, 749; industry, the, 749
Apprentice, laws, 40, 41; Naval, the, 1011
Apprentices, railway. See Railway; stable, 982; teaching of, 40, 41
Apprenticeship, Naval system of, 40
Architect, training of the, 959
Architects, earnings of, 961; expenses of, 961; salaries of, 960
Architectural League, the, 958
Architecture, mercantile, modern, 95; profession of, 958
Arc lamps, electric, 106
Armor plate, 50
Army, officers, training of, 1002; organization of the, 1001; promotion in the, 1005; regular, the, 1001; United States, strength of, 1001
Art, American, status of, 949, 950; education in United States, 957; glass, 329; in printing, 163; press, rotary, the, 408; of selling goods, the, 408; of window dressing, 405; Schools, American, 957; Students' League, the, 949, 957
Artisans, American, efficiency of, 9
Artists, as scene painters, 977; earnings of, 950; models, 966
Arts and Crafts, the, 949
Asphalt, Bermudez, 671; industry, the, 671; the father of, 672; pavements, 500, 671; producing countries, 673; production of, 673; Trinidad, 672, 673
Assay offices, employes of, 368; United States, 366
Assaying, operation of, 367
Associated Press, the, 194, 943; operations of, 944
Association, Ale Brewers', 234; Carriers', Lake, 576; Live Stock, National, 783; Longshoremen's, 611; Meat Cutters', 205; Metropolitan Street Railway, 567; of Plumbers and Fitters, 98; of Street Railway Employes, 508; Vaudeville Managers', 973; Women Stenographers', 472
Associations, building, 384, 385; cattle breeders', 774; department store, 416, 417; hog breeders', 774; horse breeders', 774; press, 942; retail protective, 414; sheep breeders', 774; stove, 123; travelling salesmen's, 461; truck farmers', 757
Asthma, grinder's, 1039
Astronomers, 853; night's work of, 855; workshops of, 854
Atbara bridge, the, 14, 37
Auctioneer, the, 1041
Author and publisher, relations of, 188, 917
Authors, earnings of, 918
Automobile accidents, 141; boilers, 138; cost of, 139; electric, the, 139, 497; gasoline, the, 138; in commerce, 140; mail delivery, 140; motors, 140, 497; mowers, 140; steam engines, 138; trade papers, 140
Automobiles, 137; three types of, the, 137
Autoplate, the, 166, 168

B

Bacteriology, the field of, 891
Bag industry, capital invested in, 488; hands employed in, 488
Bags, daily output of, 488; loaning, business of, 488
Bakery products, 210
Baking industry, the, 206
Baling cotton, 717; process of, 268
Ballet dancer, the, 976
Banana trust, the, 746
Bananas, how sold, 746
Band, the, 992

Banjos, annual output of, 358
Bank, bookkeeper of a, 380; capital, law as to, 374; cashier, the, 378; clerks, promotion of, 380; daily routine work in a, 376; great, how conducted, 376; loans, 374; operations of a, 374; president, duties of, 376, 377; president, salary of a, 377; safes and vaults, 79; safe-deposit vaults, 504; savings, operations of a, 382; teller, note, 380; teller, paying, 378; teller, receiving, 379
Banking business, the, 373; power of the United States, 373; system, national, the, 373
Banks, investments of, 375; National, depositories, 3°5; National, resources of, 373; savings, 381; savings, interest paid by, 382; savings, salaries paid, 380; savings, total deposits of, 381; taxes paid by, 376
Bar, practice at, conditions of, 878
Barley, crop, United States, average of, 690
Barley sugar, 230
Barrel making, 85
Barrel staves and heading, 85, 86
Baskets, grape, manufacture of, 240, 750
Bass, black, annual catch of, 807
Bath tubs, Dresden china, 94; porcelain, 335;
Batteries, storage, 110, 111, 139, 497
Battleship, building of a, 152; preparation of a, 1007
Bauxite mining, 618
Beds, folding and metal, 87
Bee colonies, number in 1900, 772; keeping, 770
Beef, canning of, 203
Beer, adulteration of, 237; annual consumption of, 232, 233; bottled, 244; how made, 235; lager, industry, 233
Beet sugar, 199, 224; acreage devoted to, 719; annual output, 719; consumption of, in 1901, 227; crop, 718; output of, in 1899, 227; process, 225
Bell, diving, the, 610
Bell Telephone Company, the, 433, 434
Berry industry, the, 749
Beryl, deposits of, Montana, 670
Bessemer steel process. See Steel
Betterment, industrial, 32, 73, 341, 350, 415, 559
Beverages and liquors, 232
Bicycle, American-made, demand for, 14; development of the, 126; industry, the, 143; machines, 144; manufacture of a, 144; motor, the, 145; police, 1029; sales in 1900, 144
Binding, book, 169; cloth, 189; book, machinery, automatic, 164
Biscuit, American, 198, 210; factory, a large, 211; making, materials used in, 211; making, process of, 212
Bitumen. See Asphalt
Blacksmithing, 68
Blankets, manufacture of, 273
Blasting gelatine, 344; powder, 343; submarine, 610
Block signal system, the. See Railway
Blood, utilization of, 204
Bluefish, annual catch of, 805
Bluestone quarried in 1902, value of, 674
Boarding house business, the, 476, 483; women owners of, 483
Boats, fire, New York City, 581; harbor, variety of, 580; Herreshoff, the, 155; pilot, 606; police, New York City, 581; torpedo, 1007; wooden, building of, 155
Boiler, "flash," the, 138; locomotive, building a, 132; Serpollet, the, 138
Boilers, steam, 63
Bonds, United States, manufacture of, 370; paper for, 371
Bones, utilization of, 204
Bonnets, designers of, earnings, 298; old, making over, 298
Book agents. See Agents
Book, buyers, Americans as, 186; cost of making a, 189; cover designers, 956; covers, ornamental, 170; life of a, 188; machinery, fa. 89; manufacture, 188; markets, the chief, 186; printing machinery, 189; printing presses. See Press; publication, increase in, 187; publishing in the United States, 185; statistics, publishing, 187; typewriters. See Typewriters; writing, 919
Book-backing machine, the, 170
Bookbinding. See Binding
Bookkeepers, bank. See Bank; women as, 473, 474
Books, American, export of, 187; best selling, the, 187; classes of published, 187; modern, prices of, 189; school, sale of, 187
Boot and shoe industry, hands employed in, 309; output of, 310; the, 309; centre of, 310
Boot machines, 309
Boots and shoes, prison-made, 311; rubber, 317, 318, 319
"Bosses," political, 995
"Boston system" in clothes making, 285
Bottles, manufacture of, 331, 332
Bottling industry, the, 244
Bows, violin, how made, 359
Box industry, capital invested in, 488; hands employed in, 488; materials used in, 488
Boys, office, in Wall Street, 390
Brake, air, the, 128, 510, 530, 532, 533, 538
Brakemen. See Railway
Brandy, manufacture of, 238
Brass, button manufacture, 489; cartridges, how made, 346; industry, the, 52; rolling of, 53; wire for pins. See Pin
Breweries, and brewmasters, 233; tax paid by, in 1900, 233
Brewers, academy for, 235; as saloon owners, 399; wages paid to, 234
Brewing, hops consumed in, in 1900. 727
Brewmaster, the, 235
Brick, machine, the, 59; making, 334; plants, output of, in 1900, 334; vs. stone for walls, 93
Bricklayers' Union, the, 95; wages paid to, 93
Bridge, Atbara, the, 14, 37; Brooklyn, the, 99; builders, feats of, 37; construction, 88, 99; East River, new, 100; foundations, 101; workmen, special, 100
Bridges, steel, construction of, 99
Brimstone used in match industry, 486
Briquettes, iron. See Iron
Bristles, utilization of, 204
Broadcloth, manufacture of, 273
Brokers, "curb-stone," 393; earnings of, 393; expenses of, 394; live stock, 201; real estate, 466; Real Estate, Board of, 467; Wall Street, 393
Broom corn. See Corn
"Bucket shops," operation of, 395; Produce Exchange, 396
Buckwheat, United States, acreage of, 690
Buffalo-fish, annual catch, 807; maize, 348
Builder, task of the, 91
Building, and loan companies, 384, 385; cantilevers in, 93; framework, steel, 90; Park Row, the, 90, 91; tallest, in world, 90; trades, the, 88, 93, 97
Buildings, construction of, 88, 91; fireproof, 89; modern plumbing in, 96; rapid erection of, 92; "skyscraper," 89
Bulbs, electric lamp, 107, 108; X-ray, 108
Bullets, casting, process of, 347
Burner, steam carriage, 138
Business, colleges. See Colleges; how to learn a, 7; organization in, 404
Butchers, packing house, 205
Butte, the great copper camp, 646
Butter, annual production, 764; cocoa, 231; imports and exports, 759; making, co-operative, 764; manufacture, centres of, 764; sales of, 759; trade, the, 765
Butterine, 269
Button machines, patents on, 490; making, capital invested in, 488; manufacture, 488; pearl, industry, 490
Buttons, annual sales of, 488;

brass, manufacture of, 489; celluloid, 489; composition, 489; home, how made, 489; ivory, manufacture of, 489; pearl. See also Mussel Fishery
Buyers, American, abroad, 462
By-products, ovens, coke, 665; abattoir, 203; cotton-gin, 269; oil refinery, 842; resin industry, 495; starch industry, 348

C

Cab service, electric, New York, 498
Cabinet making, 86
Cable, business, the, 419; Company, Commercial, the, 421; Hong Kong-Australia, the, 420; laying ships, 430; making industry, the, 429; sheathing machines, 429; Skagway-Juneau, the, 429; submarine, the, 428; laying of a, 430; manufacture of, 428
Cables, electric, insulated, 112; telephone, 113
Cadets, revenue cutter, 1024; Naval, training of, 1010; training of, 1003
Caisson, foundation process, the, 93, 101; workers, wages paid to, 102; working complaints, 162
Caissons, East River bridge, 101, 608
Calcium carbide, production of, 104
Calfskin, applications of, 306
Calico, American, 262; manufacturer, profit of the, 8
California, fruit. See Fruit; Fruit Exchange, 697
Camera, various uses of the, 966
Cameras, American, exports of, 14
Canal, Erie, the, 578; fleet, the, 578; Sault Ste. Marie, the, 578; Suez, tolls, yearly, collected by, 569
Canals, United States, mileage of, 578
Candle-dipper, mechanical, 59; manufacture, 349, 350
Candy, adulterants of, 229; American, exports of, 228; annual sales of, 228; cheap, composition of, 229; colors used in, 229; glucose, 229; how to test the purity of, 229; machinery, manufacture of, 228; making, 228, 229; purest, of commerce, 230; rock, 230
Cane sugar. See Sugar
Canned goods, value of, in 1900, 215; yearly consumption of, 401
Canneries, annual output of, 215; California, fruit, 216; hands employed in, 215
Canning, beef, 203; corn, operation of, 216; factory, wages paid in a, 220; fish, 218; fruit, 216; industry, father of the, 214; industry, the, 199, 214; machinery, 8; oyster, 11, 220; salmon, 199, 218; sardine, 199, 219; sea-food, 218
Can, tin, industry, the, 499
Cans, tin, how made, 499
Cantilevers in building, 93
Canvassers, business house, 463
Cape Nome gold diggings, 656
Cap industry, the, 295
Caps, cartridge, how made, 346
Captain, ship, the. See Steamship
Car, buffet, the, 532; building, 126; couplers, automatic, 134, 516, 517; dining, the, 510, 531, 532; drawing room, the, 135, 510, 522, 531; driver, modern, training of, 564; refrigerator, the, 205, 687, 743; sleeping, the, 510, 531
Caramel, or burned sugar, 230
Cargoes, ocean steamship, 584; "tooth pick," 584
Carmen, Railway, Brotherhood of, 557
Carnations, annual output of, 754
Carnegie and his employes, 36; success of, reasons for, 35
Carp, German, annual catch, 807
Carpet cleaning, mechanical, 62; industry, the, 254, 276; looms, improved, 276; machines, American, 276; mill centres, 276; surface, how produced, 277; tapestry, 277; weavers, wages paid to, 276; weaving, 277; wools used in 1900, 783; woven ply, the, 277
Carpets, annual exports of, 276; annual output of, 276; Axminster, 276, 277; Brussels, 276, 277; ingrain, output of, in 1900, 276; moquette, 276, 277; pile, 277; Wilton, 276, 277
Carriage, exports in 1900, 143; industry, the, 137, 141, 143; plants, large, 142, 143; robes, output of, in 1900, 273; school, technical, 142; electric motor, 497
Carriers, cash, mechanical, 413
Cars, air-brake instruction, 533, 538; American, exports of, 14; foreign demand for, 133; electric, U. S., number, 498; freight, carrying capacity of, 128; now in use in the U. S., 508; output of, in 1901, 133; Pullman, 135, 510; railroad and street, 126, 133; snow-sweeping, 134; steel, 14, 135; street, 133, 134, 560; tank, 18; water sprinkling, 134
Cartoonists, newspaper, pay of, 192
Cartridge shells, how made, 346
Case-making machine, 170
Cashiers, bank: See Bank. Hotel: See Hotel. Women as, 474
Casket combinations, 1043
Catalysis process, 339
Catfish, annual catch, 807
Catholic Church, 868
Cattle, breeders' associations, 774; how slaughtered, 202; market, the, 776; neat, number in U. S., 778; packing, 200, 776; raising, 777; sources of supply, 775, 776; tails, utilization of, 204
Cattlemen, organizations of, 773
Caviar, manufacture of, 802
"Celtic," steamer, the, 572
Cement, manufacture of, 668
Centralization in the United States, 15
Cereal crops of the United States, value, 6
Cereals, acreage devoted to, 712; consumed in 1900, 206; rolled, 207
Chalk-plate, the, 954
Champagne, manufacture of, 242; "sparkle" of, 242
Chef, hotel, the, pay of, 480; steamship, the, 589
Chemical, engineering. See Engineering; products, electro, 104; processes, improved, 339; industry, capital invested, 338; the, industry, 338; wages paid, 338
Chemicals, manufacture of, 339; match, consumption of, 487
Chemist in agriculture, 840; in the law courts, 840; training of a, 839
Chemistry as a profession, 838
Child labor. See Labor
Chimney climbing, 99; sweep's cancer, 1040
Chinese as farm hands, 701
Chocolate, and cocoa, 230; manufacture of, 199, 231
Choir singers, 990
Cholera, hog, loss due to, 907
Chorus, girl, the, 988; man, the, 989
Church, Catholic, the, 868; Jewish, the, 871
Churches, as employment agencies, 875; Catholic, number of, 876; Congregationalist, number, 876; Episcopal, number of, 876; Jewish, number of, 876; Lutheran, number of, 876; Methodist, number of, 876; Presbyterian, number of, 876
Cider, annual output of, 742
Cigar, boxes, annual value of, 488; makers, number of, 252; Makers' Union, 252; making centres, the, 249; making, wages paid in, 252, 253; Stores, United, 399; trades, the, 252
Cigarette, consumption of, 250; imports and exports, 248; machines, 250; making, centres of, 59, 246, 249; railway war on the, 542
Cigars, American, superiority of, 252; "Habana," of Florida, 248; imports and exports, 248; manufacture of, 246, 250; revenue tax on, 249; smoked in the United States, 1902, 245; value as a trade article, 252
Circus, bill-posters, 982; business, American, 980; "followers," 981; managers, 980; performers, 981
Citras fruits. See Fruit
Civil Service, 1015; classified, 1017; employment, 1017; examinations, 1016

Clams, annual yield, 804, 805
Clay, deposits of Missouri, 625; machines, output of, 334; products of, 333; workers, a field for, 333; working industry, the, 333
Chauffeur, the, 140
Check tabulating machine, 379
Cheese, "American," annual output, 767; annual exports of, 759, 764, 767; annual sales of, 759; factories, number in United States, 763, 767; fancy varieties of, 767; imports of, 759; manufacture, centres of, 767
Chicken farming. See Farming
Child labor. See Labor
Clearing Houses, 382, 383
Clergy, Catholic, the, 868
Clergymen. See Minister
Clerks, drug, duties of, 904; Government, women as, 474; hotel, requisites of, 480; in stores, 406
Climates favorable to industry, 11
Clock, and watch trade, the, 357; exports, 357; factories, output of, 357; industry, the, 354; making, centres of, 355, 357
Cloth, Angora goat, 784; hats and caps, 295; wire, yearly consumption of, 403
Clothes making, "factory" system, 285; "home" system, 286; "over," 289; "task" system, 286; "sweating" system, 285
Clothes mending as a trade, 289
Clothing, annual output of, 283; classification of, 284; designer, the, 284, 289; finishing, 284; industry, the, 283; industry, chief centre of the, 283; industry, specialization in, 284; industry, "task" system in, 283; industry, wages paid in the, 285; rubber, 618; trade, foreigners in the, 286; women's, 288; workers, nationalities of, 287
Cloths, cotton, manufacture of, 261
Coal, anthracite, mined, in 1901, 13, 627; bituminous, mined, in 1901, 627; burned by fleets of the world, 569; cost of mining, 636; exports in 1900, 626; fields, anthracite, conditions in, 633; handlers, dock, wages paid, 612; marketed, output in 1901, 626; miner, life of the, 628; miner, training of the, 630; mines, American, foreigners in, 630; mines, number of men employed, 619; miners' duties, laws as to, 619; miners, total number of, 628; output, value of, by States, 626; product of the United States, 6, 13, 616, 626; region, anthracite, annual wages, 636; strike, great, of 1902, 635, 636, 637; strikes of, 1897, 1900, and 1902, 632; tons, mined in 1902, 618; used in paper making, 159; yearly consumption in the United States, 629
Coal-tar colors, consumption of, 497
Coasting fleet, American, the, 572; vessels, crews of, 601
Cocoa, and chocolate, 230; butter, 231; "nibs," 231; products, 230; sources of supply, 230
Codfish, annual catch of, 804, 806
Coffee, annual consumption of, 401
Coin, gold, stock of, in United States, 654; silver, stock of, in United States, 654
Coinage, United States, value in 1901, 366
Coining, process of, 366, 369
Coins, gold and silver, 369
Coke, industry, the, 665; manufacture, process of, 665; ovens, improved, 665; where produced, 665, 666
Collar and cuff, industry, centre of, 301; operatives, Troy, 303; manufacture, 301, 302
College, men in journalism, 936; of Cardinals, the, 868; professors, earnings of, 915
Colleges, agricultural, 693, 704, 706; business, 39, 474; in the United States, 909; of Pharmacy, 903; of the Jesuits, 868; veterinary, 908
"Collier's Weekly," 179, 196, 947, 965
Color, presses, 178; printing in advertising, 449; printing, Ives process of, 167
Color photography, See Photography
"Columbia," the, 155
Combination, a great, how organized, 18; cotton seed oil, the, 269; cotton, the, 261, 263; glue, the, 496; industrial, greatest, 21; in cheese making, 767; lead, the, 647; linen thread, the, 300; match, the, 487; meat packers, the, 200; petroleum, the, 664; rubber, the, 25, 317; salt, the, 680, 681; steamship, the, 571; sugar refining, the, 221; tannery, the, 305; theatrical manager, 971; toy, the 493; wool, 271
Combinations, advantages of, 17; casket, 1043; gas, 118; glass, 321, 325; newspaper, 194; paint and oil, 340; railway, 511, 514; starch, 347; trade, effect of, 4
Commerce, foreign, of the United States, 9, 12; world's total, the, 12
Commercial Cable Company, the, 421
Commission, agent, the farmer and, 697; merchants, 464
Company stores, 31, 264, 620, 621; tenements at mines, 621
Composers, American, 983
Composing machines, 180, 183
Compositors, 165
Comptroller, of the Currency, the, 373; of the Treasury, the, 373
Comstock lode, silver product of, 625
Concert singer, the, 989
Conductors, car. See Railway; Railway, Order of, 555
Conduits, electrical, 113
Confectioners' Association, National, 229
Confectionery, manufacture of, 228
Consolidated Exchange, the, 392
Consular service, the, 998
Consulates, United States, number of, 998
Consuls, how appointed, 999; reports of, 1000; United States, pay of, 999
Consumers' League, the, 418
Consumption among workers, 1040
Continental Tobacco Company, the, 15
Converter, the Bessemer, 46
Conveyors, mechanical, 63
Convict labor, 311
Cookery, Schools of, 1038
Cooperage industry, the, 85
Coopers, hand, demand for, 86
Copper, electrolytic, 104; industry, the, 52; Lake Superior, output of, in 1901, 645; mines of Michigan, 645; mines of Montana, 645, 646, 647; mining industry, the, 645; output of, in 1902, 617; production, the world's, in 1900, 645; production, United States, in 1900, 52, 645; rolling of, 53; smelting and refining, 651, 652; sulphate from assaying, 367
Copyright Law, Federal, 968; on plays, 968, 969
Cordage and twine, annual output of, 500; industry, the, 499
Corn, broom, annual output of, 713; cannery, operations in a, 216; crop of United States, acreage of, 690, 712, 780; "gluten," 348; oil, 348; product of the United States, 6; starch, how made, 347, 348
Corporation counsel, 884
Correspondence schools, 57, 258, 537, 911
Correspondents, newspaper, 192, 193. See Newspaper; women as, 474
Cosmetics, manufacture of, 349
Costumer, stage, the, 969
Costumes, tailor-made, 289
Cotton, annual output of, 713; baled, annual output of, 268; baling, systems of, 268, 717; "belt," the, 713; cloth industry, profit in, 8; cost of raising, 714; crop, marketing the, 717; crop, the, 690, 713; crop, United States, acreage of, 690, 713; exports of the United States, 5, 6; fields, negro labor in, 714; gin, Whitney, the, 268; ginnery, annual output of, 268; ginnery, daily yield of, 268; ginning, process of, 268; goods, exports and imports, 262; handling, mechanical, 717;

how picked, 716; industry, centres of the, 261; industry, hands employed in, 261, 266, 267; industry, progress in, 264; manufacture, 254, 255; mill hands, status of, 264; mill machinery, 264; mills, child labor in, 266, 267; mills, division of labor in, 9; mills, earnings of, 262; mills, localization of, 10; mills, negro labor in, 267; mills, Northern, 261, 263; mills, Southern, 262, 264; mills, wages paid in, 260, 263, 264; picker, Mason, the, 717; planter, the, 715; production of the United States, 6; "sea island," output of, 714; tons, annually baled, 713, 714; trusts, 261; weaving, progress in, 265; yarns, manufacture of, 263
Cottonseed, annual output of, 713; fertilizer from, 503; oil, 269; products, 269
Counters, money, women as, 474; "quick-lunch," 485
Couplers, car, automatic, 134, 516, 517
Court, United States Supreme, 888
Cowboy, modern, the, 778
Cows, dairy, 760; in United States, number, 773
Crabs, annual catch of, 805
Cracker baking, electricity in, 125; bakery, a large, 211
Crackers, American, 198, 210
Crafts and arts, American, 949
Cranberry culture, acres devoted to, 743
Crane, travelling, electric, 61
Cream, annual sales of, 759; collecting of, 761, 765
Creameries, 760, 761, 763, 764; co-operative, 696
Credit man, the, 475
Crews, life-saving, 1024; of coasting vessels, 601; of Lake vessels, 602; of Mississippi River craft, 602; ship's, in the merchant marine, 591, 593
Crimp, the, or shipping agent, 600
"Crimping" system of merchant navies, 600
Cripple Creek, gold production, in 1901, 655
Crockery, manufacture, 335
Crookes tubes, 108
Crops, great, summary of the, 712
Cudbear, imports of, 497
Cuff manufacture, 301
Curb market, Wall Street, 393
Currency, Comptroller of the, 373; mutilated, redemption of, 372; notes, fibre paper for, 372
Currying leather, process of, 308
Curtains, lace, manufacture of, 262
Custom House service, the, 1026
Cutch, annual consumption of, 497
Cut-Flower Exchange, New York, 755
Cutlery, table, yearly value, 403
Cycles, motor, 145

D

Dairy, cows, 760; industry, the, 759; products, annual value, 759; waste, utilization of, 780
Dairying, syndicate system, 763
Dancer, earnings of the, 977; professional, the, 976; stage, training of the, 976
"Defender," the, 155
Dentist, American, the, 905
Dentistry, as a profession, 905; education in, 906
Department store system. See Store
Designer of costumes, the, 969
Designers, American, need of, 38; book-cover, 956; clothing, 284, 289; field of, 955; milling, 298; ring, wages paid to, 354
Detective, agencies, 1030; methods, modern, 1031; private, the, 1032; the, 1030; training of a, 1031
Diamond, a new use for the, 352; cleaving machine, 352; cutters, 352; districts of United States, 670; fields of South Africa, the, 669
Diamonds, famous, 669; how mined, 669; rough, imports of, 670
Diffusion process, beet sugar, the, 226
Diplomatic service, the, 996
Diplomats, how appointed, 998; pay of, 997
Directories, publication of, 186
Distilleries, liquor, 238; turpentine, 495
Divers, dangers run by, 609, 611; deep-sea, 608; day's work of, 608; equipment and methods of, 609; submarine, 608; varied duties of, 610
Diving, bell, the, 610; suit, modern, the, 609
Dock laborers' organization, 611
Doll manufacture, 493
Domestic service. See Servants
Dough mixing, mechanical, 213
Drama, American, the, 968
Dramatic schools, 925, 971
Dramatists, American, the, 968; Club, American, 968; women, 969
Dressmakers, wages paid to, 289
Dressmaking establishments, 289
Drills, pneumatic, 62
Drug clerks, duties of, 904
Druggists, 903
Drummers. See Travellers, Commercial
Drygoods trade, centre of the, 400; wholesale, the, 400
Dust diseases, the, 1040
Dyeing and finishing fabrics, 256; changeable effect in, 256; hands employed in, 256; improvements in, 256; mordants used in, 256, 257; textiles, 256
Dyers, liquid, output of, in 1900, 311
Dyestuffs, annual output of, 497; manufacture of, 496, 497
Dynamite, manufacture of, 344
Dynamo, modern, the, 115
Dynamos, alternating current, 109; and electric motors, difference, 110; direct current, output of, 109; great, of Niagara plant, 110; horsepower used by railways, 498; in United States, lamp capacity of, 109; manufacture of, 109

E

Eating houses, United States, number of, 484
Ebonite, how made, 319
Editor, Sunday, the, 941
Editors, newspaper, salary of, 192. See Newspaper; women, 935
Education, agricultural, 704, 706; art, in United States, 957; business, 37, 39; board of, work of a, 910; by mail, 57, 258, 537, 911; dental, 906; industrial, 37; medical, 896; musical, in United States, 984; of navigators, 590; of railway men, 537; of the veterinarian, 908; textile, in United States, 257
Eels, annual catch of, 805
Egg trade, the, 770
Eggs, annual consumption of, 770; and poultry products, annual value, 759; industrial use of, 770
Electric, accumulators, 110; automobiles, 139, 497; cables, insulated, 112; cab service, New York, 498; conduits, 113; headlight, the, 133; heat, how produced, 125; heaters, domestic, 125; heating, 124; lamp bulbs, 107, 108; lamp, Nernst, the, 109; lamp sockets, manufacture of, 108; lamps, arc, 103; lamps, incandescent, 107, 108; lamps, surgical, 108; light companies, Edison, 117; light plants, number of, 117; light plants, private, 117; lighting, 97, 103, 116; lights, incandescent, 107; locomotives, 131; motors, 61, 103, 110, 115, 122, 497, 498; power, 60, 122, 123; railway plants, 105, 500; railways, foreign, 105; railways, mileage of, 498; railways, street. See also Railway; seal fur, 294; supply industry, 116; tanning, 308; typewriters, 76, 77; welding, 125
Electrical, apparatus, manufacture of, 105; devices, patents on, 104; engineering. See Engineering; industries, the, 103; inventors. See Inventors; photography, 966; trades, the, 114
Electrician, requisites of the, 114
Electricity, capital invested in, 114; future applications of, 114; in the chemical industries, 339; in hat making, 125; in medicine, 895; in shipbuilding, 105; present importance of,

104; vs. gas, 119; vs. horse and cable power, 560
Electrolysis in metallurgy, 104
Electro-therapeutics, 895
Electrotyping, 168, 189
Elevator, Washington monument, 91
Elevators, 90; brewery, 236; grain, 198, 208, 209; shaft walls of, 89
Emerald mines of the United States, 670, 671
Employers, labor unions and, 28; liability laws for, 35; responsibilities of, 32, 35
Employes, railway, qualifying as, 540, 541, 542; A. Carnegie's, 36; club organizations of, 34; colliery, pay of, 634; cotton mill, 264, 266, 267; factory, 8; farm machine mills, 72; females, exercise for, 33; furniture factory, 87; hotel, number of, 476, 479; hotel, skilled labor for, 481; housing of, 263, 264; improved condition of, 32; machine shop, 67; match factory, 487; Metropolitan Street Railway, 566; of trusts, the, 23; print works, risks run by, 341; railway, accidents to, 516; railway, discharge methods, 547, 548; railway, earnings of, 539; railway, labor hours of, 549; railway, reprimands of, 546; railway, street. See Railway; railway, wages of, 539, 540; retail store, 406; Schwab's views on, 24; soap factory, 350; United States mint, 368; women, of the Government, 474
Employment agencies, 1040
Engine, steam, Thurston on the, 63
Engineer, civil, the, 821; electrical, qualifying as a, 833; mechanical, qualifying as, 830; mining, qualifying as a, 827; training of an, 818
Engineering as a profession, 815; chemical, 841; chemical, training for, 843; classification of, 817; conditions of success, 819; electrical, 833; gas, 832; marine, 836; mechanical, 828; mechanical, schools, 830; mining, 826; municipal, 825; railroad, 822; sanitary, 826; schools, 818; specialization in, 818; steam, 831; structural, 824; telephone, 836
Engineers, achievements of, 816; as business men, 820; colliery, pay of, 634; dock, wages paid, 612; earnings of, 820; electrical, training of, 835; institutes of, 821; Locomotive, Brotherhood of, 553; locomotive, instruction of, 538; steamer, pay of, 598
Engines, gas, 63, 121; steam, 63; steam, automobile, 138; steam, logging, 83
Engraving, and Printing, Bureau United States, 370; halftone, process of, 167; photo, process, 167; "process," 169
Entertainment bureaus, 979
Etching, line, how made, 954; zinc, 168
Exchange, Cut-Flower, the, 755; Fruit, California, 697
Exchanges, milk, 761; wool, 783; stock, mining, 625; New York, the, 391, 392
Explorers, work of, 856
Explosives, high, how made, 344; manufacture of, 342, 344
Exporter, manufacturer, the, as an, 13
Exports, agricultural, 690; apple, 749; barbed wire, 403; bicycle, 144; biscuit, 211; book, 187; candy, 228; canned goods, 215; carpet, 276; carriages, in 1900, 143; cheese, 759; cigar and cigarette, 248; clock, 357; coal, in 1900, 626; condensed milk, 14, 759; cotton goods, 262; cottonseed oil, 269; cracker, 211; flour, 209; fruit, 742; fur, 291; glass, in 1900, 322; ice, 606; kerosene, 663; lock and hinge, 403; loom, 265; perfumery, 349; petroleum, 663; pickle and sauce, 217; sewing machine, 74; shoe, 311; shoe machine, 310; table ware, 330; tobacco, 248, 722; of the United States, 4, 5, 6, 9, 13, 14; of the world, the, 12; pocket knife, 403; watch, 357; wheat and cotton, 5; wool, 781
Express, agents, 613; companies, force employed by the, 613; companies of the United States, 613; companies, miles covered by, 614; Company, American, 614; company methods, 613; money-order system, the, 614; service, the, 612; train, modern, the, 615
Expressmen, wages paid to, 614

F

Factory, tenements at Holyoke, 300; workers, dexterous, 9; employes, 8
Faience, Feroza, 335; Rookwood, 336
Farm, "bonanza," management of a, 737, 738; food products, exports in 1900, 731; great, labor on a, 740; hands, Chinese and negro, 701; hands, classes of, 702; hands, earnings of, 702, 703; hands, prosperity of, 701; implements industry, 71; implements, value of, 694; labor, 700; lands of Oklahoma, 788; live stock, value of, 694; machinery mills, employes of, 72; machines, yearly output of, 72; machine, hands, training of, 740; products, total value of, 694; properties, total value of, 694; wheat, great, conduct of, 736
Farmer, and commission agent, 697; dependence of, on machinery, 732; modern, the, 692; status of the, 691
Farmers, as tenants, 699; home study for, 709; organization among, 696, 697; reading courses for, 709; sugar-beet, number of, 719; tobacco, number of, 719; truck, 756
Farming. See also Agriculture; a business enterprise, 695; centres of United States, 693; chicken, 768, 769; cost of, reduced by machinery, 733; flower. See Flower Industry; Government aid to, 693, 706, 707; lands, total acreage of, 694; machine, 730; machine, results of, 734; specialization in, 692; "syndicate," 694, 695, 696; truck, 756, 757
Farms, abandoned, 795; and crops, mortgages on, 698; classes of operators of, 694, 699; general statistics of, 693; Pacific coast, machinery on, 735; peanut, 753; value of, increased by machinery, 731; Western, machinery on, 735
Federal, Copyright Law, 968; Steel Company, the, 22
Felt, applications of, 275; hats, how made, 296; how made, 296; industry, output of, 275
Fertilizer, from abattoir waste, 503; from fish scrap, 503; from garbage reduction, 503; from cottonseed waste, 503; from phosphate rock, 503; from spent bone black, 503; limestone as, 625
Fertilizers, annual output of, 502; as a by-product, 204, 502, 503; manufacture of, 502
Fever, Texas, loss due to, 907
Fibre, paper for greenbacks, 372; soda, how made, 160; sulphite, how made, 161; wood, in paper making, 158
Fibres, textile, imports of, in 1902, 13; textile, the, 254
Filaments, lamp, how made, 107
File industry, the hands employed in, 403
Financial, status, at beginning of 1903, 365; system, divisions of the, 364
"Finland," the, 151
Fire, alarm telegraph, the, 424; arms, manufacture of, 77; how rifled, 78; boats, New York City, 581; box, locomotive, Wootten, the, 129; Department, New York, 1033; insurance. See Insurance
Fireman, promotion of the, 1034; qualifications of a, 1033; the, 1032; training of a, 1034
Firemen, and stokers, ship, 586; colliery, pay of, 634; Locomotive, Brotherhood of, 554; locomotive, instruction of, 538; steamer, pay of, 597
Fireproof, buildings, 89; building materials, 89
Fires, United States, losses by, 1032
Fireworks, manufacture of, 345
Fish, as food, preparation of, 801; canneries, 217, 218, 219;

Commission, United States, 799; scrap, fertilizer from, 503; traps, construction of, 219
Fisheries, Department, employment in, 800; of inland waters, 807; of Middle Atlantic States, 804; of the Great Lakes, 806, 807; of the Pacific States, 805; of Gulf States, 805; Miscellaneous, 814; New England, statistics, 803; South Atlantic States, 805; vessels employed in, 800
Fishery, lobster, the, 810; marine, tonnage of the, 800; mussel, the, 809; pearl, 610, 807; products, annual value, 801; products, preservation of, 802; salmon, 805, 806; sponge, 811; whale, 803, 806, 813; oyster, 803, 804, 805, 806, 811
Fishing, industry, extent of, 800; properties, capital invested, 800; industries, the, 798; resources of America, 798
Flagpole, repairing a, 98
Flannels, production of, 273
"Flash," in journalism, 940
Flax, crop, acreage of the, 713; imports for thread industry, 300; production of the United States, 300; products, 499
Fleet, canal, the, 578; coasting, American, the, 572; fruit steamer, the, 744; merchant, of the United States, 570; merchant, English, crews of, 591; Mississippi River, the, 577; New York Harbor, 580; of the Great Lakes, the, 570, 573; of yachts, the, 579; tugboats, the, 581
Fleets, Atlantic and Pacific, 571; merchant, of the world, 569
Floor, arches, tile, 89; walker, requisites of a, 407
Floriculture, 753, 754, 755
Florists, American Society of, 755; census of, 754; exchanges, 755
Flour, mill industry, the, 206; milling processes, 207; mills, large, output of, 208; mill, the modern, 206
Flower, culture, acres devoted to, 753; culture, specialization in, 754; industry, centres of the, 753; industry, value of products, 753; trade, retail, 755; trade, extent of, in New York, 754
Flowers, cut, trade, 754
Folding machines, auto, feed, 169
Food, Marine. See Fishing Industry; preservation of, 199, 214; products, farm, exports in 1900, 731; sea, canned, 217; products, 198; staples, tropical, imports of, 13; supply of ocean steamers, 588, 589; supply of a great hotel, 479
Foods, cereal, crushed, 207; cereal, rolled, 207; perishable, expressing, 615
Footwear, for horses, 402; manufacture of, 209; rubber, 318, 319, 320
Foresters', assistants, positions for, 858; positions for, 858
Forestry, Bureau of, the, 857, 859; profession of, 857; work, preparation for, 858
Forging, gun, 48; iron and steel, 68
Foundations, "skyscrapers," 93; "raft footing," 93; deep, how sunk, 101; bridge, 101
Founding, type, 179
Foundry, products, special, 71; work, 68
Fountains, soda-water, 243
Franklinite iron ore, 79
Freight, handlers, dock, wages paid to, 612; railway, annually carried, 508
Fruit, auction sales of, 745; California, 746, 747; canneries, 215, 216; citrus, 742; classification of, 742; crop, acreage of, 712; dried, annual output, 742; Exchange, California, 697; exports in 1902, 742; imports in 1902, 742; industry, the, 741; market, New York, the, 744; orchards, product of, 742; preservation, 743; pushcart men, 745; small, acreage devoted to, 742; steamers, construction of, 744; transportation, 743, 744
"Fudge," or "stop press" bulletin, 940
Fuel, natural gas s, 666, 668; oil, for locomotives, 133, 662
Funerals, daily number in United States, 1043
Fur, bearing animals, rare, 293; companies of Canada, the, 293; dealers and jobbers, 291; different varieties of, 294; "electric seal," 294; ermine, 294; factory, processes employed in, 290; fairs of Europe, 291; fox, blue and black, 294; imports and exports of, 294; industry, the, 290; industry, annual output of, 290; industry, branches of the, 291; industry, hands employed in, 290; industry, wages paid in, 290; in hat making, 295; market, London the chief, 294; most expensive, the, 294; sable, American, 294; sable, Russian, 294; seal, the, 291; sea-otter, value of, 294; skunk, 294; trade, chief centre of, 291
Furnaces, glass, improved, 321; manufacture of, 124
Furnishings, men's, 301
Furniture, factory employes, 87; industry, the, 86; market, greatest, the, 87; plush, American, 282
Fustic, annual consumption of, 497

G

Games, manufacture of, 492
Gardening, market, 756
Garnets, mining of, 670
Gas, carbonic, manufacture of, 244; coal, industry, the, 118; consumption, annual, in United States, 118; engine, the, 64, 121; engineering. See Engineering; fitter, the, 95, 96; fitting supplies, 93; gasoline, 139; house trick, the, 940; industry, capital invested in, 118; industry, development of the, 119; motors, efficiency of, 65; motor, Otto, the, 64; natural, consumed in 1900, 667; natural, industry, 666; natural, industry, Kansas, 667; oil, 118; plants of the United States, number, 119; power, 121; prices of, average, 119; storage of, Pintsch system, 134; stores, introduction of, 119; trusts, the, 118; vs. electricity, 119; water, industry, the, 119
Geissler tube, the, 108
Gelatine, blasting, 344; from waste material, 204
Gems, precious, of the United States, 670, 671
General Electric Company, the, 116
Generators, electric, 122; steam, 63
Gin, cotton, Whitney, the, 269
Gin, manufacture of, 238
Ginghams, American, 262
Ginnery, cotton, daily output of, 268
Ginning, cotton, 267, 717
Glass, annealing of, 327; art, 329; blowing, 323, 325; bottles and jars, how made, 331, 332; casting and rolling, 322; "cathedral," 329; colored and stained, 329; cutting, 323; exports in 1900, 322; furnaces, improved, 321; imports in 1900, 322; industry, centres of the, 321, 322; jars, machines for making, 323; La Forge and Tiffany, 329; lamps, yearly output of, 333; lime vs. lead, 329; machinery, 328, 330; making, cooperation in, 326; plate industry, wages paid in, 328; industry, the, 321; plate, how made, 327; plate, yearly output of, 328; plate, polishing, 328; pressing, 323; table ware, exports of, 330; tubes, manufacture of, 326; trades, foreigners in the, 324; trusts, 321, 325; ware, blown, 330, 331; ware, cut, output of, in 1900, 331; ware, Favrille, 329; ware, molded, 329, 331; ware, pressed and blown, 329, 330; working, method of, 322, 323; window, making, 323, 325, 326; window, yearly output of, 325; wire-strengthened, 329
Glove, industry, centres of the, 315; industry, hands employed in, 315; industry, leather used in, 316; industry, the, 315; industry, wages paid in, 315; making machines, 317
Gloves, how made, 316
Glower, Nernst, the, 109
Glucose, in candy making, 239; or grape sugar, 226; manufacture of, 318

Glue, from waste material, 204; manufacture, capital invested in, 496; trust, the, 496
Gluten, corn, 348
Glycerine from waste products, 204
Goat, Angora, hair, industry, 782, 784; raising, 784; skin, applications of, 306, 313
Gold, Cape Nome, output in 1900, 656; and silver output of United States, 653; and silver, world's production of, 653; coin, stock of, in United States, 654; coins, how minted, 369; deceptive weight of, 367; how assayed, 367; industrial use in United States in 1900, 654; industrial use, world's, in 1900, 654; mine prospectors, 660; miners, Klondike, wages of, 656; miners, Western, wages of, 654; mining, hydraulic, 659; mining in Cripple Creek, 655; mining in Rocky Mountain States, 654; mining in the Klondike, 656; mining, river, 658; output of, in 1902, 617; output of United States in 1900, 653; pen manufacture. See Pen; smith, art of the, 351; sweepings, mint, value of, 368; United States imports of, 654; world's production of, in 1900, 653
Government officers, salaries of, 996
Grain, elevators, 209; speculation in, 398; scoopers, wages paid to, 612; trimmers, wages paid to, 612
Gramophone, the, 111
Granite, cutters, labor conditions of, 678, 679; Cutters' National Union, 678; cutters, number of, 678; cutters, wages paid to, 678; output of, in 1902, 674; quarries, 676
Grape, baskets, manufacture of, 240, 750; Catawba, the, 238; crop, acreage of the, 712; culture of, 239, 240; culture, California, acres devoted to, 749; district, Chautauqua, 750; industry, the, 749; juice, shipments of, 750; pickers, wages paid to, 750; sugar, or glucose, 229; trade, profits of the, 750
Graphite, artificial, 104; pencil, where mined, 492
Graphophone, the, 111
Graphotype, the Goodson, 166, 183
Grazing business, the, 774
Great Lakes, carrying trade of the, 574
Greenbacks, manufacture of, 370
Greenhouse establishments, 753, 754
Grist mill industry, the, 206
Grocery, trade, aggregate sales of, 401; trade, centre of the, 400; trade, wholesale, the, 400
Guano, 503
Guitars, annual output of, 358
Gum, asphaltum. See Asphalt; drops, cheap, how made, 229
Gun, forgings, 48; powder, black, output of, 343; powder, blasting, 343; powder, composition of, 343; powder, how made, 343; powder industry, the, 342; powder, prismatic, 343; powder, smokeless, 343; projectiles, 49
Guns, heavy, how made, 49; how rifled, 78; manufacture of, 77

H

Haddock, annual catch of, 804
Hair, Angora goat, industry, 782, 784; waste, utilization of, 204
Half-tone plates, how made, 167, 171, 954; tone, printing, 179
Halibut, annual catch of, 804
Hammer, pneumatic, 62; 250-ton, a, 43
Harbor, New York, craft of, 580
Hardware, trade, the branches of, 402, 403; builders', industry, the, 403; trade, the centres of, 402; trade, wholesale, the, 402
Harness, and saddlery, 314; making, capital invested in, 315; making, centre of, 315; making, hands employed in, 315; trimmings, rubber, 318
Harvesting Works, McCormick, the, 73
Hat, beaver, the old, 297; industry, the, 295; industry, centre of the, 295; machines, 296
Hats, cloth, 295; "derby," 296; felt, how made, 296; straw, American, 295; silk, how made, 297; "soft," 295; women's, 298; wool, 295
Hay crop, United States, acreage of, 690
Headlight, electric, 133
Headwear, manufacture of, 295
Hearse, remarkable, a, 1043
Heat, electric, how produced, 125
Heaters, car, electric, 125; coffee, electric, 125; electric, domestic, 125; electric, in the industries, 125; electric, output of, in 1900, 125
Heating, apparatus, 97, 116, 123, 124; electric, 124; gas, 119
Hemp, products of, the, 499
Herring, annual imports of, 802; annual catch of, 804, 805, 806
Hides, how prepared, 306; varieties of, 306
Hod carrier, mechanical, 92
Hoe industry, hands employed in, 403
Hog, breeders' associations, 774; cholera, loss from, 907; raising, 780
Hogs, daily slaughter of, 200; curing and packing, 200; how slaughtered, 202; number in the United States, 780
"Hogs," sand, or caisson workers, 100, 102
Hoisters, dock, wages paid, 612
"Home" system of clothes making, 286
Homestead, entries, 786; laws, the, 786
Homesteaders, 785
Honey, industry, the, 771; output in 1899, 772
Hoofs, cattle, utilization of, 204, 489
Hop, crop, marketing the, 727; crop, the, 726; culture, acres employed in, 726; culture, leading States in, 726; hands, wages paid to, 727; picking, 726, 727; substitutes, 237
Hops, annual production of, 726; curing of, 727; exports of, 727; used by brewers in 1900, 727
Horse breeders' associations, 774; jockey, the, 982; raising, 779; shoes, aluminium, 54; trainers, wages of, 982
Horses, United States, census of, 773, 777
Horticulture, business of, annual extent, 753
Hose, rubber, 318
Hosiery, industry, the, 254; manufacture of, 298
Hospital, marine, service, 1025; marine, United States, 604; relief, railway. See Railway
Hospitals, service, the, 897
Hotel, business, the, 476; cafes, 484; cashier, the, 480; clerks, qualifications of, 480; chef, duties of the, 480; chef, salary of, 480; employes, skilled labor, 481; employes at the front, 479; employes, number of, 476; great, capital invested in, 479; great, staff of a, 479; great, supplies consumed, 479; head waiter, tne, 484; help, pay of, 482; housekeeper, duties of, 481; management, 477, 478; manager, the, 479; modern, vs. the old inn, 478; modern, the, conduct of, 478; proprietor, the, 478; restaurant, the, 484; statistics, 476; steward, duty and pay of, 480; tipping system, 482; waiters, earnings of, 482; waiters, nationality of, 482
Hotels, capital invested in, 476; of the sea, the, 587; resort, 483; "that pass as such," 477; travellers' in the United States, 477; United States, number of, 476
Housekeepers, schools for, 1038
Hudson's Bay Fur Company, 293
Hydraulic, gold mining, 659; "monitor" or "giant," the, 659, 660

I

Ice, artificial, 687, 688; artificial, cost of, 687; artificial, refrigerator, 205; business, capital invested in the, 686; business, men employed in, 686; harvesting regions, the, 686; industry, the, 686; machines, patents on, 687; natural, annual consumption, 687; natural, exports of, 686; trade, zones of the, 687
Idaho, public lands in, 789
Illustrating, "half-tone," 167, 171, 954; "line-cut," 171; mechanical side, 953; processes of, 167, 168, 171

Illustrations, advertisement, 955
Illustrators, 952
Immigration, effect on United States industries, 55, 87, 95, 252, 260, 283, 285, 286, 316, 324, 353, 630
Imports, clock, 357; cotton goods, 262; dyestuffs, 497; fruit, 742; fur, 291; glass, in 1900, 322; gold, 654; of German toys, 492; of the world, 12; of tropical products, 13; of woollen goods, 274; perfumery, 349; silk, raw, 279; United States, in 1902, 13; watch, 357; wool, annual, 272; worsted, in 1900, 274
Incubator and its work, 769
Indigo, annual consumption of, 497; imports, 497
Industrial, betterment, 32, 33, 73, 341; combinations, 15; education, 37; insurance. See Insurance
"Industrials," capitalization of, total, 16
Industries, effect of climate on, 11; localization of, 10
Insulation in electricity, 112
Insulators, porcelain, 337
Insurance, accident, 31; accident, railway, 557; agents, earnings of, 442; agents, women as, 443; business, the, 439; commercial travellers', 462; companies, losses of, 444, 446; compulsory, for miners, 654; co-operative, 444; fire, 444; fire, agents, 446, 447; fire, methods in, 447; fire, expenses in, 447; fire, profits in, 445; fire, taxes on, 447; industrial, 439, 441; in labor unions, 31; life, 439, 440; life, agents, 440, 441; life, field workers, 440; life, in United States, January, 1903, 439; life, of women, 443; life, statistics, 439, 440; marine, 444, 448; marine, "Lloyds," 448; miscellaneous, 444; inland navigation, 444; ordinary, agents, 439, 442; policies, "valued," 445; transportation, 444
International, Paper Company, 157, 161; Telegraph Bureau, 419; Typographical Union, 164, 166
Invention, how to market an, 853; how to protect an, 852
Inventors, achievements of, 847; Americans as, 845; electrical, 105, 848; opportunities for, 849; reward of, 849; training of, 846
Iodine, test for starch, the, 229
"Iowa," the, 153
Iridium for pen nibs, 492
Iron, age, the, 638; anthracite, 45; bituminous, 45; briquettes, 642; casting, molding for, 68; galvanized, 56; industry, the, 43; miner, life of the, 643; mines, labor conditions in, 643; mining industry, 638; mining, methods of, 640; mining region, Lake Superior, 643; ore, Franklinite, 79; ore mining, force engaged in, 643; ore production, 639; ore reduction, machinery in, 642; ore reduction, "magnetic" process, 640; pig, classification of, 45; pig, industry, growth of, 13; pig, manufacture of, 44, 45, 46; pig, output in 1900, 46, 47; pig, output in 1901, 13; pig, output in 1902, 618; plates, tinned, 51; producing States, the, 639; pyrolignite, consumption of, 497; ships, building of, 150; workers, 44, 54
Irrigation, increase of farms by, 792; land, by corporations, 793; problem, summary of the, 795
Ivory, button manufacture, 489; nuts, industrial use of, 489

J

Jack, black-jack, or rosin-jack. See Zinc Ore
Jackie, the, 1013
Jars, glass, manufacture of, 323, 331
Jewelry, American vs. foreign, 351; manufacture of, 351
Jewish church and clergy, 871
Jews, as policemen, 1028; as tailors, 287; in the United States, number, 871
Jockey, the, 982
Journalism. See also Newspaper; as a profession, 928; college men in, 936; daily, growth of, 191; education in, 930; monthly, 947; new, the, 929; profession of, 928; weekly, 946; women in, 934; "yellow," 934
Journals, technical, 197; trade, 197, 453; weekly, pictorial, 195
Judges, salaries of, 888
Judiciary, the, 888
Jute, goods, 499; products of, 499

K

"Kearsarge," the, 153
"Kentucky," the, 152, 154
Kerosene, exports of, 663
Kick-machine, the, 145
Kid leather, glazed, vs. French, 304
Kindergarten work, 912
Klondike, gold mining in the, 656
Knife industry, hands employed in, 403
Knights of Labor, 27
Knit goods industry, the, 298
Knitting, machine needles, 494; machines, automatic, 298; industry, hands employed in, 298; industry, centres of, 298; stocking, process of, 298
Knives, pocket, exports of, 403; pocket, manufacture of, 403
"Kroonland," the, 151

L

Labels, union, use of, 283
Labor, agents, 1041; Bureaus, State, 1041; cheap, oversupply of, 285; child, in clothing industry, 283; child, in cotton mills, 266, 267; child, in mines, 622, 623; child, in the shoe industry, 310; child, in petroleum refining, 664; child, in silk mills, 280; child, on sugar beet farms, 719; child, in the wool industry, 270; child, in watch factories, 355; child, prohibition of, 260; Chinese, on farms, 701; Chinese, on steamers, 859; conditions, review of, 26; conditions in paint factories, 341; convict, 311; cost of, in building, 91; farm. See Farm; Federation, American, 26, 27; hours on farms, 701; hours on the water, 599; hours, railway, 549; hours, the law as to, 205, 260; Knights of, 27; negro, in cotton mills, 267; organizations, railway. See Railway; skilled, in hotels, 481; Sunday, on railways, 550; negro, in cotton fields, 714, 715, 716; negro, on farms, 701; negro, on Mississippi, 602; organizations, 26, 32; status in thread mills, 300; troubles, the cause of, 30; unions and employers, 28; unions, membership of, 26; unions, Schwab on, 28
Laborers in mid-air, 98
Lace, curtains, manufacture of, 262; goods industry, the, 298; makers, complaints of, 1040
Lager beer industry, the, 233
Lake, Carriers' Association, 576; Superior iron mining region, 643; vessels, crews of, 602
"Lamb," Wall Street, the, 387
Lamp, chimneys, how made, 332; chimneys, output in 1900, 331; electric, Nernst, 109; filaments, how made, 107; sockets, manufacture of, 108
Lamps, electric, 106, 107, 108; glass, yearly output of, 333
Land Office, United States, drawings, 786
Lands, irrigated, colonies in, 794; public, in Idaho, 789; public, in Missouri, 788; public, in Oklahoma, 787; public, of United States, 785; public, in Oregon, 791; public, in New Mexico, 791; public, irrigation of, 791, 782, 793, 794; public, in Washington, 790; unappropriated, acreage, 1902, 785
Landsman, the, 1013
Lard, handling, in Chicago, 4
Lathe, the geometric, 371
Lathes, improved, 61
Laundering, 303
Law, as to bank capital, 374; as to coal miners' work, 634; as to coal miners' duties, 619; as to sale of matches, 487; child employment, 407, 622; Copyright, Federal, 968; home study of, 886; labor-hours, 205, 260; office study of, 885; office, the, 881; practice, conditions of, 878; practice, civil court, 883; practice, criminal court, 883; profession of, the, 878; safety appliance, the, 517; sailors' contract, 597; schools, 884;

school graduates, 885; the specialist in, 880; union label, 31
Laws, as to button making, 765; for the control of yachts, 580; homestead, 786; navigation, provisions of, 147, 572; patent, defects in, 339, 851; railway labor-hour, 549; to protect apprentices, 40, 41; to protect employes, 35; to protect metal polishers, 57; to protect sailors, 596
Lawyers, "ambulance chaser," 882; corporation, 884; fees of, 884; women as, 886, 887
Lead, combination, the, 647; Company, National, the, 647; industry, hands employed in 1902, 647; metallic, product in 1902, 647; mining industry, the, 647; of the market, sources of, 647; output of, in 1902, 618; pencils. See Pencil; smelting and refining, 651, 652; "soft," 647; United States, product in 1900, 648; white, manufacture of, 341; white, yearly output of, 341; world's production of, in 1900, 648
Leather, blacking, process of, 309; chemical tanning of, 304; chrome-tanned, 306, 308, 309; "Cordovan," 306; "Curacoa," 306; different varieties of, 305; enamelled, 309; factories, new methods in, 305; horsehide, 306; how curried, 308; how finished, 309; how pebbled, 308; gloves, manufacture of, 315; goat, varieties of, 306; imports of, 311; industry, the, 304; kangaroo, 306, 313; "patent," 309; russet, 306; skins used for, 304, 306; sole, manufacture of, 307; Tampico, 306
Lecturers, 979
Lehr, glass-annealing, 327
Lenses, telephotographic, 966
Letter carriers, 1018, 1020
Librarians, 927; degrees for, 927; salaries of, 927; schools for, 927
Libraries, circulating, 927; of the United States, 926; travelling, 926
Life insurance. See Insurance; saving by firemen, 1034; saving crews, 1024; Saving Service, the, 604, 1022; saving station keepers, 1023
Light, apparatus, 116; house keepers, 1021; house service, the, 1021
Lighting, electric, 97, 103, 106, 107, 116; the United States coasts, cost, 604
Lights, electric, incandescent, 107
Lime, bone phosphate of, 503; stone, output, 1902, value of, 674; stone, quarrying of, 674
Line-cut illustrations, 171
Linen, goods, 499; industry, hands employed in, 300; manufacture, 255, 299; thread, 300; thread combination, the, 300
Lingerie, manufacture of, 288
Linotype machine, the, 165, 180
Linseed, oil industry, the, 340; oil, yearly output of, 341
Liquor, distilled, industry, the, 237, 238; industry, the, 232; malt, industry, 233
Liquors, and beverages, 232; excise taxes on, 237
Lisle thread, how made, 299
Literature, "hacks" in, 916, 919; profession of, the, 916
Lithographic, color printing, 168; presses, 172
Lithography, aluminium in, 168, 173
Live, stock in the United States, 773; stock. See also Stock Yards; stock markets, principal, 776; stock production, areas of, 775
Lloyds, origin of, 448
Loan and building companies, 384, 385
Lobster, fishery, 810; annual catch of the, 804, 810
Locks, door, exports of, 403; time, for safes, 79
Locomotive, boilers, 132; compound, the, 129, 130; compressed air, the, 131; construction, 131; different types of the, 128; engineer, the, 527, 528, 538; Engineers, Brotherhood of, 553; exports, 14, 128; firemen, 527; Firemen, Brotherhood of, 554; firemen, instruction of, 538; freight, cost of a, 127; industry, the, 126; life of a, 127; manufacture, 127; plants of United States, capacity, 127; railway, inventor of, 508; output in 1901, 127; up-to-date, the, 128; Vauclain, the, 127; weight of a, 132; works, Baldwin, 127
Locomotives, American, exports of, 507; electric, 131; hauling capacity of, 129; oil fuel for, 133; railway, of the United States, 508
Lodging houses, 483
Loggers, operations of, 83, 84
Logging, camps, 81; engines, steam, 83
Logwood, annual consumption of, 497; extracts, imports of, 497; imports, 497
Longshoremen, 611; Association of the, 611; on the Great Lakes, 612
Loom, fixers, school for, 258; improvements in the, 265, 280, 281; Northrop, the, 259, 265; ribbon, the, 281; silk velvet ribbon, 280
Looms, silk, American, 280, 281; carpet, power, 276; foreign, demand for, 265
Lumber, business, promotion in the, 482; cutting, method of, 81, 82, 83, 84; Handlers' Union, 611; industry, the, 80; loaders, dock, wages paid, 612; piano, 360; telegraph pole, 103
Lumbermen, Eastern, 83; wages paid to, 83; Western, 82
Lunch rooms, quick, 484
Luncheons, clubs of New York, the, 485; gratuitous, for clerks, 485
Lyceum bureaus, 979

M

Machine, addressing, the, 8; book rounding, the, 170; book stitching, the, 169; brick, the, 59; check tabulating, 379; farming. See Farming; knit goods, 254; match the, 59; paint-spraying, 62; paper folding, 169; pin, the, 8; political, the, 994; ring-spindle, the, 259; shop, effect of unions on, 66; shop, employes, 67; shop practice, 60, 66; shop products, 71; trades, the training for, 66; type-casting, 166; vs. hand work, 58
Machinery, agricultural, 71, 731; binding, 164, 169; book, fast, 189; cordage, 500; cotton mill, 264; farm, 72; in the building trades, 92; iron ore reduction, 642; metal working, 60; silk, American, 279; spinning, new, 259; steel and iron works, 43; tin can, 499; trade, the, 58
Machines, boot and shoe, 309, 312; button, 489, 490; carpet, American, 276; carriage building, 142; cigarette, 250; cloth cutting, 284; composing, 180; glass, 328, 330; glass jar, 323; glove-making, 317; hat, 296; knitting, 298; labor-saving, 8; organ, 363; pin, 494; rice, 724; sewing, 73, 75; shoe, exports of, 310; silk-throwing, 280; talking, 111; textile, vs. handwork, 259; typesetting, 59, 165, 180, 183, 184; typewriting, 75, 76; watch making, 354, 356
Mackerel, annual catch of, 804
Mackintoshes, yearly output of, 318
Madder, imports of, 497
Magazine, advertising, 453; articles, 921; buyers, number of, 453; illustrators, 953; making a, 948; monthly, the, 947
Magazines, circulation of, 196; ten-cent, 193
Magistrates, salaries of, 888
Mail, delivery, automobile, 140; order business, the, 503
"Maine," the, 152
Malt, how prepared, 236; liquor industry, the, 233; substitutes for, 237
Management, private estate, 469
Managers, advertising, demand for, 456; apartment house, 467; circus, 980; general, railway, see Railway; hotel, see Hotel; office buildings, 467, 468; plantation, wages of, 702; stage, 969; theatrical, 969, 971, 973
Mandolins, annual output of, 358
Man-of-war's men, 1011
Mantels, ready made, 85
Mantle, Welsbach, the, 118, 119

Manufacturer, the, 3, 6; the, as an exporter, 5; profits of the, 8; starting as a, 6; United States, feats of the, 4
Manufacturers' National Association, 5
Manufactures, United States, exports of, 9; United States a leader in, 6; United States, sold in 1902, 5; United States, value per capita, 9
Manufacturing, average profits of, 8; plant, the, 7; United States, hands employed, 6
Maple, sugar consumed in 1901, 227; sugar manufacture of, 228
Marble, artificial, how made, 502; deposits, where found, 675; monuments, 679; output in 1902, value, 674; quarries, 675, 677
Marbles, playing, manufacture of, 337
Marine, Corps, the, 1014; engineering. See Engineering; hospital service, 1025
Market, gardening, 756; men, 757; place, American, 758
Masts, export of, 83
Match, boxes, machine-made, 487; industry, hands employed in, 486; industry, lumber consumed in, 486; trust, the, 487
Matches, boxing, 9; daily consumption, 486; manufacture of, 59, 487; safety and parlor, 487
Mates, ship's, pay of, 598
Mats, rubber, 318
Matting, Chinese, imports of, 276
Meat, American, exports of, 5; cutters and butchers, 205; inspection, official, 203; packing industry, the, 198, 199, 200; preserving, Appert process, 205; transportation of, 204
Medicine, beginner in, 898; education in, 896; general practitioner in, 892; practice of, conditions, 890; practice of, specialists, 891
Medicines from by-products, 204
Melodeon, the, 363
Menhaden, annual catch of, 805
Merchant, fleets of the world, 569; fleet of the United States, 570; marine, crews of the, 591, 593; marine, officers of the, 595; steamers, aggregate value of, 569; steamers, yearly earnings of, 569
Merchants, commission, 464; of the United States, 399; young, advice to, 404
Mergers, railway, 511
Merit system, the, 35, 681
Messenger call, district, the, 424
Metal, building framework, 89; button manufacture, 489; forging, 68; industries, the, 42; polishers, earnings of, 124; polishers, work of, 57; polishers, law to protect, 57; sheet, structural, 56; sheet, trades, the, 56; workers, 54; working machinery, 60
Metallurgy, as a profession, 857; electrolysis in, 104
Metals, precious, process of extraction, 657
Mica, mining, 668; sheet, selling prices of, 668
Military duty, men liable to, 1006
Militiamen, 1006
Milk, annual sales of, 759; condensed, annual, output of, 762; condensed, exports of, 14, 759; condensed, how made, 763; condensed, industry, 762; consumption of, in New York, 761; exchanges, 761; inspection, 761; Producers' Union, the, 697; separator, centrifugal, 765; skimming stations, 763; trade, the, 760, 761; transportation of, 761
Milkman, the, 761
Millinery, annual output of, 298; capital invested in, 298; designers, 298; hands engaged in, 298; industry, the, 297; industry, wages paid in, 298; teachers of, 297
Milling, flour, cereals used in, in 1900, 206; flour, process of, 207; flour, industry, the, 206; flour, roller system of, 206
Mine, superintendents, 620; Workers, United of America, 632
Mineral water, industry, the, 243
Minerals, annual product, value of, 616; United States, value of, 6
Miners, American, 619; anthracite, pay of, 633; coal, life of, 628; coal, training of, 630; coal, total number of, 628; coal, United States, total number, 619; gold, Colorado, wages of, 654; iron, life of, 643; iron, United States, total number of, 619; Klondike, wages of, 656
Mines, accidents in, 623; coal, foreigners in, 630; company store system at, 620, 621; company tenements at, 621; copper, Lake Superior region, 645; copper, of Michigan, 645; child labor in, 622, 623; copper, of Montana, 645, 646; gold, "salting," 661; iron, labor conditions in, 643; of the United States, the, 616; ore, Western, labor conditions at, 650; United States, number of persons employed, 6, 619
Miniature painting, 951
"Minimum scale," the, 29
Mining, copper, 645; diamond, 669; exchange, largest, the, 625; gold, hydraulic, 659; gold, in Rocky Mountain States, 654; gold, in Cripple Creek, 655; gold, in the Klondike, 656; engineering. See Engineering; in America, 6; in America, conditions of, 619; industries, profits in, 624; iron, methods of, 640; iron ore, force engaged in, 643; lead, industry, 647; mica, 668; placer, methods of, 657, 658, 659; river, 658; schools, 828; silver, in Rocky Mountain States, 654; zinc, 648; zinc, novel features of, 649; zinc ore, cost of, 649, 650
Minister, qualifying as a, 863
Ministers, salary of, 865; number of, 864
Ministry as a profession, 862
Mints, United States, employes of, 368; United States, operations at, 366
Missionaries, 872; achievements of, 872; as printers, 874; medical, 874; salary of, 875
Missionary, work, 872, 873; work, candidates for, 874
Mississippi River, craft, crews of, 602; river fleet, 577; traffic statistics, 577
Missouri, public lands of, 788
Mittens, manufacture of, 315
Models, artists', 966; professional, life of, 967
Mohair industry, the, 782
Molasses, annual output of, 718; beet, use of, 227; centrifugal, 227; sugar consumed in, 1901, 227
Molding for iron casting, 68
Money, "countess" of the Treasury, the, 474; mutilated, counting, 372; order system, express, 614; paper, United States, manufacture of, 370
Monoline, Scudder, the, 166, 182
Monotype, Lanston, the, 166, 182
Monument, dealer, success of, the, 680; industry, wages paid, 679
Monuments, marble, 679; value of the, output of, 679
Moquette, manufacture of, 276, 277
Mordants and mordanting, 256, 257
Mortars, steel, 50
Mortgages on farms and crops, 698
Motorman, electric car, the, 563; promotion of the, 565; training of the, 564
Motors, automobile, 139, 497; electric, 61, 103, 110, 115, 122, 498; gas, 64, 65, 121; steam, 63; street car, 122, 498
Mowers, automobile, 140
Mullets, annual catch of, 805
Museum, of Art, Detroit, 957; of Fine Arts, Boston, 957
Music, boxes, manufacture of, 358; church, 990; education in, 984
Musical instruments, manufacture of, 357
Musicians, American, 983; band, 992; earnings of, 984; orchestra, pay, 992; student, abroad, 984
Mussel fishery, the, 490, 809
Mussels, pearl, 490, 808
Mutton, production of, 781; sheep, distribution of, 781

N

Nail mills of United States, output, 402
Nails, horseshoe, hands em-

ployed on, 402; manufacture of, 59
National, Academy of Design, 958; Association of Manufacturers, 5; Glass Company, the, 321; Guard, the, 1006; Lead Company, the, 647; Linseed Oil Company, the, 340; Live Stock Association, 7.3; Salt Company, the, 680, 681; Starch Manufacturing Company, 347
Naval, Academy, the, 1009; apprentices, training of, 1012
Navigation, canal, 578; Great Lake, 573, 574; laws, 147, 572; Mississippi River, 577
Navigator, education of the, 590
Navy, active list of the, 1008; enlisted force of, 1010; of Great Britain, 591; personnel of the, 1007; promotions in, 1013; ships of the, 1008; United States, the, 1007; yards, United States, 150
Needles, cutting the eye of, 9; how made, 494, 495; knitting machine, 494; sewing machine, 494
Negroes, as farm hands, 701; in labor unions, 27; labor in the cotton field, 714, 715; labor on Mississippi, 602
New Mexico, public lands of, 791
Newspaper, advertisements, 192, 449; "ad." department of, 454; bureau, Washington, 933; cartoonists, pay o 192; circulation of a, 193, 946; combinations, 194; correspondents, 192, 931, 932, 933; country, the, 941; daily, on shipboard, 589; daily, growth of the, 191; daily, staff of, 936; editors, salaries of, 192, 936; editors, 935, 936, 941; evening, the, 193, 939, 940; fraternity, the, 928; illustration, 952; making of a, 937; men, daily work of, 937, 938; office, day's work in, 937; office, night work, 938; "patent insides," the, 194, 453; photographers, 965; pictorial, the, 195; presses. See Press; publishing, 190; reporters, 929, 930, 931; reports, "pony," 945; running expenses of a, 192; space rates, 935; Sunday, the, 192, 941; syndicates, 193; trains, Sunday, 455; weekly, the, 196, 946; woman, the, 934, 935; work, subdivision of, 939
Newspapers, co-operative, 194, 453; daily printed in New York, 455; hourly output of, 192; profit and loss on, 191
Niagara Falls power plant, 123
Nickel deposits of North Carolina, 625
Nitroglycerine, how made, 344; output of, in 1900, 344
Northern Securities Company, the, 514
Novelists, 920
Novels, dramatization of, 969
Nurseries, annual product of, 753; palm, Jamaica, 753; plant, of United States, 753
Nurses, American, trained, number, 901
Nursing, as a profession, 901; profession, training for, 902
Nut, industry, the, 752, 753; orchards, profit on, 752

O

Oak bark, yellow, consumption of, 497
Oat crop, United States, acreage of, 690, 712
Oats, rolled, 207
Occupations, dangerous, 1039
Officeholders, salaries of, 996, 999; Federal, salaries of, 996; holding under fee system, 996; political, securing a, 994
Officer, Navy, duties of a, 1007
Officers, Army, training of, 1002; Consular, pay of, 999; Custom House, 1026; Marine Corps, 1014; Naval, training of, 1010; Quarantine, 1025; revenue cutter, 1024
Oil, cake, corn, 348; corn, 348; cottonseed, exports of, 269; cottonseed, application of, 269; cottonseed, yearly output of, 269; fuel for locomotives, 133, 662; gas, manufacture of, 118; linseed, industry, 340, 341; of tar, 495; refinery by-products, 842
Oklahoma, public lands in, 787
Oleomargarine, annual output, 766; how made, 766
Omnibuses, electric motors for, 497
Onion crop, annual, 755
Opals, imports of, 670; popularity of, 353
Opera, comic, writing of a, 989; mode of protecting, 968; rehearsals, 987, 988; staging an, 987
Orchard fruits. See Fruit
Orchestra, musicians, pay of, 992; the, 991
Ore, iron, Franklinite, 79; steamers, Great Lake, the, 575; unloader, automatic, the, 576; trimmers, wages paid to, 612; mine, Western, labor conditions at a, 650; zinc, or "jack," 649
Oregon, public lands in, 791
Ores consumed in 1900, 45
Organ, industry, the, 362, 363; pipe, the, 362; reed, the, 362, 363
Organette, the, 363
Organization, business, importance of, 404, 478
Organzine, spinning, 280
Otter, sea, the, 293, 806, 814
Ovens, coke, improved, 665
Oyster, canning, 11, 220; fishery, the, 803, 804, 805, 806, 811

P

Packing, hog and cattle, 200; house, the, 200, 201; house butchers, 205; machines, tobacco, 251; meat, 198, 199
Paint, and oil trusts, 340; and varnish trade, 341; factories, number of, 341; industry, wages paid in, 340; spraying machine, 62; works, employes of, 341
Painters, American, 950; earnings of, 950; miniature, 951; portrait, 951; scene, 969, 977
Paints, colored, yearly output of, 341; mixed, output of, in 1900, 341
Paper, applications of, 156; banknote, manufacture of, 370; book and magazine, 160; Company, International, 25; cutting machines, improved, 169; fibre for currency, 372; for newspapers, 156, 159; industry, the, 156; mills of the United States, 157; machine, Fourdrinier, 158; manufacture, process of, 158; money, manufacture of, 370; note and bond, 371; trust, the, 157; United States currency, counting, 372; used in book work, 189; wood-pulp, 157, 188
Papers, technical, 197; trade, automobile, 140; trade, 197, 453; See Newspapers; weekly, illustrated, 195
Paraffine used in match industry, 486
Parlor, cars, 135, 510, 522, 531; matches. See Match
Passenger, agents. See Railway; fares, railway, average, 522; service, Atlantic and Pacific, 571; traffic, railway, 508
Patent, how to sell a, 852; "insides," newspapers, 194, 453; laws, defects in, the, 339, 851; leather, 309; Office, personnel of, 851; system, the, 851
Patents, annually issued, 845; button machine, 490; on carriage devices, 143; on condensed milk, 763; on electric inventions, 105; on refrigerating processes, 687
Patrons of Husbandry, the, 697
Pattern, makers, 69; Makers' League, the, 70
Pavement, artificial stone for, 501; asphalt, 671
Pavements and roads, 500
Paving, industry, the, hands employed in, 500; material, annual output of, 500
Pawnbrokers, the, 1042
Peanut, crop, acreage devoted to, 753; farms, yield to the acre, 753; farmers, number of, 753; region, great, the, 753
Pearl, button industry, 490; divers, 610; fishery, 610, 807; fresh-water, 490; mother-of, 490; ocean, 490
Pearls, annual yield of, 809
Pecan, culture of the, 752
Pedagogy, School of, New York, 912; science of, modern, 913
Pelts. See "Fur"
Pelzer, private town of, 263
Pencils, lead, how made, 492
Pen, fountain, the, 492; indus-

try, the, 490, 491; stylographic, the, 492
Pens, annual consumption of, 490; gold, how made, 491, 492; steel, how made, 491
Pension, fund, seamens', 586; relief, railway. See Railway
Perfumery, industry, the, 349; exports and imports of, 349
Periodicals, publication of, 190
Petroleum, combination, the, 664; crude, how measured, 664; exports of, in 1900, 663; fuel for locomotives, 662; industry, the, 662, 663; output of, in 1902, 618; pipe lines, 662; production, 616, 663; refined, output in 1900, 663; refining, hands engaged in, 664; Texas and California, 618; vs. coal as fuel, 133; wells, United States, 6
Pharmacists, 903
Pharmacy, colleges of, 903
Philippine service, the, 1015
Phonograph, the, 111
Phosphorus, disease caused by, 487
Photo-engraving, process of, 164
Photographers, earnings of, 964; newspaper, the, 962, 965; studio, 962, 963
Photographic studio, the, 964
Photography, as a profession, 962; color, 966; electrical, 966; retouching in, 964; schools of, 963; training in, 964
Physical culture for workers, 33
Physician, country, the, 893; in court, the, 894; in public life, 894; the, as business man, 893. See also Medicine; woman as a, 899; young, trials of, 898
Physicians, organization among, 900; young, mistakes of, 897
Piano, accessories, manufacture, 358; attachments, 362; case industry, centre of, 357; how made, 360, 361; industry, 357, 359; player, pneumatic, 362; renting, 360
Pickles, manufacture of, 217
Pike, annual catch of, 807
Pilot, boat "New York," the, 606; boats, mode of operating, 606, 607; Commissioners, Board of, 605; power and fees of the, 607
Pilot at sea, the, 606
Pilotage, charge for, 607
Pin, industry, centre of the, 493; machines, 494
Pins, how made, 494
Pilots' Club, the, 605
Pilots, organization of, 605
Pipe, lines, natural gas, length of, 667; lines, petroleum, 17, 662; making, industry, the, 246
Pisciculture, 799, 800
Pitch, brewers' and common, 495, 496; "glance," 672; "lake," 673; lake of Trinidad, the, 672, 673; "land," 673
Placer, meaning of the word, 657; mining, methods of, 657
Planes, exports of, 14
Planing mill products, 84
Planter, rice. See Rice; tobacco. See Tobacco
Plate, aluminium, 54; armor, 50; glass, how made, 327; terne, 50; tin, 50; tin, coke and charcoal, 52
Plates, roofing, 51; steel, tinned, 51
Play, making of a, 968; mode of protecting a, 968; writers, female, 969
Players' Club, the, 972
Plays, copyright on, 968, 969
Plows, hand and steam, 71
Plumber, licensed, the, 96; trade of the, 95
Plumbers' and Fitters' Association, 98
Plumbing establishments, 93
Plush, Angora goat hair, 784; furniture, 282; manufacture of, 282; seal, 282; velvet, 282
Poetry as a paying art, 920
"Point," in printing, 180
Police, bicycle, 1029; boats, New York City, 581; force, New York, 1027; mounted, 1029
Policeman, the, 1027
Polishers, glass, disease of, 1040; metal, earnings of, 124; metal, law to protect, 57; metal, work of, 57
Polishing, glass, 328
Political "machine," the, 994
Politics, as a business, 994; as a profession, 993
Porcelain, insulators, 337; production of, 337
Portrait painters, 951
Posing for artists, 966, 967
Positions, Civil Service, 1015, 1016
Postal, routes, "star," 1020; service, the, 1018; service, railway, 1020; system, organization of, 1019
Postmasters and postmen, 1019
Post Office, Department, the, 1018; Department, Auditor of, 365; United States, number of, 1019
Potato, crop, United States, acreage of, 690, 712, 755; sweet, annual crop, 755
Pottery, centres, the, 336; China, 335, decoration, American, 336, 337; Feroza faience, 335; how made, 337; modern, 336; products, 335; Rookwood, 336; table and sanitary, 336
Poultry industry, the, 768
Powder, blasting, 343; industry. See Gunpowder; smokeless, 343, 344; tooth, 349
Power, apparatus, 116; compressed air, 62; electric, 122, 123; gas, 121; motive, appliances, 63; plant, Niagara Falls, 123; pneumatic, 61; steam, 120; transmission, electric, 123; used in manufactures, 119, 120; water, 11, 121
Preacher, qualifying as a, 863
Preserves, manufacture of, 217
Press, art, rotary, 178; Associated, the, 194; associations, 942; Association, American, 194; building, 171; gangs, the, 599; lithographic, the, 172; printing, perfecting, the, 172, 177, 178; printing, duodecuple, 176; printing, Hoe, 172, 173, 174, 177, 178; printing, octuple, 175; platen or job, 171; printing, quadruple, 174; printing, sextuple, 174; technical, the, 197
Presses, printing, color, 178; printing, cylinder, 172; printing, the "American's," 174; printing, 171, 172, 173, 174, 176, 177, 178; printing, weekly paper, 176
Priesthood, training for the, 868
Prima Donna, qualifying as, 986
Priming-caps, how made, 346
Printing, and Engraving, Bureau, United States, 370; art in, 162; color, in advertising, 449; "equality scale" in, 165; half-tone work, 179; illustrations, 164; in colors, 167, 168, 171; industry, the, 162; machine, a great, 176; Office, Government, the, 165; offices, job, 162, 164; office, steamship, the, 589; offices, women in, 165; papers, co-operative plan, 194; plant, cost of a, 164; plates, half-tone, 167, 171; plates, line-cut, 171; plates, zinc etched, 168; presses. See Press; trades, the, 164
Prisms, Laxifer, 329
Process work, 164, 167, 954
Produce, Exchange, the, 392; Exchange bucket shops, 396; speculation, 398
Professors, college. See College
Projectiles, steel, 49
Promoters, profits of, 19
Proprietor, hotel, the. See Hotel
Prune, industry, the, 751; orchards of California, 751
Prunes, how prepared, 752
Publicity and business progress, 449
Publisher, the, 185; as an educator, 186; and author, relations of, 188, 917
Publishers', Association, Newspaper, 193; co-operative, 925
Publishing, book, in United States, 185, 187; industry, the, 185; newspaper, 190; of periodicals, 190
Pullman, cars, 135, 510; town of, the, 136
Pulp, chemical, 161; wood, 156, 160, 161
Pulpit, influence of the, 862
Pulpits, vacant, number of, 865
Punch-cutter, type, Benton, 166
Pupils, number in the United States, 909
Pursers, ship, duties of, 587
Pursuits, dangerous, 1039
Pushcart men. See Fruit
Putty, annual output of, 341

Q

Quarantine service, the, 1025
Quarries, American, capital in-

vested in, 674; granite, 676; marble, 675, 677; marble, employes of, 676; State, 676; United States, production of, 674
Quarrying, industry, the, 672; operations of, 677
Quarrymen, at work, 677; total number of, 674
Quick-lunch rooms, 484
Quicksilver product in 1902, 618

R

Radiators, steam vs. stoves, 123; steam, manufacture of, 123
Raft-footing, 93
Railroading as an occupation, 535
Rails, steel, exports of, 14
Railway, accidents, 516; apprentices, 550; baggage charges, 522; Belmont, the, 514; benefit and pension departments, 557; brakemen, 529, 530; Brotherhoods, 553, 554, 555, 556, 557; business departments of a, 518; capitalization, value of, 16; car ferry boats, 574, 581; combinations, 511, 514; companies of United States, number, 509; conductors, 531, 536; department of Y. M. C. A., 559; discipline, Brown system of, 545; electric, motorman, 563; employes, accidents to, 516; employes, education of, 537; employes, wages of, 539, 540; employes, number of, 508; employe, qualifying as a, 540, 541; employes, discharge methods, 547, 548; employes, reprimands of, 546; engineering. See Engineering; fares, passenger, 522; general passenger agent, 521; general manager of a, 520, 536; general superintendent of a, 522; labor organizations, 552, 553, 554, 555, 556, 557, 558, 559; locomotive engineers, 528, 536; manager, requisites of a, 521; men, earnings of, 538, 539; men, labor hours of, 549; men, training of, 537; mergers, recent, 511; mileage of the United States, 509, 512; mileage of the world, 509; Morgan, the, 513; operating department of a, 522; pension relief, 558; plants, electric, 105, 560; postal service. See Postal service; president, the, 519; relief departments, 558; rolling stock of United States, 508; savings fund, the, 558; service, discipline in the, 544; service, improvements in, 509; service, opportunities in, 536; service, promotion in the, 542, 543, 544; service, telegraphic, 426; signals, systems of, 523; statistics, 508; street, electric, first, 560; street, employes, opportunities, 560; street, management of a, 562; Street, Metropolitan, 562, 566, 567, 568; street, New York, employes, 566; system, Gould-Rockefeller, 513; system, Harriman, the, 513; system, Morgan-Hill, the, 513; system, Pennsylvania, 513; system, organization of a, 518; system, Vanderbilt, the, 512; time-table, how made, 533; trackwalker, the, 549, 551; traffic department of a, 521; traffic, extent of, 126; train, braking a, 532; train despatcher of, 523, 524, 525; train, modern, the, 126; transcontinental, the, 13; transportation, 507
Railways, aggregate value of, 509; American, passenger service of, 522; annual receipts of, 508; community of interests, 515; electric, foreign, 105; electric, in the United States, 560; electric, statistics, 498; electric, mileage of, 498; freight traffic of, 508; of the United States, 6, 13, 507; passenger traffic of, 508; separate lines of, 514; street, 560; street, capital invested in, 498; street, electric motors for, 498; subsidized, 511; Sunday work on, 550; total capital, 509
Raisin industry, the, 750, 751
Raspberry culture, acreage devoted to, 743
Real, estate agents, 465; estate agents, women as, 466; Estate Board of Brokers, 467; estate brokers, 466
Refrigeration, mechanical, 688; processes, patents on, 687
Refrigerator car system, 205, 687, 743, 744
Rehearsals, theatrical, 987, 988
Reporters. See Newspapers
Resin, industrial uses of, 496; industry, by-products of, 495; industry, the, 495
Restaurant, business, the, 476, 484; hotel, the, 484
Restaurants, department store, 485; midnight, 485; number of, in the United States, 484; quick lunch, the, 484
Revenue, cutter cadets, 1024; cutter service, the, 1024
Rheostat, the, 125
Ribbon, manufacture of, 280
Rice, annual output of, 723; cost of raising, 723; crop, the, 722; crop, acreage devoted to, 722; culture, lowland, 724; culture, upland, 725; fields, use of machinery in, 724; harvesting and marketing, 725; how cultivated, 724; mills, centres of, 725; planter, the, 723; region, greatest, the, 723; varieties of, the, 723; yield of, 723
Rifle, bullets, how cast, 347; cartridges, how made, 346; plant, a New Haven, 77
Rifles, manufacture of, 77
Rifling firearms, 78
Ring, designers, wages paid to, 354; spinning machine, the, 259
Rings, finger, manufacture of, 352, 353; children's, demand for, 353; machine-made, 353; settings, styles of, 353, 354
River, and harbor improvements, 604; gold mining, 658
Riveting by machine, 92
Roads, and pavements, 500; bad, loss through, 500; wagons, cost of transportation in, 501
Rolls, crushing, 207
Roofing plates, 51
Rope, machinery, 500; making industry, 499
Roses, annual output of, 754
Roustabout, the, 603, 716
Rubber, annual consumption of, 317; balls and stamps, 318; belting, 318; clothing, 318; Company, United States, 317; crude, the, supply of, 320; ebonite, 319; erasers, 318; footwear, 317, 318, 319; Goods Manufacturing Co., 317; goods, mechanical, 318; Goodyear, treatment of, 317, 319; goods, manufacture of, 318; hard, goods, 318; horse coverings, 318; hose, 318; how vulcanized, 318; industry, the, 317, 318; insulated wire, 318; in the harness trade, 318; mackintoshes, 318; producing trees, 319; tires, annual value of, 318; trees, cultivation of, 320; trusts, 25, 317; waste, renovation of, 320; whence derived, 319, 320
Rugs, American, output 1900, 277; floor, manufacture of, 276
Rum, manufacture of, 238
Rye crop, United States, acreage of, 690

S

Saddlery and harness, 314
Safe deposit business, the, 504
Safes, American, export of, 79; manufacture of, 79; time-lock for, 79
Safety-appliance law, the, 517
Sailor's Snug Harbor, the, 604
"St. Louis" and "St. Paul," the, 147, 151, 572, 584, 586, 595, 599
Salaries of officeholders, 996, 999
alesmen, American, abroad, 462; travelling, number of, 458
Saleswomen, retail, 406, 407, 417; wages paid to, 408
Salmon, fishery, the, 805, 806; canning of, 199, 218; how caught, 219
Salt, annual output of, 683, 684; combination, the, 680, 681; deposits, where found, 682; industrial uses of, 680; industry, the, 680; industry, units of measure in, 683; in silver mining, 684; manufacture, processes of, 683, 684, 685; reservation, New York, 684; sources of supply of, 683
Salting gold mines, 661
Salvation Army, work of the, 876
"Sand-hogs," or caisson workers, 102
Sandstone, cutters, disease of, 1039; quarried in 1902, 674
Sapphire mines of the United States, 670, 671

Sapphires, Georgia, 625
Sardines, canning of, 199, 218, 219
Sauces, manufacture of, 217
Savings, banks. See "Banks"; fund, railway. See Railway
Saw, mills in Maine, 85; mill products, 84
Saws, manufacture of, 403
School, Auchmuty, the, 38; books, sale of, 187; brewers', New York, 235; building-trade, 94; carriage, technical, 142; loom fixers', 258; night, Cooper Union, 38; night, Y. M. C. A., 38; of Design, Cincinnati, 957; of Design, Mass., 258; of Design for Women, 957; of Fine Arts, St. Louis, 957; ships, German and American, 595; Textile, Philadelphia, 257; training, for deck officers, 595; training, for motormen, 564; training, United States, 1011; Williamson, 38
Schools, agricultural, 706; art, American, 957; business, 37, 39; correspondence, 57, 258, 537, 911; dental, 906; dramatic, 971, 975; engineering, 818; for advertisement writers, 456; for iron founders, 38; for librarians, 927; for servants, 1038; for window trimmers, 406; in the United States, 909; law, 884; manual training, 37, 67, 94; mechanical engineering, 830; mining, 828; night, for weavers, 258; of photography, 963; Sunday, 867; system, public, 909; technical, graduates of, 37; textile, American, 38, 257, 258; theological, 865; trade, graduates of, 94
Schooner "Eleanor A. Percy," 154
Schooners, coasting, large, 154, 573
Science, domestic, instruction in, 1037
Scientists in government employ, 860
Scissors and shears industry, 403
Sculptors, American, 951
Sea, faring, discomforts of, 592; faring men, average, 593; faring men, creature comforts of, 596; faring men, life of, 594; faring men, wages paid to, 596; food, canned, 217
Seal, "electric," of furriers, 294; fur, breeding grounds of the, 291; fur, the, how caught, 291, 806; plush, 282; restrictions on the capture of, 292; skins, exports of, 292
Seaman, able, pay of the, 598; American, bill of fare of, 597; creature comforts of the, 596; the, 590; training of a, 1012; method of employing a, 599
Seamen's, institutions, 603; Union of the Pacific, 594; unions, 603
Seed, crop, the, 728; Distribution, Congressional, 728; how tested, 728; trade, wholesale, the, 401
Selling, art of, the, 408
Seltzer water, manufacture of, 244
Servants, domestic, 1035; general conditions, 1036; instruction of, 1037; schools for, 1038; wages of, 1036; women, 1035
Service, domestic, disadvantages of, 1037
Sewing, machines, exports of, 74; machine industry, the, 73; machine needles, 494; machine, shoe, 314; machine, Singer's, 75
Shawl fabrics, output of, in 1900, 274
Sheep, breeders' associations, 774; in United States, number, 773, 780; mutton, distribution of, 781; packing, 200; raising, 780; skin, applications of, 306; States, principal, the, 780
Sherries and ports, domestic, 239
Ship, battle, building a, 152; building industry, the, 146; building in navy yards, 149; building, labor in cost of, 149; building in private yards, 148; building, iron and steel, 150; building on the Lakes, 149; building plants, American, 148; modern, of the Great Lakes, 574; of war, preparation of, 1007; propulsion, turbine, 64; sailing, the largest, 154; steam, building a, 151; sunken, how raised, 610; wooden, building, 155; wooden, "George W. Wells," 154
Shipping, tonnage tax on, 604
Ships, American, tonnage of, 1901, 147; cable-laying, 430; foreign and American, conditions on, 597; of the Navy, 1008; sailing, 154; training, United States, 1007, 1010, 1012
Shipyard, Cramps', 148
Shirt, manufacture, 301; waist factory, "model," 288
Shirts, machine-made, 302
Shoddy, consumption of, 273, 781
Shoe, and boot industry, the, 309; factories and machines, 312; factories, total number of, 310; machinery, exports of, 310; machines, 309; manufacture, process of, 312, 313
Shoes, American, exports of, 311; and boots, rubber, 317, 319; prison-made, 311; ready-made, variety of, 310
Shoppers, women, how to treat, 408
Sidewalks, artificial stone for, 501
Signal, system, "block." See Railway; system, torpedo. See Railway
Silk, culture in the United States, 255; designs, weaving, 282; hats, how made, 297; industry, the, 255, 278; industry, United States, father of, 278; looms, American, 280; machinery, American, 279; mills, hands employed in, 279, 280; mills, output of, in 1900, 278; product of France and United States, 279; raw, greatest market for, 279; raw, where produced, 279; raw, imports of, in 1900, 279; ribbon, how made, 280; spinning, 280; velvets, 282; weaving, 280
Silver, and gold, output of United States, 653; and gold, world's output, 653; coins, how minted, 369; coin. stock of, in United States, 654; how assayed, 367; mining in Rocky Mountain States, 654; output of, in 1902, 617; product of Comstock lode, 625; plated ware, 352; prints, how made, 955; smith, art of the, 351
Singer, choir, the, 990; in concert, the, 989; in opera, the, 986; pay of the, 985
Singing as a profession, 985
Skins. See Fur and Leather
'Skyscrapers," 89
Slate, goods, manufacture of, 677; marbleized, 677; roofing, annual output of, 677; quarries, 676; quarried in 1902, 674
Slaughtering industry, the, 199, 776
Slaughter pen, by-products of, 203
Smelting, capital invested in, 651, 652
Snuff, consumption of, in 1902, 246; manufacture of, 250, 251
Soap, and candle industry, 349, 350; from waste material, 204; imports and exports of, 350
Society of American Artists, the, 958
Soda, fibre, how made, 160; water fountain industry, 243; water, manufacture of, 243
Soldier, private, the, 1004; training of the, 1005
Solicitors, business house, 463
Soloists, salaries of, 990
Song writers, 990
Sorghum cane, annual product, 718; crop, acreage of, 718; sirop, manufacture, 718; sugar, 227
Specialists, trained, salaries of, 25
Speculation, produce, 398; stock, 396
Spelter, production of, 53; home consumption of, in 1900, 648
Spindle, Rabbeth, the, 8
Spindles, cotton, improved, 265
Spinners, wages paid to, 259, 266
Spinning, machine, ring, the, 259; machinery, cotton, 264; organzine, 280; silk, 280
Spirits, distilled, consumption of, 238
'Spoils system," the, 995
Sponge fishery, 811
Stage, manager, the, 969, 971, 973; professional jealousy on, 988; scene painters, 977; suc-

cess, conditions of, 972; training for the, 975
Staging an opera, 987
Stamps, postage, paper used for, 371
Standard Oil Company, the, 15, 664
Starch, corn and wheat, 347; corn, how made, 347, 348; factory, by-products of, 348; glucose, 348; industry, the, 347; iodine test for, 229; pearl, 348; potato, 347, 349; trusts, 347
Star, postal routes, 1020; routes, letting of, 1021
Statistics, industrial, 15
Staves and heading, barrel, 85, 86
Steamboats, Mississippi, tonnage of, 577; boilers, 63; engines, 63; engine, automobile, 138; engines, logging, 83; engine, Thurston on the, 63; engineering. See Engineering; fitter, the, 97; radiators, manufacture, 123; radiator vs. stoves, 123
Steamer, cargo, modern, value of, 611; the tank, 18
Steamers, fruit, construction of, 744; Great Lake, crews of, 602; merchant, aggregate value of, 569; ocean, hands employed on, 571; ore, how unloaded, 575, 576; "whale-back," 574, 575
Steamship, captain, the, 585; great, building a, 151; line, organization of a, 582; ocean, cargo of an, 584; ocean, life on an, 587, 588; ocean, navigating department, 585; ocean, steward's department, 588; ocean, as a hotel, 587; operations when in port, 583; trust, the, 571
Steam turbine, 63
Steel, acid process, 48; basic process, 48; Bessemer, 46, 47; bridges; construction of, 99; cars, manufacture of, 135; Company, Federal, 22; Corporation, United States, 21; frames for buildings, 90; gun forgings, 48; industry, the, 13, 43; molten, shipment of, 4; open-hearth, 47; pen manufacture. See Pen; production of, 13; production of United States Steel Corporation, 22; projectiles, manufacture of, 49; rails, exports of, 14; rails for trolley lines, 104; ships, building of, 150; structural, 90; tempering of, 69; trust, the, 22; varieties of, 46; workers, 44, 54
Stenographers, 470; as bookkeepers, 473; court, salary of, 472; earnings of, 470; law, 473; railroad-office, 472; Women, Association of, 472
Stereotyping, 166, 168
Stevedores, 611
Steward, hotel, the, 480; ship, the, 588
Stitching-machines, book, 169
Stock, brokers. See Broker; companies, United States, 446; Exchange, the, how conducted, 391; exchanges, mining, 625; raising industry, 773; raising States, the, 776; speculation, 396; ticker, the, 424; yard, the, 201
Stocking knitting, process of, 298
Stocks, buying and selling, 388, 389; buying on a margin, 387, 389, 395
Stokers, and firemen, ship, 586; Chinese, 598; mechanical, 63; steamer, pay of, 5
Stone, artificial, how made, 501; carving, mechanical, 92; cutters, diseases of, 1039; masons, dangerous tasks, 99; masons, wages paid to, 93; monuments, 679; precious, industry, 670; quarrying of, 674
Storage, batteries, 110, 111, 139, 497; cold, 204, 743; cold, warehouses, 743
Store keeping, success in, 403
Stores, Company, 31, 264, 620; department, advertising of, 415, 450, 452; department, behind the scenes, 413; department, comforts in, 415, 416; department, conduct of, 411; department, credit given in, 414; department, delivery system of, 413; department, economics of, 409; department, employes of, 415; department, general conditions, 414; department, lunch room of, 416, 485; department, personnel of, 412; department, salaries paid in, 411, 412, 413, 415; department, sales of, 411; department, social life in, 410, 416, 417; retail, employes of, 406, 408; Wanamaker, success of, 35
Stories, short, market for, the, 923; short, writing of, 921; qualifying as a writer of, 922
Stove, associations, 123; industry, the, 123, 124
Stoves, electric, 124; gas, vs. coal, 119
Strawberry crop, acreage devoted to, 742
Straw, hats, American, 295; matting, imports of, 276
Street, cars, 133; railways. See Railway
Strike, coal, great, of 1902, 635, 636, 637; labor, New Orleans, the, 27
Strikes, coal, of 1897, 1901 and 1902, 632; labor, cause of, 29, 32
Sturgeon, annual catch of, 807
Suction table, the, 252, 253
Suez Canal, tolls yearly collected by, 569
Sugar, barley, 230; beet. See Beet; beet, 199, 224; beet, consumed in 1901, 227; beet, factory, the, 225; beet, output of, in 1899, 227; burned, 230; cane, acreage devoted to, 718; cane, annual output of, 718; cane, consumed in 1901, 227; cane, culture of, 221; cane, manufacture of, 222; cube, 224; grape, or glucose, 229; how granulated, 224; how refined, 221, 222; imports, in 1901, 227; industry, the, 199; inverted, 229; loaf, how made, 224; maple, consumed in 1901, 227; maple, manufacture of, 228; molasses, 227; of milk, 767; raw, whence imported, 221; refinery, the largest, 221; sirop, annual output of, 718; sorghum, 227; statistics, 227; string, 227; trust, largest, the, 221
Sunday, editor, the, 941; newspaper, the, 941; school teachers, 867
Supper and tea rooms, 484
Surgeons, 895; dental. See Dentistry; marine hospital, 1025; ship, 587; veterinary. See Veterinary
Surveyor, land, the, 821
'Sweating'' system, the, 284, 285'
"Sweat-shop," the, 284, 285
Synagogues, number in United States, 871
Syndicate, dairying, 763; farming. See Farming
Syndicates, newspaper, 193; organization of, 19

T

Table, cutlery, manufacture of, 403; suction, the, 252, 253; ware, glass, exports of, 330; ware, plated, 352; ware, white, 336
Tabulating machine, check, 379
Tailoring, nationalities employed in, 287
Tailor-made costumes, 289
Talking machines, 14, 111
Tanneries, American, number of, 304
Tannery Combination, the, 305
Tanning, capital invested in, 305; chemical, 304, 306, 308, 309; electric, 308; industry, the, 305; processes of, 304, 305, 306, 307, 308, 309
Tar, oil of, 495; wood, how made, 495
Tariff, effect of the, on wool trade, 272
'Task'' system, the, 284, 288
Tea, and supper rooms, 484; annual consumption, 401; crop, profit from, 729; culture, American, 728, 729; factory, cost of a, 729; manufacture, process of, 728, 729; yearly imports of, 729
Teacher, qualifications of a, 912
Teachers', bureaus, 914; earnings of, 914; licensing of, New York, 913; number of, in United States, 909; training of, 913, 914
Telantograph, Gray's, 425
Telegraph, apparatus, Marconi, 432; apparatus, yearly output of, 425; Bureau, International, 419; business, the, 419; cables,

insulated, 113; code, international, 420; fire alarm, 424; line, Adelaide—Port Darwin, 420; lines, extension of, 420; lines, International, length of, 420; lines, operation of, 423; messenger call, 425; messages sent in 1901, 421; messages sent yearly, 422; poles, how prepared, 422, 423; Postal, 420; Postal and Cable, capital, 421; service, railroad, 426; system of the United States, 420, 424; system of the world, 419; Western Union, 420, 421
Telegraphers, 425, 426; earnings of, 427; Railroad, Order of, 556; railway, labor hours of, 549; training of, 427
Telegraphing in Chinese, 420
Telegraphy, applications of, 424; submarine, 428; wireless, 431
Telephone, apparatus, manufacture of, 434; cables, 113; Company, the Bell, 433, 434; engineering. See Engineering; exchange, conduct of a, 437; exchange, operations in, 436; line, construction of, 422; service, labor conditions, 438; statistics, 434; trust, the, 433; system of the United States, 434; systems of the world, 433
Telephones, manufacture of, 434
Telephonists, routine work of, 436; women as, 435; wages paid to, 437
Telephotographic lenses, 966
Tellers, bank. See Bank
Temper colors, 69
Tempering, pens, 491; steel, 69
Tenements, company, 263, 621; farm, 701
Terne plate, 50
Terra cotta, enamelled, 89; manufacture of, 334; tiles, 89; vs. stone, 93
Textile, eduction, 257; fibres, imports of, 1902, 13; fibres, the, 254; industries, the, 254, 255; industry, branches of the, 256; machines vs. hand work, 259; School, Philadelphia, 257; trades, the, 259
Textiles, combined, 254; dyeing and finishing, 256; woollen, 272
Theatre, hands, number in United States, 970; trusts, 971
Theatres, continuous performance, 973; of the United States, 970
Theology, schools of, 865; students of, 866
Therapeutics, electro, 895
Thread, linen, 300; lisle, 299; mills, labor status in, 300
Tile, manufacture, 334
Tiles, terra cotta, 89
Timber, commercial, 80; products, principal, 84; regions of the United States, 80, 81
Time tables. See Railway
Tin, can industry, the. See Can; plate, 50, 51; plate used in canneries, 215; workers, 54
Tinning, process of, 52
Tipping system in hotels, the, 482
Tires, rubber, annual output, 318
Title and guarantee companies, 882
Tobacco, a food product? 245; annual output of, 719; "belt," the, 719; chewing, 250; consumed in 1902, 246; crop, how harvested, 721; crop, United States, acreage of, 690, 719; exports of, 248; factories, number of, 246; how cured, 721; farmers, number of, 718; growing under cover, 721; how grown, 720; imports of, 248; industry, the, 245; kinds raised in the United States, 720; market, the, 721; packing machines, 251; pipe manufacture, 246; planter, the, 720; plug and long cut, 246, 251; production, home, 247; raising for export, 722; smoking, 250; stemming industry, the, 246; trust, the, 24; where raised, 247; worm, the, 720
Toilers in mid-air, 98
Toilet articles, manufacture of, 349
Tools, forming, automatic, 61; machine, 60; manufacture of, 58, 62, 403; pneumatic, 61
Tooth powder, 349
Torpedo, boats, 1007; signal system, the, 524
Towelling, manufacture of, 300
Town, of Pelzer, private, 263; of Pullman, 136
Toy, factories, American, 493; making, 492; trust, the, 493
Toys, annual output of, 492; imports of, 492
Trackmen, Railway, Brotherhood of, 556
Trade, and general business, 364; foreign, of the United States, 12; combinations, modern, 4; unions, 26, 30; retail, the, 403; wholesale, the, 399
Train, braking a. See Railway; despatcher, the. See Railway; "express," modern, the, 615; railroad, vestibuled, 126, 510
Trainmen, Railway, Brotherhood of, 555
Transportation, by land, 507; by water, 569
Traprock quarried in 1902, 674
Travellers, commercial, 458; commercial, associations, 461, 462; commercial, conditions, 461; commercial, how paid, 458; commercial, on the road, 460; commercial, requisites of, 459; hotels in United States, 477
Travel, modern means of, 60
Treasuries, sub, employes of the, 368
Treasury, United States, the, 356
Tree, rubber, cultivation of, 320
Trees, timber of the United States, 81, 82
Truck, farmers' associations, 757; farming. See Farming
Trust, banana, the, 746; cottonseed oil, 269; glue, the, 496; lead, the, 647; linen thread, 300; match, the, 487; meat packers', 200; paper, the, 157; salt, the, 680, 681; steamship, the, 571; steel, the, 22; sugar, largest, 221; system, the old, 23; tannery, the, 305; telephone, the, 433; tobacco, the, 24; toy, the, 493; wool, the, 271
Trusts, casket, 1043; employes of, 23; cotton, 261, 263; gas, 118; glass, 321, 325; Havemeyer's views on, 18; paint and oil, 340; management of, 20; mother of the, 18; organization of, 19; Rockefeller's views on, 16; rubber, 317; Schwab's views on, 16; starch, 347; C. R. Flint on, 20; theatrical, 971; trade, modern, effect of, 4
Tubes, Crookes, 108; gun, how made, 48; vacuum, electric light, 108; vacuum, Moore, 108
Tugboats, fleet of, the, 581
Tumblers, glass, how made, 332
Turbine, water wheels, 65, 122; ship propulsion, 64
Turbines, steam, 63
"Turbinia," steamer, 64
Turf, American, the, 982
Turpentine, how made, 496; industry, the, 495
Turquoise, Nevada, 670
Turtle fishery, 814
Twine, and cordage industry, the, 499; and cordage, annual output of, 500; binder, manufacture of, 500
Type, casting machine, Barth, 166; distributers, 166, 184; founding, 179; measuring, "point" system, 166; setting machines, 59, 165, 180, 182, 183, 184; writers, book, 76; writers, development of, 76; writers, electric, 76, 77; writers, exports of, 76; writers, long distance, 77; writers, manufacture of, 75; writers, operators of, 75, 471; writers, postal, salary, 1018; writers, power, 76; writers' work legalized, 76

U

Undertaker, the, 1042
Underwriting. See Insurance
Union, Cigar Makers', 252, 253; labels, use of, 30, 253; Milk Producers', the, 697; Stock Yards, the, 203
Unions, and the machine shop, 66; labor, membership of, 26, 27; labor, number of, 28; labor, Schwab on, 28; seamen's, 603; trade, incorporation of, 30
Unio. See also Mussel Fishery; the, or fresh-water mussel, 490
United States, armory, Springfield, 77; banking power of the, 373; Fish Commission, 799, 800; foreign trade of the, 9, 12; Leather Co., the, 15; mar-

vellous progress of, 3; Military Academy, 1002; mints, the, 366; Rubber Co., the, 317; Steel Corporation, the, 21, 24; the, as manufacturers, 5; Supreme Court, 888; Treasury, the, 365
University, conduct of a, 910; extension, 911

V

Varnish, factories, number of, 341; industry, the, 340, 341; industry, materials used in, 341; output of, in 1900, 341
Vaudeville, actors' organization, 975; managers, 973; Managers' Association, 973; refined, continuous, 974; theatres, 973
Vaults, and safes, manufacture of, 79; safe deposit, 504
Vegetable, growing under glass, 755; industry, the, 755
Vehicle building industry, the, 126
Vehicles, electric, output of, in 1902, 497
Velocimeter, the, 78
Velvet, manufacture of, 282. See Carpet and Plush
Vessel, steel, "Edward Sewall," 154
Vessels, American, total number of, 570; coasting, crews of, 601; of the Navy, 1008; wooden, built in 1900, 155
Vestibule platform, Pullman, 134; trains, 126, 134, 510
Veterinary, profession, the, 907; surgeon, education of, 908; surgeons, openings for, 908
"Vigilant," the, 155
Vinegar, annual output of, 742
Violets, annual output of, 754
Violins, annual output of, 358; manufacture of, 358, 359
"Viper," torpedo-boat destroyer, 64
Volunteers, Army, 1006; of America, work of, 877
Vulcanite, how made, 319

W

Wagon industry, the, 137, 141, 142
Wagons, road, electric motors for, 497
Waiters, head, hotel, 484; hotel, earnings of, 482; restaurant, 484
"Walking delegates," 30
Wall Street, brokers, 393; "bucket shops," 395; business of, 386; "curb market," 393; history, notable event in, 514; "lamb," the, 387; stock speculation in, 397, 398; office boys in, 390; young men in, 387
Walrus fishery, annual yield, 806
War correspondents. See Newspaper
Warehouses, bonded, 237; cold storage, capacity of, 743
Warship, preparation of a, 1007
Washington, correspondent. See Newspaper; public lands in, 790
Waste, collection of, the, 876; cotton-gin, 269; dairy, utilization, 780; oil refinery, 842; rubber, renovation of, 320; slaughter house, fertilizer from, 503; starch factory, 348; packing house, use of, 204
Watch, and clock trade, the, 357; case industry, the, 355, 356; "clock," the, 356; crystals, manufacture of, 326; "dollar," the, 355; factories, wages paid in, 355; imports, decline in, 357; industry, the, 354; life of a, 354; machine-made, the, 355; makers, requisites of, 354; making, centres of, 354, 357; making, Swiss, 354; movement industry, the, 355, 356; "register dial," the, 355
Water, carbonated, 243, 244; gas, 118, 119; melon industry, the, 748; mineral, 243, 244; power, 121; seltzer, 244; soda, 243; wheels, turbine, 65; wheels, United States, horsepower, 122
Watervliet Arsenal, the, 48
Weaving, carpet, 276, 277; machine, Szczepanik, 282; machinery, cotton, 259, 264; silk, 280; silk designs, 282
Welding, electric, 125
Whale, back, steamers, 574, 575; fishery, the, 803, 806, 813
Wheat, daily consumption of, 209; American, exports of, 5; area of the Pacific Coast, 735; crop, a, how raised, 739; crop, United States, acreage of, 690, 712; farm, great, conduct of, 736; markets, seat of the, 210; rolled, 207; starch industry, the, 347; used in milling, 207
Whey, industrial use of, 767
Whiskey, annual consumption of, 232; manufacture of, 238; tax on, 237
Wind instrument industry, the, 358
Window, Glass Company, American, 325; glass, how made, 325; glass, annual output of, 325; trimming, art of, 405
Wine, American, output of, in 1900, 240; California, 239, 750; champagne, 242; classification of, 241; district, the greatest, 239; "dry" and "sweet," 241; how "fortified," 241; industry, the, 238; machine-made, 240; making, process of, 240
Wineries, American, 240
Wire, aluminium, 104; barbed, exports of, 14, 403; barbed, industry, 403; cloth, yearly consumption of, 403; insulated, 104, 112, 113, 318; nail mills, output of, 402
Woman's League, Professional, 972
Women, as bookkeepers, 473; as counterfeit detectives, 474; as editors, 935; as lawyers, 886; as models, 966; as money counters, 372; as real estate agents, 466; as physicians, 899; as reporters, 934, 935; as trained nurses, 901; boarding house keepers, 483; dramatists, 969; in advertising, 457; in button making, 491; in collar making, 301; in oil refineries, 664; in printing trade, 165; insurance agents, 443; in the cotton mill, 266, 267; in the silk industry, 280; in textile trades, 255, 259; new field for, 289; Stenographers' Association, 472
Wood, annual consumption of, 80; for musical instruments, 358, 359, 360; hard, 85; pulp, daily consumption of, 161; pulp industry, the, 122, 160, 161; pulp, paper, 157, 188; making industry, the, 80; working factories, centre of, 47
Woods, industrial, 81
Wool, carpet, used in 1900, 783; consumed in 1900, 781; exchanges, 783; exports in 1900, 781; foreign, 782, 783; hats, manufacture of, 295; imports of, 272, 782; industry, effect of tariff on, 272, 782; industry, the, 270, 271, 272, 783; industry, tendency of the, 783; manufacture, 254, 255; marketing, centres of, 783; product of 1900, 781; short-staple, combing, 274; supply, the, 781; trust, the, 271
Woollen, braids, output of, in 1900, 275; cloth industry, profit in, 8; dress goods, imports of, 274; dress goods, output of, in 1900, 274; goods, 272, 273
Worsted, braids, output of, in 1900, 275: coatings, output of, in 1900, 274; cotton-warp, 274; goods, 274, 275; industry, progress of, 274; yarn used in 1900, 783
Wrist drop disease, the, 1040
Writers, advertisement, pay of, 456; comic opera, 989; dramatic, 968, 969; "hack," 924; song, 990

Y

Yarn, carpet, manufacture, 783; lisle, how made, 299; manufacture of, 263, 275; total sales of, in 1900, 275; worsted, used in 1900, 783

Z

Zinc, annual profits on, 649; etchings, how made, 168, 954; mines, Kansas, 625; mines, product of, marketing, 650; mining industry, the, 648; mining, novel features of, 649; mining region, the great, 648; ore, cost of mining, 649, 650; ore, or "jack," 649; output of, in 1902, 618; oxide, yearly output of, 341; product of United States in 1900, 648; smelting and refining, 651, 652

WILLETS, GILSON
Workers of the Nation
Volume II
HC
106
.W6