HOMESTEAD MANUAL

THE HOMESTEAD MANUAL

OF

VALUABLE INFORMATION FOR THE PEOPLE RELATING PRINCIPALLY

TO THE

FARM, ORCHARD

GARDEN AND HOUSEHOLD.

THIS BOOK IS PRESENTED TO EACH NEW SUBSCRIBER FOR THE IOWA HOMESTEAD.

CAREFULLY PREPARED FROM THE BEST AUTHORITIES

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EDITOR OF THE IOWA HOMESTEAD.

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PREFACE.

Great care has been taken in the compilation of this book to procure all facts and information presented to the HOMESTEAD SUBSCRIBERS from the best authorities. Access has been had to the files of the best Agricultural, Horticultural, Dairy and Stock journals, to several private libraries and the great State Library of Iowa. More than a thousand volumes of standard authorities have been examined and the well settled facts, methods and recipes appropriate to the scope of the work condensed for use in this Manual. On General Farming, Dairy, Stock Raising and Breeding, the latest and best writers have been consulted.

It has been the aim of the compiler to introduce no doubtful theories, but to give well settled conclusions only, that have been reached by careful and experienced workers in the various departments of which this volume treats.

Our aim has been to collect such information as will be of the greatest value to those living on prairie farms, or in western homes. Very little space has been given to the details of general farming and ordinary grain raising, as each farmer has his own methods and is supposed to be well informed on these general topics. More space has been given to the later and improved methods and systems upon which general interest is felt, and information sought.

Forestry and fruit-growing, grass and forage plants, bee-keeping, household affairs, rules, facts, methods and recipes, occupy liberal space, as they are subjects of general interest, and such information as is eagerly sought for by thousands.

The compiler has had more than twenty years experience in western

farm management, stock raising and fruit culture, and ought therefore to be able to judge of the competency and correctness of the authorities relied upon in the preparation of this work. We trust that the SUBSCRIBERS of the HOMESTEAD will find in these pages much of value to every owner of a farm or home. The Household Department has been prepared by ladies who are thoroughly experienced in all household duties, and we are confident that it will be found of great value to young wives and girls who are qualifying themselves for useful and happy lives.

The Horticultural Department is made up largely from a compilation of the published experience of the members of the Iowa State Horticultural Society as gathered and condensed from the valuable Annual Reports of their transactions.

Inexperienced persons can rely upon the correctness of the information and suggestions herein contained as relates to varieties of fruit, propogation and culture. We present this volume to the HOMESTEAD SUBSCRIBERS in the confident belief that it will become a valued and reliable guide on many subjects in which they often need to seek information, and that it will never mislead, but prove one of the most profitable of the many household aids to success.

FARM DEPARTMENT.

CHAPTER I.

EMIGRATION WESTWARD.

The population of the great west is made up very largely from the active enterprising young men and women who were born and reared to mature years in some of the older states and countries of the east. For more than three centuries the tide of emigration has been moving steadily westward from the old world into the newly discovered and enticing wilds of America. The surplus population that overflows from the old crowded nations of Europe, here find the promised land, rich in virgin soil, in new forms of vegetation, in vast mineral deposits, in its varied scenery of grand forests, vast inland lakes, great rivers, towering mountains and broad reaching prairies, presenting to adventurous settlers boundless fields of promise for future homes of plenty, where industry skill and energy could be employed without encroaching upon a dense population, or fixed habits, customs and oppressive laws. The allurements of the great undeveloped and almost unknown west were continually presented to the young and adventurous spirits who were looking forward to something better than the crowded old homes could offer, and westward has wended the ever-growing and steadily increasing tide of emigration for century after century until vast empires have grown up in the new world. And still the tide flows westward as uniformly, steadily and ceaselessly as the trade winds blow, or ocean tides roll on to the

end of time. Our people have a most commendable ambition to become owners of homes and farms. The American spirit of independance developes into an absorbing desire to become the proprietor of a farm, or a village or city home. This spirit prompts the young man of the east to leave the old home and all of its endearments, ties of friendship, a life of ease and plenty, to become a pioneer in the far west. He must endure privations, encounter hardships, toil early and late, practice rigid economy, suffer in health, isolate himself from every youthful companion and pleasure, to earn a farm, and convert it into a home. But the process, hard as it may seem, binds him by new ties to his country. His ownership of the soil developes in him a stronger love of the country of which he is in part the owner. It adds dignity and stability to his character, and makes him a better citizen. That country that so shapes its laws and public policy as to convert the most of its citizens into owners of the soil, has the strongest fortifications against foreign aggression or internal dangers. The enactment by our government of the Homestead law, although coming many years too late, was one of the wisest measures of the age.

It placed within the reach of many of our citizens the first opportunity of a lifetime to become the owners of homes. The great mistake that speedily followed, of granting millions of acres of our most valuable public lands to railroad corporations, may yet involve us in the most serious internal troubles that can be feared.

Every owner of a farm or home should show his love of country and his appreciation of the liberal government under which he lives, by studying how to beautify and render more valuable and attractive the plot of ground—be it large or small—that belongs to him.

THE PRAIRIE STATES.

The upper Mississippi Valley is chiefly a vast prairie interspersed with rivers, lakes, groves and hills. It is with this prairie country more especially that our book will deal.

Farming in the eastern states among stones, rocks, roots and stumps, upon a soil exhausted by the successive generations it has raised, is

essentially different in methods, crops and processes, from that in the western prairie states. The tedious work and heavy expense of falling the trees and working among stumps, cutting the brush, removing the timber and grubbing out roots, occupied the pioneers of the eastern and middle states after settling on the new land of the timbered regions. Only the rudest and strongest farm implements could be used in the cultivation of the "clearing" that was slowly enlarged from year to year by the hardest toil known to pioneer life. No labor saving machinery could be used to lighten the farm work, as the stumps and roots, stones and rocks banished reapers, mowers, cultivators and corn planters from the field.

The best years of settlers' lives were spent in chopping, and destroying the huge trees and stumps to make room for seed and sunshine, and but a few acres a year could be thus subdued with axe and mattock. For half a lifetime after the removal of trees and brush, the sturdy stumps occupied a good share of the little fields, keeping up a stubborn resistance to every effort of the farmer to dislodge them. Half a lifetime was required to clear the farm of these obstructions before labor saving machinery could be used to advantage. The prairie farmers, who in later times began to settle in the great Misssissippi Valley, were happily relieved of the slow and exhausting toil required to open farms in the great forests of the more eastern states. Here on the broad prairies they found millions of acres of the most beautiful and fertile meadows, undulating enough to afford good surface drainage, no trees or stumps, rocks, or other obstructions to interfere with the plow, reaper, drill or planter. The breaking plow could be started as soon as the settler had pitched his tent, and before midsummer an "eighty" could be made ready for the next year's crop, the result of the easy labor of one man and his team for two months.

ORIGIN OF THE PRAIRIES.

The causes that have produced in the great basin of the Mississippi Valley, the immense prairies, which are simply plains, large and small, beginning in southern Michigan, and extending in places southward to

the Gulf of Mexico, and westward to the Rocky Mountains, have never yet been satisfactorily solved by Geologists.

Dr. Cha's. A. White in his *Geology of Iowa* writes as follows:

"By the word prairie we mean any considerable surface that is free from forest trees and shrubbery, and which is covered more or less thickly with annual plants. This is also the popular understanding of the term. It is estimated that about seven-eighths of the surface of Iowa is prairie or was so when the State was first settled. They are not confined to the level surfaces, but are sometimes even quite hilly and broken, and it has just been shown that they are not confined to any particular variety of soil, for they prevail equally upon Alluvial, Drift and Lacustral soils. Indeed, we sometimes find a single prairie whose surface includes all these varieties, portions of which may be respectively sandy, gravelly, clayey, or loamy. Neither are they confined to the region of, nor does their character seem at all dependent upon the formations which underlie them, for within the State of Iowa they rest upon all formations, from those of Azoic to those of Cretaceous age inclusive, which embrace almost all kinds of rock, such as quartzite, friable sandstone, magnesian limestone, common limestone, impure chalk, clay, clayey and sandy shales, etc. Southwestern Minnesota is almost one continuous prairie upon the drift which rests directly upon, not only the hard Sioux quartzite, but also directly upon the granite.

Thus, whatever the origin of the prairies may have been, we have the positive assurance that their present existence in Iowa and its immediate vicinity is not due to the influences of climate, the character or composition of the soil, nor to the character of any of the underlying formations. It now remains to say without the least hesitation, that *the real cause of the present existence of the prairies in Iowa is the prevalence of annual fires.* If these had been prevented fifty years ago, Iowa would now be a timbered instead of a prairie state.

Thus far we have stated facts and what are deemed legitimate deductions from them. The following are offered only as suggestions. We have no evidence to show or suggest that any of the prairies ever had a growth of trees upon them; notwithstanding the fact that those at least of the eastern part of the great prairie region will support an abundant growth of trees after they are introduced, if protected from the fires.

There seems to be no good reason why we should regard the forest as any more a natural or normal condition of the surface than the prairies are. Indeed, it seems the more natural inference that the occupation of the surface by the forests has taken place by dispersion from the original centers, and that they encroached upon the unoccupied surface, until met and checked by the destructive power of the fires.

Then arise questions like the following, not easily answered, and for which no answers are at present proposed: When was the fire first introduced upon the prairies, and how? Could any but human agency have introduced annual fires upon them ? If they could have been introduced only by the agency of man why did the forests not occupy the prairies before man could introduce his fires, since we see their great tendency to encroach upon the prairies as soon as the fires are made to cease? The prairies doubtless, existed as such almost immediately after the close of the Glacial epoch. Did man exist and possess the use of fire then that he might have annually burnt the prairies of so large a part of the continent, and thus have constantly prevented the encroachment of the forests ? It may be that these questions will never be satisfactorily answered; but nothing is more evident than that the forests would soon occupy a very large proportion of the prairie region of North America if the prairie fires were made to cease, and no artificial efforts were made to prevent their growth and encroachment."

THE PREVAILING SOILS.

The soil of the prairie states of Illinois, Iowa, Minnesota, Nebraska and Kansas, present many points of similarity. In these five states prairie is the prevailing soil. Illinois had more of the immense level prairies, too flat for good surface drainage in early days, and for many years these great treeless plains were avoided by the early settlers as unsuitable for occupation as homes. The pioneers made their claims in the scattered groves and along the belts of woods that border on the watercourses. There they found shelter from the bleak winds of winter that in early days swept with resistless fury over the vast stretches of treeless plains and struck terror to the hearts of the bravest men. The stories of the perils encountered by the emigrants and travellers over these great prairies in the winter months have never half been told. Hundreds of adventurous travellers have started across these pathless plains in the pleasant winter mornings, who have been caught out of sight of human habitation or aid, and amid the fierce howling winds of the sudden storms that have overtaken them, have perished after heroic struggles in the driving snow and pitiless beatings of the western "blizzard" that knows no mercy to man or beast. Many of these great prairies were from twenty to fifty miles across without a tree or object of

any kind to break the dull monotony of two or three days travel to the white top emigrant wagon with its slow ox teams as they toiled slowly on towards the "promised land." Long before the advent of railroads, the writer of this book crossed the great prairies of Illinois in a white top wagon, when it took five days to make the trip from the then humble little city of Chicago, to the banks of the Mississippi, opposite to where the city of Davenport has since grown up. No one whom we met on that long winter ride over the great, bleak, flat, ice covered prairies, believed that they would be settled in our day. These great desolate plains of that day, are now covered with beautiful groves, fruitful orchards, fine farm houses and barns, cloverfields, meadows, gardens, evergreens, beautiful villages and thriving inland cities. The magic hand of western enterprise, has converted the desolate, dreary, treeless plains of wild grass, great marshes, the abode of wolves, prairie chickens, muskrats and ducks, into beautiful homes of wealth and luxury and the grandest farms of America.

THE CLIMATE OF IOWA AND NEBRASKA.

These states lie so nearly in the same latitude, separated only by the Missouri river that the soil, climate, productions and methods of farming are quite similar in most respects.

The climate is dry and healthful, with hot summers, long and remarkably pleasant autumns, dry winters with usually but little snow and seldom any rain. The storms and cold of the winters have been greatly exaggerated by eastern travelers. The storms are not more frequent or severe, and the cold no greater than in central New York.

Prof. Parvin, of Iowa City, publishes tables in White's Geology of Iowa showing that for a period of thirty years from 1839 to '69 there was an average of nineteen days to the month in which no rain or snow fell. The average rainfall from 1848 to 1869 was twenty-seven inches per year. The average fall of snow during the same period of twenty-two years was thirty-three inches per year. The earliest fall of snow during this twenty-two years was October 17th. 1851. Prof. Parvin of the State University, who is one of the oldest citizens of Iowa, and has for

nearly forty years been a careful observer of the weather, keeping an accurate record thereof, says:

"It has happened but twice in a period of thirty years that frost in central Iowa has severely injured the corn crop." We learn also from his published records that the average time of the flowering of fruit trees for twenty-one years, was as follows: Apples, May sixth; peaches, May third, cherries, May second, plums, May second, pears, May fifth. The mean time for late frosts during this period was May fourth. The average number of days that the Mississippi river remained closed by ice at Muscatine, was sixty-seven, being from December twenty-third to February twenty-sixth, a little more than two months."

THE MINERALS OF IOWA.

Bituminous coal is found in the valley of the Mississippi in Scott Co. in the valley of the Iowa in and below Hardin Co. and in vast quantities along the Des Moines River and its tributaries below Fort Dodge. Shafts sunk out on the prairie, many miles from these streams have developed fine veins of coal in many parts of the State, demonstrating clearly that the supply of coal is practically inexaustable. Rich mines of lead are found in the vicinity of Dubuque, a large deposit of gypsum near Fort Dodge and excellent building stone is found in the eastern and central parts of the State. Clay for brick and pottery, limestone and marble are found in various localities, while granite boulders of large size are common in many of the counties.

BREAKING PRAIRIE.

It is a peculiarity of the prairie sod, that it will not rot well unless it is broken between the first of May and the middle of July. The month of June is the best time, but a fair crop can be raised the next season on sod turned over any time between the first starting of grass and midsummer. The breaking should always be done with a sharp plow, and run as shallow as possible, not cutting deeper than two inches. Of late years it has been found that a

FLAX CROP

is the most profitable on new breaking the first year. For a good crop,

the seed should not be sown later than May, about half a bushel of the seed sown broadcast to the acre. It should then be thoroughly covered with a slanting tooth harrow, going over the ground three or four times. Nothing more is required until time for harvesting, when the crop is cut with a reaper and treated like small grain. The usual yield of seed varies from six to eighteen bushels per acre, and generally brings from eighty cents to one dollar per bushel. The land is left clean and in fine order for fall plowing and is in the best possible condition for raising wheat, corn, oats, or barley.

SOD CORN.

Corn is sometimes planted on new breaking either by dropping the seed in every third or fourth furrow after the breaking team, or by cutting into the sod with an ax and depositing the seed. In a favorable season a fair crop is sometimes raised in this way, but oftener it is nearly a failure.

BEANS ON BREAKING.

A surer crop on new breaking than corn is white beans. They may be dropped in every second furrow and with no further care are apt to make a fair crop. Great care should be taken in harvesting to keep them off the damp ground, as they soon spoil if left on the ground in piles. They can be kept quite securely by driving stakes, putting some old hay or straw at the bottom, and stacking them up firmly around the pole, rounded to a point at the top and closely secured to the pole.

BUCKWHEAT ON SOD.

This is another crop that often succeeds well on breaking, being sown and harrowed similar to flax, half a bushel of seed to the acre being sufficient. This crop may be sown as late as the latter part of June. The chief objection to buckwheat is its tendency to seed the land for several successive years from the grain that falls while securing the crop, after it has matured.

WESTERN FARM HOMES.

CHAPTER II.

SELECTING A HOME.

Too little consideration is often given to the selection of the Farm which is to be the Home for the husband, wife and the children, for many years of their lives. A farm is too often selected from accident or some special temporary incident, without that careful and deliberate consideration that should be given to such an important act. It is too often done in haste without carefully weighing all of the objections or advantages. Several farms are offered for sale in the vicinity where the purchaser desires to settle. One may be from the necessities of the owner, offered at a very low price. It may be regarded as a bargain– in point of price. It may be badly cut up by ponds, marshes and sloughs, the soil may be inferior, it may be seeded with noxious weeds, it may be distant from school, postoffice, shops and stores. Its topography may render drainage very difficult and expensive; the fences and buildings may be poor, the soil exhausted by long cropping without a proper system of rotation of crops or fertilizing, it may be destitute of orchards, groves, and shade trees, and yet to a casual observer it might be regarded as a great bargain at twenty dollars an acre.

Not far distant may be another 160-acre farm that is convenient to schools, shops and stores ; it has good buildings, fences, orchard, groves and soil ; it is in a high state of cultivation ; has natural drainage, and the soil has been kept in a condition of high fertility by judicious rotation of crops and liberal use of fertilizers ; every acre may be capable of producing grain, hay, pasture, fruit, timber, or vegetables in profusion, but the price may be high—$40 per acre. Too many buyers

would permit the difference in price to determine for them which to purchase, and the poorer, run-down, exhausted, unhealthy, inconvenient farm would be selected for the family home for life—because it was so much cheaper than the other. Now let us see which was the best investment at the price asked for them. The poorer farm costs $3,200, while the good farm, in excellent repair and condition, costs $6,400. The purchaser of the cheap farm looks around at his buildings and finds that he must have a new house to make his family comfortable, or expend $1,000 in repairs and additions to the old one. Then his barn, granary, corn crib, and cattle sheds will require $500 more to put them in suitable condition to protect his hay, grain, horses, cattle and hogs. A wet season nearly ruins his wheat and oats for want of drainage, and the cockle burrs, wild buckwheat and barn grass compel him to expend a month's extra work on his corn crop, to keep the weeds from smothering the corn. His fields are in irregular, broken patches, requiring more time to plow, harrow, cultivate and reap. His land is too wet to use a reaper on when his grain is ripe, and a large per cent is lost before his light crop can be secured. It takes the best part of a day to go to the postoffice, blacksmith shop, mill or store. He has no wood, and must purchase and draw his coal from a distant station. His children must be taken to school in a severe winter or kept at home. At the end of their first year he has lost two months' time from farm work for himself and team in making the necessary trips to the post-office, stores, mill, shops, and in drawing to market his surplus grain, and procuring a supply of fuel and fencing. He must buy all of the fruit and every stick of timber used, while his loss on crops each year from exhausted soil, wet land and noxious weeds may be several hundred dollars. So in a financial point of view, the cheap farm soon proves to be a very expensive one. But the money consideration is not the only one, nor is it of the most importance. The farm should be a pleasant and attractive home for the family. Congenial neighbors, convenience to church, school house, postoffice, and some town, are essential luxuries that should, if possible, be indulged in. The family on most farms give too little time to social intercourse with their neighbors. The labor required of all members of the farmer's family is

generally quite as heavy as they are able to perform, and amid the pressure of more work than can well be done, apportioned to each member, the recreations and social pleasures that women and children delight in and enjoy so much, are too often crowded out and deferred from day to day, month to month, and year to year, receding as the years go by, and banishing from the household a thousand pleasures that might have been enjoyed. Our American farms are too much of work shops, instead of being the pleasant and attractive homes that they should be made. The great lesson that is needed to be impressed upon our western farmers, and one that can not be dwelt upon too largely or repeated too often is TO MAKE PLEASANT AND ATTRACTIVE HOMES OF OUR FARMS. We have as a nation too little genuine attachment and love for our homes. He have grown up to regard them as only so much property, to be sold or exchanged for other property whenever a good offer is tendered. This light estimate that most of us have grown into placing upon our farms, has largely destroyed our real love of home. Whatever we regard as mere merchandise, to be bought, sold or traded for the purpose of gain, we do not set our affections upon. No family will permit themselves to become very strongly attached to a rented house or farm. But if we could feel that the quarter-section of wild prairie that we have selected, was to be converted into our home for life, every improvement we made upon it would be carefully considered, deliberately and substantially done, with a view to permanence, and to contributing to the comfort of ourselves and children for all the years of our future lives. Every tree planted would be regarded as a companion that was to remain with us, growing up like a child, becoming a fixture in our home, to be watched as it develops into a lofty, wide-spreading screen from summer's heat and winter's cold. Every building would be carefully planned for convenience and durability ; every fence constructed of the best material and located where it should remain undisturbed. We should plant more forest, shade, ornamental and fruit trees, with assurance that we or our children would enjoy the benefit and pleasure that they bring to every lover of nature's choicest gifts. Young men, make HOMES of your farms. Never permit yourselves to look upon God's broad acres

granted to you—as merchandise to be misused, exhausted, desolated and traded off like a worn out jack knife. Cultivate a taste and love for your FARM HOME, and study to beautify and adorn it with useful and ornamental trees, shrubs, groves, lawns, tasty and convenient buildings, fences, meadows and hedges. Make it a beautiful home that will be prized and loved by all whose lives are associated with its history.

LOCATION OF THE HOUSE.

In locating the house select high ground having good natural drainage, so that no water will settle in the cellar or stand in pools around the yard. Avoid the immediate vicinity of large streams, marshes, low, damp land or stagnant pools. These are all sources of malaria and consequent sickness. Locate your house some distance from the public highway to avoid the annoyance of tramps, lightning rod peddlers, dust and dogs. If a good building place can be found near the middle of the farm, for many reasons such a location should be chosen. It brings the farmer nearer to his work. It gives him a view of his entire farm or most of it, and as most of the hay, grain and other products are stored in the vicinity of the buildings, such a location saves much travel and unnecessary conveyance of heavy loads over greater distances.

The barns, sheds, cribs and yards for all domestic animals should be a good distance from the house, thus preserving the home from the unpleasant odors, flies, noise and confusion, and protecting the hay, grain, stock and barns from the danger of fire.

The house should be warm and well-built, with plenty of windows and doors on the south side to let in sunlight, give good ventilation and admit the prevailing south winds in the hot summer. The sills should be well raised above the earth and protected by stone or brick walls from contact with the ground. Too much care cannot be taken to see that the flues are made of hard brick, for soft brick, such as are often used are unsafe and cause most of the fires by cracking and affording a chance for the fire to communicate with the wood work. Never trust a bricklayer to look after the safety of your chimneys, but see to their

construction yourself, and be sure that a thorough coating of good mortar is spread over the entire inside surface of the chimney as it is constructed. Have all sleeping rooms well ventilated with windows and transoms over the doors. No house is complete without a good coal or wood house to protect the fuel from snow and rain. The cellar should be divided into two rooms, one of which should be used for fruit and vegetables, and the other for milk, cream and butter. Milk is a great absorbent of all odors, and should never be kept in a room with decaying fruit or vegetables, or any other substance that emits an offensive odor. The well and cistern should be protected from any overflow of surface water.

THE BARN AND GRANERY.

These buildings should be located at some distance from the house No dwelling house can be made pleasant, attractive and a healthy place for a family to live in, that is in close proximity to stables, cattle yards or hog pens. The barn should be located on a gentle southern or eastern slope, in order to afford good drainage, and a warm exposure for the cattle in the winter. It will be found good economy to build a barn large enough to hold all the clover hay, for it is almost impossible to keep clover in good order in the stack. The stacks of timothy and native hay should be located on the west or north sides of the feeding yard, that they may afford additional shelter from winter winds. A grove of native forest trees, interspersed with Scotch and Austrian pines should be planted on the east, north and west sides of all farm buildings to afford protection from the fierce winter winds and driving snows. No other shelter is equal to a good grove having in it plenty of pines, to protect stock from winter storms. It must not be understood that groves are recommended as a substitute for barns, sheds and stables, but they are needed in addition to all farm buildings in the prairie states.

SHELTER FOR STOCK.

No farmer or stock grower should ever undertake to keep any kind of live stock through the winter without good shelter from wind and storms. The additional amount of hay and grain required to keep stock

in good condition without shelter, will each winter cost enough to build sheds for them. The pioneer prairie farmer, who has no money to buy lumber with, can construct comfortable sheds of sod and prairie grass.

Take your breaking plow to a low peice of prairie where the sod is heavy and tough, and break up to a debth of four or five inches as much sod as may needed for the walls of the sheds. With a sharp spade cut up the sod in blocks of suitable size to handle and begin your wall for the sheds by building up as you would with brick. When at the proper highth, place wide boards along on top of the finished wall to protect it, and rest the poles upon. Set a few posts to support the poles needed to sustain the roof, and cover the structure with long slough grass, giving the roof slope enough to carry off rains. Such a building can be used for horses or cattle temporarily for two or three winters, until permanent buildings can be afforded. Thousands of cattle perish every year from cold and exposure to the pitiless storms, when such cheap shelters as these would have saved them. Every settler on a prairie farm, should plant groves as soon as the sod can be subdued. Let the trees be growing to shelter your family and domestic animals while you work and sleep and grow old. Plant trees; no other labor or investment adds so much to the comfort of your family and stock, nor so much to the value of your prairie home. No home is worthy of the name, that is destitute of trees—for fruit, shade, ornament and shelter. We shall have more to say of tree planting in another place.

FARM CROPS.

The kind of crops that will prove most profitable must necessarily be determined by each farmer for himself, taking into consideration the location as to markets, soil, cost of labor etc. Raising small grain in the prairie states, where the surplus must be sent by railroads to distant markets, where labor is dear and grain cheap, is a ruinous system of farming. It rapidly exhausts the soil, requires expensive machinery and a large amount of help when such help is required by all of the neighbors at high wages, and after all expenses are paid and the crop sold, the net profit is generally very small. The prairie states are generally better adapted to corn and grass growing, enabling the farmer who turns his

attention to this system of culture, to keep cattle, horses, hogs and sheep to consume nearly all of his surplus products on the farm. The study of western farmers should be to concentrate and condense the bulk and value of all surplus products into the smallest possible compass of the greatest possible value. Hay for example is not usually worth more than from 25 to 35 cents per hundred weight, and corn is not often worth more than 50 cents per 100 lbs. While beef usually sells at from $3.00 to $5.00 per 100 lbs, pork at a little more, cheese at from $8. to $10. per 100 and first class butter at from $15. to $25. per 100 lbs. Where the ultimate market is and must largely remain many hundred of miles east or west of us, over costly lines of rail transportation, we will find it profitable to condense our bulky straw, stalks, hay, corn and oats into high priced beef, pork, horses, cheese and butter before it is shipped.

FEED THE SOIL.

The intelligent farmer must admit that for permanent profit it is as essential to success, to feed the soil liberally as to feed his live stock generously. It is no more ruinous policy to starve domestic animals, than to starve the soil. If every prairie farmer could realize the truth of this statement as fully as the writer of this book has seen it demonstrated in his thirty years of farm experience, we should see more clover fields, more buckwheat raised to plow under, more attention everywhere given to the intelligent rotation of crops and the saving and using of kinds of manure that can be made on the farm. It takes many years of reckless farming with wheat after wheat, and corn after corn to exhaust the grain producing elements of our fertile prairie farms. But the time comes sooner or later when the fertility must be renewed. All will admit that the return of some kind of fertilizer to the soil either by seeding to clover, pasturing, turning under green crops or other manure is the only way in which land can be preserved in condition to insure unimpaired productiveness.

STOCK RAISING.

CHAPTER III.

THE BEST BREEDS OF HORSES.

For many years the old system of wheat-raising has been giving way to the later and better system of diversified farming. Corn largely takes the place of wheat in all of the prairie country south of the 43d degree of latitude. With the enlarged production of corn follows the raising and feeding of horses, cattle, hogs and sheep.

As the raising of horses has seemed to require more capital and care, it has not yet become as prominent a feature of western farming as cattle and hog-raising; but as capital accumulates many intelligent farmers are turning their attention to raising horses. Large importations of improved breeds are now annually being brought into the western states, and some of our western breeders and importers are acquiring wide reputation.

THE PERCHERON-NORMAN HORSES.

This famous breed of heavy French horses originated many hundred years ago in the interior of France. They acquired the name from the ancient province of La Perche, situated south-west from Paris. They are identical with the famous Norman war-horses used by the knights in the days of chivalry. This race of horses seems to have gradually developed in that part of France from the care and attention given for many successive generations in breeding only from the best animals. Many years ago these horses were only known in this country under the general name of "French" horses. They are noted for good disposi-

tion, heavy build, great strength and endurance, as well as activity. About ninety per cent of the Percherons are grey or dappled, some being nearly white, while others are black. They are remarkable for transmitting their own peculiar qualities to their offspring in a marked degree. The height of the Percheron varies from fifteen to sixteen and a half hands; weight from 1,300 to 1,700 lbs.

THE MORGAN HORSE.

This popular breed originated in Vermont in 1793. The horse called Justin Morgan was foaled in that year; his sire was True Briton, and his dam was of the Wild Air breed. The descendants became the justly celebrated Morgan horses. They have been very popular in the Eastern States and their fame has extended to every part of the country. They are rather small in size, but strong, active and showy. The original Justin Morgan was fourteen hands high, and weighed 950 lbs. The Morgans are fine carriage and saddle horses, but too light for heavy teaming.

THE ARABIAN HORSE.

While beautiful and very docile, and particularly adapted to traversing the great deserts on scanty feed, have not proved to be of great value in England where they have been crossed with the native stock. The stock is not remarkable there for speed or indurance.

THE CLYDESDALES.

For heavy horses the Clydesdales from Scotland are growing in popularity. The average height is about sixteen hands. They are rather low of stature, with heavy bodies and limbs, and are noted for their great strength as draft horses. There is a growing demand for the Clydesdales for crossing with our native stock. In color they are usually black or brown, but bay is not uncommon. The average weight is perhaps 1,700 or 1,800 lbs.

THE MESSENGER STOCK.

This breed is traced in this country from Messenger, imported from

England in 1788. His descendants are widely scattered throughout New York and New Jersey, and from him came many celebrated and valuable animals, such as Potomac, Hambletonian and Membrino. They were noted for speed and endurance, and most of the best horses in the two States named trace their pedigree back to the Messenger stock.

THE CONESTOGA

Is a heavy roadster, principally reared in Pennsylvania, and is a mixture of several breeds, but is traced back to the Flemish horse, popular among the German emigrants who settled in Pennsylvania.

THE ENGLISH CART HORSE

Is used largely for drays in cities, and for heavy teaming.

THE CLEVELAND BAYS

Are attracting considerable attention as fine carriage horses.

Of the many fine breeds of trotters and fast horses we have not room to treat in this book.

THE BEST BREEDS OF CATTLE.

SHORT HORNS.

This noted breed of English origin, has become the most widely popular of any of the imported stock. They are especially valuable for beef, maturing at an early age and attaining large size and fine, compact form, laying on flesh very rapidly with good care and feed. Crossed with our native cows a good dairy herd is obtained. The early importations of sixty years ago were noted for their good dairy qualities. Some of the cows brought over about that time were remarkable for their merits as profitable dairy animals. But their superiority for beef soon became so well established in this country that more attention was given to those strains noted for early maturity, rapid growth and large size. Fabulous prices were for many years paid for choice imported animals and their thoroughbred progeny, bulls selling as high as

from $7,000 to $10,000 for an extra choice animal of the most fashionable strain, while choice cows frequently sold at from $1,000 to $2,500 each. But in 1874 prices declined rapidly, and good thoroughbred bulls one year old can be pulchased for from $75 to $125 each. The short horns require good feed and good care, and with such treatment are a profitable breed of cattle.

THE HOLSTEINS.

This breed of cattle originated in North Holland, where they have been bred and improved for a long time. Their surpassing excellence seems to be their milking qualities, coupled with large size, compact massive frame, capable of making good beef. They are generally black and white with short horns, hair soft, fine and silky. The cows often weigh from 1,000 to 1,400 lbs., and the bulls from 2,000 to 2,500. The Holsteins for beef are probably not as profitable as Short Horns, but for dairy purposes they are superior.

THE AYRSHIRES

Are Scotch cattle, and are essentially a dairy breed. They are hardy, docile and yield a liberal supply of milk. Mr. Aiton says, "an Ayrshire cow may be reckoned to yield 257 English pounds of butter per annum. He adds that 28 gallons of milk with cream will yield 24 pounds of sweet milk cheese, or 574 pounds per annum besides the whey and calf." For beef they are inferior to the Short Horns.

THE ALDERNEY, JERSEY AND GUERNSEY.

These cattle are natives of Normandy in France, but were long ago transplanted to the British Islands of Jersey, Guernsey and Alderney, lying off the coast of Normandy. They are small, gentle, rather homely little pets, of kind disposition, light red or fawn color, smoky gray and sometimes pretty white. The Guernsey cows are generally larger and coarser than the Jerseys and Alderneys, The Alderney is prized for marked richness and deep, yellow color of her milk, which is very rich in cream and butter. They require good shelter and care. The Jerseys are becoming a popular breed among town people who keep

but one or two cows, owing to the exceeding richness of the milk and cream. They make very fine beef also, but are inferior in size, and can never compete with the larger breeds for profitable feeding; but for rich milk and superb butter the Jerseys are unequalled.

THE DEVONS.

The Devons are traced back in origin to about the time of the invasion of England by the Romans. In fineness of limb, uniformity of color, delicacy of proportions, they are unequalled. They are like no other, and by no intermixture with other breeds can they be reproduced. In size the Devon is medium as compared with other native cattle. The average weight of a well grown ox in good condition will range from 1,400 to 1,600 lbs., cows from 800 to 1,000. The Devon cows give but a moderate supply of milk, but its quality is superior. The Devons are a beautiful red color, docile and easy to keep, have fine horns and silky hair. As work oxen the Devons have no superiors.

THE HEREFORDS.

The Herefords are an ancient breed of English origin, generally red, with mottled faces, sometimes running into light with white faces. They are larger and coarser than the Devons. As a dairy breed they have little reputation. As work oxen they are among the best, being kind, intelligent and strong. For beef the Herefords are very profitable, being of good size, hardy and maturing early. They are of late years much sought after by the large cattle raisers on the plains, as they are regarded as hardier than the Short Horns.

THE GALLOWAYS.

This a polled or hornless race of cattle, originated in the lowlands of Scotland. They are short in the leg, broad in the back, and nearly level from head to rump. The prevailing color is black, but some are dark brindle, some dun color, and a few speckled with white. The cows give but a small quantity of milk, from six to eight quarts per day at their very best, and go dry from two to three months. The aver-

age weight of fat bullocks at three and a half years old is not more than 900 lbs. The heaviest at five years old are reported at 1,400 lbs. They are adapted to a hilly, rough, grazing country, and thrive where a Short Horns could hardly support life.

POLLED CATTLE.

Some attention has lately been given by western breeders to the hornless or polled cattle. In Scotland and England there is a distinct breed of black hornless cattle, which has been well distributed in the United Kingdoms. The cattle are not equal to Short Horns for beef, nor to Jerseys or Alderneys for milk, their chief merit being lack of horns. Some western breeders have improved the native hornless cattle by breeding the native hornless cows to Short Horn bulls, thus getting desirable polled cattle.

OUR NATIVE CATTLE.

Our native cattle have no distinctive character, although in some localities they are superior to others. They are a mixture of several European breeds, having their origin in the cattle brought over by Dutch, French, English, Scotch and Spanish emigrants hundreds of years ago. The mixture for many generations has been going on until we find among the natives all shapes, colors, sizes and forms. The chief defect in the natives for beef is the lack of early maturity, the large proportion of offal to flesh, and the uncertainty as to quality and quantity of milk. They are large consumers of food in proportion to the flesh they carry. But by selecting the best specimens for milk and crossing with thoroughbred males, we get excellent grade animals. There are some excellent dairy cows found among our native stock, but they are the exceptions.

Every farmer and stock grower should aim to raise that grade of cattle in which there is the most clear profit, taking into consideration the purpose for which he designs his stock. If selling milk is his chief aim he should select that breed which produces the greatest quantity of milk. If butter is the object, cows giving the richest milk, that yield-

ing the most cream should be chosen. If beef is the primary object, that breed of cattle that mature youngest and take on flesh fastest and attain the greatest weight on a given amount of feed should be chosen.

THE VARIOUS BREEDS OF SHEEP.

THE COTSWOLDS

Are fine large mutton sheep and often shear from ten to sixteen pounds of wool per head. The carcass at two years old frequently weighs over 200 pounds. They are a hardy race and not liable to disease. They are prolific breeders, the ewes frequently having two lambs at a birth.

THE LINCOLNSHIRES

Resemble the Cotswolds in many respects, and only a practiced eye can distinguish them.

THE LEICESTERS

Are of similar origin and qualities and are among the valued long wool sheep. There has been from time immemorial numerous flocks of these large coarse-wool sheep existing in numerous localities of England, all coming from a common origin, and the different names have been derived from the locality in which they have been kept for a long period, the names Leicester, Cotswold and Lincolnshire thus attaching. Careful breeding has thus given to the world these varieties of long wool sheep which have been widely scattered over the old and new world. The fleece is adapted by its length and absence of felting properties to the manufacture of worsteds, bombazines, and mousseline delaines. It is also extensively used in carpets and many other fabrics.

THE SOUTH DOWNS.

This is a hardy breed of medium sized sheep furnishing a fair quality of wool and a superior quality of mutton. Great improvement has been made in the South Downs in the past 70 years by careful and intelligent breeding. The size and form have been improved, and early maturity and productiveness attained. They will shear from 3 to 4 lbs clean washed wool of quality equal to a good Merino. The live weight of well fattened South Downs has not unfrequently reached 200 lbs.

THE MERINOS.

These fine wool sheep from France and Spain have been largely introduced into the United States. The prominent features of this breed are abundance and fineness of fleece, the tenacity with which it is held, its crimped or spiral form, its felting properties and the large amount of oil it contains. This oily property with the compactness of the fleece repels snow, rain and wind like a coat of mail, thus fitting them to endure exposure. The Merinos are long lived often living 18 or 20 years. They are small boned medium size, the ewes weighing about 80 lbs and the rams from 140 to 160. The mutton is excellent in quality.

The old practice of washing sheep has of late years been generally abandoned as cruel and useless, and buyers do not pay enough additional to justify washing.

THE VARIOUS BREEDS OF SWINE.

THE BERKSHIRE.

The origin of this breed of hogs is traced back about a century, and the first improvement appears to have come from a cross of a Siamese boar upon the old Berkshire swine of England. The marked and valuable improvements attained have come from better methods of keeping and feeding, and the judicious selection for breeding purposes of the best animals calculated to fix and develop the most desirable points. The chief points of excellence claimed for the Berkshire are: their ability to resist disease; their wonderful digestive and assimilating power; their great prolificacy and the remarkable strength and vigor of the pigs when young; the aptitude to lay on flesh along the back as along the sides; the facility with which they may be fattened at an early age.

CHESTER WHITES.

A writer who is an admirer of this breed of hogs thus describes them: "They are known by their white color, great length and depth of carcass, small heads and offal parts, capacity for growing to great size, sometimes weighing at two years old from 700 to 900 pounds.

With an equal amount of food the Chester Whites will make more and better pork than any other breed of hogs. They fatten very readily." Notwithstanding this enthusiastic description, comparatively few are kept in the Mississippi valley. There must be some good reason for it. They originated in Chester county, Pennsylvania.

THE POLAND CHINA.

This popular breed appears to have had its origin in Butler county, Ohio, some time between 1830 and 1840, and to have been a cross between the Poland hogs and China breed that was kept in that region. Magie and Moore, two careful breeders have developed this cross by careful breeding into what is now known as the Poland China breed. This breed of hogs is very popular in the great corn-growing States, and has been widely distributed through the Mississippi valley. They attain large size, take on flesh rapidly and mature young. In color they are black and sandy.

THE ESSEX.

This is an old English breed, smaller than most others, fine boned, with small nose and ears. Color is solid black. They are highly esteemed for fine quality of pork, but in the west are considered too small to be profitable.

JERSEY REDS.

This breed originated in New Jersey. They are red in color and deep in carcass, not so lengthy as the Chesters, but are compactly built. They mature young and frequently attain at eighteen months old an average weight of 500 lbs. At ten months old they average about 425 lbs.

Of the many other breeds of hogs we have not space to treat in this work, but refer the reader to more elaborate stock books and agricultural papers.

THE DAIRY.

CHAPTER V.

Of late years stock raising and dairying has grown into large proportions in Illinois, Iowa, Nebraska and Kansas. Wheat raising has been found too expensive and unreliable for a profitable and continuous business, and the tendency has been towards growing corn, grass, hogs, cattle, butter and cheese. The cash outlay involved in producing grain for market, the heavy freight charges that are required to transport it to distant markets, the uncertainty of a good crop arising from insect depredations and other causalties, its rapid exhaustion of the fertility of the soil—have induced many of the most far-seeing and intelligent of our farmers of the west to turn their attention toward stock and dairy farming.

The wild prairie grasses which are exceedingly rich, nutritious and valuable in their season for pasture, and at all times for hay, are rapidly disappearing in the older settled portions of the prairie states. Cultivated grass, such as red and white clover, timothy, blue grass, red top and orchard grass all grow readily and luxuriantly in these states, and make more desirable meadows and pasturage than the native grasses. More grass and less grain is now the theory practiced by the best farmers, and its advocates are becoming more numerous every year. Let the cattle, hogs and sheep do their own harvesting is the prevailing sentiment among the most thoughtful. Large herds of improved cattle are found in every part of the west. More attention is given to forage plants and less to grain. Since the introduction of the new methods of butter-making by creameries, prices of butter have advanced, owing to the marked improvment in quality. Cheese-making is carried on in the most approved manner also, diminishing the cost and increas-

ing the price from labor-saving and superior merit, until some of the Western states now rank as high for dairy products as any in the East.

THE BEST DAIRY BREED.

F. D. Curtis, of New York, at the late meeting of the Dairymen's Convention gives his opinion on this subject as follows :

Have you the requisite stock? If you have not, this you must obtain from some source ; for in this age of sharp competition and oleomargarine you cannot succeed with cows that give inferior milk, or milk in very small quantity. If you want to make butter, select or rear cows that give at least a fair yield of milk rich in cream. If you want to make cheese, get the stock that gives the largest yield of milk, rich in caseine. I understand the favorite stock of this section is the Durham or Short Horn. These are splendid animals for beef—probably the best in the world—and beef production is an important, and I presume a profitable industry of the West. Some families of the Short Horns are splendid milkers and good butter-makers. But in selecting a strain for dairy purposes it is necessary to exercise great care, lest you get one out of which nearly all the milking qualities have been been bred, in order to make the stock beautiful and beefy.

The Devons are accounted good butter cows, and are great favorites in some portions of the Empire State. They give a rather small mess of rich milk, and would not be so profitable for cheese.

The Jerseys are in my state considered the best butter cows *per se*, and the high color and flavor of their butter have made it quite generally the standard in the popular mind. They are small animals, rather angular in build, but with beautiful fawn-like heads and faces that make them very winning. They give a small mess of very rich milk, and it is not an uncommon thing for one of them to make two pounds of butter daily in the flush of the season.

The Ayrshire gives a larger mess of milk, but not so rich in cream. Her milk compares favorably with much of the Shorthorn, but is accounted with us better for cheese than for butter.

Of the older and well-known breed, these are the chief with us. But two new breeds are coming rapidly into favor. In Solsville, Madison county, New York, originated a breed beginning to be known now as the American Holderness. They are line-back, white, spotted with red, or brindle, or black, and of medium size. They are deep milkers, and give milk closely approaching in richness that of the Jerseys. A herd of twenty, owned by the originator, has averaged three hundred

pounds of butter per cow yearly for several years past, and the butter is fancy, selling in the Utica market for five to ten cents a pound above the market price of the finer grades of butter. The herd was originated by Truman A. Cole, by the practice of twenty-seven years of the closest possible inbreeding.

The other breed of cattle coming rapidly into favor is the Holstein. The principal herd of these, in our state, is that of the Messrs. Smiths & Powell, Syracuse. These animals are large, as heavy as the Shorthorns, spotted black and white, and are most remarkable milkers. An annual yield of 10,000 to 16,000 pounds of milk is not uncommon for a cow of this breed. From the best of my observation, and from the recorded analysis of Holstein milk, I am of the opinion that it is rich both in butter and cheese. The butter made from it is of excellent quality, and no one has disputed that the milk makes good cheese.

HOW TO MANAGE THE DAIRY.

O. S. Kilbourn, of Elysian, Ill., says :

Good cows, well fed and well watered, will produce good milk—well watered means plenty of good healthy water from a running stream or good well. It is a notorious fact that poor water or water from stagnant pools is the cause of more taint in milk in summer time than anything else. Salt, regularly given, adds to the quantity as well as the quality of milk. If it be possible, let your cows have access to plenty of shade during the hot days of summer, for many a can of milk is spoiled by a single pailful being drawn from a cow in an overheated condition. Do not hurry your cows. Do not allow your men to beat them, nor dogs to worry them. They will give more and better milk for the kindness bestowed on them. When your men come to milk insist that they clean the bags and teats with water, if they need it, and then dry them before milking, and for heaven's sakes don't allow them to drain the dirty mixture into the pail. Look to it, that every pail, every strainer, every can, is washed in cold water first, and allowed to get the sun's rays upon them if possible, for there is no purifier like good pure air and a bright sun. My attention has lately been called to an excellent pail known as the Perfect Milk Pail, having a long and somewhat flaring spout, into which the milk is injected, the top is covered and upon its sits the milker. It prevents odors of the stable from getting into the milk, also any dirt or filth that often drops from the cow's body or bag ; neither can the cow gently plant her foot or switch her tail into the milk as she is wont to do occasionally.

Every dairy farm should be providded with a good milk house, situ-

ated at good distance from the cow stable, so that it may be free from the disagreeable odors that milk is always sure to absorb if left all night in the cow stable. If you have not running water in the milk house, provide yourself with a good wind mill pump. As soon as the milk is drawn, carry it *at once* to the milk house. Have the water about your cans changed several times and the milk stirred to prevent cream raising, until it is cooled to about sixty degrees for the night's milk and sixty-five degrees for the morning's. During all this time be sure and leave the can covers off to allow the animal heat to escape. Do not mix your morning's and night's milk, but place them in separate cans even if you have only a can altogether. Carry to the factory as soon after milked as it is cooled to the proper temperature, using, if possible a spring wagon, to prevent too great churning of the milk on rough roads. Always cover your cans with a blanket to protect the milk from the sun in summer and from the cold in winter. The cardinal points: 1st, Good food and water. 2d, Cleanliness in utensils and milkers. 3d, Properly cooling and stirring the milk in open cans set in cold water. 4th, Milk house removed from cow stable. 5th, Carry to factory with care.

THE CREAMERY.

As there is a growing desire on part of the people to know more of the creameries, we here present some facts from reliable sources. John Stewart, of Iowa, an experienced and intelligent butter maker, gives the following

DIRECTIONS FOR BUTTER MAKING:

In winter have a good, warm, dry place for your cows. Feed ground feed. Ground corn, oats and barley, mixed with equal portions of each, is the best food to produce quality and quantity combined. Give the cow plenty of sweet hay and pure water.

Milk pails and pans should be thoroughly scalded and cleansed every time before using. A pan that can be set in a water vat is best. Use tin pails for milking—never wooden pails.

If you have nothing but a cellar, see that it is properly ventilated, and do not have anything else in the cellar with the milk. The cellar should be thoroughly whitewashed every season, and kept sweet and clean. In warm weather you should have water vats, containing enough cold water to come up around the pans as deep as the milk in the pans. A temperature of sixty-two to sixty-five degrees will keep the milk sweet thirty-six hours.

Skimming should be attended to in proper season, if everything else

is neglected. The neglect to take off the cream at the proper time, spoils more butter than anything else connected with its manufacture. You must watch your milk in warm weather, and not let it thicken before the cream is taken off. Ordinarily the cream should be taken off in thirty-six hours after setting the milk. It never should stand over forty-eight hours, and it is often necessary to take it off in twenty-four hours. If it stands over forty-eight hours it makes bitter butter. Milk should never set in cold weather where it will chill ; it injures the milk as much to chill as to keep it at too high a temperature in warm weather. Observe these directions closely in regard to skimming.

Churn every day, if possible. Cream should not be kept longer than forty-eight hours, at most. It should be a little acid. Have the cream at a temperature of fifty-eight to sixty degrees in winter. *Do not churn too quickly;* twenty to thirty minutes is quick enough. *Stop when the butter comes.* Before it forms in mass draw off the buttermilk, and wash it with clear, cold water, or, what is better, cold brine, until the water runs off clear. Then gather and remove it to the worker.

Work the salt thoroughly through the butter, about one ounce to the pound. After you have worked the salt thoroughly through the butter, set it in a cool, clean place for twenty-four hours. Then work all the milk out, and occasionally dash cool water or brine over the butter as you work it. *Don't work it too much.*

PACKING.

Never pack in crocks. Get the best tubs you can, even if they cost a little more. Soak the tub in brine twenty-four hours before using. Pack the butter closely, and be careful that it is pressed closely to the sides and bottom of the tub. Fill *level* with the top of the tub; don't make it dishing nor round on top, but use a straight-edge, or something to level it. Put a clean bleached muslin cloth, saturated with brine, over the top.

PACKAGES.

Very *neat* packages only should be used ; those that are rough, uncouth, and irregular, should be avoided when it is possible. The package should be as light as is consistent with carrying its contents perfectly. In a lot of goods, let all the packages be of the same size, shape and style. This is very important. In shipping articles that require air, be sure to allow for ventilation. There is very great loss constantly occurring by shipping perishable fruits in close packages.

When articles are to be sold by the package, those of standard size only should be used.

Packages should not be "topped off" with the best of the contents, but show on opening an average of the quality.

RULES FOR THE GUIDANCE OF PATRONS FURNISHING MILK TO CREAMERIES OR CHEESE FACTORIES.

1st. That the patrons give their cows free access to salt, or salt them regularly as often as twice a week.

2d. That they provide them with pure water, and as far as possible prevent them from using any other.

3d. That their cows be fed no whey or similar slops.

4th. That they must not allow their cows to be worried by dogs or other *brutes*, biped or quadruped.

5th. That cows in heat should be separated from the herd as far as practicable.

6th. That they see that their pails and cans are clean, and use no rusty or wooden ones.

7th. That they keep all foreign substances out of their milk as much as possible, and wash the cows udders before milking, if dirty; remember that no straining will cleanse milk once dirty.

8th. That the milk cans be set in water at the commencement of milking, and let the water in the cooling tubs always be higher than the milk in the cans.

9th. That night's and morning's milk must not be mixed; unless in case of small quantities, short distances to be carried, and the morning's milk cooled before being put in the can.

10th. That cooling places be at a good distance from dung-heaps, decaying straw, hog troughs, etc., and exposed as much as possible to pure air, and do not suffer pools of stagnant water to collect around them.

11th. That the milk be stirred thoroughly during the cooling process.

12th. That in perilous times the night's milk be cooled to sixty degrees and the morning's as cool as cold water around the cans will make it during milking.

13th. That the cans must not be closed till ready to start to factory.

14th. That the cans of milk be protected from rain by sheds or coverings above and clear from the top of cans.

15th. That the patrons bring milk to the factory from none but healthy cows, and not till four days after calving.

16th. That if in doubt as to the good quality of the milk on account of inflamed udders, curdled milk, bad teats, etc., try it on your own tables, and if you do not like to try it you may be sure that your factoryman does not wish to.

17th. That all patrons report accidental or unavoidable variations from these rules to their cheese maker, that he may note the result.

ESTIMATED COST OF OUTFITS FOR CHEESE FACTORIES.

Having many inquiries from parties intending to engage in the dairy business, as to the cost of outfits for factories and private dairies, estimates for various sized factories are here given. Some may require extra articles, not enumerated, but in the main the following will be found all that is necessary:

FOR A DAIRY OF FIFTY COWS.

One No. 10 vat	$60 00
Three 16-inch hoops and followers, 12 inches deep	6 75
Three plain press screws	7 50
One 8-blade curd knife	2 65
One thermometer	40
One curd scoop	1 00
One curd pail	1 50
Total	$79 80

FOR A FARM DAIRY OF ONE HUNDRED COWS.

One No. 12 heater vat	$85 00
Six 15x12 hoops	13 50
Six plain screws	15 00
One 12-blade curd knife	3 85
Thermometer, curd scoop and pail	2 90
Total	$120 25

FOR A FACTORY WITH TWO HUNDRED COWS.

One No. 18 vat	$115 00
Ten 16-inch hoops	22 50
Ten screws	25 00
One 14-blade curd knife	4 45
One set Fairbank's 400-lb. platform scales, with wheels	19 50
One 60-gallon weighing can	10 00
One set testing instruments	2 50
One dozen test tubes	75
One milk conductor, 8 feet	5 00
One thermometer	40
One curd pail and scoop	2 50
Total	$207 60

FOR A FACTORY WITH FOUR HUNDRED COWS.

Where more than one vat is required, would recommend steam for heating, and estimate as follows:

One six-horse brick set boiler, half-front	$140 00
Two 600-gallon steam vats	100 00
Eighteen hoops and screws	85 50
Curd sink	18 00

Smoke stack, pump, pipes and fittings, about	40 00
Other articles, as in previous estimate	40 25
Total	$423 75

FOR A FACTORY WITH FIVE OR SIX HUNDRED COWS.

Three 600-gallon vats	$150 00
One 7-horse half-front boiler, for brick	160 00
Twenty-four 6-inch hoops and screws	114 00
Smoke-stack and boiler pump, about	25 00
One set Fairbank's scales, with wheels	24 75
One set 240-lb scales	10 50
One 15-blade curd knife	4 75
One 80-gallon weighing can	12 00
One rubber mop	65
Curd sink, small tin	18 00
Other small articles, as in previous estimate	11 65
Expense of pipes, valves, etc., about	10 00
Total	$541 30

If steam engine is required, add $130, and about $5 for extra pipes and fittings.

By comparing the above lists, a correct idea of the cost of any sized factory can be computed. Where it is intended to make butter as well as cheese, a larger boiler may be needed; but as much of the additional expense will depend upon the situation of the factory, the supply of water, and the manner of setting the milk, a special estimate will be be necessary.

CHEESE MAKING.

Hon. Hiram Smith, one of the veteran dairymen of Wisconsin, at a recent Convention of Iowa Dairymen gave his method of cheese making as follows:

It may be safely assumed, that for the general market, the "English Cheddar" stands pre-eminently at the head, and the best American cheese makers have achieved success in its manufacture, and there is no dispute among exporters and consumers, that the best American cheese takes no second place. At the recent International Dairy Fair in New York, Canada took the first prize and Wisconsin the second prize for cheese made anywhere in the world. This desireable point was reached in the presence of the best English cheddar cheese. It is safe to say that this kind of cheese is recognized as the most desirable cheese made in America. There is no more dispute among experts in regard to its excellence, when properly made, than there is among master masons in regard to brick. In its manufacture there are well defined rules to observe, a process that one person can teach another person, briefly stated as follows: The evening's milk cooled to 70 degrees, the morning's milk added, and the mass thoroughly stirred and sufficient

heat applied to raise the temperature to about 85 degrees, when rennet or extract of rennet should be added, so the milk will coagulate in one hour—when the curd becomes firm. It should be cut with a gang knife perpendicularly and allowed to stand about five minutes, when a horizontal knife should make it as fine as kernels of corn, the heat gradually raised to 100 degrees and kept almost constantly stirred, in the meantime drawing off a large part of the whey, leaving just sufficient whey to float the curds to prevent it adhearing together, and kept in this condition—it may be one hour, it may be four hours—kept until an acid is developed sufficient to have the curd spin one-fourth of an inch when applied to a heated iron, when all the warm water under the vat should be removed and cold water supplied, which checks the further development of acid, when the remaining whey should be removed and the curd allowed to drain, cool, be areated and salted, and put to press. When well pressed, twenty-four or forty-eight hours, it should be placed in a curing room where the temperature can be controlled, so that it should never be above eighty degrees nor below fifty-five degrees. If salted two pounds to the 100 of cheese it ripens early, if three and one-half pounds to the 100 the ripening is delayed much longer. If these rules are observed (and they can be and are in hundreds of cases), the cheese will be uniformly close, mellow, mild flavor, rich in quality, and give almost universal satisfaction to exporters, to the home trade, and to all lovers of good cheese.

FORAGE PLANTS.

As the wild grass of the great prairies disappears before the rapidly advancing tide of immigration, and stock raising and dairying assume greater proportions from year to year, much attention is being given to the production of green crops to lengthen the season of pasturage and increase the yield per acre of forage for the winter months. W. T. Scott, of Des Moines, a very intelligent and careful experimenter, has been for some time testing the value of various forage crops. He writes as follows of his trial of several plants :

The object of the experiments was to determine in a practical way the relative value of twenty-nine varieties of fodder plants, both for green soiling and dry fodder.

In the search for more light on this subject, from every available

source, I have found it stated that in the Eastern and Middle states, five acres of land are required for the support of an animal, three acres summer pasture, and two acres made or mown into hay, for winter use. This refers to an average, and entirely to the different kinds of pasture —both tame and natural grasses. In the Southern states no reliable statistics can be obtained, except in the favored blue grass regions of Kentucky.

It is asserted that on the best regulated stock farms in that State, three acres of blue grass are allowed for the use of one animal, affording sufficient pasture in ordinary years, summer and winter. In our State the question of pasturage has received but very little attention, for the reason that the rich bottoms, and unoccupied quarter sections—to be found in almost every neighborhood—have generally afforded the necessary amount of food, and if not, the adjacent corn fields have supplied the deficiency.

At present, the herd laws and the rapid disappearance of the prairie commons, begin to remind us of our grassless condition.

The estimate of relative value is based on the amount of cheap, milk-producing food, and apparent improved condition of cows and horses, during the time of trial, the item of cost of production and feeding considered, and as single varieties, giving the most food per acre with the least expense.

Teosinthe—In appearance and habits of growth, this plant somewhat resembles Indian corn, but the leaves are much longer and broader, and the stalks are filled with sweeter sap. We place this plant at the head of the list.

1st. Because it will yield more green or dry fodder, per acre, than any other plant known.

2d. For its branching proclivities.

3d. Its continued growth after being cut.

4th. Its power to resist drouth.

5th. Economy in handling.

Planted May 10th; distance apart 3x3 feet; four seed in each hill; number of hills 4,800; amount of land one acre; average weight per hill, green, 27½ lbs.; dry, 17 lbs.; or 65 tons green, or 45 4-5 tons dry fodder per acre, cut and weighed September 15th.

Doura—As a forage plant for green soiling, we would place this next on the list. Producing nearly as much fodder as Teosinthe; planted in the same manner, and having all the valuable characteristics of the last named except that it is not so valuable for dry food. There are two other varieties of this plant, one known as Egyptian corn,

valuable for the grain product. White-seeded. Another, brown-seeded, of no value for either grain or fodder.

Waste in feeding the two first named varieties about equal to prairie hay.

Mammoth Sweet Corn—This variety is the most valuable, having a branching tendency and abundance of leaves. Planted at the same time and in the same manner as Teosinthe and Doura, gave a fraction over 29 tons of green and 16 4-5 tons of dry fodder per acre. This crop was evidently only one-half thick enough on the ground to produce the best results. The dry weather also injured the crop. Waste in feeding about fifty per cent. greater than Teosinthe or Doura. Crosby's Early sweet corn is also valuable for an earlier crop, giving about seven-twelfths the amount of green food, compared with the Mammoth variety.

Henderson's Summer Cabbage.—Valuable as an early fodder plant. Planted two and one-half feet apart each way, gave an average of ten pounds each, or 34½ tons per acre; available at least one month before any other annual forage plant except fall or spring rye—valuable for all farm stock. Waste in feeding, about equal to Teosinthe and Doura.

Winter Rye.—This is placed on the list as No. 5, for the reason that it will give more food of good quality, in a season of the year when green food is of the most value, than any other plant known, more valuable as a pasturage plant than for green-soiling. The fact that this plant will afford a vast amount of pasture late in the fall and very early in the spring, and the land still be available for a crop of corn, millet or potatoes, is an item of great importance to farmers.

Next in importance is the Millet family. This family has a tendency to develop almost as many new varieties as Indian corn. Some of these varieties are decidedly valuable.

PROF. KNAPP, of the Iowa Agricultural College, strongly recommends sweet corn. He writes of it as follows:

Experience has shown that sweet corn fodder comes nearer filling all the requirements of best and most economized food to meet the contingencies between full grazing in the summer and full fodder in the winter than any other product of the farm. It ranks as first of the fodder crops in the following particulars: 1st. Certainty of crop. 2d. Economy in production. 3d. Value of product. 4th. Relish with which it is consumed by stock at all times. The old method of sowing corn broadcast for fodder has been almost entirely abandoned and the drill substituted. Prepare the soil as for any corn crop; most of Iowa farmers have a drill; set the largest holes in the two-horse planter and in-

struct the dropper to throw the lever rapidly. This gives a hill of six kernels once in ten inches and rows regular distance apart. It will require about one bushel of seed per acre. Planting should be done from the first to the tenth of May. Harrow and cultivate as in field corn. At maturity it completely covers the ground and looks like an impenetrable thicket, but nearly every stalk will have an ear from six to eight inches long. There will be from twenty to thirty tons on an acre. Coarser varieties of corn will produce more, but that is about an average Stowell's Evergreen, the variety usually planted. For soiling milch cows, cutting can commence the middle of July; for storing, a month later is better. In shocking the corn four rows in width and one rod in length make a shock. This may be bound in four bundles to form the shock, or a jack may be set in the center of the space and the corn leaned against it, making one band do for the entire shock. In about two weeks the corn will be cured, when such proportion as will be used after the middle of October may be put in the stack for better preservation of the fodder, and greater convenience in the use. It costs three dollars an acre to cut and shock corn. If the cost of seed and production be estimated at three dollars and a half per acre the total cost in shock would be six dollars and fifty cents per acre. In this is a combination of coarse fodder and grain, secured at a time that prolongs the harvest, and to that extent insures against drouth or wet weather.

What is an acre of corn fodder worth to feed? It is difficult to make comparison with hay on account of the loss in the lower part of the stalk. This is usually estimated at thirty per cent, and the remainder is considered equal to hay.

In practical feeding, as near as we could estimate by substituting corn and hay for sweet corn fodder, an acre of the latter is equal to four tons of hay and eighty bushels of corn.

Hon. C. F. Clarkson, agricultural editor of the *State Register*, has for years strongly recommended sweet corn for green and dry feed.

Asa C. Bowen, of Sand Springs, Iowa, has a dairy of thirty-five cows, and keeps over one hundred head of hogs. He kept up the flow of milk through the heated period and late into the fall, and his cows were strong and healthy to enter the winter. The hogs fattened finely on it, and his herd of brood sows were pushed forward with such rapidity after weaning that their average was fully up to their herd of barrows that had been fed all the season on good old corn. This result was obtained from twelve acres, which lasted until the new crop of Dent corn was matured, and the finishing feed was cheaply and quickly done with the results named. There were no signs of disease either among cattle or hogs.

He says that a litter of young pigs dropped Aug. 13th, were fed sweet corn when a week old; the kernels were shelled and placed on a board to which they had access. They soon learned to eat it, and increased one pound a day from the start. The sow was fed with the same and in six weeks was sent to market in fine order.

Young calves are also very fond of it and make rapid growth. And it is especially valuable for old horses, whose teeth are defective. As a winter fodder it is not only excellent for horses, but hogs will eat both stalks and corn when cold, and store hogs can be carried through the winter on it.

Another writer recommends the following:

Egyptian, East India or Pearl Millet—This new millet is quite distinct from all other species, and is destined to take a place in the front rank of valuable forage plants. It grows from eight to ten feet high, tillers enormously, a single seed producing sometimes twenty or more stalks, which are short-jointed, and very leafy. It may be cut repeatedly, and it will throw up fresh stalks each time. The fodder is in the best condition for cutting and curing when the stalks are five to six feet high. Cows, horses and other farm stock are exceedingly fond of this kind of millet, and it is more nutritious than Indian corn. The leaves retain their green color much better than any other fodder plant. Sow when all danger of frost is past. Sow thinly in drills thirty inches to three feet apart, and thin out to twelve inches or more in the hill.

German, or Golden Millet—An improved variety, medium early, will grow in any climate or soil; the yield in hay or seed is larger than any other grass. Grows from three to five feet high; the heads are closely condensed, spikes very numerous; seeds golden yellow. It is extensively grown, and gives general satisfaction. For seed, sow in drills, from May 1st to June 15th; for hay, broadcast, until last of July. Half a bushel will sow an acre.

White Egyptian, or China Corn (*Sorghum Vulgare.*)—This has very large heads, some of them contain a pound of pure seed each. A valuable article of food, either cooked when the kernels are not fully ripe, like green corn, or after fully ripe cooked like rice, or ground into fine meal and used for making buns, cakes, muffins, etc. It makes a very valuable forage plant, being nearly equal to Pearl millet in this respect. The culture is very simple; when grown for the grain it should be planted like corn. For fodder, sow in drills from two to three feet apart, dropping the seeds three or four inches apart in the drills. It may be cut several times during the growing season.

Hungarian Grass—Sown after corn planting, furnishes a large amount of excellent hay for cattle; for horses it should be cut before the seed ripens.

POULTRY.

CHAPTER VI.

Of the many improved breeds of fowls that have been introduced in the past fifteen or twenty years we shall not have space to treat very fully.

THE COCHIN CHINA.

This breed is noted for its size, the average weight of the fowls being from seven to eight lbs. The average of their eggs is about two ounces each. They are good layers and the chickens mature rapidly to good size.

THE DORKINGS

Are large-bodied and finely proportioned; their bodies are long, plump and well fleshed; the legs short, breast broad, with small offal. They are light color, often white. The weight of the Dorkings varies from five to eight lbs. Some have been known to weigh as high as twelve lbs. They are not great layers, but are excellent mothers.

THE MALAYS.

These are not highly prized for the flesh, which has a coarse, stringy, oily flavor. The hens are excellent layers and their eggs are remarkable for their delicacy, being of buff color and highly prized by epicures.

THE POLANDS

Are of several varieties, the Black, Golden and Silver. They all have their admirers, some of them being very handsome and showy. They are excellent for the table, the flesh being white, tender and juicy. The chicks are not hardy, many perishing when young.

THE PLYMOUTH ROCKS

Are a mongrel breed, being a cross of Cochin and Dorking. They are large, and the hens are great layers. The pullets begin to lay at five months old.

THE BRAHMAS.

There are two varieties of this breed, the light, and the dark Brahmas. They are large fowls, good layers and good setters. The light Brahmas are white with black tails; legs yellow, and covered with feathers.

The dark Brahmas are similar in form, with white backs and black breasts. The tail feathers should be pure black. The Brahma pullets will lay at six months old and continue right along until spring. The cocks often weigh twelve pounds and the hens eight or nine pounds. While not as fine flesh as some other breeds, upon the whole the Brahmas are generally regarded as about the most profitable breed for all purposes.

THE BLACK SPANISH.

This is a breed of beautiful fowls of medium size. The hens are the best of layers but the chickens are not hardy; when full grown they are good fowls, but liable to suffer in wet weather.

THE HAMBURGS.

These are small fowls, with brilliant red combs, blue legs and beautifully pencilled plumage. The hens are good layers, each one generally laying from two hundred to two hundred and fifty eggs a year. There are several varieties of the Hamburgs, but the black are generally preferred.

THE HOUDANS

May be regarded as a cross of Dorking and Poland. They are large, with compact bodies, short legs and small bones. The plumage is usually white with black spangles. The hens sometimes weigh ten pounds.

THE BANTAMS

Are dwarfed fowls, very small, and not valued except for beauty and as curiosities.

TURKEYS.

Undoubtedly the best breed of turkeys is the Bronzed. They are very large, fine looking, resembling the wild turkey. They are a beautiful bronze color, and have been known to weigh as high as thirty-six pounds.

DUCKS.

There are a great many breeds of ducks, and those wishing to engage extensively in duck raising should read up on the subject from the writings of the best breeders. The Pekin and Muscovy are quite popular and are largely raised by breeders of ducks.

GEESE.

The Toulon Geese are highly recommended. They are of French origin, attain large size, are good layers and their flesh is tender and well flavored.

THE BREMEN.

These are beautiful geese imported from Holland. Their flesh is delicious and differs from that of any other breed of geese. Many pronounce it equal to that of Canvass-back ducks.

THE CHINESE.

This is a beautiful pure white goose, swan-like in form, has a long slender neck, which is generally arched in swimming. They are prolific layers but the eggs are quite small.

THE BRANT

Is a small wild goose which goes north to the arctic regions to breed. Its flesh is delicious and highly prized.

HOW TO DRESS POULTRY FOR MARKET.

Never feed them the day before they are to be killed. This leaves an empty crop when dead. *This is of the utmost importance.*

In dressing them, the heads must be cut off, and when they have done bleeding, tie up the end of the neck with a piece of string to keep the blood from dropping about the body.

Cut off the wings at the second joint. Leave the feet and legs on.

Be sure and pluck them dry. Do not under any circumstances scald them before plucking, as it reduces the price at least three cents per pound.

Draw the inwards carefully, without making too large a hole in the bird. Leave the gizzard and crop in.

Great care must be taken not to tear the skin, and the bird should be as free from feathers, and as clean as if ready for the table. In packing for the market, they should be allowed to get perfectly cold after killing and then pack as close as possible in a clean box, using no straw. Paper the box or barrel unless clean. Mark the gross weight and tare on each package.

Poultry designed for Thanksgiving or the Holidays, should be large, fat and well dressed, and should be in market at least two days before day.

Geese are used most on Christmas.

Small or inferior poultry, if sent at all, should be sent at other times, as the demand then is almost exclusively for large nice poultry.

By followiug these directions, poultry can be safely shipped almost any distance, in quite warm fall or winter weather, and will bring a good price even when inferior poultry is plenty and low.

Grouse and quail should be carefully wrapped in paper and packed in small boxes or barrels, with the heads down. Never in any case should the entrails be removed. Mark the number of grouse or dozen of quail on each package.

ABOUT EGGS.

Shippers will avoid loss, by adhering strictly to the following directions :

First, candle your eggs carefully from the 15th of May till the last of September. Soft material should be placed under the bottom and over the top layer to prevent breakage. Place eggs in their cells lightly, (not drop them), use *thick* paste board between the layers.

Eggs should never be washed, as it causes them to rot in a few days, nor allowed to remain in the sun, as it heats them, they should be hauled on *spring* wagons.

Eggs kept in cellars or damp places rot in a very short time; to keep them well they should be placed in cool and dry rooms. Never pack eggs in pine saw-dust, shavings or damp straw, it injures them materially.

SHIPPING LIVE POULTRY.

Live poultry should be sent in good coops with feed and water troughs. Just before shipping, give plenty gravel or charcoal, then feed well. The old fowls should have soaked oats, and the spring chickens broken corn, well cooked; give plenty clean fresh water to drink. Never allow the poultry to remain in the sun or rain at the station; haul them in covered spring wagons. Ship only in ventilated cars. Railroad and Express companies, have no right to transport them in any others, unless they are willing to pay the losses caused by the overheating in close cars.

FORESTRY AND TREE PLANTING.

CHAPTER VII.

PRAIRIE WOODS.

It was the belief of the early settlers in the Mississippi Valley that trees would never flourish on the prairies; that it was useless to plant forest or fruit trees where nature had not provided them. But that popular delusion has long since been dispelled and years of successful tree culture have demonstrated the fact that the great prairies can be easily converted into woodland, orchard and grove. On no soil known to the tree planter does timber planting give more speedy returns in rapid and vigorous growth than on the prairies.

White's Geology says on this subject:

It has before been stated that forest trees can be cultivated as successfully as a crop of corn upon all varieties of our soil, and this question being settled in the minds of those interested in the subject, it becomes necessary to consider the time within which the result may be practically accomplished: because to meet the wants of the rapidly increasing population, it is necessary that some almost immediate supply be provided in the case of the broad prairie districts. Some such districts are upon, or adjacent to the coal-fields. Some are adjacent to considerable bodies of woodland, and others have important deposits of peat; from all of which sources immediate supplies of fuel may be obtained. But besides these, there are other broad and fertile tracts that have none of the advantages just named, and those who occupy them must rely for their supplies of fuel upon distant sources or upon its production from the soil. Railroads are being rapidly constructed which will carry coal from our coal-fields to a large part of these prairie regions, but a large portion of the inhabitants of Iowa must depend alone for their ordinary fuel upon the growth of trees.

By first planting those trees which have the most rapid growth, to be

followed immediately by those of slower growth and greater density of wood, one not acquainted with the subject would be surprised to see how quickly a sufficient supply of fuel may be obtained, and how a future supply of the best kinds of wood can be established. The principal kinds of trees indigenous to the State, which are, or may be used as fuel, are the following given in the order of their estimated relative abundance by natural growth in the State at large: Oaks—several species—cottonwood, elm, white maple, sugar maple, linden, hickory, black walnut.

The oaks form the greater part of the firewood now used in Iowa. In some parts cottonwood is scarcely used at all for fuel, but in others, better wood being scarce, it constitutes the greater part of the fuel used by the inhabitants. Other trees, such as hackberry, ash, honey-locust, slippery-elm, butternut, etc., are occasionally used as fuel, but they are comparatively so few in number that they hardly deserve mentioning as varieties of fuel. In the new natural growth of these trees the relative abundance of the trees is somewhat changed, the black oak, hickory and black walnut increasing. The following named trees are those that will probably be most used for cultivation. They are given in the order of their estimated rapidity of growth: Cottonwood, white maple, black walnut, oaks, sugar maple and hickory.

The relative value of each of these kinds of wood for fuel is estimated to be in the same order, cottonwood being the poorest and hickory the best; or, in other words, the slower the growth of the tree, the more valuable the wood for fuel. But taking into account the necessity that exists for immediate supplies of fuel in many parts of the State, the cottonwood becomes one of the valuable trees because of its rapid growth. As soon as it has performed this valuable pioneer service, it should be laid aside to give place to more solid and useful varieties.

The most congenial habitat of the cottonwood is upon the sandy alluvial soils of the river valleys; but it grows with astonishing rapidity on all varieties of soil in the State, and flourishes as well upon the prairies as in the valleys. Instances are numerous of the growth of this tree from the seed, or from a riding stick stuck in the prairie soil, to the size of from twelve to fifteen inches in diameter, a foot above the earth, within the space of ten or twelve years. So rapid is the growth that those well acquainted with it estimate that ten acres planted with seeds or young shoots, will, at the end of five years supply a family continually with all necessary fuel. Indeed, a large number of persons have practicallly proved the correctness of these estimates.

Cottonwood may be propagated either from the seed, cuttings, or by transplanting the young trees. The seed, which is very light, is sown

times scraped up from the sandy surfaces along the streams where it has fallen from the trees, the seed and sand mixed together and sown broadcast upon the ground prepared for it as small grain is sown. Sometimes the slender poles are cut from the dense growth that often springs up along the streams, trimmed of their branches, and then notched with an axe at intervals of a few feet along their entire length, then placed end to end in furrows at proper distance apart and covered with soil by the plow. Sprouts quickly start from the sides of the notches and rapidly become thrifty trees.

The most congenial habitat of the white maple is also upon the lowlands, but it thrives well upon the prairies. For rapidity of growth it ranks next to the cottonwood and makes better and more durable fuel. It succeeds well upon all varieties of soil and may be readily propagated from the seed, or by transplanting the young trees from their places of natural growth.

The black walnut has been proven to succeed well upon the prairies by artificial propagation. It is propagated from the seed with certainty and little labor.

These three kinds of trees are those now most commonly used for the production of artificial groves and woodlands by the people of the State, since the failure of the black locust, in consequeuce of its destruction by the borers. It is well known that all other indigenous trees may be artificially cultivated, but these seem to have been wisely chosen for the rapidity of their growth and the small amount of labor required in their propagation and cultivation. These tests which the people have made extensively throughout the State, prove beyond the possibility of a doubt that a sufficient amount of fuel and fencing material may be produced from the soil alone in any part of Iowa.

People have hitherto been in the habit of regarding the great proportion of prairie in our State as a calamity; but with a knowledge of the facts just stated it is evident that views directly opposite should be taken, because the labor and expense of procuring all necessary fuel by the means just explained, is but a tithe of what would be necessary to prepare the land for cultivation if it had been originally covered with forests, such as formerly prevailed in a large part of Ohio and Indiana. In a prairie region like ours the farmer selects the finest lands for cultivation; every acre of which is ready for the plow, and sets aside the less tillable and more broken portions for his future woodlands. Thus he may not only choose the location of his fields aud woodlands, but also the kinds of crops, whether grain or trees, that shall be grown upon each.

A CATALOGUE OF THE INDIGENOUS FOREST TREES OF IOWA.

Acer dayscarpum—White Maple.
Acer sacchirinum.—Sugar Maple.
Aesculus glabra.—Buckeye.
Betula nigra.—Water Birch.
Carya alba.—Hickory.
Carya amara.—Pig-nut Hickory.
Carya olivaeformis.—Pecan.
Celtis occide talis.—Hackberry.
Cerasus scrotina.—Black wild cherry.
Fraxinus Americana.—White Ash.
Gleditschia tricanthus.—Honey Locust.
Gymnocladus Canadensis.—Kentucky Coffee bean.
Juglans cinera.—Butternut, White walnut.
Juglans nigra.—Black walnut.
Negundo aceroedes.—Box-elder.
Plantanus occidentalis.—Button, Sycamore.
Populus monilifera.—Cottonwood.
Populus tremuloides.—Aspen.
Quercus alba.—White oak.
Quercus imbricaria.—Laurel oak.
Quercus macrocarpa.—Burr oak.
Quercus tinctoria.—Black oak.
Tilia Americana.—Linden, Basswood.
Ulmus Americana.—Common elm.
Ulmus fulva.—Slippery elm.

Some of the trees enumerated in this catalogue can hardly be said with strict propriety to be a part of our forest trees on account of their scarcity. A few others might also be mentioned that occur in small numbers within the State, besides several species of the smaller class of trees; but the object of this catalogue is only to give a general view of the arboreous flora of the State to those who are not acquainted with it.

FORESTRY ON THE PRAIRIES.

The time has passed long since in the prairie country for doubting the feasibility or profit of tree planting for timber and shelter. Hon. C. E. Whiting, of Monona county, Iowa, who is one of the most successful of pioneer tree growers, well says:

Timber-growing is no longer an experiment, but with care, a certain and complete success.

If planted in belts around the farm, the protection is worth more than the rent of the land on which the timber stands. All the timber which I have planted, or will plant under the present law, will stand, when ten years old, without having cost me a cent.

It renders a farm so much more comfortable, beautiful and attractive as a home, and so much more valuable if we wish to sell.

One can hardly look on these beautiful groves, with their cool shade

in summer, and protection in winter, without a feeling of self-conscious satisfaction that he has done one good thing for himself, for his State, and for his posterity.

Several of the western prairie states have wisely offered special inducements to tree planting, by exempting for a term of years a certain amount of property from taxation. In Iowa the exemption is as follows :

TAX EXEMPTIONS

TO ENCOURAGE FORESTRY AND ORCHARD PLANTING IN IOWA.

Section 798, Title 6, Chapter 1, of the Code, as amended by the 17th General Assembly:

For every acre of forest trees planted and cultivated for timber within the State, the trees thereon not being more than twelve feet apart and kept in a healthy condition, the sum of one hundred dollars shall be exempted from taxation upon the owner's assessment, for ten years after each acre is so planted: Provided, that such exemption be applied only to the reality owned by the party claiming the exemption, not to exceed each one hundred and sixty acres of land, upon which the trees are grown and in a growing condition.

For every acre of fruit trees planted and suitably cultivated within the State, the trees thereon not being more than thirty-three feet apart and kept in a healthy condition, the sum of fifty dollars shall be exempted from taxation upon the owner's assessment, for five years after each acre is planted. Such exemption shall be made by the assessor at the time of the annual assessment, upon satisfactory proof that the party claiming the same, has complied with this section; and the assessor shall return to the board of equalization, the name of each person claiming exemption, the quantity of lands planted to timber or forest trees, and the amount deducted from the valuation of his property.

THE IOWA STATE HORTICULTURAL SOCIETY

has done very much to encourage forest tree planting. A FORESTRY ANNUAL is published by this society each year giving valuable information on the subject.

FAST GROWING TREES.

The settler on a prairie farm should first plant some quick growing

trees to furnish shelter for his orchards, buildings and stock, while the more valuable varieties of slower growth, are coming on. The Cottonwood, White Willow, Balm of Gilead, Box Elder, Poplar and Soft Maple all grow rapidly, all growing readily from cuttings except the maple.

Prof. J. L. Budd, says:

"In making plantations, if cuttings two or three feet in length, and from one to two inches in diameter be used, they will grow with more uniformity and give less trouble in cultivation, than small cuttings, or even small plants. These large cuttings should be sawed off into lengths wanted, and the lower end sharpened with a keen axe, with a sloping cut *all on one side.* Set these cuttings by making holes with a light iron bar, in which the cuttings are driven carefully with a wooden mallet. All of the Poplar and Willow family of trees, grow best from cuttings put out in the fall, if they are set firmly and deeply. Either in fall or early spring, set them where wanted as soon as a wagon load of cuttings is prepared. They are much injured by laying around, even for a day or two.

If more convenient, the Cottonwood may be grown by the million from the seed, with very little trouble. Gather the catkins in June, rub them apart with the hand when ready to sow, and mix them up with sand to facilitate even sowing. Put in drills on mellow, moist soil, and cover not more than one inch deep: all of the Willows and Poplars may be started in great quantity in this way, where the catkins are abundant.

Suel Foster, one of the oldest of Iowa's pioneer tree planters; writes as follows:

WHAT TREES TO GROW.

No farm is complete without a wood-lot, and it is easier to raise one than to clear off one covered with the usual natural growth. When one plants his own timber, he can have such as he wants. White Ash is best for farm tools; Black Cherry for cabinet work. It will grow as fast as Black Walnut—the Walnut roots are poisonous to the crops and orchard trees for some distance. Then, for post timber, the hardy Catalpa has lately been more extensively recommended than any other tree. It is by undoubted evidence, that it has been known to last in the ground, as a post, for more than fifty years. In proof of this, Mr. E. E. Barney, President of the Car Manufacturing Company at Dayton, O., sent me a piece of Catalpa wood which was taken from a post which had stood in the ground seventy-five years. This tree is a rapid grower, easily raised from seed, and easily transplanted

The Osage Orange, our well known hedge plant, may be grown as a forest tree or wind-break in the south half of the State. It is a remarkably firm, heavy, strong wood, and valuable for many farm uses; for mallets, mauls, beetles, sled-stakes, pins, rake-teeth, and many such uses that are constantly arising on the farm.

I would not intermix different species in the grove, for some grow faster than others, and the slower growth is liable to be nearly lost by overgrowth of the larger. But for wind-break of a few rows, there may be no objection to planting different species; planting the largest growers on the outside row, and so taper down with smaller growers towards the field.

Set some evergreens about the premises. They make the best wind-break. Set them on the north of the orchard and the buildings. Plant deciduous and fruit trees as early in the spring as the ground can be plowed and evergreens a little later. Some people do not have any luck in planting evergreens. It is because they do not know how. Handle them carefully. If the ground is dry, use plenty of water. Keep the roots from drying. Plenty of wet straw or rags of gunny sacks about the roots will keep them moist. Make a mud-hole, and dip the roots in before setting. Dig the hole large enough to lay the roots out in their natural position, fill in the earth and poke it carefully underneath all the roots; when the roots are all covered and the hole half filled with soil, dash in water enough to thoroughly wet and settle the dirt about the roots; if it is dry, fill in more dry dirt and tramp it hard that it may be firmly pressed on every part of the roots, for the roots must have the privilege of absorbing water, and every part of the bark of the roots will absorb where the moist earth comes in contact with it.

After the trees are set, mulch or cover the surface with any sort of litter, leaving earth on them to prevent blowing away. If drouth comes in summer, water, but do not slop a little water on the top of the ground, it is the roots of the tree that need the water; dig the earth away until you get near the roots, then pour in water enongh to wet the ground thoroughly a foot distant around and beneath the roots, then fill in the earth and cover with mulch, and it will last a long time, and usually save the life of the tree and contribute greatly to its growth.

A few notes on the relative growth of well known species on my grounds, may be useful. They are the results of actual measurement with line and pole, on March 6th, 1879.

Hardy Catalpa, twenty-two years from seed, height thirty-five to forty-one feet, diameter 15 to 16½ inches.

Black Cherry, transplanted from woods, twenty years growth, height 40 feet, diameter 11 inches.

Sugar Maple, transplanted from woods, twenty years growth, height 20 feet, diameter 14½ inches.

Soft Maple, transplanted, twenty years growth, height 35 feet, diameter 16 inches.

Chestnut, from seed, twenty-four years growth, height 30 to 39 feet, diameter 10 to 16½ inches.

Hardy Catalpa, from seed, four years growth, height 10 to 12 feet, diameter 3 to 5 inches.

White Pine, two years seedlings, growth twenty-four years, height 50 feet, diameter 19 inches.

Norway Spruce, four year seedlings, growth 20 years, height 34 feet, diameter 13 inches.

European Larch, one year seedling, growth ten years, height 20 to 30 feet, diameter 4 to 7½ inches.

Scotch Pine, two years seedlings, growth twenty years, height 30 feet, diameter 16 inches.

Austrian Pine grows much like the Scotch, but more stocky, not quite as tall, is deeper green in color and a more beautiful tree.

The largest Catalpas have stood on rather poor, hard soil, and have not had as good culture as the four year old trees. As to the two varieties, hardy and tender, myself and foreman were looking at them to-day, and we could not attempt to distinguish one from the other by the appearance of the bark and the twigs. The hardy one grows thriftiest, and its time of blooming here is from 5th to 15th of June; while the tender kind blooms from two to three weeks later, the flowers of the early variety all dropping before a flower of the other has opened. The hardy variety has a larger and whiter flower, and the seed pods are much longer and less numerous.

The Sugar Maple is a slow growing tree from seed, until it is about five years old, when it begins to make top. In the hard grass ground by the roadside, it grows, when once started, nearly as fast as the Soft Maple.

The Black Cherry grows nearly as fast as the Walnut, and it is more valuable for cabinet work.

H. C. Raymond, of Council Bluffs, Iowa, writes:

I herewith give measurement of several of the species which were planted by me ten years ago. I give the diameters measured one foot above the surface of the ground. The plants were all about one foot high when planted. The figures are about what may be expected when trees are grown for timber. Isolated trees, or single rows, under favorable circumstances, are, and can be, grown to double the sizes here given: White Maple, diameter 8 inches, height 30 feet; Ash, 4½ inches, height

29 feet; Abele or Silver Poplar, 9 inches, height 30 feet; Black Walnut, 5 inches, height 20 feet; Black Cherry, 6 inches, height 28 feet; Catalpa, 6 inches, height 25 feet; White Pine, 5 inches, height 19 feet; Scotch Pine, 6 inches, height 21 feet; Cottonwood, 9 inches, height 35 feet; Ash Leaved Maple, 5½ inches, height 27 feet; Butternut, 5 inches, height 20 feet; Chestnut, (9 years old, from seed), 4½ inches, height 20 feet; Elm, 4½ inches, height 25 feet.

"Of the Evergreens for timber or wind-break, I would much prefer to grow the Scotch pine. It is most rapid in growth, and also the best able to stand all the extremes of our climate (excepting the Austrian Pine), and makes valuable lumber. The White Pine may be equally valuable where the air is more humid, but our air of the Missouri valley is hard on it when young, yet it can be grown if well sheltered from wind by other trees.

So far the Black Cherry (*Prunns Serotina*) has not received the attention that it merits. It grows rapidly, the lumber for finishing work is highly prized, the fruit is valuable for the birds, and the wood is valuable for fuel and very many farm uses. In these degenerate days when everything we buy is adulterated, we should plant more Sugar Maple. The more independent each family may become, the better will it be prepared for famine, pestilence, peace or war."

TRANSPLANTING FOREST TREE SEEDLINGS.

BY PROF. BUDD.

We have almost uniformly advised the planting of forest tree seeds where they are to stand permanently. But this is not always practicable, or indeed advisable. In transplanting, the plan of inserting the plants into a cavity formed by thrusting a narrow spade in the ground and pressing the handle forward, has been generally practiced. But careful growers of forestry belts and hedges, find that it pays bountifully to do the work more systematically. In reality, the best and surest method takes little, if any, more time and labor than the less perfect and successful mode of setting behind a spade.

Plow straight furrows four feet apart across the plat, running the plow as deep as possible. When ready to put in the plants, keep the team at hand, and deepen two or three furrows at a time, so the earth will be fresh and moist, by plowing back in each furrow with active boy pressing down on the plow beam. This gives a deep furrow with mellow dirt thrown up on both sides. In setting the plants, two hands work to the best advantage. Stretch a line over the center of the furrow, straighten the crooks in the furrow with a spade, and proceed to set the plants.

One hand attends to wetting the roots of the plants, a bunch at a time, as taken from the convenient point where they are heeled in, and sets them upright at proper distance apart, pulling in the requisite loose dirt, with his hands or feet. The other hands follow with a hoe, leveling up between the plants, and tramping the earth firmly around each plant.

Two hands in this way will soon put out several acres. After the plat is finished, cultivate with two horse corn cultivator or double shovel, depending on the height of the plants. About the middle of June, plow the spaces between the rows, by throwing the furrows towards the trees. A plantation started in this way, will usually make double the growth the first year made by those planted carelessly with a spade, and if the plants are in good order, not one in two hundred will fail to grow. If plants *barely live* the first season after planting, their growth will be feeble for several years, and they are liable to perish the succeeding winter.

USES OF THE COTTONWOOD AND POPLARS.

In the older countries, belts of these trees were set, which are now large trees, making fair sized logs for sawing. Many of these belts were set so near orchards and home grounds as to encroach, by their shade and root robbing, on grounds needed for garden, small fruit, or orchards. They are counted almost worthless for any purpose except summer fuel. We wish to direct special attention to the value of the timber of the Cottonwood, the Abele, Balm of Gilead, and large Aspen, for *fencing*, the *building of corn cribs, etc.* When the trees become abundant, as they soon will, in many neighborhoods on our great northern prairies, small logs of twelve inches in diameter, taken out in thinning, can be cut with profit and advantage, into fencing and lumber with small portable mills.

A few years ago, the writer put in his scrap book the following item, written by one of the closest observers England has ever produced, Dr. Lindley:

"About twenty-eight years ago, a light fence was put up near where we are writing. It was cut of Lombardy Poplar, just felled, and sawed. After being erected, it was coated well with *boiling coal tar*, which sunk deeply into the soft wood. This fence was perfectly sound for over twelve years, and yet exists, though now showing signs of decay. Question: Would it have stood at all without the tar?"

An intelligent Englishman of Du Page County, Illinois, assured the writer, that in his old neighborhood in England, the inch boards of Lombardy Poplar, White Poplar (here called Silver Poplar), Willow, and other light, soft wooded trees, are saturated with boiling hot coal tar

while yet green and sappy, as in this condition it enters the inter-cellular spaces of the wood most freely.

Thus prepared, these boards are found as durable as hard wood lumber, and far stronger than pine.

The writer has experimented with green Cottonwood and Basswood strips, saturated with hot coal tar, and has found them as durable as green White Oak for nursery stakes.

Hon. C. E. Whiting, of Monona county, reports: "I am now using many round Cottonwood posts, cut from my young thrifty growing trees, peeled, seasoned, and boiled a few minutes each in coal tar, at an expense of about one cent each. These bid fair to outlast oak posts not so treated."

BLACK WALNUT.

Each season we acquire new bits of experience, as guides in the labor of tree planting.

Careful observations during the past two years in the prairie states, convince us, that the Black Walnut makes the most rapid and healthy growth on our prairies richest in humus, and yet having a porous subsoil, so that it will not suffer in extreme seasons of wet or drought.

Another fact in relation to its growth has become apparent, which will be important for planters to remember: Where blue grass has been introduced, it is sure to get in and ruin or sadly injure the trees when planted alone in groves, unless culture is kept up more years than is profitable. This special liking of the blue grass for the Black Walnut groves, results we suppose, from the very late period in the spring when the foliage is fully expanded, giving the blue grass such a start that it matures its seed. In Illinois, this has become such a drawback in the culture of this tree, that it is now being planted in alternate rows with some tree coming into leaf early in the season. Soft Maple and Box Elder have been used to good advantage for the alternate rows, which must be taken out in whole or in part for fuel, when it is evident that they are seriously injuring the Walnuts. With this treatment, the Walnuts will run up faster and straighter than when planted alone, and they will be free from grass.

Judge Whiting gives this opinion as to value of timber for posts, and mode of keeping and planting nuts:

It is very durable, if put in the ground dry, for posts. Fifteen years ago I planted Cedar and Walnut posts at the same time, and also posts of White Oak. All are now decayed about equally. Always plant the Walnut where you want it. Will transplant well, but loses, in losing its tap-root, years of growth. Seven bushels of walnuts, with the shucks

on, will plant an acre. During the winter I put in trenches, not too thick, and cover with leaves.

Plant before sprouting if possible. Mark the ground out as for Ash, and plant the nuts early and deep, so they will not dry.

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WHITE PINE AND LARCH.

These well known trees are placed together, as many experiments at the west have demonstrated that they are mutual aids to each other in growth, and on the prairies we have special uses for the larch poles, when it becomes necessary to cut them, to give room for the development and growth of the pines. But few of our prairie settlers realize how cheaply they can now start an acre or two of these valuable and really quick growing conifers.

Aside from intrinsic value for timber, such groves prove good investments, in the way of breaking up the monotony of prairie scenery, and as places for pleasant resort in winter as well as in summer.

The most profitable mode of planting, is to set the plants in rows four feet apart. Every alternate row is planted exclusively with Larch three feet apart in rows. In the row in which the Pines are planted, they stand eight feet apart with a Larch planted half way between. When the Larch poles are cut, the Pines stand eight feet apart both ways. A practical estimate of the cost of two acres, and results at the end of ten years, may prove useful.

PRACTICAL ESTIMATE.

4200 Larch plants (transplanted, 12 to 15 inches)	$ 42 00
1400 White Pine (transplanted, 12 to 18 inches)	28.00
Preparing ground and setting	15.00
Culture for four years	25.00
Total	$110.00

After the fourth year, these trees will keep down nearly all weed growth, and the ground will begin to be carpeted with a mulching of leaves.

As wanted for use, when from eight to twelve years planted, the

Larch trees would be worth not less than fifteen cents per tree for wire fence posts, poles for fencing and other uses, for fuel, etc.

The account would now stand:

Credit to Larch, 4200 trees at 15 cents each	$630.00
Outlay in cash and labor	110.00
Estimated profit	$520.00

RED ELM.

Maple, for instance, has become over our State, the popular tree for general planting. Let us suppose the Red Elm had become equally popular. It grows as rapidly, is far hardier, it is free from insect ravages, it is worth far more for fuel, it is excellent for rails and even posts, its lumber is valuable for stable floors, bridge plank, wagon hubs, and many other uses, the trees require little if any care in the way of pruning, etc., etc. If it could supplant the Maple, the gain would soon be very apparent.

The seeds of the Elm ripen in May, usually before the trees come into full leaf. The seeds are light, and being surrounded by a membraneous wing, they are widely scattered by the wind. Sow at once on gathering, and by all means sow where wanted, if possible. They may be planted in corn hills to excellent advantage. They usually grow about one foot in height the first season. Planting with corn is an advantage, as the plants are sometimes injured when very young by direct exposure to our dry air and hot sun of July and August. The plants transplant readily, but if you want rapid growth, never break the first tap root.

BUTTERNUT.—(*Juglans cinerea.*)

This well known tree of the Northern States, does well on about all our varied prairie soils, either in groves or planted singly, in not too exposed positions, for its nuts. Western experience makes it certain, that propagated from seed, with culture when young, that nuts may be much improved; as the shells become thinner, the kernel larger and richer, and much easier to free from the divisions of the shell. It is well worth planting around our inland prairie homes for its fruit. Fuller says: "Farmers, remember that a few Butternut trees may cause your sons and daughters to send a thought or blessing back to the old homestead, when far far away and surrounded by the cares and anxieties, which we all experience in our journey through life."

When dry, the wood lasts well for posts, and the poles, when large enough to split, where they run up straight in close plantings, are durable and strong for fence rails.

DURATION OF WOODS.

The duration of thin pieces of boards buried in the earth, was tested in Europe by Hartig, with the following results :

Decay proceeded in the order named, commencing with the most perishable : Plane (European Sycamore), Horse Chestnut, Linn (Basswood), Lombardy Poplar, American Birch, Red Beech, Hornbeam, Alder, Ash Maple, Silver Fir, Scotch Fir, Elm, Weymouth, Pine, Larch, Robinia (Black Locust), Oak. The same list of experiments included tests of various preservative processes ; and the one found most effective was charring in the fire and then dipping in hot coal tar pitch. Simply charring the wood was of little utility, as was likewise saturations with different salts, which have been recommended.

PROFITS OF TREE PLANTING.

In a lecture at the Industrial University of Illinois, the following instances of forest growth and profits of timber culture were mentioned by Mr. O. B. Galusha :

A few miles from my residence are a few acres of ground which were cleared of timber sixteen or seventeen years since. There was then left upon the ground a growth of underbrush only, consisting of several varieties of Oak, Hickory, Ash, and some other sorts. I have watched the growth of timber from year to year, until the present time, and am myself surprised at the result. The land was worth, when cleared, perhaps $12 per acre, not more. There have been taken from it, during the last seven years, poles equal in value, probably, to $10 per acre, and $150 per acre would hardly buy the trees now standing up it. So that, if we estimate the value of the land (at the the time mentioned) at $12 per acre, and compute the interest upon this for sixteen years at six per cent compound interest, adding the amount of taxes accruing during the time, with interest upon this at the same rates, we have $100 per acre as the net profit of the timber crop ; while, of course, the land itself has partaken of the generally enhanced value of surrounding real estate, and would now probably sell for $50 per acre, were the timber removed.

* * * Let us estimate the expense of raising a growth of ten acres, planted with White Ash and Black Walnut, five acres of each. These varieties grow at about the same rate, and are about equally valuable for lumber. The seeds of the Ash, like all seeds of this class which ripen in the autumn, should be gathered when ripe, and kept in the cellar through winter. The Walnuts, as other nuts, should be spread evenly upon the ground, where surface water will not stand, not more

than two nuts in depth, and covered with two or three inches of mellow soil, that they may freeze during the winter; to be planted as soon in the spring as they show signs of sprouting. The land should be deeply plowed, late in the fall if practicable, and finely pulverized in early spring, and marked both ways, as for corn, three feet eight inches apart. The tree-seeds and nuts should be planted eleven feet apart, which will admid of two rows of corn or potatoes between each two rows of trees. By putting two or three seeds in a place, to be thinned out to one if both or all germinate, an even stand can be secured. A better way is to plant in rows, eleven feet apart, running north and south, and three feet eight inches—(in the marks for corn). This will secure straight trees, being closer and they may be thinned out to eleven feet each way, when large enough to use for grape-stakes, bean or hop poles. This will give 300 trees per acre, or 3,000 trees in all, allowing for some vacancies, though in all cases of tree planting, whether in groves or screens, a supply of good plants, grown elsewhere, should always be in readiness to use in filling vacancies, which should be done at the end of the first year.

The preparation of the ten acres, at $5 per acre, would be $50. Average cost of seed, 50 cents per acre, $5. Planting, $25. The cultivation, during the first five years, will be paid for in the crops grown between rows. For cultivation from fifth to ninth years, four years, with horses only, $30 per year, $120. After this time no cultivation or care will be needed. This makes the entire cost, in seed and labor, of the 10 acres of trees, $300. These trees will, at twenty-five years of age, average sixteen inches in diameter at the ground, and about ten inches at the height of sixteen feet. This will give, deducting waste in sawing, 120 feet of lumber per tree. Allowing one-sixth for damage by the elements and loss from other causes, we have, in round numbers, 360,000 feet of lumber, which, at $50 per M, would amount to $18,000. The value of the tree-tops for fuel would be equal to the cost of preparing the logs for the mill, and the expense in sawing would not exceed $5 per M. This, added to the cost of producing the trees, and the amount deducted from the value of the lumber, leaves $16,000 for the use of ten acres of land for twenty-five years, and the interest upon the amount expended in planting and cultivating the trees! This statement may be deemed incredible, perhaps, by those who have not previously turned their attention to the subject; but after much study and many years observation and measurements of growths of different varieties of trees, I am convinced that in all well-conducted experiments in growing artificial groves upon our large prairies, the profits will not fall far, if at all, short of the rates above stated. It must be born in mind that

trees standing at regular and proper distances upon rich prairie soil, and receiving good cultivation, will grow much faster than the same varieties found growing in natural groves.

PROPAGATING AND TRANSPLANTING EVERGREENS.

Robert Douglass of Waukegan, Illinois, the champion Evergreen grower of the West, sums up the method of propagating, as follows :

" Plant early in the spring ; never allow the roots to become dry, and pack the ground tight, so that they cannot shake about or be moved by the winds." He would plant as soon as the frost was out of the ground, (first puddling the roots as soon as received), and plant a little deeper than they had grown in the nursery. The center of the hole should be elevated to set the tree on, and the roots should be spread out and filled in compactly, and particularly under the tree, so that it will not sink.

In his own practice he sowed the seeds in the spring, until May, in beds four feet wide, broadcast, and raked in. The young plants must be shaded, the first year at least, by lath, cloth, or brush, and his former practice was to lay frames of lath, with spaces as wide as the strips, over the seed-beds. Another, and by some regarded as a better screen, is a frame-work of poles raised upon posts about six feet high, and covered with brush. He would bed out the plants from three to six inches apart in the rows, and the rows twelve to eighteen inches apart, shading the first season, and working with the hoe. The earth should be drawn up to the plants at the last hoeing of the season, to prevent heaving out in winter. In two years from planting they will be nice stocky trees, averaging about one foot in height, and may then be planted in nursery rows, three or four feet apart, or in shelter-belts and hedges. Three-year-old plants, six to nine inches high, may be planted immediately into 3-foot or 4-foot rows. His advice in the choice of kinds for different situations was as follows :

For hedges and screens, not intended to grow higher than eight feet, plant the American Arbor Vitæ ; for higher hedges and screens, plant Norway Spruce ; for wind-breaks, sheltering orchards. etc., plant Scotch Pine or Norway Spruce ; for ornamental planting, use Norway Spruce more freely than any other evergreen.

E. Ferrund of Nebraska, who has had ten years experience as an Evergreen forest planter, writes :

1. Never plant your Evergreen in the fall of the year, but do it in the spring as early as you can obtain the trees.

2. Do not set your trees in the ground deeper by an inch than they

stood in the nursery. Use no manure of any kind in planting Evergreens or Larch, but let the soil be mellow and friable, without lumps in contact with the roots.

3. Do not plant trees under two years old even for stocking a nursery, and for the garden and lawn give the preference to trees one to three feet high.

4. Never dig deep among the roots of your trees, but keep the soil mellow and moist at the surface by a light mulching of bruised straw or hay, that will prevent the weeds from growing.

5. Last, but not least, get your trees direct from a nursery, carefully avoiding trees that are heeled in by peddlers in the fall, because such are always killed at the root, notwithstanding their green appearance; and here allow me a little digression. Give your preference to home nurseries. You have men here engaged in the business who have spent their lifetime, judging what varieties of trees you could better plant, for your profit and success.

D. C. Scofield, an experienced Evergreen planter, of Elgin, Illinois, says:

Large nursery-grown, oft-transplanted trees, may be removed with as much certainty of their living as small ones. The hardy evergreens, such as the Norway Spruce, Scotch, Weymouth (or white), and Black Austrian Pines, may be removed from the height of twelve to eighteen feet as safely as from two to four feet. The method of removing is the same as of small trees, and they have no more need of a large ball of earth to secure their growth than a plant of twelve inches. True, they must be taken up with great care to preserve the roots from breaking on being moved or from exposure to a dry atmosphere, and when set, especial care must be taken to keep the roots in their natural position, thoroughly packing the earth among all the roots with the fingers, so as to exclude the air and retain moisture. This should be done by suspending the tree in the hole, which should be made sufficiently large not only to receive the roots of the tree, but also the planter to readily get to his task. The earth must be in fine tilth for planting corn, and must never be wet or muddy, and when thus planted the earth around should be pressed thoroughly with the feet, and when well planted, a quantity of coarse mulching of rotten straw, leaves, or, better, spent tan-bark, should be put around the tree and cover the surface from two to four feet on all sides, and from three to six inches in depth; but do not pack too closely against the trunk of the tree. Three strong stakes, six feet high should be set four or five feet from the tree at equal distances from each other. A collar or band should be fixed around the tree five or six feet from the ground, to which strong hay bands should be fastened, and

then to each stake a piece of fence-wire, which will not shrink or expand.

In the transit, the roots should be secured with moist fine straw, hay, or moss, so that they shall not at all lose their native condition. When the tree is thus set a few pailsful of water may be poured upon the ground so as to settle it, as if a great rain had done the work. When dry, spade up often, and mellow the soil to give the air circulating and condensing room in hot weather. Then replace the mulching about the tree. The less of earth retained in which the tree formerly stood the better, as from it the substance or nutriment necessary to feed the tree is entirely exhausted, and the myriads of feeding roots running off in every direction have been left in the ground. To retain the entire ball as when removed in the frost, would be to not only stop the growth of the tree, but to starve it to death before the fibrous roots could extend far enough to procure necessary food. I have had large Evergreen trees stand thus, scarcely living for three or four years, and only from freely feeding the ball with liquid manure were they kept alive; for in our ignorance we supposed we must remove as much earth as possible to make an Evergreen live. We now send our large trees off by the car load that are several days on the transit, and yet all are reported to live.

HEDGE FENCES.

HONEY LOCUST.

The Honey Locust is used in some parts of the West as a hedge plant. F. W. Hart of Mt. Vernon, Iowa, gives his method of treating it as follows:

The plants, which were two years old, were plowed in the ground sixteen inches apart. The second year they were bent down and fastened to the ground by means of forked sticks. The third year the same method was pursued, only the tops were bent mostly in the opposite direction; and the fourth year a small pole was placed along the fence four feet from the ground, and the tops of the hedge entwined around the pole, thus making an almost impregnable barrier to the encroachments of almost any kind of stock. I give it as the result of my deliberate conviction, based upon a residence of fourteen years in Linn County, that in this and northern latitude the Honey Locust is the only hedge thus far tried that will stand the test of all contingencies.

OSAGE ORANGE.

G. P. Wood of Cedar County, Iowa, gives his method of making a hedge of this plant, as follows:

While the plants may be readily grown from seed by any one familiar with seedling growing, it yet is better, as a general rule, to get them from a professional grower in the spring, as near planting time as practicable. The most suitable time for planting is just after corn planting ing is finished. In fitting hedge row for planting, throw the furrows out on a land six feet in width, leaving the middle clean and deep. When ready for planting secure a rope of bed corn size, about one hundred feet long, knotted at intervals of one foot with common wrapping cord, by passing through the rope with large needle and tieing; sort the plants in two or three sizes, planting each size separate to secure more uniform growth; puddle the plants in very thin muck, and keep shaded with sacking or old blanket. With strong stake for driving at each end stretch the line tightly, and drop a plant at each knot on the line. In setting use a sharp, bright spade; with the handle opposite the knots on cord, press down spade full length of blade, crowd forward until opening is made for insertion of plant back of the blade; get the plants down as low as possible; if several buds on the top are covered all the better, a success in hedging largely depends on deep planting in good, well prepared soil, especially if drouth soon follows the planting. If a single hand is planting after line is set, let him tramp around the plants as he goes back to move his stake, setting his foot with quick motion on opposite side of each plant. In this way the planting is done speedily, effectively, and in straight line. In moving line ahead, throw it clear of the row, so that no plants will be loosened or drawn out in dragging line forward. Cultivate thoroughly until midsummer but no later; before corn husking mulch well the young hedge with straw or long manure, intermixed with good manure, which will give the plants an early growth in the spring. This manuring results favorably so far as I have observed. Cultivate each year on the same plan until the plants are about one inch in diameter; then in early spring plash very low, cutting the plants about half off in the collar, with two inch paring chisel set in a long handle; using a light mallet. They may also be clipped with a light ax. In either case let a second hand draw the plant back, and press it down nearly horizontally with a long handled hook, readily made by bending the tines of an old hay fork.

THE WHITE WILLOW.

Gov. John Scott, of Iowa, who has had long experience with this tree, writes as follows concerning it:

"It does not accord with the facts to speak of the white willow as a

hedge plant, for such it is not, in any sense. It may be grown to answer the purpose of a hedge in restraining live stock; but calling such a barrier a hedge has a tendedcy to mislead. The willow is A TREE, and every attempt to dwarf it by cutting back, slashing, plaiting, or otherwise, will result in failure. It will only be healthy and strong when permitted to take the form of a tree. Because of this idea that it may be grown as a dwarf, and pleated together, or slashed over, it has often failed to answer any good purpose.

To realize the best results from planting corn most persons know that strong seed, proper preparation of the ground, carerul planting and good culture are essential. It is the same with the willow.

1. *Strong Seed.*—Cuttings made from upright, thrifty shoots are stronger than those from the later growth. Cuttings should be made before the buds start in the spring, and they should not be exposed to the drying influences of the sun and wind; nor should they be forced into premature growth by being packed in sawdust, or covered with manure, or placed in a warm corner. Let them be kept back until the time for planting.

2. The soil should be warm and mellow, and capable of being well packed upon the cuttings when they are set. It should rest very firmly upon the base of the cutting. This may be effected by tamping well with the foot. If the ground is in such condition that it can be kept in the proper condition for growing a crop of corn, and is so kept—clean and mellow—the growth will be satisfactory.

3. The cuttings should be set firmly, about one foot apart, and deep enough to reach moist earth. If they are from four to eight inches long they should be so set that the topmost bud should be rather below the surface of the ground. Perhaps the very best way would be to have the line of planting a little below the general surface, and to set the cuttings so that the top would be barely visible. This would leave little of the cutting exposed to drying influences, and when the shoots had fairly started from the upper bud, a little earth could be carefully drawn towards the row, and securing it from all possibility of such damage.

4. In a short time the row of young shoots will be so well developed as to suggest going over them with a hoe, and garden rake, and clearing out the weeds and drawing a little more earth. When this has been done the plow or cultivator should be used through the season as for corn. But if the soil is not in condition for this treatment, as portions of it may not be, the best course would be to very thoroughly mulch on both sides of the row of cuttings, wide enough to leave good space clear of weeds, and deep enough to insure permanently a moist surface.

The principles above laid down are for the first year. It would be well to continue the cultivation and mulching, one or both, through two or three subsequent years. The increased growth would be good compensation for the care and labor. The treatment indicated will insure that most essential feature in a stock barrier—a GOOD STAND.

Thomas Wardell of Mitchell Co., Iowa, who has had experience with the white willow writes as follows:

Recent observation leads me to conclude that the white willow is, par excellence, possessed of all the qualities necessary to a northern hedging plant. It bears the knife or shears with impunity; it stands all kinds of hard usage, or insect enemies better than any other tree or plant that I know of. If cut down to the ground it comes up again with a growth of five or six feet the first year, so thick that, as a windbreak on our bleak prairies, it has no equal in quick returns for the amount of care and skill bestowed upon it. As a timber tree it is good; as a hedging plant it is better; as a windbreak it is best. That tells my short story. I have little else to say. But lest some one who reads this may not be a brother of the horticultural craft, I will tell him how to make some willow hedge—a thing of beauty—and a windbreak; a joy for a herd or flock, and a blessing to the farmer's home and a traveller on the public highway.

Prepare your hedge row ground by very deep plowing in autumn, and plant fresh cuttings of large size and twenty or more inches in length, with a smooth slanting cut, as if cut off with one blow of a sharp hatchet. Before they get dried in the sun, put them in the hedge row sixteen inches apart, and tramp the soil well at the bottom if no where else. Cover up so that the rains of spring will expose the top of the cuttings, and give culture as for a row of corn, for three years, and you may rely on a hundred per cent, if the stock used was healthy when planted. We succeed by the above plan admirably.

Then, after four or five years' growth, plash in March, (not later) and a barrier will be grown in one year, that will defy man or beast to penetrate it. I see such a hedge often. White willow and the knife are friends in March ; afterwards enemies.

FOR WINDBREAKS.—Plant in the fall as you do for hedges, only make you cuttings three or more feet long, and of larger limbs, and plant them at an angle of sixty degrees, and leave a few inches out of ground when finished, and give the cuttings a few blows with a beetle, to settle them thoroughly into the earth below. These are better for mulching through the first winter. But you will loose but very few plants if cultivated for two or three years.

HORTICULTURAL.

THE APPLE ORCHARD.

CHAPTER VIII.

LOCATION.

In choosing ground for an apple orchard, the first and most important point to consider is *drainage*. It is a waste of trees to set them in what would be called *wet* ground. On swampy ground, at the bottom of a ravine, or in any location where water stands on or near the surface of the soil, apple trees will not do well. Notice when you visit an old orchard, that the low, wet places are either vacant or reset with young trees, or possibly occupied by dead ones. High rolling and well-drained land is the best.

Persons who have no dry land suitable for an orchard, can prepare a piece by laying tile drains two rods apart and at a depth of four feet. To do this lay out the ground in lands the length of the piece and thirty-two feet wide, and plow a few times, throwing the earth as much as possible into a ridge in the center of each land. Then lay tile four feet deep along each dead-furrow and set a row of trees on the ridge along the center of each land. In plowing, continue to throw the earth toward the trees for several years and *good drainage* will be secured.

Probably the point next in importance is the choice of soil. Gravelly clay or loam is the most favorable, produces the best and earliest crops of fruit as well as healthiest growth of tree. The land known as "*white oak ridges or knolls*" seems peculiarly adapted to fruit. The healthiest and most profitable orchards we have seen in the west are located on such land. The rocky or gravel hills, which are common in some parts of

the west, are good orchard lands. Any of the soils named are more profitable for orchards than the rich black prairie or bottom lands. In this climate high ground, sloping to the north, is now considered the best, for the reason that trees on such a slope are not exposed to such sudden extremes of heat and cold, and alternate freezing and thawing in winter. Frost stays in the ground later on a north hillside, and there is less danger of the fruit buds starting too early.

VARIETIES.

From the endless list of old and new varieties only a few have proved profitable and satisfactory in this climate. South of the center of Iowa, Illinois and Nebraska, varieties which will endure the winter cold are numerous, but when we look for the kinds producing a large crop of fine fruit at an early age, our list will be reduced to less than a dozen names. The most profitable varieties are probably Red June, Duchess of Oldenburg and Early Pennock for summer; Cole's Quince, Maiden Blush, Fulton and Utter's Red, for fall; Grimes' Golden, Jonathan, Dominie, Ben Davis, and Willow Twig for winter. To furnish a succession of fine fruit for home use, *profit not considered*, we should prefer for summer, Early Harvest, Red June, Early Joe and Chenango Strawberry; for fall, Benoni, Dyer, Lowell and Fulton; for winter, Grimes Golden, Jonathan, Wealthy, White Winter Pearmain and Willow Twig. The preceeding lists are not recommended for localities north of the center of Iowa, Illinois and Nebraska.

The combined efforts of prominent western horticulturists have produced and tested a number of varieties which can be relied upon to endure the extremes of temperature to the northern limits of our fruit regions. The list of iron clads includes Tetofski, Oldenburg and Red Astrachan for summer; Alexander, Gros Pomier, Wolf River, Plumb's Cider and Fameuse, for fall; Wealthy, Walbridge and Canada Baldwin for winter.

TOP GRAFTING.

Many of our most experienced orchardists now favor and recommend the top-grafting of choice varieties which are not perfectly hardy, upon

such iron clad trees as Oldenburg, Gros Pomier and Wealthy. The experience of many careful observers has been that trees thus formed bear younger, are more productive and profitable, and endure the severities of our climate better than root-grafted trees of the same varieties. In setting an orchard of 100 top-grafted trees the varieties would furnish a profitable succession of fruit for home and market if set in the following proportion:

For Summer—Early Harvest 1, Red June 2, Early Joe 1, Irish Peach 1, Oldenburg 2, Early Pennock 3.

For Fall—Chenango Strawberry 1, Dyer 1, Fameuse 1, Cole's Quince 1, Porter 1, Fall Orange 2, Fulton 2, Lowell 2, St. Lawrence 3, Maiden Blush 3, Utter's Red 3.

For Winter—Wealthy 2, Winesap 2, White Winter Pearmain 2, Canada Baldwin 2, Rawles' Janet 2, Virginia Greening 5, Grimes' Golden 5, Jonathan 15, Ben Davis 15, Willow Twig 10, Dominie 10.

When preparing the ground for an orchard, one important point to be considered, is the distance apart, or number of trees to the acre. Most of the old orchards in the west were planted too close. In many cases the trees were set only 16 or 18 feet apart, and now stand with branches crowded and locked together, producing only partial crops of small apples; 25 feet apart is the least distance apple trees should be set; 32 feet is better, and some varieties need over 40.

Prepare the ground you intend for orchard by *deep fall plowing*, and if possible sub-soiling. Harrow sufficiently to smooth and level the ground. Then set tall, slim poles in line where you want the first row of trees, and with a steady team and heavy plow throw out a deep furrow on both sides of the line, making a ditch where the trees are to stand. Have the poles at each end of the row exactly straight and 16 feet long, and with them measure off 32 feet from the first furrow at at each end; get the poles all in line by sighting from the two end ones and turn two furrows *from* this line as before. Continue this until you have gone across the field, then plow another lot of furrows across these, measuring in the same manner, to lay out rows the other way.

Now if this has been correctly done, you have the rows laid out both

ways and tree holes half dug by horse power. Then go over the field before winter and dig a round hole three feet wide, and one and a half feet deep, where the furrows cross.

When spring and tree planting time comes, you have the holes all ready, and about one-third full of loose earth in just the right condition for the young trees. In setting the trees at least two men are needed; one to spread out the roots and hold the tree in just the right place until the other can cover the roots with about three inches of earth, which should then be packed hard around the roots with the feet. Now throw in the earth until a little above the level of the ground, and pack again. When this is done, throw on loose earth enough to make a little mound about six inches high around the tree. As soon as setting is finished, commence mulching and cover the ground for three feet in every direction around each tree with about six inches of old hay, straw or saw-dust.

In selecting trees for an orchard take two and three-year-olds, they are much less damaged by moving than large trees, will start better, and you will lose fewer of them. Choose those with short, heavy bodies and small side branches. Take none that are barked or damaged near the ground or that have bad forks. It will be profitable to pay a few cents extra for *your choice.* No tree should be set with a heavy top, cut the lower limbs from such a tree for a distance of three or four feet.

H. W. Lathrop, ex-President of the Iowa State Horticultural Society, says:

Early in June the bodies and large limbs of the trees should have a good washing in strong soap-suds or weak lye from wood ashes. This washing will keep the bark smooth and healthy, and prevent the formation of hiding places for insects. If borers have ever found a lodgment in any of the trees they should be made the subject of watchful extermination. The knife and wire probe are the best weapons of offense against these troublesome pests. A never-failing sign of their presence is their saw-dust-like deposits about the roots. An applicetion of boiling lye from the spout of a tea-kettle to the outside of their places of retreat is said to be effectual in destroying them in the early stages of their existence. The advent of bark-lice, canker-worms, cicadæ, codling moths, fall web-worms and all other insect enemies should be met with a fixed resolution for their immediate extermination if possible, for while

the price of berries may be a few cents per quart, and of grapes two or three cents per pound, the price of apples is "eternal vigilance."

SMALL FRUITS.

No home is complete without a good supply of small fruit, such as cherries, plums, raspberries, strawberries, currents, blackberries, grapes, etc. Most of them come at a season of the year when apples, peaches and pears are not plenty, and are luxuries that may be indulged in by every owner of a farm or a town lot. The method of propagation and cultivation recommended by the IOWA STATE HORTICULTURAL SOCIETY is as follows:

STRAWBERRIES.

The preparation of the ground for strawberries should be made by deep plowing and thorough pulverizing, and it should be sufficiently rich to produce a heavy crop of corn. The plants may be put out in September, or early spring, and if for field culture, in rows four feet apart, with plants one foot apart in the row; if for garden and home culture, the rows two feet apart. If put out in the fall they should be mulched with coarse litter to prevent winter-killing. In large plantations they may be tilled with a straddle-row cultivator, the same as corn, and they should have a plowing every week or ten days during the first part of the season, and the plants may be allowed to spread until they occupy the space of one foot in the row. They should be mulched at the beginning of the winter with some material that is free from seeds, such as corn or sorghum stalks, prairie hay or coarse straw. The mulch, after the frost is out of the ground, is to be raked between the rows to retain the moisture in the ground, and afford a clean path on which to do the picking, and to enrich the ground by its decay.

When the plantation is to be renewed, which should be done every fourth year, plow the ground between the rows, set out the plants therein and then plow up and cultivate the old row.

The varieties that succeed generally in the west are Wilson's Albany, Downer, Crescent Seedling and Charles Downing. The Downer is early, Crescent Seedling and Charles Downing follow next, late, Wilson's Albany. The Duchess and Kentucky are also highly prized by many.

RASPBERRIES.

The preparation of the ground should be the same as for strawberries,

the rows to be from five to seven feet apart, depending on the length the canes are permitted to grow. The ground should be richer than for strawberries. The plants may be put out in the fall or spring, but if in the fall, a small mound of earth should be raised over them before the ground freezes. Set them from one to three feet apart in the row and cultivate as you do corn. When the young plants have made a growth of from one and a half to two feet, pinch or cut off the terminal bud; it will then throw out branches, and when the branches have made a growth of one foot or more, cut off their terminal buds. After the crop of berries is harvested, the old bearing canes should be removed, and only from three to five new canes should be permitted to grow from one stool. If you plant the suckering varieties, unless the suckers are wanted for transplanting, treat them as you would weeds, and subdue them on all suitable occasions with the plow or hoe.

The varieties generally recommended are,of the black, Doolittle, Mammoth Cluster and Gregg. Of the red varieties Turner, and Philadelphia succeed best.

BLACKBERRIES.

The planting and cultivation of this fruit should be similar to that of the raspberry. It will flourish with partial shade better than any other fruit, and may be planted on the north side of a grove, or in a young grove not too thickly shaded. In the blackberry days of early times it succeded best on our sparsely-timbered lands and in our hazel thickets.

The only variety worthy of general cultivation is the Snyder which is hardy and productive.

CURRANTS AND GOOSEBERRIES.

Should be planted in rows five feet apart, and three to five feet in the row, depending upon the number of canes left in the hill. Prepare the ground as for raspberries, and plant cuttings or rooted plants. If cuttings, they should be made from the last year's growth, soon after the leaves have fallen, and if then put in the ground and well protected during the winter, will become calloused and frequently-rooted, so that they may be put out in the spring following. The currant is a gross feeder, and will use to good advantage an abundant supply of manure. A heavy mulching should be applied each year and left on the ground to decay and fertilize it. From five to eight canes only should be left

in a hill, and all superfluous sprouts should be removed. Occasional pruning of canes may be made when they branch too much, and as the plantation attains age the old canes that become enfeebled should be removed and their places supplied by young sprouts.

GRAPES.

Should be planted quite deeply—18 inches or more—and then be well protected the first winter by being laid down and covered with earth, and if of tender varieties they should be protected every winter. The first year but one cane should be grown, the next not more than two, and the third a little fruit may be obtained. Plant in rows six to eight feet apart and train to trellis or stakes, vines four to eight feet apart in the row. A trellis may be made of three wires, the highest not more than four to five feet high, or stakes may be used from two to four inches in diameter. With the trellis you can cultivate or plow but one way, while with the stakes plowing may be done both ways. The pruning should be done in the fall, winter or spring, before the buds begin to swell. No definite rule can be given for pruning, but in doing it we should bear in mind that only the last year's growth produces fruit. A young or feeble vine should not have too much bearing-wood left on it lest it overbear, while a strong well-established vine may be more heavily taxed. Cultivation of the vines with the plow, cultivator, one-horse harrow or hoe should be begun as soon as the ground is in good condition to work in the spring, and it should be kept up until well into midsummer or later. Close pruning induces the growth of large berries and large bunches, while a superabundance of fruit-bearing wood tends to the production of numerous small bunches, with smaller berries. Each bud on last year's growth of wood may be counted on to produce from one to five bunches of grapes when the vine is well pruned.

The varieties that succeed best are the Concord everywhere, and in some localities the Delaware, Martha, Roger's Hybrids, Nos. 4, 5, 9, and 15.

PLUMS.

Plum raising in the west has not generally been profitable. Of the natives the Wild Goose, Miner, De Soto and Weaver succeed best and in some localities have given satisfaction. Of the eastern varieties the Lombard or Spanish King has proved the most profitable in central Iowa. The curculio is the great enemy of plum raising of the choice varieties.

CHERRIES.

Several varieties of cherries are grown in abundance on the prairie soil. The Early Richmond, top-grafted on the Morello, makes a good tree and begins to bear two or three years after planting. The Late Richmond and English Morello also do well in most parts of the west. Sweet cherries of the Heart varieties do not succeed. Plum and cherry trees should be planted about eighteen feet apart each way.

THE VEGETABLE GARDEN.

CHAPTER IX.

The garden should be near the house with a southern exposure, on dry soil and kept well manured. It must be securely protected from poultry, pigs and all kind of stock. Every farmer will find that it pays to have a good garden, for none of the products of the farm contribute more towards setting a good table, than a plentiful supply of vegetables. They give variety to the daily meals, and supply many little luxuries that can not otherwise be indulged in, besides being preservers of health. With a little care early vegetables may be supplied at small expense. Be careful to get good seeds, of the best varieties in all cases.

Sowing the Seed and Preparing the Soil.--These are very important matters, and care should be taken to have your seed bed finely raked and free from all rubbish aud lumps, and well enriched with well-rotted manure, and also not to sow seed too early, or, in other words, until the soil becomes sufficiently warm and dry, so that it will work mellow and crumble to pieces when struck with the spade. Do not attempt to raise fine flowers or good vegetables on a poor soil: always keep a heap of manure on hand for the next season, when it will be thoroughly rotted and ready for use. If these points are overlooked and the seed sown too early, it is apt to rot or perish, and consequently involve a loss and sad disappointment on the part of the cultivator, and is not the fault of the seed or seedsmen, as it is unfortunately laid a great many times. By sowing everything, as much as possible, in drills, instead of broadcast, a great deal of labor will be saved, as all can be kept clear of weeds by the hoe and hand cultivator.

Hot Beds.--The hot-bed is made by forming a pile of horse manure with the straw used for bedding or leaves, some three feet in height, and about 12 or 18 inches larger all around than the size of the frame to be used. Shake all together, so that the straw and manure will be equally mixed. It may be sunk in the ground a foot or eighteen inches, or made on the surface. Place the frame on as soon as the bed is made, and fill in with about 5 or 6 inches of good mellow soil, keeping the frame closed for a few days until fermentation takes place and the soil quite

warm. It is better to wait a day or two after this, and then sow the seeds. The frame can be constructed by any handy man at a very small expense. It consists of a wooden frame, from 3 to 6 feet wide, and from 6 to 16 feet long, according to the supply of vegetables or flowers required. The back side should be at least 6 inches higher than the front—the frame sub-divided by cross-bars, and each division covered by a glazed sash. The frame should face the south or southeast. From the time the seed is sown, attention to airing and shading during the hot part of the day, and covering up at night, is essential, and also that the soil be never allowed to get dry. The watering should be done with a very fine rose watering pot, and with tepid water. The temperature at night may range from 55 degrees to 65 degrees, and during the day from 70 to 80.

Cold Frame.—A cold frame is so easy in construction and management as to be available to all. This is simply a hot-bed frame, with glazed sash, placed upon a bed of fine mellow earth, in some sheltered place in the garden. After the frame is secured in its place, a couple of inches of fine earth should be placed inside, and the frame closed up for a day or two before the seeds are planted. As the cold frame depends upon the sun for its warmth, it must not be started as soon as the hot-bed, and in this latitude the latter part of April is soon enough. Watering occasionally will be necessary, and air must be given in bright, warm days. Shade also is necessary.

Thinning is a very important operation. Everything ought to be thinned very early, even in seed leaf, if the plants stand too close. Another thinning may be necessary when they are more advanced, to give them room to grow stocky. All plants, when crowded together, run up tall and slender, and never succeed well.

Transplanting.—In transplanting, the main points to be regarded are, care in taking up the plants, so as to avoid injury to the roots, planting firmly so as to enable the plant to take a secure hold of the soil, reducing the top to prevent evaporation, and shading to prevent the hot sun from withering and blighting the leaves. Transplanting should be done just at evening, or immediately before or after a rain. Give each plant a gill of water, and shade from sunshine.

The tillage of the garden should be done with the most approved labor-saving implements—*wheel-hoes* for hand use, *scarifiers* and *cultivators* for horse; the seeds should be sown with *hand-drills*, and fertilizers of the guano class applied with similar apparatus, and thus, without interfering with the labor of the farm, be made to yield vegetables in profusion, when if the spade and hoe be relied on they are produced in stinted quanity.

The amateur gardener, and the experts as well, should make out a list of the varieties of vegetables he desires to have, and then *lay off on paper a diagram of his garden, assigning certain rows to each sort.* He can then readily calculate by reference to the following table the amount of seed he will require :

QUANTITY OF EACH KIND OF VEGETABLE SEED TO SOW ONE HUNDRED YARDS OF SINGLE ROW.

Asparagus	8	ounces.	Corn	1	qt.	"	6 oz	for sets
Beans, Bush	3	quarts.	Cress	1	ounces.	Parsley	2	ounces.
" Lima	3	pints.	Cucumber	4	"	Peas	3	quarts.
" Pole	1	pint.	Egg Plant	½	ounce.	Pepper	½	ounce.
Beet	2	ounces.	Endive	2	ounces.	Pumpkin	3	ounces.
Brocolli	1	ounce.	Leek	2	"	Radish	3	"
Brussels Sprouts	1	"	Lettuce	2	"	Rhubarb	4	"
Cabbage	1	"	Melon, Water	4	"	Salsify	4	"
Carrot	2	ounces.	" Citron	4	ounce.	Spinach	4	"
Cauliflower	1	onnce.	Mustard	2	ounces.	Squash	3	"
Celery	½	ounces.	Okra	6	"	Tomato	1	ounce.
Collards	1	ounce.	Onion, 2 oz. for large bulbs.			Turnip	2	ounce.

The thoughtful cultivator will provide himself with *a surplus quantity* of the seeds he designs to plant, to hold as *a reserve* for re-planting, as dry weather, beating rains, and insect depredations often destroy the first sowings.

QUANTITY OF SEED AND NUMBER OF PLANTS REQUISITE TO CROP AN ACRE OF LAND.

Asparagus in 12 inch drills	16	quarts.
" plants @ 4x1½ feet	80.0.	
Barley	2½	bushels.
Beans, Bush in drills, @ 2½ ft	1½	bushels.
" Pole, Lima @ 4x4 ft	20	quarts.
" Carolina, Prolific, etc., 4x3	10	"
Beets and Mangolds in drills @ 2½ ft	4 to 6	pounds.
Broom corn in drills	12	"
Buckwheat	½ to 1	bu.
Cabbage, sown in outdoor beds for transplanting	10	ounces.
Cabbage, sown in frames	4	"
Carrots, in drills @ 2x½ feet	4	pounds.
Celery, seed	8	ounces.
" plants @ 4x4½ ft	25,000	
Clover, White Dutch	16	pounds.
" Luccrne	10	"
" Alsike	6	"
" Large Red with Timothy	12	"
" " " without "	16	"
Corn, Sugar	10	quarts.
" Field	6 to 8	"
Corn Salad, drills, 10 inches, large seed	25	pounds.
Cucumber, in hills @	2	quarts.
" in drills	3	"
Egg Plants, plants 3x2 ftt	4	ounces.
Endive, in drills @ 2½ ft	3	pounds.
Flax, broadcast	20	quarts.
Grass, Millett	32	quarts.
Hemp, broadcast	½	bushels.
Kale, Germau Greens	3	pounds.
Luttuce, in rows 2½ ft	3	"
Leek, " "	3	"
Lawn Grass	35	"
Melons, Water, in hllls 8x8 ft	3	"
" Citron, " 4x4 ft	2	"
Oats	2 to 3	bushels.
Okra, in drills, 2½x¼ feet	20	pounds.
Onion, in beds for sets	35	"
" in rows to make large bulbs	4	"
Parsnip, in drills @ 2½ ft	5	"
Pepper, plants 2½x1	17,500.	
Pumpkin, in hills, 8x8 ft	2	quarts.
Parsley, in drills @ 2 ft	4	pounds.
Peas, in drills, short varieties	2	bushels.
" " tall " 1 to 1¼		"
" broadcast	3	"
Potatoes	8	"
Radish, in drills @ 2 ft	8	pounds.
Rye, broadcast	2	bushels.
" drilled	1½	"
Salsify, in drills @ 2½ ft	10	pounds.
Spinach, broadcast	30	"
Squash, Bush, in hills 4x4ft	3	"
" running, 8x8 ft	2	"
Sorghum	4	quarts.
Turnips, in drills @ ft	2	pounds.
" broadcast	3	"

Grass, Timothy, with Clover...	6	pounds.	Tomatoes, in frame.....	3	ounces.
" " without " ...10		"	" seed in hills 3x3....	8	"
" Orchard.....25		"	" plants 3,800		
" Red Top 20		"	Wheat, in drills.....	1¼	bushels.
" Blue 28		"	" broadcast, ...	2	"
" Rye.....20		"			

We here give a few general directions for planting and cultivation of vegetables and plants in general use:

Artichoke.—Plant early in Spring, in deep, rich, sandy loam. Following Spring transplant to permanent beds in rows three feet apart and two feet in the row. They mature the second year. Must be protected in Winter. The edible portion is the undeveloped flower-head, which is only fit for use before it begins to bloom. It is eaten raw and boiled, and by epicures is considered quite a luxury.

Asparagus.—Soak the seed for twenty-four hours in tepid water; sow early in Spring, in rows two feet apart; keep clean by frequent weeding and hoeing. At one or two years old transplant to permanent beds. The ground should be trenched over or dug two feet deep, burying plenty of manure, decayed leaves, or leaf mould, mixing it thoroughly with the soil. Lay out the beds four and a half feet wide, and draw three drills fourteen inches apart and sixteen inches deep, lengthwise of each bed; place the roots in them about a foot apart, in their *natural position*, and cover fourteen inches deep. A rich sandy loam is most suitable. Every autumn, after clearing off the stalks, spread on a covering of manure, to be forked in, with a good dressing of fine salt, very early in the Spring. A new bed should not be cut over before the third year.

Beans—Dwarf or Bush varieties.—Dwarf or Bush Beans require no support, and may be planted in hills or drills, the latter way being preferred. Make the drills an inch and a half deep, and drop the beans three inches apart in the drills. Beans are tender annuals, and cannot be planted till danger of frost is past. Keep clean, but do not hill up or hoe when wet, as it tends to make them rust. A sandy loam is most desirable.

Beans—Pole or Running.—These are more tender and require rather more care and culture than the Bush Beans; they succeed best in clay loam, which should be liberally enriched with short manure in the hills, which are formed according to the variety, from three to four feet apart; from five to six seeds are planted in each hill about two inches deep.

Beets.—Beets are an important crop with market gardeners. They succeed best in rich, sandy loam. Early varieties should be sown as early as the ground can be worked, and for a succession every two weeks

to first of June. For winter crop sow in May. Seed germinates quicker if soaked in warm water six hours, but care should be taken not to plant soaked seed in very dry ground, as it is liable to die.

Cabbage.—Sow early sorts in hod-bed in February and March, or in open ground as soon as it can be worked. Later and winter crops, in May or June, in shallow drills, six inches apart. When the plants are four inches high, transplant into *richly manured* ground; the early kinds two feet apart; the fall and winter varieties three feet apart. The ground should be *deeply loosened and worked thoroughly and often* to produce solid heads.

For winter and spring lift the plants before severe frost sets in. Select the driest and most sheltered part of the garden, and bury the roots, stump and portion of the head in the ground, and when the weather is severe cover with straw and a light covering of earth.

Celery.—Sow seed in open ground, in light, sandy soil, in April, and thoroughly firm the soil; keep shaded, moist and clean of weeds. Clip the tops two or three times, to make the plants stocky, before transplanting, which should be done in July, in trenches eight inches deep and three feet apart for dwarf, and four for tall varieties. Cultivate often for two months, when it will be time to commence "earthing up," which should be done by degrees as the plants grow, being careful not to allow any soil to get into the center of the plant. Store in trenches, in well drained, open ground, twelve inches wide and of sufficient depth so the tops of the celery will be six inches above the surface, which must slope to carry off the surface water. Set plants closely together in an upright position. On the approach of severe cold weather, cover gradually (to prevent heating) with hay or leaves, and boards to keep out moisture. The stalks will blanch perfectly and may be taken out at any time during the winter.

Carrot.—A light, sandy loam, deeply tilled, is best. For early crops, sow in spring soon as ground can be worked, in rows fifteen inches apart, covering one inch. For field culture rows should be of sufficient distance to admit the use of a horse cultivator. Sow seed in May.

Cucumbers.—Cucumbers succeed best in rich, loamy soil. For first early sow in hot-beds, upon pieces of sod or in small flower pots, six weeks before they can be set out in open ground. When danger of frost is over transplant to hills four feet apart each way. For general crop, plant in open ground in May, about twelve seeds in a hill. When danger of bugs is past, thin to four strong plants in a hill. For pickles, plant in June. Sprinkle vines with plaster or air-slacked lime to protect from bugs.

EARLY CORN.

The following varieties are highly recommended for garden cultivation:

Extra Early Six Weeks produced good roasting ears for us last season in less than six weeks from planting. Ears small but well filled; not sweet.

Early Minnesota. Early, excellent; ears large, very uniform.

Crosby's Early Sweet. Little later than above; sweet and fine.

Moore's Early Concord. Large, well filled ears; highly prized.

Early Des Moines. An excellent variety, which has been grown and improved by the gardeners in this vicinity for many years. Among the earliest; good sized ears, delicious flavor.

Early Boynton. One of the very earliest. Ears about seven inches long; quality superb.

Lettuce.—Sow in hot-beds in March; open ground soon as can be worked. Transplant to rows 12 inches apart in very rich, pulverized soil. Or, for early plants, sow in September, and winter over in cold frames. For succession, plant every three weeks during the season. Thin out as it grows so that the plants left to head will stand 12 inches apart.

Musk Melon.—A rich sandy loam is most advisable for melons. The seeds should be planted in hills 4 or 6 feet each way, thoroughly mixing with the soil in each hill a couple of shovelfuls of thoroughly rotted manure, which will produce a strong and healthy growth; plant when the earth becomes warm, in as warm a situation as can be found. Put 10 or 12 seeds in each hill, and after they are out of danger from bugs, thin out to three or four plants; when small, dust with ashes or air-slacked lime, when the dew is on to protect from bugs.

Water Melon.—Plant in hills six or eight feet apart; cultivate same as Musk Melons.

Nasturtium, or Indian Cress.—Cultivated both for use and ornament. Its beautiful orange-colored flowers serve as a garnish for dishes, and the young leaves are excellent in salads. The flower buds scarcely formed and the green seed pods, preserved in vinegar, make a pickle esteemed by many superior to capers. One ounce will sow 25 feet of drill. Sow early in spring, in drills one inch deep—the "Tall" variety by the side of a fence, trellis-work, or some other support to climb upon; and the "Dwarf" to form borders for the alleys. They will thrive in good ground in almost any situation but are most productive in light soil.

Onion.—The onion thrives best on very rich loamy soil. Unlike most

vegetables, it flourishes when cultivated on the same land for many successive years. If possible, plow ground in fall. Sow four pounds of seed per acre *as early in spring as soil can be worked*, which must be *thoroughly* pulverized and leveled, in drills 15 inches apart; cover one-half inch. Commence hoeing soon as rows can be seen; skim the ground over the surface, avoid stirring deeply, and work the soil *away* from the bulbs. At second hoeing weed thoroughly and carefully by hand; thin plants to 3 inches in the row. When the tops die, pull and spread evenly over the ground; stir or turn until fully dried, then cut the tops one-half inch from the bulb. To keep onions through winter, a cool, dry, outside cellar, (those under dwellings being usually too warm,) or barn may be employed, any cool, (not freezing) dry, well ventilated room will do. If in a barn, protect all sides with two feet of good straw. Do not pile them in more than 10 inch layers between the straw. Freezing does not injure if not allowed to thaw and freeze again. To grow sets from seed sow very early and thick in drills. When tops die down (about middle of July) they are ready to harvest.

Parsnips.—Sow early in spring, in drills 15 inches apart, covering half an inch. Thin to 5 or 6 inches apart in the rows. They are improved by the frost, and it is usual to take up in the fall a certain quantity for winter, leaving the rest in the ground until spring; in this latitude they need no protection if left in the ground.

Pumpkin.—Pumpkins are now principally cultivated for agricultural purposes. They are usually planted in fields of corn or potatoes, but may be profitably raised in fields by themselves. Plant in May, in hills 10 feet apart both ways.

Peas.—Peas mature quickest on light, dry soil, not too rich. May be sown as early as the ground can be worked, and for a succession every two weeks up to July, after which there is danger of mildew. Sow in drills 4 to 6 feet apart, according to varieties, 1 inch apart in the drills, not less than 4 inches deep, and late in the season 7 or 8 inches. Occasionally a good late crop can be obtained by sowing an early sort as late as the 30th of August.

Radish.—For early use sow on *thoroughly enriched*, warm soil, protected on the north and west if possible, as early as the ground can be handled. For a succession at intervals of two weeks until midsummer. The winter varieties should be sown about the time of turnip sowing. Good radishes cannot be raised on poor soil. They require very quick growth.

Rhubarb or Pie Plant.—This succeeds best on deep, rich soil. Sow in spring, in drills, cover one inch. Thin plants to six inches apart.

Transplant in spring or autumn to permanent beds, 3 feet apart each way. It is a strong feeder, and bears manuring heavily.

Spinach.—Extremely wholesome and palatable. Used for greens. For summer, sow early in spring, in deep, rich soil, in drills 1 foot apart, cover 1 inch. Sow at intervals of two weeks through the season. For very early spring use, sow the winter varieties in August, and protect by covering with straw.

Squash.—Plant about the middle of May,in hills, the early varieties 4 to 5 feet apart, and the late sorts 8 or 10 feet. The hills should be highly manured, and prepared in a similar manner to those for melons. Plant from 6 to 10 seeds in a hill, thinning out after they have attained their rough leaves, leaving 3 or 4 of the strongest plants. Dust the plants when the dew is on, with air-slaked lime or ashes, to keep them from being destroyed by the striped bug.

Tomato.—Sow in a hot-bed in March and April, or, for want of hot-bed, in window-pots or boxes, or in a warm border on the south side of a fence by the last of April or first of May; thin to three or four inches to keep them low and stocky, and when frosts are no longer to be feared, transplant to four by four feet apart. Hoe often and earth up a little until the plants are a foot high, when they may be supplied with supports or be allowed to spread on the ground.

Turnip.—For the spring crop, sow the Early White Dutch, or the Strap-leaved sorts as early as the seed can be got into the ground, in drills fourteen inches apart, and thin to five or six inches. For the fall or main crop sow, at the north, from the middle of July to the last of August, in drills as directed for the spring sowing. In the field the turnips are more generally sown broadcast, though much the larger crops are obtained by drill culture. The sowing should always be done just before or after a rain, if possible. An acre requires from one to two pounds of seed.

Ruta Baga, or Swede Turnip.—The ruta baga, Swedish or Russian turnip, is extensively grown for a farm crop; the roots are close-grained, very hard, and will endure a considerable degree of cold without injury. The roots are best preserved in a pit or cellar during the winter, and are excellent for the table early in spring. Sow from 20th of June to the 1st of July, in drill two feet apart, and thin out to 8 or 10 inches.

Mammoth Russian Sunflower.—Sunflower seed is the best egg producing food known for poultry, they eat it greedily, keeping them in fine condition and fatten well on it. It is also being planted in low grounds and around drains, as a preventive of malarial fevers. It can be planted on any waste piece of ground, from 1st of May to 1st of July. Plant in hills three feet apart.

THE HOUSEHOLD.

CHAPTER XI.

HOME COOKING.

The methods of cooking here given are from the actual experience of accomplished housekeepers, and will be found suited to the home in every day life. Those who want to get up fancy dishes for ornament and style alone, will not find all they are in seach of in these pages. The three considerations—health, convenience and economy, have been continually kept in view in the preparation of the methods, recipes and instructions found in this chapter.

SOUPS.

Beef Soup.—The meat should be cut into several pieces, and the bones cracked. Put on in cold water, and bring slowly to a boil. Before it comes to the boiling point, the scum will rise freely; take this off before it breaks; then when it does boil throw in a cup of water and skim again. It must never go below boiling point after this until made, but it must boil slowly. Do not add the salt until the meat is thoroughly done, as it has a tendency to harden the fibres and retain the flow of the juises. Boil from five to six hours, and strain through a cullender. Beef soup is much better if made before it is wanted, so that all the fat can be removed.

Holiday Soup.—In carving your turkey, slice the meat from all of the larger bones, put with them points of wings, neck and such parts as have but little meat on, set away in a cold place and you can have a delicious soup any time within three days. The savings of a good turkey will make three quarts of rich soup. Three hours before the soup is

wanted, put the pieces over to boil in the proper quantity of water, boil two hours, then skim out the bones and carefully pick from them any nice meat that may remain, leave out bits of skin and bones, return to the kettle, season with salt and pepper to the taste, add butter the size of an egg, and simmer until wanted for the table.

Oyster Soup.—Drain the liquor from a quart of oysters through a cullender, put with it a pint of water in a kettle over the fire; when it comes to boiling heat, add three pints of new milk, season with salt and a generous piece of butter, and when it boils drop in the oysters with a dozen oyster crackers rolled fine; when it boils up once send to the table.

Bean Soup.—For three quarts of soup take one pint of white beans. Soak over night—giving plenty of water to be absorbed; rinse before the first boiling, add a little soda to the first water, boil fifteen minutes, drain through a cullender, then add seven pints of water which is to constitute the soup; boil from two to three hours, mash the beans thorougly when done, season with salt, have your toureen hot, put in it a piece of butter half the size of a teacup or more if you like, strain into the toureen and send to the table. Marrowfat beans are thought by many to be the best for soup.

Another Bean Soup.—After breakfast put one coffeecup of beans into four quarts of water, with the trimmings from yonr breakfast steak or other bits of meat. Let it boil constantly until dinner, adding water if necessary. Season with salt and pepper, and when done strain into a toureen through a cullender.

Green Corn Soup.—Take one dozen ears of green corn, shave the corn from the cobs, put the cobs into a gallon of cold water and boil thirty minutes; take them out and skim the water carefully; chop or bruise the corn, and boil thirty minutes in the same water; add two quarts of new milk, season with butter, salt and pepper. Let it boil up and then serve.

Potato Soup.—Peel and slice four potatoes, boil them in two quarts of water till done, then add a pint of new milk, pepper, salt and butter to suit taste. A teacup of cream added just before taken up improves very much.

GREEN PEA SOUP.—Four pounds of beef cut in pieces, one-half peck green peas, and one gallon of water. Boil the empty pods of peas in the water one hour before putting in the beef. Strain them out, add the beef, and boil slowly for an hour and a half longer. Half an hour before serving strain through a cullender and add the shelled peas, and twenty minutes later add salt and pepper.

TOMATO SOUP.—Two and a-half pounds of veal or lamb, one gallon of water, two quarts of fresh tomatoes, peeled and cut fine. Boil the meat to shreds and the water down to two quarts. Strain the liquor, put in the tomatoes, stirring them very hard that they may dissolve thoroughly; boil half an hour. Season with parsley or any other green herb you may prefer, and pepper and salt. Strain again and stir in a tablespoonful of butter, with a teaspoonful of sugar before serving. This soup is better still if made with the broth in which chickens were boiled for yesterday's dinner.—*Marion Harland.*

MEATS.

ROAST BEEF.—Roasting is a very simple operation, requiring no preparation except a bright fire and a hot oven. If the joint is very lean put into the pan a tablespoonful, or two, of water, if fat, it will not require any. While the meat is in the oven, baste it several times, and when about half done turn it, always keeping the thickest part of the meat in the hottest part of the oven. The fire should be kept hot and bright. Allow half an hour to each pound of meat. If the oven is in good condition the meat will be brown and the bottom of the pan covered with a thick glaze. Remove the meat, put the pan on the stove and pour into it half a cup of boiling water and a little salt. This makes a delicious gravy. Before the joint is served sift over it evenly fine salt. If the meat is tough, a good way to cook it is to boil until tender and roast in the kettle, turning often until brown. Corned beef, to be good, must be boiled very slowly.

BEEFSTEAK.—The best possible way to cook a beefsteak is to broil. A wood fire is best for this purpose, but with care it may be done over a coal fire. The coal must not blaze, but be burned down to a bed of red coals, yet it must be very hot. If you cannot have the fire just right,

and it is difficult to do so when other things are cooking, do not attempt broiling, but have a fryingpan smoking hot, and, after hacking the steak with a dull knife (never pound it) put into the pan without butter or fat of any kind. In either broiling or frying, a steak should be turned frequently.

Pressed Beef.—Boil beef of any good kind till the bones fall out; pick it over carefully, removing all gristle and inedible substance, chop it fine, season with salt and such herbs as taste suggests, press in a pan with a heavy weight. When cold cut in slices and serve. Very tough and cheap pieces of beef may be made really delicious by this mode of preparation.

Boned Ham.—Having soaked a well cured ham in tepid water over night, boil it until it is perfectly tender, putting it on the range in warm water; take it up in a wooden tray, and leave it to cool. Afterward remove the bone carefully, and press the ham again into shape; return it to the boiling liquor, remove the pot from the fire, and let the ham remain until it is cold.

To Roast a Shoulder of Mutton.—Season and roast the same as beef, basting with butter and water till there is plenty of gravy. Mutton requires more cooking than beef.

Chicken Pot-Pie.—Cut the chicken in pieces ready to serve, boil until it begins to be tender, have plenty of liquor in your kettle, season with salt and drop in a piece of butter. Make a crust like biscuit, only richer, roll rather thin, cut in strips and lay across the top and around the sides. Allow three-quarters of an hour for the crust to cook. Make a thickening with flour and water, beaten smooth, pour this in at the sides of the kettle by tilting the cover, if the air is admitted the crust is likely to fall.

Baked Chicken Pie.—Cut the chicken in pieces ready to serve, boil in water barely sufficient to cover them till cooked nearly enough for the table; skim the water carefully. Remove the skin if it is very thick. Line a deep dish with a rich light crust, place the pieces of chicken in layers; such as have bones in them should be laid from the center to the edge, to make carving more easy. Season each layer with salt and

pepper, put in bits of butter, and sprinkle with flour, pour over all as much of the liquid in which the chicken was boiled as the dish will hold without boiling over. Roll the upper crust twice as thick as for fruit pies, cut out a small round piece from the middle, for the steam to pass out, and lay it over the dish, first wetting the under crust with a thin paste, to close the edges tightly. Bake in a quick oven.

To Fry Prairie Chicken.—Skin the breast and legs of a prairie chicken—as these are the only parts that it is profitable to cook. Let them lie in cold salt and water an hour, or better still, with salt and pepper sprinkled on them over night. Slice the breast in four pieces, roll it and the legs in floor, and lay in hot lard, cover tightly and set where it will steam till nearly done, then remove the cover and fry a light brown.

Roast Wild Duck.—Parboil in water with a little salt, placing a carrot or an onion inside, to absorb the fishy taste. When boiled half an hour, stuff as you would a turkey—adding onions if prefered—roast till brown and tender, basting with butter and water at first, then with the drippings, make a gravy by taking off every bit of fat, then thicken with flour.

Roast Rabbit.—Soak in water slightly salted for an hour and a half, changing the water once during the time. Parboil the heart and liver, chop fine, and mix with a slice of fat pork also minced, add to these a sufficient quantity of bread crumbs and season to taste with salt pepper and sage. Stuff the body with this and sew it up. Rub with butter and roast, basting with butter and water until the gravy flows freely, then with the dripping. It should be done in an hour. Dredge with flour a few minutes before taking it up, then baste once with butter, add to the gravy a tablespoonful of butter, and thicken with browned flour.

Baked Fish.—Open the fish so that it will lie perfectly flat. Rub salt over it, and sprinkle with flour, lay it in a dripping pan, with a little butter in the pan and on the fish, put it in a very hot oven and bake twenty minutes or half an hour. Of course the skin side is laid next the pan.

Meat Cakes.—Chop any kind of fresh cold meats very fine ; sea-

son with salt and pepper; make a nice batter; lay a spoonful of batter on the griddle to prevent it sticking, then a spoonfull of chopped meat, and then a spoonful of batter; when it is browned on one side turn carefully and brown on the other. It makes a palatable dish.

EGGS.

Scrambled Eggs.—Put a piece of butter into a frying-pan and, when hot, pour in the eggs, which should be previously broken into a dish and seasoned. Stir constantly till cooked as much as desired. Serve immediately.

Omelet.—Six eggs; beat the yolks, and add one tea cup of milk; beat two tablespoons of flour with a little milk; *beat* the whites to a stiff froth, mix all together, and fry in a buttered spider.

Shirred Eges on Toast.—Buttered toast; 1 egg to each slice; butter, pepper, salt. Drop whole eggs into a dish. Set it in the oven. Let it remain there until the whites of the eggs are set. The moment the dish is taken from the oven break the eggs with a fork, add pepper, salt and butter to taste. Then spread it on hot and crisp toasted bread, well buttered. Eggs prepared in this way are equally nice on Graham, brown, or flour bread, toasted.

VEGETABLES.

RULES APPLICABLE TO THE COOKING OF ALL VEGETABLES.

First.—Have them as fresh as possible; Summer vegetables should be cooked on the same day they are gathered. *Second.*—Lay them, when peeled, in *cold* water for some time before cooking. *Third.*—If to be boiled, put a little salt into the water. *Fourth.*—Cook them steadily after they are put on. *Fifth.*—Be sure they are thoroughly done—rare vegetables are neither palatable nor healthy. *Sixth.*—Drain well. *Seventh.*—Serve hot.

POTATOES.

Mashed Potatoes.—Old potatoes are best mashed. Pare and let them lie in cold water half an hour. Put a pinch of salt into the water in which they are boiled. Drain thoroughly when done, sprinkle with

salt, and mash with a *wire* masher. Add a little butter and enough milk to make the consistency of soft dough; beat until perfectly smooth and free from lumps.

Potatoe Balls.—Make cold mashed potato into flat cakes; flour and fry in lard until they are a light brown.

Potato Croquettes.—For croquettes mash your potatoes, season with butter, milk, salt, a dash of nutmeg and a dash of cayenne pepper; add the beaten yolk of an egg. Beat thoroughly; and mould up into balls or oblongs; roll these in egg and then in fine cracker crumbs and fry in boiling lard.

Saratoga Potatoes are prepared with a little cabbage cutter, which shaves off a large fair potato slices of fairy-like thinness. Put the slices for a few minutes on ice or in cold water. Try your boiling hot lard with one slice to see if it colors properly; if all right, put in a few slices; when of a delicate yellow color, skim them out upon a tin plate with your perforated tin ladle, sprinkle over them some fine salt and put them in your dish. They are as good cold as hot.

CABBAGE.

Hot Slaw.—Mince or slice the cabbage, the finer the better. Put a piece of butter the size of an egg into a spider; when melted, put in the cabbage, and a cup of boiling water, salt and pepper. Cover close, and cook till tender and dry. Have ready an egg, well beaten, half a cup of vinegar, a tablespoonful of sugar, thoroughly mix, and pour over the cabbage the last thing before taking up. Stir for a moment and serve hot.

Cold Slaw.—An excellent cold slaw is made by shredding a solid head of cabbage with a thin, sharp knife or a slaw cutter, then placing the cut cabbage in your dish, pour over it a dressing made by heating a pint of vinegar scalding hot, then beating into it quickly one beaten egg with a lump of butter as large as a walnut, and a tablespoonful of sugar. The cabbage should be slightly sprinkled with salt and pepper as it is put in the dish.

Dressing for Chopped Cabbage.—The yolks of three or four hard-boiled eggs, mashed fine, with a lump of butter the size of a walnut,

add to this a teaspoonful of mustard, and beat it all up in vinegar weakened by water and sweetened with sugar so as to be palatable, and pour while hot over the cabbage and cover. Serve when cold. Some prefer salad oil in the place of butter.

BOILED ONIONS.

Peel and lay in cold water half an hour, put in a kettle with boiling water to cover them, cook sixteen minutes and drain off the water, recover with water from the boiling tea-kettle, boil until a straw will pierce them; drain and put into a dish with pepper, salt and plenty of butter.

SLICED TOMATOES.

Do not scald, but pare with a keen knife, slice thin and evenly, cutting out the hard core if there is any; lay in uniform rows in a dish, and set on ice or in the cellar until wanted for the table; serve in individual dishes, and let each dress their own; some prefer sugar, others pepper, salt and vinegar.

BREAD.

From inferior flour it is possible to make biscuit, muffins, plain pastry and pan cakes that are eatable; but to make good bread you must have the best of flour. In handling flour, squeeze a handful tightly, and if it retains the imprint of the hand it is pretty safe to conclude that it is not the best quality or that it is new flour. In either case it is greatly improved by sifting enough for each baking into the bread tray and exposing to the hot sun for several hours, or setting near the stove. Next in importance to the quality of the flour is that of the yeast, which should be light and lively. Set the dough to rise in a moderately warm place, and keep it in an even temperature. Cold arrests the process of fermentation; too much heat carries forward the work too rapidly, and makes the dough puffy and sour. In this case, if you do not wish to throw it away, which is the best possible thing to do with sour bread, dissolve a little soda in hot water and work it well in. Bread should be mixed as *soft as it can be handled.* It will rise sooner, be lighter and keep fresh longer if this rule is followed. If you can mould it at all, it

is not too soft. When it is in managable shape, begin to knead. Work the mass into a ball, always having the hands and the board well floured; knead hard, and always toward the center of the mass, which should be repeatedly turned over and around. Brisk and long kneading, twenty minutes or half an hour, makes the pores fine and regular. This done, work the dough into a ball, sprinkle with flour, throw a cloth over it and leave on the kitchen table to rise. In summer it will rise in four or five hours—in winter in about six hours. It should come up steadily until it is treble its original size and the floured surface cracks all over the mass. Knead again ten or fifteen minutes; divide into as many parts as you want loaves, and put these into the well-greased pans for the final rising. Set the pans in a warm place for an hour longer. The oven should not be too hot. If you cannot hold your bare arm in it while you count thirty it is too hot. After the bread is in, keep the heat very regular. If the bread rises rapidly while baking, and the crust begins to form before the lower part of the loaf is baked, cover the top with a paper until you are ready to brown it. If the crust should burn, grate it instead of clipping with a knife. When taken from the oven, stand the loaves on edge, and cover with a cloth until cool. This position allows the air to cool all sides and prevents sweating.

GERMAN YEAST.—Parch a teacupful of corn, cook it well, but do not brown much, put this with a good double handful of hops, tie it in a thin muslin bag, in a kettle with four quarts of water, and boil three hours; strain through a cullender, put back in the kettle and put in six large potatoes without paring, boil one hour, strain again and rub the potatoes through the cullender; return again to the kettle and add a teacup of white sugar, the same of salt, a tablespoonful of ginger and water enough to make a gallon. When cool put in a teacup of good yeast, or two yeast-cakes that you know are good, keep warm until it rises, which will take about thirty-six hours.

Keep in a jar in the cellar.

SELF-WORKING YEAST.—Tie two ounces hops in a coarse muslin bag, and boil one hour in four quarts of water, and let it get nearly cold before removing the bag. Wet with the tepid liquor, a little at a time, one pound of flour, making to a smooth paste. Put in half a pound of white

sugar, and one tablespoonful of salt; beat up the batter three minutes before adding the rest of the tea. Set it away for two days in an open bowl covered with a thin cloth, in a closet which is moderately and also evenly warm. On the third day peel, boil and mash eight potatoes, and strain through a cullender into the thickened hop liquor, let it stand twelve hours longer in the bowl, stir often and keep in the warm kitchen. Bottle, or put away in corked jars, and it will keep a month in a cool cellar.

BREAD.—Pear three large potatoes and boil in water enough for three pints when done; have one large spoonful of flour in a gallon crock and pour on the boiling potato-water, stir it well and mash the potatoes with a fork or a wire potato masher—a wooden mallet makes them heavy—and put the potatoes into a crock,stir well, and when about milk warm add two-thirds of a teacupful of German yeast, cover the crock, and in cold weather cover with a cloth and set it where it will keep warm over night. If the sponge is not as light as a honeycomb in the morning, set the crock in a pan of quite warm water, and when as light as it can be, stir in flour enough to make a thick batter, and then let it rise very light again, which will take from two to three hours; this time have your tray of flour sifted and warmed, (you will need about five or six quarts), make a hole in the center and pour in the sponge, rinse the crock in a very little water and pour it in. Then proceed to mix and knead according to general directions. The above quantity will make three good loaves.

Very nice light rolls may be made by taking the desired quantity at the last moulding and mixing in as much lard or butter as will make it tender, set very close in the baking pan to make them deep instead of making them spread.

GRAHAM BREAD.—Make a sponge the same as for white bread, and finish with graham flour. Ten minutes will suffice for the moulding, but bake slowly and one-third longer than the time for white bread.

STEAMED BROWN BREAD.—Take one quart of corn meal, scald with a pint of almost boiling water; if boiling the meal will cook in lumps and

be hard to make smooth. Add a pint of graham flour, a pint of sour milk, half a teacup of molasses, half a teaspoon of salt, and one teaspoon of soda dissolved in warm water enough to make a rather thick batter.

Steam from four to six hours, a double steamer is the best, if you do not have that use a flaring basin covered tight with a plate or pie tin, and set in a common steamer over a kettle.

Baking Powder Biscuit.—Mix three heaping teaspoons of baking powder thoroughly with two quarts of sifted flour, add half a teaspoon of salt, rub into it lard and butter twice as large as an egg, mix soft with cold water or sweet milk, work as little as possible. Bake in a quick oven.

Quick Graham Biscuits.—Three pints of graham flour, three teaspoons of baking powder, one teaspoon of salt, mixed thoroughly with the flour; rub into this a piece of nice lard the size of an egg, and half as much butter, then pour in water or sweet milk slowly and stir to a stiff batter. Drop in spoonfuls as in drop cakes, in a dripping pan, or bake in gem cups. Bake in a moderate oven half an hour.

Muffins.—One cup of flour and two cups of corn meal, or two cups of flour and one of meal, one-half cup of butter, one-half of sugar, two eggs and two tablespoons of baking powder; one cup of water and a little salt. Bake in muffin rings or gem irons.

Graham Muffins.—Add two beaten eggs to a pint of milk; stir in two and a half cups of graham flour and one teaspoon of baking powder. Bake in a quick oven fifteen minutes. These are made very quickly and easily.

Johnny Cake.—One-half pint of sour milk or buttermilk, one pint sweet milk or water, one egg beaten light, half a teacup of sugar, lard or butter the size of an egg and half a teaspoonful of salt. Add meal to make a thin batter, and half a teaspoonful of soda dissolved in a very little water. Bake from one-half hour to one hour, according to the thickness of the loaf; this may be from one two inches.

Waffles.—One quart of sour milk, one teaspoonful soda, three eggs, beaten separately, make a little stiffer than pancakes, sweet milk and baking powder can be used if preferred, some add butter half the size of an egg, warmed and beaten with the batter.

GRAHAM GRIDDLE CAKES.—Take three pints of warm water, one gill of good yeast, and an even teaspoon of salt, thicken with gaham flour, a very little thicker than for white flour cakes, set it in a warm place overnight to rise, and bake on a very hot griddle longer than white cakes.

BUTTER CRACKERS.—One quart of flour, three tablespoons of butter, one-half teaspoonful soda, dissolved in hot water, one teaspoonful salt and two cups sweet milk. Rub the butter into the flour, or what is better, cut it up with a knife or chopper, as you do in pastry; add the salt, milk, and soda, mixing well. Work into a ball, lay upon a floured board and beat with a rolling pin for half an hour, turning and shifting the mass often. Roll into an even sheet, a quarter of an inch thick or less, prick deeply with a fork and bake in a moderate oven. Hang them up in a muslin bag in the kitchen for a day or two.

CAKE MAKING AND CAKE BAKING.

The excellence and beauty of *all* cake, rich or plain, depends upon the manner in which the process of making is begun and carried to the sweet, *not bitter*, end. Cake should always be stirred in an earthen bowl —or a crock—and with a pudding or other stick kept for that purpose. The best way is to begin by preparing the baking pan, for a delicate white cake, it is well to line at least the bottom of your dish with buttered paper; if you do not line, a good way is to grease carefully every corner and seam with a very little nice lard, use a clean white rag to rub with; if a cake sticks to the pan it is ruined. Next look to the fire, that your oven may have the proper heat, which should be mild; having satisfied yourself on that important point, proceed by sifting flour and rolling sugar, if you do not use the granulated—which is much better, and less liable to adulteration. For delicate white cake, the very best, is the powdered sugar, generally used for frosting. The next thing to be done, is to measure the butter, which should be of good quality, and should be washed; this can be done by adding a pint of water—tepid, if the butter is hard, but be careful not to make it warm enough to melt in the least or mischief will be done; stir slowly for a few minutes, be sure the water has penetrated every particle; when it begins to look

broken, drain off every drop of water, stir briskly until it is like thick cream, add the sugar, and you will be surprised to see how little time it will take to "cream" it again. Before going any farther stir in one half cup of the flour, then put in half of the milk—or water, which is just as good, and another half cup of flour, stirring steadily all the time, and so keep on alternating flour with other ingredients untill all are used. Baking powder should be mixed with a tablespoonful of the flour and stirred in lightly the last thing; do not stir more than barely to mix in the powder; bake immediately.

Eggs should be beaten, whites and yolks seperately—the Dover egg-beater is the best instrument for this purpose, in the market; if you do not possess one, beat the eggs in a platter with a tin whisk or sharp knife, until it is as firm as snow and cuts clear and smooth. Beat the yolks in an earthenware bowl until they cease to froth, and thicken as if mixed with flour. Have the dishes cool. It is impossible to beat whites stiff in a warm room. It facilitates the work more than one-half if two can give their time,—one to stir without ceasing, and the other to measure, beat eggs, and add ingredients in their order, besides ensuring a finer quality, and giving the ladies a chance to whet their ideas in that direction, which they will never lose. There is an interest about cake baking which makes a woman chatty if she has an agreeable helper. We have known neighbors to exchange where there was only one woman in the houshold. Indeed, we have a distinct recollection of doing so ourselves upon a few extra occasions, and getting any amount of *fun* out of simply—baking cake. Cake should rise to its full height before the crust forms. If it hardens too fast on the top, cover with paper. Move gently and keep the oven closed as much as possible. All loaf-cakes require a gentle heat to give time for rising, and a longer time than is generally given for baking. Try with a broom straw, if it comes out clean the cake is done.

Icing.—Whites of four eggs, one pound powdered sugar; lemon, vanilla, or other flavoring. Break the whites into a cool dish, throw a handful of sugar upon them, and begin beating. A few minutes later, throw in more sugar, and keep adding it at intervals until it is all used up. Beat until the icing is of a smooth, fine and firm texture.

PLAIN CAKE.—Three-fourths of a cup of butter, one cup sweet milk, two cups sugar, three eggs, three cups flour, two teaspoons baking powder. Flavor to taste.

LEMON CAKE.—One cup butter, three cups sugar, five eggs, four cups flour, one cup sweet milk, one lemon, one teaspoon of soda.

POUND CAKE.—Four and one-half cups flour, three and one-half cups sugar, two cups butter, eight eggs.

CORN STARCH CAKE.—Two cups sugar, two cups flour, one cup corn starch (sifted with the flour), one cup butter, one cup sweet milk, two even teaspoonfuls baking powder. Whites of eight eggs beaten to a stiff froth and added the last thing. Flavor with bitter almond. This cake requires great care in baking. It should bake about an hour in a slow oven.

PLAIN SPONGE CAKE.—One teacup pulverized sugar, three eggs, one teacup flour, one even teaspoon baking powder. Flavor with lemon—half the juice and half the rind of one. Bake twenty minutes in shallow tins.

SNOW CAKE.—One tumbler of flour, one and one-half tumblers pulverized sugar, one-half teaspoon cream tartar, and a pinch of soda. Mix the above thoroughly and sift into a bowl. Beat the whites of ten eggs with one spoonful of vanilla to a stiff froth, and pour over the flour, mixing as lightly as possible. Bake in a moderate oven.

MARBLE CAKE.—*Light Part*—Whites of seven eggs, one and one-half cups white sugar, one cup butter, one-half cup sweet milk, three and one half cups flour, two teaspoons baking powder. *Dark Part*—Yolks seven eggs, one and one-half cups brown sugar, one cup butter, one-half cup coffee, one nutmeg, one tablespoon alspice, one tablespoon cloves, two tablespoons cinnamon, two and one-half cups flour, two tablespoons baking powder. Put in the pan either alternate layers or spoonfuls of the light and dark.

COFFEE CAKE.—Three and one-half cups flour, one cup molasses, one cup brown sugar, two-thirds of a cup of butter, one cup strong coffee, one pound or more raisins, one-fourth of a pound of citron, one teaspoon

each of cloves, cinnamon and nutmeg, one teaspoon of soda. Bake slowly.

NUT CAKE.—Two cups sugar, one cup butter, three cups flour, one cup cold water, four eggs, two teaspoons baking powder, two cupsful kernels of hickory nuts, carefully picked out, added last of all.

CHOCOLATE CAKE.—Two cups sugar, one cup butter, the yolks of five eggs and whites of two, one cup of milk, three and one-half cups of flour, one-third teaspoon of soda, one teaspoon cream tartar sifted into the flour. Bake in jelly-cake tins. *Filling:* Whites of three eggs, one and one-half cups sugar, three tablespoonsful grated chocolate, one teaspoonful vanilla. Beat well together, spread between the layers and on top of cake.

CARAMEL CAKE.—Three cups sugar, one and a half cups butter, one cup milk, four and a half cups flour, five eggs, three teaspoons baking powder. *Caramel for gilling*: Two cups brown sugar, two-thirds of a cup of milk, one cup molasses, one teaspoonful butter, one tablespoonful flour, two tablespoonsful of cold water. Boil five minutes, add half a cake Baker's chocolate (grated), boil until it is the consistency of rich custard, add a pinch of soda, stir well and remove from the fire. When cold spread between the layers of cake, and set in an open sunny window to dry. This quantity will make two large cakes.

COCOANUT CAKE.—Two cups powdered sugar, one-half cup butter, three eggs, one cup milk, three cups flour, two teaspoons baking powder. Bake as for jelly-cake. *Filling:* One grated cocoanut, or one and a half cups prepared cocoanut. To one-half of this add whites of three eggs, beaten to a froth, and one cup of powdered sugar. Lay this between the layers. Mix with the other half four tablespoons powdered sugar, and spread thickly on top of the cake.

BLACK OR WEDDING CAKE.—One pound powdered sugar, one pound butter, one pound flour, twelve eggs, one pound currants well washed and dredged, one pound raisins seeded and chopped, one-half pound citron cut into slips, one tablespoonful cinnamon, two tablesponsful nutmeg, one tablespoonful cloves, one wineglass brandy. Cream the butter and sugar, add the beaten yolks of the eggs, and stir *well* together before

putting in half the flour. The spices should come next, then the whipped whites stirred in alternately with the rest of the flour; lastly the brandy. The above quantity is for two large cakes. The icing should be laid on stiff and thickly. This cake, if kept in a cool, dry place, will not spoil in two months. Test the cakes well and be sure they are quite done before taking from the oven.—*Marion Harland.*

Cookies.—Sift together three pints of flour, two heaping teaspoons of baking powder, and half a teaspoon fine salt; rub into this one teacup of butter, or lard and butter together; rub until it is thoroughly mixed, then work in two teacups of sugar,—granulated is best—now moisten with four eggs, yolks and whites beaten separately. If not stiff enough to mould, work in more flour, roll thin, and bake in hot oven. When eggs are scarce, they are almost as good if you break an egg into a teacup and fill up the same with water for moistening.

Ginger Cookies.—One cup of sugar, one cup of molasses, one cup of butter and lard mixed, one tablespoon of ginger, one teaspoon of soda and a little salt. Heat sugar, molasses, butter, and lard to boiling, stir in ginger and soda while hot, mix rather stiff and cool thin. Bake in a quick oven.

PIES.

In making paste, use ice water. Have the lard and butter cold and hard. Do not knead the dough, but mix it as lightly as possible. For two pies, take two large cups of flour, one-half cup of water, a half cup of butter, a half cup of lard and a little salt. If you do not want a rich crust, sift an even teaspoonful of baking powder in the flour and leave out one-third of the shortening.

Custard Pie.—Line your pie dish with a rich crust, and make the custard with one and one-half pints of new milk, two eggs beaten very light, two-thirds of a cup of white sugar, a pinch of salt, flavor to taste, bake in a moderate oven.

Mince Pie.—Four pounds of beef, boiled in salted water till very tender, and when cold, chopped fine; eight pounds of currants, three pounds of raisins, two pounds of citron, six pounds of sugar, a fourth of an ounce of cloves, the same of allspice, one ounce of cinnamon, nut-

megs and orange peel grated, moisten with sweet cider; if you can't get cider use three pints of good vinegar, with enough water to moisten.

APPLE PIE.—Pare, core and slice ripe tart apples, line your pie-tin with a good crust, put in a layer of fruit, then sprinkle in half a tea cup of sugar, strew bits of butter over, and season with any spice you choose, or leave plain; then lay on apples until the tin is a little more than even full; add half a gill of water, moisten the edge of the under crust with thick paste made with cold water and flour, lay over the upper crust and press gently all round before cutting off the edge; bake well.

Make pieplant pies just the same, except to double the quantity of sugar, and leave out the water.

LEMON PIE.—Take one lemon, roll under the hand until soft, to break the cells, grate the rind and squeeze out the juice, add the yolks of two eggs beaten with half a cup of sugar and third of a cup of flour or corn starch, butter half the size of an egg; beat till it foams, add water to fill one pie, put in a small pinch of salt, bake with one crust, like custard pie. When the pie is almost done, make a frosting of the whites of two eggs, beaten to a stiff froth, with half a cup of sugar, spread over the top; return the pie to the oven till it is a light brown. We think this one of the very best pies made.

PUDDINGS.

RICE PUDDING.—One teacup of rice, two quarts of milk, one cup of sugar, butter the size of an egg, a teaspoonful of salt and a cup of raisins. Bake slowly three hours, stirring frequently at first.

BREAD PUDDING.—Put in your pudding dish one pint of broken bread, pour over it a pint of milk, set where it will warm to soften the bread while you beat two eggs—be sure they are beaten light—then with a spoon or fork crumble the bread quite fine by pressing against the side of the dish, add another pint of milk, three-fourths of a teacupful of sugar, a pinch of salt, butter to taste, and put it in the oven, stir two or three times, at intervals of ten minutes from putting in the oven. A light frosting made with the white of an egg and a heaping tablespoonful of granulated sugar, improves it. Fruit, jelly or an acid sauce to serve with it is also very nice.

BERRY PUDDING.—Stew a quart of blueberries and whortleberries; sweeten to taste. Take stale bread, and butter each piece; immerse each piece in the berries, and lay in a pudding-dish first a layer of bread, then a layer of berries, taking care to have the last layer one of berries. To be eaten cold, with cream and sugar.

BLACKBERRY PUDDING.—One pint of sweet milk, two well-beaten eggs, a little salt, one-half teaspoonful cream tartar sifted in the flour, enough sifted flour to make a stiff batter, one pint of blackberries well dredged with flour. Boil for one hour in a buttered mould or floured bag.

CANNED PEACH PUDDING.—Soak one pint of picked and washed tapioca in three pints of boiling water, letting it stand three hours, then place in a glass fruit can a layer of sliced peaches, with sugar enough to sweeten them, then a layer of the soaked tapioca, adding alternate layers until the can or cans are filled. Then set a kettle two-thirds the depth of water, and then boil half an hour; take out and seal precisely as you would any canned fruit. These will be very convenient in case of any accident happening to your dessert, or of any unexpected arrival of company too late to cook a dessert, or in case any refreshments are wanted at an unusual hour, and nothing is cooked. Serve cold, or put into boiling water and heat to the boiling point.

BAKED APPLE DUMPLINGS.—One pint of flour, one tablespoonful of lard and butter mixed, one cup of milk, one-half teaspoonful of soda dissolved in hot water, one of cream of tartar, a pinch of salt. Chop the shortening into the flour; after you have sifted this and the cream tartar together, put in the soda and wet up quickly with the milk—just stiff enough to roll into a paste less than half an inch thick. Cut into squares and lay in the center of each a tart apple, pared and cored; bring the corners of the square neatly together, and pinch slightly. Bake in a moderate oven; eat with hot, sweet sauce.

APPLE PUFFETS.—The following recipe for a plain dessert we have tried and find very nice. Two eggs, one pint of milk, sufficient flour to thicken as waffle batter, one and one-half teaspooonfuls of baking powder; fill teacups alternately with a layer of batter and then of apples

chopped fine; steam one hour; serve hot with flavored cream and sugar. You can substitute any fresh fruit or jams you like.

Oatmeal Mush.—As a general rule, the coarser the meal the better the mush. The meal in which the kernels are barely broken in two once, is next in quality to the groats, which are not broken at all. Pour one measure of this coarse oatmeal into three and one-half measures of boiling water. Stir occasionally, and boil briskly until the meal is evenly diffused through the water, then set the kettle back where it will barely simmer; cover close and let it cook an hour *without* stirring. Then dish and serve warm. This makes a nice dessert with good cream and sugar.

Preserves and Fruit Jellies.

Use none but porcelain, or good bell-metal kettles for preserves and jellies. If the latter, clean thoroughly just before you put in the syrup or fruit. Scour with sand, then set it over the fire, with a cupful of vinegar and large handful of salt in it. Let this come to a boil, and scour the whole inside of the kettle with it. Do not let your preserves or anything else stand one moment in it after it is withdrawn from the fire; fill the emptied kettle instantly with water and wash it perfectly clean, although you may mean to return the syrup to it again in five minutes. By observing these precautions, preserves and pickles made in bell-metal may be rendered as good and wholesome as if the frailer porcelain be used.

Use only fine sugar for nice preserves. Moist or dark sugar cannot be made to produce the same effect as dry white.

Do not hurry any needful step in the process of preserving. Prepare your fruit with care, weigh accurately, and allow time enough to do your work well. Put up the preserves in small jars in preference to large, and, when once made, keep them in a cool, dark closet that is perfectly dry. Keep jellies in small stone china jars, or glass tumblers closely covered. You can procure at most china and glass stores, or house-furnishing establishments, metal covers with elastic rims for these, which can be used from year to year.

Cover jellies and jams with tissue paper, double and wet with brandy, pressed closely to the conserve before you put on the lid, or paste on

the thick paper. Examine your shelves frequently and narrowly for a few weeks to see if your preserves are keeping well. If there is the least sign of fermentation, boil them over, adding more sugar.

If jellies are not so firm after six or eight hours as you would have them, set them in the sun, with bits of window glass over them to keep out the dust and insects. Remove them at night and wipe off the moisture collected on the under sides. Repeat this every day until the jelly shrinks into firmness, filling up one cup from another as need requires. This method is far preferable to boiling down, which both injures the flavor and darkens the jelly.

Preserved Peaches.—Weigh the fruit after it is pared and the stones extracted, and allow a pound of sugar to every one of peaches. Crack one-quarter of the stones, extract the kernels, break them to pieces and boil in just enough water to cover them, until soft, when set aside to steep in a covered vessel. Put a layer of sugar at the bottom of the kettle, then one of fruit, and so on until you have used up all of both; set it where it will warm slowly until the sugar is melted and the fruit hot through. Then stain the kernel-water and add it. Boil steadily until the peaches are tender and clear. Take them out with a perforated skimmer and lay upon large flat dishes, crowding as little as possible. Boil the syrup almost to a jelly—that is, until clear and thick, skimming off all the scum. Fill your jars two-thirds full of the peaches, pour on the boiling syrup, and, when cold, cover with brandy tissue-paper, then with thick cloth lastly with thick paper tied tightly over them The peaches should be ready to take off after half an hour's boiling; the syrup be boiled fifteen minutes longer, fast, and often stirred, to throw up the scum. A few slices of pineapple cut up with the peaches flavor them finely.

Preserving Crab-Apples.—The red Siberian crab is best for this purpose. Pick out these that are nearly perfect, leaving the stems on, and put into a preserve-kettle, with enough warm water to cover them. heat this to boiling, slowly, and simmer until the skins break. Drain, cool, and skin them; then, with a penknife, extract the cores through the blossom ends. Weigh them; allow a pound and a quarter of sugar and a teacupful of water to every pound of fruit Boil the water and

sugar together until the scum ceases to rise; put in the fruit, cover the kettle, and simmer until the apples are clear red, and tender. Take out with a skimmer; spread upon dishes to cool and harden; add to the syrup the juice of one lemon to three pounds of fruit, and boil until clear and rich. Fill your jars three quarters full of the apples, pour the syrup in, and, when cool, tie up.

PRESERVED CHERRIES.—Stone the cherries, preserving every drop of juice. Weigh the fruit, allowing pound for pound of sugar. Put a layer of fruit for one of sugar until all is used up; pour over the juice and boil gently until the syrup begins to thicken. The short-stem red cherries, or the Morellos are best for preserves. Sweet cherries will not do.

PRESERVED STRAWBERRIES.—Pound for pound of sugar. Put them in a preserving kettle over a slow fire until the sugar melts. Boil twenty-five minutes, fast. Take out the fruit in perforated skimmer and fill a number of small cans three-quarters full. Boil and skim the syrup five minutes longer, fill up the jars, and seal while hot. Keep in a cool, dry place.

RASPBERRY AND CURRANT JELLY.—To two parts red raspberries or black caps, put one of red currants, and proceed the same as with other jelly.

WILD CHERRY AND CURRANT JELLY.—Two thirds wild cherries (stones and all) and one of red currants, a pound of sugar to a pint of juice and make as you do plain currant jelly.

CURRANT, BLACKBERRY AND STRAWBERRY JELLIES.—Put the fruit into a stone jar; set this in a kettle of tepid water, and put it upon the fire. Let it boil, closely covered, until the fruit is broken to pieces, strain, pressing the bag (a stout coarse one) hard, putting in but a few handfuls at a time, and between each squeezing turning it inside out to scald off the pulp and skins. To each pint of juice allow a pound of sugar. Set the juice on alone to boil, and while it is warming divide the sugar into several different portions, and put into pie-dishes or pans that will fit in your ovens; heat in these, opening the ovens now and then to stir it and prevent burning. Boil the juice *twenty minutes* from the moment it begins fairly to boil. By this sime the sugar should be be so hot you

cannot bear your hand in it. Should it melt around the edges, do not be alarmed. The burned parts will only form into lumps in the syrup, and can be easily taken out. Throw the sugar into the boiling juice, stirring rapidly all the while. It will "hiss" as it falls in, and melt very quickly. Withdraw your spoon when you are sure it is dissolved. Let the jelly just come to a boil, to make all certain, and take the kettle instantly from the fire. Roll your glasses or cups in hot water, and fill with the scalding liquid. Be sure and follow directions.

JAM.

RASPBERRY JAM.—One pound of sugar to each pound of berries, and nearly a pint of currant juice. Put the sugar and berries together in a pan over the fire and with a potato masher or wooden spoon keep stirring them constantly to prevent burning. When they are well mashed, add the currant-juice and boil briskly, still stirring it carefully. Just before it boils skim it well. Let it boil about three quarters of an hour to bring it to the right consistency. It is best to put it in cups, bowls or fruit jars, as it does not keep so well after being disturbed. Cover the cups with firm paper varnished with the white of an egg, and pressed closely around over the edges of the cups. Jam should be kept in a cool dry place.

STRAWBERRY JAM.—For every pound of fruit three-quarters of a pound of sugar; one pint currant juice to every four pounds of strawberies. Boil the juice of the currants with strawberries half an hour, stirring all the time. Add to the sugar when you have dipped out nearly all the juice, leaving the fruit quite dry, and boil up rapidly for about twenty minutes, skimming carefully. Put in small jars, with brandied tissue paper over the top. You can omit the currant juice, but the flavor will not be so fine.

MARMALADE.

PEACH.—Pare, stone and weigh the fruit; heat slowly to draw out the juice, stirring often with a wooden spoon. After it is hot, boil quickly, still stirring, three-fourths of an hour; add then the sugar, allowing three fourths of a pound to every pound of fruit. Boil up well for five min-

utes, taking off every particle of scum. Add the juice of one lemon to every three pounds of fruit, and the water in which one-fourth of the peach kernels have been boiled and steeped. Stew altogether for ten minutes more, stirring to a smooth paste. Put it up hot in air-tight cans, or if you prefer to put it up in glass jars, put it in them when nearly cold, and put white paper over the top of each jar.

Canned Fruits and Vegetables.

First, examine cans and elastics narrowly before you begin operations. See that the screw is in order, the can without a crack or nick, the elastic firm and closely fitting. Secondly, have the fruit boiling hot when sealed. Have upon the range or stove a pan in which each empty can is set to be filled after it is rolled in hot water. Lay elastic and top close to your hand, fill the can to overflowing, remembering that the fruit will shrink as it cools, and that a vacuum invites the air to enter; clap on the top without the loss of a second, screw as tightly as you can, and as the contents and the can cool, screw again and again to fit the contraction of metal and glass. Thirdly, if you use glass cans (and they are the cheapest in the end, for you can use them year after year, getting new elastics when you need them) keep them in a cool, dark place, and dry as well as cool. The light will cause them to ferment, and also change the color.

Canned Berries.—Heat slowly to boiling, in a large kettle. When they begin to boil, add sugar in the proportion of one tablespoonful to each quart of fruit. Boil all together fifteen minutes, and can. Huckleberries, grapes, blackberries, currants, raspberries, cherries, and strawberries put up in this way are very good, eaten as you would preserves, and make pies which are scarcely inferior to those filled with fresh fruit.

Canned Plums.—Prick with a needle to prevent bursting; prepare a syrup allowing a gill of pure water and a quarter of a pound of sugar to every three quarts of fruit. When the sugar is dissolved and the water blood-warm, put in the plums. Heat slowly to a boil. Let them boil five minutes—not fast or they will break badly, fill up the jars with plums, pour in the scalding syrup until it runs down the sides, and seal. Greengages are very fine put up in this way; also damsons for pies.

CANNED TOMATOES.—Pour boiling water over the tomatoes to loosen the skins. Remove these; drain off all the juice that will come away without pressing hard; put them into a kettle and heat slowly to a boil. Your tomatoes will look much nicer if you remove all the hard parts before putting them on the fire, and rub the pulp soft with your hands. Boil ten minutes, dip out the surplus liquid, pour the tomatoes, boiling hot, into the cans, and seal. Keep in a cool, dark place.

CANNED TOMATOES AND CORN.—Boil the corn on the cob, when it is in order for roasting, twenty minutes over a good fire, and cut off while hot. Have your tomatoes skinned and rubbed to a smooth pulp. Put in two measures of them for every one of the cut corn; salt as for the table, stirring it well in, and bring to a hard boil. Then, can quickly, and as soon as they sre cold set away in a cool, dark place.

Self-Freezing Ice-Cream.

1 quart rich milk. 8 eggs—whites and yolks beaten separately and very light. 4 cups sugar. 3 pints rich sweet cream. 5 teaspoonfuls vanilla or other flavoring, or 1 vanilla bean, broken in two, boiled in the custard, and left in until it is cold.

Heat the milk almost to boiling, beat the eggs light, add the sugar, and stir up well. Pour the hot milk to this, little by little, beating all the while, and return to the fire—boiling in a pail or sauce pan set within one of hot water. Stir the mixture steadily about fifteen minutes, or until it is thick as boiled custard. Pour into a bowl and set aside to cool. When quite cold, beat in the cream and the flavoring, unless you have used the bean.

Have ready a quantity of ice, cracked in pieces not larger than a pigeon egg—the smaller the better. You can manage this easily by laying a great lump of ice between two folds of coarse sacking or an old carpet, tucking it in snugly, and battering it, through the cloth, with a sledge-hammer or mallet until fine enough. There is no waste of ice, nor need you take it in your hands at all—only gather up the corners of the carpet or cloth, and slide as much as you want into the outer vessel. Use an ordinary old-fashioned upright freezer, set in a deep pail; pack around it closely, first, a layer of pounded ice, then one of rock salt—

common salt will not do as well. In this order fill the pail; but before covering the freezer-lid, remove it carefully that none of the salt may get in, and, with a long wooden ladle or flat stick (I had one made on purpose), beat the custard as you would batter, for five minutes, without stay or stint. Replace the lid, pack the ice and salt upon it, patting it down hard on top; cover all with several folds of blanket or carpet, and leave it for one hour. Then remove the cover of the freezer when you have wiped it carefully outside. You will find within a thick coating of frozen custard upon the bottom and sides. Dislodge this with your ladle, which should be thin at the lower end, or with a long carving-knife, working every particle of it clear. Beat again hard and long until the custard is a smooth, half-congealed paste. The smoothness of the ice-cream depends upon your action at this juncture. Put on the cover, pack in more ice and salt, and turn off the brine. Spread the double carpet over all once more, having buried the freezer out of sight in ice, and leave it for three or four hours. Then if the water has accumulated in such quantity as to buoy up the freezer, pour it off, fill up with ice and salt, but do not open the freezer. In two hours more you may take it from the ice, open it, wrap a towel, wrung out in boiling water, about the lower part, and turn out a solid column of cream, firm, close-grained, and smooth as velvet to the tongue.

Should the ice melt very fast, you may have to turn off the water more than twice; but this will seldom happen except in very hot weather.

Chocolate Ice-Cream.—1 quart of cream. 1 pint new milk. 2 cups sugar. 2 eggs beaten very light. 5 tablespoonfuls chocolate rubbed smooth in a little milk.

Heat the milk almost to boiling, and pour, by degrees, in with the beaten egg and sugar. Stir in the chocolate, beat well three minutes, and return to the inner kettle. Heat until it thickens well, stirring constantly; take from the fire and set aside to cool. Many think a little vanilla is an improvement. When the custard is cold, beat in the cream. Freeze.

Coffee Ice-Cream.—3 pints of cream. 1 cup of black coffee—very strong and clear. 2 cups sugar. 2 tablespoonfuls arrowroot, wet up

with cold water. Heat half the cream nearly to boiling, stir in the sugar, and, when this is melted, the coffee; then the arrowroot. boil all together five minutes, stirring constantly. When cold, beat up very light, whipping in the rest of the cream by degrees. Then freeze.

LEMON ICE-CREAM.—1 quart cream. 2 lemons—the juice of one and the grated peel of one and a half. 2 cups of sugar. Sweeten the cream, beat the lemon gradually into it, and put at once into the freezer. Freeze rapidly in a patent freezer, or the acid is apt to turn the milk. You may make orange ice cream in the same way.

RASPBERRY OR STRAWBERRY ICE-CREAM.—1 quart ripe sweet berries. 1 lb. sugar. 1 quart fresh cream. Scatter half the sugar over the berries and let them stand three hours. Press and mash them, and strain them through a thin muslin bag. Add the rest of the sugar, and when dissolved beat in the sugar little by little. Freeze rapidly, opening the freezer (if it is not a patent one) several times to beat and stir, *Or*, You may have a pint of whole berries, unsugared, ready to stir in when the cream is frozen to the consistency of stiff mush. In this case add a cup more sugar to the quart of chrushed berries.

LEMON ICE.—6 lemons—juice of all, and grated peel of three. 1 large sweet orange—juice and rind. 1 pint of water. 1 pint of sugar. Squeeze out every drop of juice, and steep in it the rind of orange and lemons one hour. Strain, squeezing the bag dry; mix in the sugar, and then the water. Stir until dissolved, and freeze by turning in a freezer—opening three times to beat all up together.

ORANGE ICE.—6 oranges—juice of all, and grated peel of three. 2 lemons—the juice only. 1 pint of sugar dissolved in 1 pint of water. Prepare and freeze as you would lemon ice.

CURRANT AND RASPBERRY ICE.—1 quart red currants. 1 pint raspberries—red or black. 1 pint of water. 1½ pint sugar. Squeeze out the juice; mix in the sugar and water, and freeze.

STRAWBERRY OR RASPBERRY ICE.—1 quart berries. Extract the juice and strain. 1 pint sugar—dissolved in the juice. 1 lemon—juice only. ½ pint of water.

DRINKS.

TEA.—Tea varies so in strength that it is impossible to give an exact

recipe for making it; every cook must be governed by her own judgment, after trying a new supply, and considering what degree of strength she desires in the tea. The teapot should be washed every day and thoroughly scalded. A good way to make tea is to put the desired quantity in the teapot, pour in just enough hot water to wet it, and set the teapot back where it will steep but not boil—for ten minutes—then bring forward to more heat, and add more water; boil gently five minutes, pour in the desired quantity of water and remove to the hearth to settle, which is almost as necessary as with coffee.

Coffee.—The first requisite is good coffee, the next to have it nicely browned; this is best done in a hot oven. The person having charge of it should have no other "irons in the fire" at the time, else there may be blackened kernels, which will spoil it all. If the oven has the proper heat, twenty or thirty minutes is long enough to do the work. When almost done put in a bit of butter the size of a hickory nut and stir well through, then give it another minute or two in the oven; it should be put into a tin canister or other tight covered vessel at once. Brown coffee loses strength by exposure as readily as tea. Soft water is best for both tea and coffee if you can have it pure. Coffee left over should not be allowed to stand in the coffeepot, but poured off into a pitcher kept for the purpose, and may be added to the next morning's coffee. The coffeepot should be as carefully cleaned as a milk pan.

To Make Coffee.—Grind fine one teacupful of whole coffee, into a bowl, add half of an egg, cold water enough to moisten, mix well, scald the coffeepot, put in two quarts of *cold* water, saving half a teacupful to settle it with, put in the coffee and set the pot on the stove; manage to have it boil two or three minutes before wanted for the table, pour in the half teacupful of cold water and set back to settle, but don't let it cool, and do not pour off into another coffeepot.

Chocolate.—Six tablespoons of grated chocolate to each pint of water, as much milk as you have water and sweeten to taste. Put in the water boiling hot. Rub the chocolate smooth in a little cold water. Boil twenty minutes; add the milk and boil ten minutes more, stirring frequently.

MISCELLANEOUS COOKERY, RECIPES, ETC.

Corned Beef.

Beef pickled and cooked after the following recipe makes the most delicious dish of the kind we have ever tasted, and it is with pleasure that we give it to our readers. Four gallons of water, one and one-half pounds of sugar or molasses, two ounces of saltpetre, six pounds of rock salt or pure common salt. If it is to last more than three months, or through summer, use nine pounds of salt. Boil all together gently and skim. Have the beef or tongues closely packed in the vessels in which they are to remain, and pour the pickle over while boiling hot. Pour on enough to cover the meat well, and place a weight upon it. The meat will be fit for use in ten days. The same pickle may be used the second time by adding about one-third of the ingredients and heating it again. The meat can remain in the pickle any length of time when six pounds of salt is used without becoming too salt. If nine pounds are used the meat may need to be freshened before boiling it. This pickle is sufficient for 100 pounds of beef if properly packed. When the meat is to be cooked, cover it with boiling water and simmer gently till it is tender. The usual allowance of time in cooking corned beef is three-quarters of an hour to the pound. Let it cool in the water in which it is boiled, slice thin and serve. Rock salt is recommended, as ordinary salt is often adulterated with lime, which will spoil meat of any kind.

Chicken Salad.

Take the meat from a pair of boiled chickens. Chicken, as well as celery, should be cut as large as a cranberry. Have equal quantities of chopped chicken and celery. Take a level tablespoonful of dry mustard and rub it very smooth with the yolks of four hard-boiled eggs, and the yolks of two raw eggs. Then pour on very slowly, stirring all the time, one-third of a bottle of salad oil alternating with the juice of one large lemon, or two smaller ones; then add a large tablespoonful of salt and then add two or three tablespoonfuls of rich cream. Just before serving, mix the chicken well through this dressing; then add the celery. You may garnish the top with the tender leaves of the celery, very thin

slices of lemon, a few capers here and there, and half a dozen stoned olives. Some add half a teaspoonful of cayenne pepper to the dressing, while others object to it.

Dressing for Sandwiches.

One half pound butter, two tablespoons mixed mustard (one spoonful of common mustard will do), three tablespoons thick sweet cream, a little red or black pepper, yolk of one egg. Warm the butter and beat all together; when cool spread bread with the dressing, and then put in ham chopped fine.

To Keep Sausage Meat.

Instead of the usual casing, it answers very well to sew cotton into long narrow bags—say ten inches long, and then strip before sewing together eight inches wide. Stuff this tightly with the meat; tie both ends, and dip in cooked clear starch; hang up to dry; keep in a cool, dry place.

Chiele Sauce.

Take five large onions, eight green peppers, chop fine—thirty ripe tomatoes, cut up, five tablespoonfuls sugar, three of salt, eight cups of vinegar, and boil all together two and a half hours, and bottle for use.

Cucumber Pickles.

Soak the cucumbers two days in a weak solution of salt and water, one teacupful, and a lump of alum the size of a hickory nut, for a three gallon jar of cucumbers. Then cover them with boiling vinegar and let it remain two days; then put them in jars with whole spices scattered among them and some horseradish cut in long shreds, and some white mustard. Cover with *new* vinegar, boiling hot, and sweetened in the proportion of a teacup of sugar to each gallon of vinegar. The vinegar in which the pickles are *kept* one year, will do for the *first* vinegar the next. Before pouring in the last vinegar cover with horseradish leaves, three deep, and leave them on.

Baking Powder.

Six ounces tartaric acid, eight ounces bi-carbonate soda, one quart flour Mix well and sift several times. Keep in tight cans.

BAKED APPLES.

Pare the apples and remove the core; this can be done by turning a pointed knife round and round, thus boring out the core; fill the hole with sugar, put a very little butter on each one, pour half a teacup of water in the pan and bake in a pretty hot oven, turn them and change about to prevent browning too much and add a little water if necessary, to have juice in the pan when done.

ANOTHER WAY.—This is especially good with late keeping apples, like the Ben Davis, which lose much of their acid and juiciness toward spring, being a little overripe. Bore out the cores as in the above, but do not pare; fill the cavity with sugar, and dip one teaspoonful of cider vinegar into each place; add water to give a teacup of juice when done; lay the apples on a platter and pour the juice over them and then sprinkle lightly with sugar, and you have a pretty addition to any meal.

Tomato Figs.

Take six pounds of sugar to sixteen pounds of tomatoes; scald and remove the skin in the usual way, cook them together slowly till the tomatoes are clarified; take them out and spread on earthen plates, flatten and dry them in the sun and add a little syrup to each one as they dry out when all is evaporated, after which pack in boxes and sprinkle powdered sugar between the layers.

Tincture.

LEMON AND ORANGE TINCTURE.—Never throw away lemon or orange peel; cut the yellow outside off carefully, and put it into a tightly corked bottle, with enough alcohol to cover it. Let it stand until the alcohol is a bright yellow; then pour it off, bottle it tight, and use it for flavoring. Add lemon and alcohol as often as you have it, and you will always have a nice flavoring.

Vinegar.

The surest way to procure pure cider vinegar is to make it at home. You will find it an easy matter to save all the parings, for this purpose. Put the parings in a stone jar, and add just enough warm water to wet them thoroughly. Cover with a coarse piece of muslin and set in a

warm place until fermentation begins. Then strain—first through a coarse seive (this will remove the skins), then through a piece of toweling. After this has settled, drain it off into a stone jug. Tie a coarse cloth over the mouth, to keep out insects without keeping out the air. Stand in the kitchen, near the stove, until sour enough for use. Set in a cool place, and almost before you are aware of it, you are well supplied with good vinegar without its having cost anything except a little labor.

Gooseberry.—To every gallon of water put one quart of full-ripe gooseberries. Boil the water first, and let it stand till quite cold; then crush the fruit with a wooden spoon, and add it to the water. Let it stand covered over for five days in a cool place, stirring it twice every day; strain it at the expiration of the five days through a hair-sieve into a cask, and to every gallon of liquor add 1¼ lbs. of moist sugar. When it has stood for six months, bottle it.

Wine and Cider.—Take a clean oaken-barrel, wine-cask, place it in a warm room; if in the summer time, in a hot place, where the sun will strike on it; put in one, two or more gallons of clear fermented cider; leave the bung out, so that the air may have free circulation. In two or three weeks it will be fit for use. Cider may then be added, from time to time, in small quantities, taking care that no larger quantity of it be added at any one time than there is vinegar in the cask.

CLEANING AND SCOURING.

The common method of cleaning cloth is by beating and brushing, unless when very dirty, when it undergoes the operation of scouring. This is best done on the small scale, as for articles of wearing apparel, etc., by dissolving a little curd soap in water, and, after mixing it with a little ox-gall, to touch over all the spots of grease, dirt, etc., with it and to rub them well with a stiff brush until they are removed, after which the article may be well rubbed all over with a brush or sponge dipped into some warm water, to which the previous mixture and a little more ox-gall has been added. When this has been properly done, it only remains to thoroughly rinse the article in clean water until the latter passes off uncolored, when it must be hung up to dry. For dark colored

cloths the common practice is to add some fuller's-earth to the mixture of soap and gall. When nearly dry the nap should be laid right, and the article carefully pressed, after which a brush, moistened with a drop or two of olive oil, is passed several times over it, which will give it a superior finish. Cloth may also be cleaned in the dry way as follows: First, remove the spots, as above, and when the parts have dried strew clean, damp sand over it and beat it in with a brush, after which brush the article with a hard brush, when the sand will readily come out and bring the dirt with it. Black cloth which is very rusty, should receive a coat of reviver after drying, and be hung up until the next day, when it may be pressed and finished off as before. Scarlet cloth requires considerable caution. After being thoroughly rinsed, it should be repeatedly passed through cold spring water to which a table spoonfull or two of solution of tin has been added. If much faded it shonld be dipped in a scarlet dye-bath. Buff cloth is generally cleaned by covering it with a paste made with pipe-clay and water, which, when dry, is rubbed and brushed off.

Renovation of Cloth.—The article undergoes the process of scouring before described, and, after being well rinsed and drained, it is put on a board, and the threadbare parts rubbed with a half-worn hatter's card filled with flocks, or with a teazle, or a prickly thistle, until a nap is raised. It is next hung up to dry, the nap laid the right way with a hard brush, and finished as before. When the cloth is much faded it is usual to give it a dip, as it is called, or to pass it through a dye-bath, to freshen up the color.

Uses for Ammonia.

No housekeeper should be without a bottle of aqua ammonia, for aside from its medical porperties, it is valuable for household purposes. It is nearly as useful as soap, and its cheapness brings it within the reach of all. Put a teaspoonful of ammonia in a quart of warm soap-suds, dip a cloth in it and go over your soiled paint and see how rapidly the dirt will disappear; no scrubbing will be necessary; it will cleanse and also brighten it wonderfully. To a pint of hot suds add a teaspoonful of the ammonia, dip in your forks and spoons, rub with a soft brush and finish with chamois skin. For washing windows and mirrors it is also very

good. It will remove grease from every fabric and not injure the garment. Put on the ammonia nearly clear; lay blotting paper over, and set a hot iron on for a moment. Also a few drops in water will cleanse and whiten muslins beautifully. A few drops in a bowl of water, if the skin be oily, will remove all greasiness and disagreeable odors. Added to a foot bath it absorbs all obnoxious smells; and nothing is better to remove dandruff from the hair. For cleaning hair and nail brushes it is equally good.

For heartburn and dyspepsia it is especially prepared; ten drops of it taken in a wineglass of water will give relief.

For house plants, five or six drops to every pint of water, once each week, will make them flourish. It is also good to cleanse plant jars. So be sure and keep a bottle of it in the house, and have a glass stopper as it eats corks.

Washing.

Take five pounds of sal soda, one pound of borax, one pound of fresh unslacked lime; dissolve the soda and borax in one gallon of boiling water, and slack the lime in the same quantity of boiling water. Then pour them both into eight gallons of water; stir a few times and let it stand 'till morning, when the clear fluid should be drawn off and kept ready for use. One quart of this compound, with three pounds of good bar soap, cut fine, and two pounds of sal soda boiled in three gallons of water for ten minutes, will give four gallons of splendid soft soap. Directions for use: Select from the clothes to be washed the coarse from the fine, put them separately to soak over night. In the morning, add half a pint of compound, half a pint of soft soap to four gallons of hot water; after wringing out of the cold water, put them into the hot water and cover for ten minutes. Put some mixture in boiler, wring out, suds, hang out to dry. No rubbing necessary.

Washing Nice Lace Edgings.—Cover the outside of a large glass bottle smoothly with soft white cotton, linen or flannel. Wrap the lace round it, basting each edge carefully with very fine thead. Fasten a piece of thin muslin or net over the outside of the lace. Soak the bottle in tepid water for an hour or two, then wash in soap suds until clean, after which lay in clean water for twelve hours, changing it once

or twice during that time. To finish take it from the water and dry by wrapping in a towel, then dip the bottle into rice water and roll it in a fresh towel. While still damp take the lace carefully from the bottle and placing it between clean white cloths, iron until completely dry.

How to do up Shirts.—A lady gives the following in the the *Ohio Farmer*: To three tablespoonfuls of common starch, well boiled in a quart of water, add a lump of lard the size of a pea, a tablespoonful of loaf sugar and a little salt. Let it cool until you can use it without burning your hands. When the clothes are thoroughly dry dampen your shirts in a thin, cold starch; roll them up and let them lay one hour before ironing. When ready to iron have a bowl of clean, cool water at hand, dip a clean handkerchief into it and wring it out dry; then stretch the shirt over a shirt board, and with the dampened handkerchief wipe off every particle of starch that appears on the surface, taking care always to wipe downward. Be careful not to have the iron too hot. the more pressure you use on the starched surface the finer polish you will get. I have done up shirts in this way for several years, and know that it will produce a polish equal to any laundry work. I forgot to mention in its proper place that you should never boil the starch until your clothes are ready to hang up to dry. No shirt can be done up nicely without a shirt board. The one I have is two feet long and one foot wide—an inch board planed smooth, and covered on one side with six thicknesses of flannel, the top one being soft white flannel. The first five thicknesses are stretched over tightly, and tacked securely onto the edge of the board, all around; the white flannel, outside, is stitched to the edges of the others, so that it can be removed for washing whenever necessary. Old blankets or shawls that have done their duty as such can be well utilized for this purpose.

Woolen Undergarments when shrunken by washing cannot be made to resume their original proportions. Something may be done in that direction, however, by pressing them with a hot iron while stretching them to their full length. To wash flannel so it will not shrink, make a suds of boiling hot water, put the flannel in and pound or souse up and down until it is clean, then wring, and put into scalding hot water and rinse; wring dry and hang at once on the line. We have washed

flannels in this way without shrinking them until they dropped to pieces from wear. If the water is hard soften it with borax. A machine makes the cleansing of flannels mere play.

To Wash Woolen Blankets.—Dissolve in boiling water four teaspoons of borax and two thirds of a pint of soft soap; put into a tub and pump two thirds full of soft water for two blankets. Let them soak over night, squeeze, or pound, and lay in a basket to drain. Rinse and drain well twice, the last time blue the water. Dry without wringing.

To Revive The Color of Black.—If a coat, clean it well, then boil from two to four ounces of logwood in your copper, or boiler for half an hour; dip your coat in warm water and squeeze it as dry as you can; then put it into the copper and boil it for half an hour. Take it out and add a piece of green copperas about the size of a horse-bean; boil it another half hour, then draw it and hang it in the air for an hour or two; take it down, rinse it in two or three cold waters, dry it and let it be well brushed with a soft brush, over which a drop or two of the oil of olives has been rubbed, then stroke your coat regularly over.

To Clean Black Lace.—Squeeze softly and often in skimmed milk; when it seems clean, put it in clean skimmed milk, squeeze again, lay it on sheets of stiff paper, draw out the scallops and edges with fingers, cover with stiff paper and a heavy weight. Chloroform is very useful in removing great stains from light silk and poplin. French chalk is also very good. To clean black cashmere, wash in hot suds with a little borax in the water; rinse in blueing water—very blue—and iron while damp. It will look equal to new.

To Preveet Colors From Fading.—Dissolve one ounce of sugar of lead in one pail of soft water. Put the dress into the water and let it stay a half hour; then wring out and dry before washing. Hay water cleanses and stiffens brown or buff linen. One large spoon of beef's gall to two pails of suds, improves calicoes and prevents their fading. Make starch for black calicoes of coffee water. Glue is good for stiffening calicoes. Never let your calicoes freeze when drying.

To Remove Ink Stains.—Apply lemon juice and salt and lay in the sun.

To Clean Oil-Cloths.

Soap should not be used in cleaning oil-cloths. To half a pail of hot soft water, add half a cup of washing fluid, or a piece of sal-soda half the size of an egg; with a scrubbing-brush or broom rub hard, putting on only sufficient water to keep it from running off; wipe dry with a soft cloth, and it will look as bright and shining as when new. This is a good way to clean common paint, as it does not destroy the gloss or varnish. It is also good for cleaning windows.

To Wash Ribbons.

As washing and doing up ribbons is quite a source of economy, it is not every lady who knows that with the exception of a few delicate colors, pink, sky-blue, etc., almost any ribbon can be washed and ironed and made to look nearly if not quite as well as new. To wash ribbons, make a clear lather of clean, white soap, the water as warm as you can bear your hands; rub the ribbon through this; soap may also be applied where there are grease spots on the wrong side; rinse in cold water. As soon as washed, without hanging out to dry, have ready a hot iron, and press them out while wet; press on the wrong side. They will wrinkle and never look well if not pressed while wet. If you wish to stifen them, dip them, before ironing, in a solution of gum arabic; when ironed smooth, take the scissors and trim off the ends. Narrow satin ribbons, yellow and white, have been renewed in this way, when you would not know they had ever been used; also wide colored ribbons, black, etc.

To Clean Ribbons.—Benzine will take the grease out of the most soiled ribbons, and clean them, and make them equal to new. Lay the soiled ribbon, or piece of silk, in a plate and cover it with benzine, and then lay it, after rubbing it a little with a piece of flannel, in a clean cloth to dry it somewhat, and then iron it on the wrong side. Then put the ribbon outside in the air.

To Clean Kid Gloves.—However well adapted benzine is to cleaning of kid gloves, certain precautions are necessary to insure success. Soak for several hours in benzine, squeeze out and rinse in fresh benzine. Wring dry, and hang in current of air to dry. When dry lay on a plate over a kettle of boiling water. Do not rub while washiug them.

AGRICULTURAL TABLES.

To Measure Grain in the Bin.

By the United States standard, 2150 cubic inches make a bushel; one cubic foot contains 1728 cubic inches. Rule—Multiply the number of feet in the width of the bin, by the length, and the result by the depth, and then divide the number by 5, and multiply the quotient by 4, which number will give the quantity in bushels.

Power Required to Grind Grain.

TO GRIND GRAIN WITH PORTABLE MILLS.

Horse Power.	Size of Stones.	Revolutions per minute.	Bushels Corn per hour.	Bushels Wheat per hour.
2 to 5	12 inch.	800 to 900	1 to 4	1 to 3
5 to 8	20 "	650 to 700	5 to 8	4 to 6
8 to 11	30 "	550 to 600	10 to 15	7 to 10
12 to 18	36 "	450 to 500	18 to 25	12 to 15
20 to 30	48 "	350 to 400	25 to 35	15 to 18

Oat Meal.

It takes about 12 bushels of oats to make a barrel of 200 lbs. of oat meal; another rating estimates that 14 pounds of oats produces 8 pounds of oat meal.

Buckwheat.

One bushel of buckwheat, or 50 lbs., will produce 25 lbs. of buckwheat meal; more may be obtained, but the quality will be impaired.

Wheat.

One bushel of good wheat, or 60 lbs., is estimated to make 40 lbs. of flour; *i. e.* $2\frac{1}{2}$ bushels of wheat for 100 lbs. of flour.

Barrel of flour weighs 196 lbs; pork, 200; beef, 200; salt, 180; firkin of butter, 56; corn, 5 bushels to the barrel; potatoes, $2\frac{1}{4}$ bushels to the barrel.

The following table gives nearly the following quantities of meal, flour and bread, viz:

1 bushel of wheat, weighing	60	lbs,	makes	40	lbs flour,	and	54	lbs. bread.
1 " " rye "	54	"	"	42	"	"	"	56	"	"
1 " " barley, "	48	"	"	36½	"	"	"	50	"	"
1 " " oats, "	33	"	"	18½	"	"	"	24¾	"	"

Corn and Pork.

Table showing the price of pork per pound at different prices per bushel for corn:

Corn per bu.	Pork per lb.	Corn per bu.	Pork per lb.
cts.	cts.	cts.	cts.
12½	1 50	38	4.52
15	1.78	40	4.76
17	2.00	42	5.00
20	2.30	45	5.35
22	2.62	50	5.95
25	2.96	55	6.54
30	3.57	60	7.14
33	3.92	65	7.74
35	4.05	70	8.57

By reversing the above table we have the price of corn per bushel, at different prices per pound for pork. For example, should corn be selling for 50 cents per bushel, and pork for only five cents per pound, it would be more profitable to sell the corn; but should corn be selling for 40 cents per bushel, and pork for six cents per pound, it would be more profitable to reduce the corn to pork, and sell the latter. (The above is exclusive of the labor of feeding and taking care of hogs.) According to the Patent Office reports, and the results of numerous experiments, one bushel of corn weighing 56 pounds will produce 10½ pounds of pork.

NOTE.—The foregoing table and rules must not be taken as invariably correct, it is only deemed a safe general average, the very nature of the subject precludes the possibility of exactly defining the results and proportions.

Another close calculation by another party as to what it costs to make 100 pounds of pork from corn food, is as follows:

When corn costs	10	cent	per bushel,	pork costs	$1.00 per cwt.
" " "	15	"	"	"	1.50 "
" " "	20	"	"	"	2.00 "
" " "	25	"	"	"	2.50 "
" " "	30	"	"	"	3.00 "
" " "	35	"	"	"	3.50 "
" " "	40	"	"	"	4.00 "
" " "	50	"	"	"	5.00 "

The manure will abundantly pay for the care of hogs when properly saved. The fatter hogs become the closer their quarters may be, for then they require only rest.

How to Sell Hogs.

A question of financial importance to farmers is often asked of each other in regard to the shrinkage of hogs in dressing to decide what should be the difference in the price between live and dressed hogs. A close calculator selected twenty pigs, they were well fed and fattened, though not large, with the following results. We give below the exact weights, alive and dressed:

No.	Live weight.	Dressed weight.	No.	Live weight.	Dressed weight.
1	172	143	11	131	112
2	151	128	12	176	145
3	155	130	13	148	118
4	126	104	14	153	128
5	155	116	15	164	138
6	163	136	16	148	120
7	130	108	17	133	115
8	136	114	18	168	139
9	153	128	19	132	114
10	148	120	20	113	90
	Total, Live Weight,	2,935		Total, Dressed Weight,	2,447

Shrinkage, 488 pounds, or a trifle over one-seventh. He was offered $4.00 per 100 for the lot on foot, but sold for $5.10 dressed, a gain of $7.62 in favor of dressing, and the rough lard was sufficient to pay for butchering. Farmers can look this over at their leisure, and decide how they will sell.

TABLE

Showing how much one team and plow will perform in a day in acres and tenths.

Width of furrow in inches.	Acres and tenths.	Width of furrow in feet.	Acres and tenths.
5	1.0	2	4.8
6	1.2	2½	6.0
7	1.4	3	7.2
8	1.6	3½	8.4
9	1.8	4	9.6
10	2.0	4½	10.8
11	2.2	5	12.0
12	2.4	5½	13.2
14	2.8	6	14.4
16	3.2	6½	15.6
18	3.6	7	16.8
20	4.0	7½	18.0
22	4.4	8	20.2

NOTE.—The above table is constructed on the presumption that the team moves at the rate of three feet per second, or two miles per hour for ten hours per day. Horses and mules in good condition will do this.

The required amount of food for a horse of ordinary work is twelve pounds of oats, or any other kind of grain food, and fourteen pounds of hay. A horse weighing 1,000 pounds, and fed eight quarts of grain or oats, which is equivalent to eight pounds of hay, should be fed eight pounds of hay. Hay is the nerve food for horses, cattle or sheep, and grain is the muscular fat-producing food.

TABLE

Showing the distance traveled by a single horse in plowing an acre of land.

Breadth of furrow.	Space traveled in plowing an acre.	Breadth of furrow.	Space traveled in plowing an acre.
INCHES.	MILES.	INCHES.	MILES.
7	14⅛	14	7
8	12½	15	6½
9	11	16	6⅛
10	10	17	5¾
11	9	18	5½
12	8¼	19	5¼
13	7½	20	5

Nutriment in Food, and Time of Digestion.

Below we give a table showing the amount of nutriment contained in some of the common articles of food, and the time required to digest them:

Article.	*Time of Digestion.* Hrs.	Min.	*Amt. of Nutriment,* Per Cent.
Rice, boiled	1		38
Soup, Barley, boiled	1	30	
Apples, sweet, mellow, raw	1	30	10
Tapioca, boiled	2		
Milk, boiled	2		
Barley, boiled	2		
Liver, Beef, fresh, boiled	2		
Eggs, fresh, raw	2		
Milk, raw	2	15	7
Turkey, domestic, roasted	2	30	
Cake, sponge	2	30	
Beans, boiled	2	30	37
Parsnips, boiled	2	30	
Cabbage, head, boiled	2	30	7
Oysters, fresh, raw	2	55	
Beef, roasted	3		26
Mutton, fresh, roasted	3		30
Soup, Bean, boiled	3		
Chicken Soup	3		
Dumpling, Apple, boiled	3		
Oysters, fresh, roasted	3	15	
Pork, roasted	3	15	24
Sausage, fresh, broiled	3	20	
Oysters, fresh, stewed	3	30	
Cheese, old, raw	3	30	

NUTRIMENT IN FOOD, AND TIME OF DIGESTION—*continued.*

Oyster Soup, boiled,	3	30	....		.....	
Bread, Wheat, fresh, baked,	3	30	....	60	.....	
Turnips, flat, boiled,	3	30	....	4	.....	
Potatoes, Irish boiled,	3	30	....	13	.....	
Eggs, fresh, hard boiled,	3	30	....		.....	
Green Corn tnd Beans, fresh, boiled,	3	45	....		.....	
Beets, boiled	3	45	....		.....	
Poultry, roasted,	2	45	....	27	.....	
Sugar,	3	30	....	96	.....	
Veal, roasted,	4		....	25	.....	
Fish, boiled,	2		....	20	.....	
Cucumbers,			....	2	.....	
Butter,	2	30	....	96	.....	

Growth and Life of Animals.

Man grows for 20 years, and lives	90	or 100	years.
The Horse grows for 5 years and lives	30		"
The Ass grows for 4 years and lives	30		"
The Ox grows for 4 years, and lives	15 "	20	"
The Cow grows for 4 years and lives	20		"
The Hog lives	10 years.		
The Camel grows for 8 years and lives	40		"
The Lion grows for 4 years and lives	40		"
The Dog grows 2 years and lives	12 "	14	"
The Cat grows for 1½ years and lives	9 "	10	"
The Hare grows for one year and lives	8		"
The Guina Pig grows 7 monthsand lives	6 "	7	"
The Beaver lives	30		"
The Deer and Wolf live	20		"
The Fox ives	14	16	"

To Measure Corn in the Crib.

This rule will apply to a crib of any size or kind. Two cubic feet of good, sound, dry corn in the ear, will make a bushel of shelled corn To get, then, the quantity of shelled corn in a crib of corn in the ear, measure the length, breadth and height of the crib inside of the rail; multiply the length by the breadth, and the product by the height; then divide the product by two, and you have the number of bushels of shelled corn in the crib.

Another way to measure in the crib: multiply the length by the breadth, and the product by the height, to obtain the number of cubic feet, multiply this product by 4, and strike off the right hand figure, and the result will be shelled bushels, nearly.

To Find the Number of Bushels of Grain in a Granary.

Multiply the length in inches by the width in inches, and this again by the height, and divide the product by 2150, and for heaped measure, 2,448, and the quotient will be the answer.

Example.—In a granary 9 feet long, by 4 feet wide and 6 feet deep, how many bushels will it contain?

Solution.—108 inches length x 48 inches width, 72 inches in depth = 373,248 divided by 2,150 = 173.65 bushels. Answer.

The number of eggs annually laid by a hen is estimated at fifty-two, which would weigh about six pounds; and as a fowl seldom weighs any more than three pounds, a hen lays annually double her own weight.

Seventeen eggs will weigh, on the average, two and one-fifth pounds.

To find the number of bushels of apples, potatoes, etc., in a bin, multiply the length, breadth and thickness together, and this product by 8, and point off one figure in the product for decimals.

Capacity of Boxes, Bins, Etc.

Length.	Breadth.	Depth.	Bushels.	Length.	Breadth.	Depth.	Bushels.
5 ft.....	3 ft.....	2 ft..will contain.....	24	7 ft.....	5 ft.....	3¾ ft will contain	100
5 "	3 "	3 " .. " "	36	9 "	6 "	5 " " "	216
5 "	3 "	4 " .. " " ...	48	13 "	8 "	6 " " "	500

Accurate Wood-Measure.

LENGTH EIGHT FEET.

Width	Height in ft.				Height in inches.										Width	Height in ft.				Height in inches.									
FT.	IN.	1	2	3	4	1	2	3	4	5	6	7	8	9	10	11	FT.	IN.	1	2	3	4	1	2	3	4	5	6	7	8	9	10	11
2	6	20	40	60	80	2	3	5	7	8	10	12	13	15	17	18	3	0	24	48	72	96	2	4	6	8	10	12	14	16	18	20	22
	7	21	41	62	82	2	3	5	7	8	10	12	14	15	17	18		1	25	49	74	99	2	4	6	8	10	12	14	17	18	20	22
	8	21	42	64	85	2	4	5	7	9	11	13	14	16	18	20		2	25	51	76	101	2	4	6	8	10	13	15	17	19	21	23
	9	22	44	66	88	2	4	6	8	9	11	13	15	17	18	20		3	26	52	78	104	2	4	7	9	11	13	15	17	20	22	24
	10	23	45	68	91	2	4	6	8	10	11	13	15	17	19	21		4	27	53	80	107	2	5	7	9	11	14	16	18	20	23	25
	11	23	47	70	94	2	4	6	8	10	12	14	15	17	19	21		5	27	55	82	109	2	5	7	9	11	14	16	18	20	23	25
3	6	28	56	84	112	2	5	7	9	12	14	16	19	21	23	26		10	31	61	92	123	3	5	8	10	13	16	18	21	23	26	29
	7	29	57	86	115	3	5	8	10	12	15	17	19	22	24	27		11	31	63	94	125	3	5	8	10	13	16	18	21	23	26	29
	8	29	59	88	117	3	5	8	10	12	15	17	19	22	24	27	4	0	32	64	96	128	3	5	8	11	13	16	19	21	24	27	29
	9	30	60	90	120	3	5	8	10	13	15	18	20	23	26	28																	

EXPLANATION.—Find the width of the load in the left-hand column of the table; then move to the right on the *same line*, till you come under the height in *feet*, and you have the contents in feet; then move to the right on the same line, till you come to the height in *inches*, and you will have the *additional* contents in feet for the height in inches. The *sum* of these two gives the contents in feet. For loads 12 feet long, add one-half, and for four feet, subtract one-half.

Example.—If a load of wood be 2 feet 10 inches wide, and 8 feet 7 inches high, what are the contents? Against 2 feet 10 inches, and under 3 feet, stands 68; and under 7 inches at the top, stands 13: then 13 plus 68 equals 81, the true contents in feet.

Price of Wood Per Cord.

Ft.	$1 50	$1 75	$2 00	$2 25	$2 50	$2 75	Ft.	$3 00	$3 25	$3 50	$4 00	$4 50	$5 00
1	01	01	01	02	02	02	1	02	02	02	03	03	03
2	02	02	03	03	04	04	2	05	05	05	06	07	07
3	03	04	04	05	06	06	3	07	07	08	09	10	11
4	05	06	06	07	08	09	4	09	10	10	12	14	15
5	06	07	08	09	10	11	5	12	13	13	15	17	19
6	07	08	09	11	12	13	6	14	15	16	18	21	23
7	08	10	11	12	14	15	7	16	17	19	21	24	27
8	09	11	12	14	16	18	8	19	20	21	24	28	31
16	19	22	25	28	31	35	16	37	40	43	49	56	62
24	28	33	37	42	47	52	24	56	61	65	75	84	93
32	38	44	50	56	63	69	32	75	81	87	1 00	1 12	1 25
40	47	55	63	70	78	86	40	94	1 02	1 09	1 25	1 40	1 56
48	56	66	75	84	94	1 03	48	1 12	1 22	1 31	1 50	1 68	1 87
56	61	77	88	98	1 09	1 20	56	1 13	1 42	1 53	1 75	1 96	2 18
64	75	88	1 00	1 13	1 25	1 38	64	1 50	1 62	1 75	2 00	2 25	2 50
72	84	98	1 13	1 27	1 41	1 55	72	1 69	1 83	1 96	2 25	2 53	2 81
80	94	1 09	1 25	1 41	1 56	1 72	80	1 88	2 03	2 18	2 50	2 81	3 13
84	98	1 15	1 31	1 48	1 64	1 81	84	1 97	2 13	2 29	2 62	2 95	3 28
88	1 03	1 20	1 38	1 55	1 72	1 89	88	2 06	2 23	2 40	2 75	3 09	3 43
92	1 08	1 26	1 44	1 62	1 80	1 98	92	2 15	2 33	2 51	2 87	3 23	3 59
96	1 13	1 31	1 50	1 69	1 88	2 06	96	2 25	2 44	2 62	3 00	3 37	3 75
104	1 22	1 42	1 63	1 83	2 03	2 23	104	2 44	2 64	2 84	3 25	3 65	4 05
112	1 31	1 53	1 75	1 97	2 19	2 41	112	2 62	2 84	3 06	3 50	3 93	4 38
120	1 41	1 64	1 88	2 11	2 34	2 58	120	2 81	3 05	3 28	3 75	4 21	4 68
128	1 50	1 75	2 00	2 25	2 50	2 75	128	3 00	3 25	3 49	4 00	4 50	5 00

Ft.	$5 50	$6 00	$6 50	$7 00	$7 50	$8 00	Ft.	$5 50	$6 00	$6 50	$7 00	$7 50	$8 00
1	04	04	05	05	05	06	56	2 40	2 62	2 84	3 06	3 28	3 50
2	08	09	10	10	11	12	64	2 75	3 00	3 25	3 50	3 75	4 00
3	12	14	15	16	17	18	72	3 09	3 37	3 65	3 93	4 28	4 50
4	17	18	20	21	23	25	80	3 43	3 74	4 06	4 37	4 68	5 00
5	21	23	25	27	29	31	84	3 60	3 94	4 26	4 59	4 92	5 25
6	25	28	30	32	35	37	88	3 78	4 12	4 47	4 81	5 16	5 50
7	30	32	35	38	41	43	92	3 95	4 30	4 67	5 03	5 40	6 75
8	34	37	40	43	46	50	96	4 12	4 49	4 87	5 25	5 62	6 00
16	68	74	81	87	93	1 00	104	4 47	4 87	5 28	5 69	6 09	6 50
24	1 03	1 12	1 22	1 31	1 41	1 50	112	4 80	5 24	5 69	6 12	6 56	7 00
32	1 37	1 50	1 62	1 75	1 87	2 00	120	5 15	5 62	6 09	6 56	7 03	7 50
40	1 72	1 87	2 03	2 19	2 34	2 50	128	5 50	6 00	6 50	7 00	7 50	8 00
48	2 06	2 25	2 44	2 62	2 81	3 00							

EXPLANATION.—Find the number of feet in the left hand column of the table; then the price, in dollars and cents at the top of the page, and trace the line and column until they meet, and you will find the amount in dollars and cents.

Example.—If a load of wood contains 96 feet, at $2.50 per cord—first find the amount of 96 feet, which is $1.88; and then add the value of 2 feet, (4 cents,) making $1.92. So of all similar examples.

Hints to Lumber Dealers and Mechanics in Selecting Materials For Building Purposes.

SELECTION OF STANDING TREES.

The principal circumstances which effect the quality of growing trees, are *soil*, *climate*, and *aspect*.

In a moist soil, the wood is less firm, and decays sooner than in a dry, sandy soil; but in the latter, the timber is seldom fine; the best is that which grows in a dark soil, mixed with stones and gravel. This remark does not apply to the poplar, willow, cypress, and other light woods, which grow best in wet situations.

In the United States, the climate of the Northern and Middle States is most favorable to the growth of timber used for ordinary purposes, except the cypress.

Trees growing in the center of a forest, or on a plain, are generally straighter and more free from limbs than those growing on the edge of the forest, in open ground, or on the sides of hills; but the former are at the same time less hard. The aspect most sheltered from the prevalent winds is generally most favorable to the growth of timber. The vicinity of salt water is favorable to the strength and hardness of white oak.

The selection of timber trees should be made before the fall of the leaf. A healthy tree is indicated by the top of branches being vigorous, and well covered with leaves; the bark is clear, smooth, and of a uniform color. If the top has a regular, rounded form—if the bark is dull, scabby, and covered with white and red spots, caused by running water or sap—the tree is unsound. The decay of the uppermost branches, and the separation of the bark from the wood, are infallible signs of the decline of a tree.

DEFECTS OF TIMBER TREES, (ESPECIALLY OF OAK.)

Sap, the white wood next to the bark, which very soon rots, should never be used, except that of hickory. There are sometimes found rings of light colored wood surrounded by good hard wood; this may be called the second sap; it should cause the rejection of the tree.

Brash-wood, is a defect generally consequent on the decline of the tree from age; the pores of the wood are open, the wood is reddish colored, it breaks short, without splinters, and the chips crumble to pieces. This wood is entirely unfit for mechanical purposes or artillery carriages.

Wood which has died before being felled, should in general be rejected; so should knotty trees, and those which are covered tuberbles, etc.

Twisted wood, the grain of which ascends in a spiral form, is unfit for use in large scantling; but if the defect is not very decided, the wood may be used for naves, and for some light pieces.

Splits, checks, and cracks, extending toward the center, if deep and strongly marked, make the wood unfit for use, unless it is intended to be split.

Wind-shakes, are cracks separating the concentric layers of wood from each other; if the shake extends through the entire circle, it is a ruinous defect.

All the above mentioeed defects are to be guarded against in procuring timber for use in artillery constructions; the center heart is also to be rejected in nearly all cases.

FELLING TIMBER.

The most suitable season for felling timber, is that in which vegetation is at rest, which is the case in mid-winter and in mid-summer; recent opinions, derived from facts, incline to give preference to the latter season, say the month of July; but the usual practice is to fell trees for timber between the first of December and middle of March. Some experiments are in progress with a view to determine the question with regard to oak timber for ordnance purposes.

The tree should be allowed to obtain its full maturity before being felled; this period in oak timber is generally at the age of 75 to 100 years, or upwards, according to circumstances. The age of hard wood is determined by the number of rings which may be counted in a section of the tree. The tree should be cut as near the ground as possible, the lower part being the best timber. The quality of the wood is in some

degree indicated by the color, which should be nearly uniform in the heart wood, a little deeper toward the center, and without sudden transitions.

Felled timber should be immediately stripped of its bark, and raised from the ground.

As soon as practicable after the tree is felled, the sap-wood should be taken off, and the timber reduced, either by sawing or splitting, nearly to the dimensions required for use.

SEASONING AND PRESERVING TIMBER.

For the purpose of seasoning, timber should be piled under shelter, where it may be kept dry, but not exposed to a strong current of air; at the same time, there should be a free circulation of air about the timber, with which view slats or blocks of wood should be placed between the pieces that lie over each other, near enough to prevent the timber from bending.

In the sheds, the pieces of timber, should be piled in this way, or in square piles, and classed according to age and kind. Each pile should be distinctly marked with the number and kind of pieces, and the age, or the date of receiving them.

The piles should be taken down and made over again at intervals, varying with the length of time which the timber has been cut.

The seasoning of timber requires from two to four years, according to its size.

Gradual drying and seasoning in this manner is considered the most favorable to the durability and strength of timber, but various methods have been prepared for hastening the process. For this purpose steaming and boiling timber has been applied with success; kiln-drying is serviceable only for boards and pieces of small dimensions, and is apt to cause cracks, and to impair the strength of wood, unless performed very slowly.

Timber of large dimensions is improved by immersion in water for some weeks, according to its size, after which, it is less subject to warp and crack in steaming.

Oak timber loses about one fifth of its weight in seasoning, and about one-third of its weight in becoming dry.

TABLE

SHOWING THE COMPARATIVE DIFFERENCE BETWEEN GOOD HAY AND THE ARTICLES MENTIONED BELOW, AS FOOD FOR STOCK—BEING THE RESULTS OF EXPERIMENTS.

100 Pounds of Hay Are Equal to:

Green Indian Corn	275 lbs.	Rye	54 lbs.
Green Clover	400 "	Wheat	46 "
Rye Straw	442 "	Oats	59 "
Wheat Straw	360 "	Peas and Beans mixed	45 "
Oat Straw	164 "	Buckwheat	64 "
Barley Straw	180 "	Indian Corn	57 "
Pea Straw	153 "	Acorns	68 "
Buckwheat Straw	200 "	Wheat Bran	105 "
Corn Stalks dried	400 "	Rye	100 "
Raw Potatoes	201 "	Wheat, Pea and Oat Chaff	167 "
Boiled Potatoes	175 "	Rye and Barley, mixed	179 "
Turnips	504 "	Linseed	59 "
Carrots	300 "	Mangel Wurzel	339 "

TABLE

SHOWING THE AMOUNT OF HAY, OR ITS EQUIVALENT PER DAY, REQUIRED BY EACH 100 POUNDS OF LIVE WEIGHT OF ANIMALS.

Working Horses	3.08 lbs.	Dry Cows	2.42 lbs.
Working Oxen	2.40 "	Young Growing Cattle	3.08 "
Fatting Oxen	5.00 "	Steers	2.84 "
" " when fat	4 00 "	Pigs	3.00 "
Milch Cows	from 2.25 to 2.40 "	Sheep	3.00 "

Standard Weight of Grain.

The weight per bushel of the following articles has been regulated by custom in some of the states, as follows:

BUSHEL.	LBS.	BUSHEL.	LBS.
Bran	20	Malt Barley	34
Shorts	20	Malt Rye	35
Middlings, coarse	30	Cranberries	33
Middlings, fine	40	Charcoal	22
Broom Corn Seed	46	Stone Coal	70 and 80
Pop Corn	70	Coke	40
Corn Meal	45	Quicklime	80
Hungarian Grass Seed	48	Coarse Salt	50
Millet Grass Seed	50	Fine Salt	55
Orchard Grass Seed	14		

Cubic Feet of Hay in a Ton.

No exact rule can be given for measuring hay in bulk: the rules are as various as the kinds of hay, its condition, and the amount of pressure to which it has been subjected. The rules for hay in general use are as follows for a ton:

Timothy, a year in mow or stack	500	cubic feet.
Timothy from the bottom of the stack	400	" "
Timothy, newly stacked	700	" "
Clover, stacked for some months	700	" "
Clover, new	900	" "

Timothy and Clover, old, stacked	.600	" "
Timothy and clover, new	.800	" "
Common meadow hay, old	.800	" "
Common meadow hay, new	1000	" "

TABLE

TABLE OF DAILY SAVINGS AT COMPOUND INTEREST.

CENTS A DAY.	PER YEAR.	IN TEN YEARS.	IN FIFTY YEARS.
$ .02¾	$ 10	$ 130	$ 2,900
.05¼	20	260	5,800
.11	40	520	11,600
.27½	100	1,300	29,000
.55	200	2,600	58,000
1.10	400	5,200	116,000
1.	500	6,500	145,000

Cost of Various Styles of Fence, Varied by Localities.

Narrow Slat Picket Fence	$6.25 per rod.
Wide Slat Picket Fence	5.25 "
Common Stone Wall	3.00 "
Common Four Board Fence	2.00 "
Common Split Rail Fence	2.00 "
Virginia Split Rail Fence	1.50 "
Steel Barbed Wire Fence, four wires	.84 "

TABLE

THE FOLLOWING TABLE WILL SHOW THE GRADE PER MILE AS THUS INDICATED:

An inclination of 1 foot in 10 is 528 feet per mile.
" " 1 " 15 " 352 " "
" " 1 " 20 " 264 " "
" " 1 " 25 " 211 " "
" " 1 " 30 " 176 " "
" " 1 " 35 " 151 " "
" " 1 " 40 " 132 " "
" " 1 " 50 " 106 " "
" " 1 "100 " 53 " "
" " 1 "125 " 42 " "

TABLE

FOR CAPACITY OF CISTERNS.

Bottom. Ft.	Bottom. In.	Stave. Ft.	Stave. In.	Capacity. Barrels.	Bottom. Ft.	Bottom. In.	Stave. Ft.	Stave. In.	Capacity Barrels.
3	6	3	6	7	5	6	5	4	27
4		4		11	5	6	6		31
4		4	8	13	6		4	8	30
4		5	4	15	6		5	4	32
4	6	4		14	6		6		37
4	6	4	8	16	6		7		46
4	5	5	4	18	6	6	5	4	38
5		4		18	6	6	6		43
5		4	8	20	6	6	7		51
5		5	4	22	6	6	8		61
5		6		26	7		5	4	43
5	6	4		22	7		6		50
5	6	4	8	25	7		7		59

The Size of Nails

The following table will show at a glance the length of the various sizes, and the number of nails to the pound. They are rated from 3-penny up to 20-penny:

Number.	Length in inches.	Nails per pound.
3-penny	1	557
4-penny	1¼	535
5-penny	1¾	282
6-penny	2	177
7-penny	2¼	141
8-penny	2½	101
10-penny	2¾	68
12-penny	3	54
20-penny	3½	34

From the foregoing table an estimate of quantity and suitable size for any job of work can easily be made.

Number of Eggs per Annum.

Experiments show that the laying capacities of the principal varieties of chickens average about as follows:

Varieties.	Eggs per pound.	Lay per year.
Light Brahmas and Partridge Cochins,	7	130
Dark Brahmas,	8	130
Black, White and Buff Cochins,	7	115
Plymoth Rocks,	8	150
Houdans,	8	150
La Fleche,	7	130
Creve Cœurs,	8	140
Black Spanish,	7	140
Leghorns,	8	160
Hamburgs,	9	150
Polish,	9	125
Dominique,	9	135
Games,	9	130
Bantams,	16	90

TABLE

SHOWING WHAT WEIGHTS HEMP ROPE WILL BEAR WITH SAFETY.

Circumference.	Pounds.	Circumference.	Pounds.
1 inch.	200	3 inch.	1800
1¼ "	312.5	3¼ "	2112.
1½ "	450	3½ "	2450
1¾ "	612.5	3¾ "	2812.5
2 "	800	4 "	3200
2¼ "	1012.5	5 "	5000
2½ "	1250	6 "	7200
2¾ "	1512.5		

NOTE.—A square inch of hemp fibres will support a weight of 9,200 pounds. The maximum strength of a good hemp rope is 6,400 pounds to the square inch. Its practical value is not more than half this strain. Before breaking it stretches from one-fifth to one-seventh, and its diameter diminishes from one-fourth to one-seventh. The strength of a manilla rope is about one-half that of hemp. White ropes are one-third more durable.

TABLE

	Per Hour.	Per Second.
A man travels	3 miles.	4 feet.
A horse trots	7 "	10 "
A horse runs	20 "	29 "
A steamboat runs	18 "	26 "
A sailing vessel runs	10 "	14 "
A slow river runs	3 "	4 "
A rapid river runs	7 "	10 "
A moderate wind blows	7 "	10 "
A storm moves	36 "	52 "
A hurricane moves	80 "	117 "
A rifle ball moves	1000 "	1466 "

The following table is given in "How Crops Grow," showing the average per cent of saccharine, or cane sugar, in juice of the plants mentioned:

Sugar Cane	18 per cent.	Maize, in tassel	3¼ per cent.
Sugar beet	10 " "	Maple sap	2½ " "
Sorghum	9½ " "	Red Maple	2½ " "

Table of Wages.

EXPLANATION.—The column in the left hand of the table shows the number of days; and the rate per month is seen at the top of the page.

To find the amount of 19 days work, at $11 per month: Find 19 in the column of days; then move to the right, on the same line, till you come under $11, (the rate per month) and you find $8.04—the answer sought.

The amount for 11 days, at $9 per month, would be found to $3.81.

In all cases, the amount will be found directly under the price per month, and at the right of the given time.

In this table, the wages are cast at 26 working days per month. For a fraction of a day take an equal part of the amount for one day, and for rates less than $8 per month, half what is shown for twice the amount. Thus, at $6 per month, for 11 days, take half what the tables give for $12, and that is, $2.54.

TABLE OF WAGES, AT GIVEN RATES PER MONTH OF TWENTY-SIX DAYS.

D.	$8	$9	$10	$11	$12	$13	$14	D.	$15	$16	$17	$18	$19	$20	$21
1	31	35	38	42	46	50	54	1	58	62	65	69	73	77	81
2	62	69	77	85	92	1 00	1 08	2	1 15	1 23	1 31	1 38	1 46	1 54	1 62
3	92	1 04	1 15	1 27	1 38	1 50	1 62	3	1 73	1 85	1 96	2 08	2 19	2 31	2 42
4	1 23	1 38	1 54	1 69	1 85	2 00	2 15	4	2 31	2 46	2 62	2 77	2 92	3 08	3 23
5	1 54	1 73	1 92	2 12	2 31	2 50	2 69	5	2 88	3 08	3 27	3 46	3 65	3 85	4 04
6	1 85	2 08	2 31	2 54	2 77	3 00	3 23	6	3 46	3 69	3 92	4 15	4 38	4 62	4 85
7	2 15	2 42	2 69	2 96	3 25	3 50	3 77	7	4 04	4 31	4 58	4 85	5 12	5 38	5 65
8	2 46	2 77	3 08	3 38	3 69	4 00	4 31	8	4 62	4 92	5 25	5 54	5 85	6 16	6 46
9	2 77	3 12	3 46	3 81	4 15	4 50	4 85	9	5 19	5 54	5 88	6 23	6 58	6 92	7 27
10	3 08	3 46	3 85	4 23	4 62	5 00	5 38	10	5 77	6 15	6 54	6 92	7 31	7 69	8 08
11	3 38	3 81	4 23	4 65	5 08	5 50	5 92	11	6 35	6 77	7 19	7 62	8 04	8 46	8 88
12	3 69	4 15	4 62	5 08	5 54	6 00	6 46	12	6 92	7 38	7 85	8 31	8 77	9 23	9 69
13	4 00	4 50	5 00	5 50	6 00	6 50	7 00	13	7 50	8 00	8 50	9 00	9 50	10 00	10 50
14	4 31	4 85	5 38	5 92	6 46	7 00	7 54	14	8 08	8 62	9 15	9 69	10 23	10 77	11 31

TABLE OF WAGES, AT GIVEN RATES PER MONTH OF TWENTY-SIX DAYS—*continued.*

15	4 62	5 19	5 77	6 35	6 92	7 50	8 08	15	9 05	9 23	9 81	10 38	10 96	11 54	12 12
16	4 92	5 54	6 16	6 77	7 38	8 00	8 62	16	9 83	9 85	10 46	11 08	11 69	12 31	12 92
17	5 23	5 88	6 54	7 19	7 85	8 50	9 15	17	9 81	10 46	11 12	11 77	12 42	13 08	13 73
18	5 54	6 23	6 92	7 62	8 31	9 00	9 69	18	10 38	11 08	11 77	12 46	3 15	13 85	14 54
19	5 85	6 58	7 31	8 04	8 77	9 50	10 23	19	10 96	11 69	12 42	13 15	13 88	14 62	15 35
20	6 15	6 92	7 69	8 46	9 23	10 0	10 77	20	11 54	12 31	13 08	13 85	14 62	1 38	16 15
21	6 46	7 27	8 08	8 88	9 69	10 50	11 31	21	12 12	12 92	13 73	14 54	15 35	16 16	16 96
22	6 77	7 61	8 46	9 31	10 15	11 00	11 85	22	12 69	13 54	4 38	15 23	16 08	16 92	17 77
23	7 08	7 96	8 85	9 73	10 62	11 50	12 38	23	13 27	14 15	15	15 92	16 81	17 69	18 58
24	7 38	8 31	9 23	10 1	11 08	12 00	12 92	24	13 85	14 77	15 69	16 62	17 54	18 46	19 38
25	7 69	8 65	9 62	10 58	1 54	12 50	13 46	25	14 42	15 38	16 35	17 31	18 27	19 23	20 19
26	8 00	9 00	10 00	11 00	12 00	13 00	14 00	26	15 00	16 00	17 00	18 00	19 00	20 00	21 00

D.	$22	$23	$24	$25	$26	$27	$28	D.	$29	$30	$31	$32	$33	$34
1	85	88	92	96	1 00	1 04	1 08	1	1 12	1 15	1 19	1 23	1 27	1 30
2	1 70	1 77	1 85	1 92	2 00	2 07	2 15	2	2 23	2 30	2 38	2 46	2 54	2 60
3	2 54	2 65	2 77	2 88	3 00	3 11	3 23	3	3 34	3 46	3 58	3 69	3 81	3 90
4	3 38	3 53	3 69	3 84	4 00	4 15	4 31	4	4 46	4 62	4 77	4 92	5 08	5 20
5	4 23	4 42	4 62	4 81	5 00	5 19	5 38	5	5 58	5 77	5 96	6 15	6 35	6 50
6	5 1	5 30	5 54	5 77	6 00	6 23	6 46	6	6 69	6 92	7 15	7 38	7 62	7 84
7	5 92	6 19	6 46	6 73	7 00	7 27	7 54	7	7 78	8 08	8 35	8 61	8 89	9 15
8	6 77	7 08	7 38	7 69	8 00	8 30	8 62	8	8 92	9 23	9 53	9 85	10 16	10 46
9	7 61	7 96	8 31	8 65	9 00	9 34	9 69	9	10 04	10 38	10 73	11 08	11 43	11 77
10	8 46	8 85	9 23	9 61	10 00	10 38	1 77	10	11 15	11 54	1 92	12 31	12 7	3 07
11	9 30	9 68	10 15	10 57	11 00	11 42	11 84	11	12 27	12 69	13 12	13 54	13 96	14 38
12	1 15	10 62	11 08	11 54	12 00	12 46	12 94	12	13 38	13 85	14 32	14 77	15 24	15 69
13	11 00	11 50	12 0	12 50	13 00	13 50	14 0	13	14 50	15 00	15 50	16 00	16 50	17 00
14	11 84	12 38	12 92	13 46	14 00	14 52	15 08	14	15 61	16 05	16 70	17 23	17 78	18 30
15	12 69	13 27	13 85	14 42	15 00	15 58	16 15	15	16 73	17 31	17 88	18 46	19 04	19 60
16	13 54	14 15	14 77	15 38	16 00	16 61	17 23	16	17 84	18 46	19 07	19 69	20 30	20 92
17	14 38	15 03	15 70	16 34	17 00	17 65	18 31	17	18 96	19 62	20 27	20 92	21 59	22 23
18	15 23	15 91	16 62	17 3	18 00	18 68	19 38	18	20 07	20 77	21 47	22 15	22 86	23 53
19	16 07	16 80	17 54	18 27	19 0	19 72	20 46	19	21 19	21 92	22 65	23 38	24 13	24 83
20	16 92	17 69	18 46	19 23	20 00	20 76	21 54	20	22 30	23 08	23 85	24 62	25 38	26 15
21	17 77	18 56	19 38	20 19	21 00	21 80	22 61	21	23 42	24 23	25 04	25 85	26 66	27 45
22	18 61	19 46	20 31	21 15	22 00	22 84	23 69	22	24 53	25 38	26 23	27 08	27 93	28 77
23	19 46	20 34	21 23	22 11	23 0	23 88	24 77	23	25 65	26 54	27 42	28 31	29 20	30 07
24	20 30	21 22	22 15	23 08	24 00	24 91	25 85	24	26 76	27 67	28 6	29 54	30 48	31 37
25	21 15	22 12	23 08	24 4	25 00	25 95	26 92	25	27 88	28 85	29 8	30 77	31 73	32 68
26	22 00	23 0	24 00	25 00	26 0	27 00	28 00	26	29 00	30 0	31 00	32 00	33 00	34 00

D.	$35	$36	$37	$38	$39	$4	D.	$35	$36	$37	$38	$39	$40
1	1 35	1 38	1 42	1 46	1 50	1 54	14	18 84	19 38	19 92	20 46	21 00	21 54
2	2 69	2 77	2 84	2 92	3 00	3 08	15	20 19	20 76	21 34	21 92	22 50	23 07
3	4 04	4 15	4 27	4 38	4 50	4 62	16	21 54	22 15	22 77	23 38	24 00	24 61
4	5 38	5 54	5 69	5 85	6 00	6 15	17	22 88	23 53	24 19	24 84	25 50	26 15
5	6 73	6 92	7 11	7 31	7 50	7 69	18	24 23	24 92	25 61	26 30	27 00	27 69
6	8 07	8 31	8 53	8 77	9 00	9 23	19	25 57	26 30	27 04	27 76	28 50	29 23
7	9 42	9 69	9 96	10 23	10 50	10 77	20	26 92	27 68	28 46	29 22	30 00	30 77
8	10 77	11 07	11 38	11 69	12 00	12 31	21	28 26	29 06	29 88	30 69	31 50	32 31
9	12 11	12 46	12 81	13 15	13 50	13 84	22	29 61	30 45	31 31	32 14	33 00	33 84
10	13 46	13 84	14 23	14 61	15 00	15 38	23	30 96	31 83	32 73	33 60	34 50	35 38
11	14 81	15 22	15 65	16 07	16 50	16 92	24	32 31	33 22	34 15	35 06	36 00	36 92
12	16 15	16 61	17 07	17 53	18 00	18 46	25	33 65	34 60	35 57	36 52	37 50	38 46
13	17 50	18 00	18 50	19 00	19 50	20 00	26	35 00	36 00	37 00	38 00	39 00	40 00

BLEACHING, WASHING AND COLORING.

To Bleach Muslin.

For every five pounds of cloth dissolve twelve ounces of chlorate of lime in a small quantity of boiling soft water. When cold strain it into a sufficient quantity of water to immerse the goods in. Boil them ten

or fifteen minutes in strong soap-suds, wring in clear cold water, then put the goods into the chlorate of lime solution for ten or twenty minutes, with frequent airings, rinse well and dry the goods, then scald in clear soft water and dry.

ANOTHER METHOD.—Boil thick sour milk, strain it into a stone pot, and then put in whatever it is desired to bleach; let it remain there for a few days, turning three times a day; wring out, wash in cold soft water and spread in the hot sun. Repeat the process once or twice if necessary.

Bleaching Cotton.

In bleaching cotton by chloride of lime, one pound is dissolved in three gallons of water for each pound of cloth; the cloth is afterward passed through diluted muriatic or sulphuric acid (one part of acid to thirty of water) and then washed.

YARN.—First, scour well your yarn; when dry, get a barrel with the head out; put in an iron vessel two or three ounces of lac-sulphur (brimstone), and set this in the bottom of the barrel; throw in coals enough to make a smoke; put some sticks across the barrel for the yarn to rest on; lay the yarn on the sticks and cover up the barrel with a cloth to keep the smoke from escaping. You can vary the sulphur according to the quality of yarn. An ounce to the cut is the allowance. This will bleach yarn as white as snow, and renders home-made yarn beautiful for knitting hoods, comforts, scarfs, etc., etc.

BLEACHING AND SCOURING WOOL.—The first kind of bleaching to which wool is subjected is to free it from grease. This operation is called scouring. In manufactories it is generally performed by an ammonical ley, composed of five measures of river water and one of stale urine; the wool is immersed for about twenty minutes in a bath of this mixture, heated to fifty six degrees; it is then taken out, allowed to drain, and then rinsed in running water; this manipulation softens the wool, and gives it the first degree of whiteness: it is then repeated a second, and even a third time, after which the wool is fit to be employed. In some places scouring is performed with water slightly impregnated with soap; and, indeed, for valuable articles, this process is preferable, but it is too expensive for articles of less value. Sulphurous acid gas

unites very easily with water, and in this combination it may be employed for bleaching wool and silk.

To Bleach Straw Bonnets.

Get a deep box, air tight if possible, place at the bottom a stone, on the stone a flat piece of iron red-hot, or a pan of charcoal, on which scatter powdered brimstone, close the lid and let the bonnet remain a night. There should be hooks on the box on which to hang the bonnets.

Stains.

An accidental prick of the finger frequently spoils the appearance of work; and, if for sale, decreases its value. Stains may be entirely obliterated from almost any substance by laying a thick coating of common starch over the place. The starch is to be mixed as if for the laundry, and laid on quite wet. The free and early application of a weak solution of soda or potash, and the subsequent application of the solution of alum, is recommended.

To Remove From Broadcloth.—Take an ounce of pipe-clay that has been ground fine, and mix it with twelve drops of alcohol and the same quantity of spirits of turpentine. Whenever you wish to remove any stains from cloth, moisten a little of this mixture with alcohol, and rub it on the spots. Let it remain until dry, then rub it off with a woolen cloth, and the spots will disapear.

To Remove.—If on woolen from grease, scrape a little French chalk on the spot. If of paint rub in spirits of turpentine with a flannel. If of discoloration from any acid, the color may perhaps be restored by rubbing a solution of carbonate of soda or magnesia on the part. In this case, avoid the use of soap with water, as the former will restore the red appearance.

To Remove Coffee.—Mix the yolk of an egg with a little milk-warm water, and use it as soap on the stain. For stains which have been on the material for some time, add a few drops of spirits of wine to the egg and water.

On Cloths.—To take out acid, fruit, ink, glove-marks, and stains from a coat, first dampen the part with oxalic acid dissolved in water—

about the eighth of an ounce in a wine glass of water is strong enough. The common salts of lemon in water also answers well.

To Remove Fruit.—Boiling water will take out the stains of nearly all fruits, but on the juice of some, such as peaches, nectarines, and. blackberries, it seems to have but little effect.

To Remove Grass.—Wash the stained places in clean, cold, soft water, without soap, before the garment is otherwise wet.

To Remove Acid.—Chloroform will restore the color of garments, where the same has been destroyed by acids, When acid has accidentally or otherwise destroyed or changed the color of the fabric, ammonia should be applied to neutralize the acid. A subsequent application of chloroform restores the original color. Spots produced by hydrochloric or sulphuric acid can be removed by the application of concentrated ammonia, while spots from nitric acid can scarcely be obliterated.

To Remove Grease Spots.

Magnesia will effectually remove grease spots from silk on rubbing it in well ; and after standing awhile apply a piece of soft brown paper to the wrong side, on which press a warm iron gently ; and what grease is not absorbed by the paper can be removed by washing the spot carefully with warm water. Or to remove a grease spot from silk, scrape some French chalk on the wrong side ; let it remain some time and then brush off.

To Remove Marking Ink From Linen.

Dip the garment in a solution of one ounce cyanide of potassium in four ounces of water. After a few hours the stain will be obliterated. This is very effectual, but the mixture is highly poisonous, and should be carefully removed.

To Remove Iron Rust.—This may be removed by salt mixed with a little lemon juice.

To Remove Iron.—Salts of lemon mixed with warm water and rubbed over the mark will, most probably, remove the stains.

To Remove Ink Spots.

As soon as the ink has been spilled take up as much as you can with

a sponge, and then pour on cold water repeatedly, still taking up the liquid; next rub the place with a little wet oxalic acid or salt of sorrel, and wash it off immediately with cold water, and then rub on some harts-horn.

COLORING.

Aniline Dyes.

It is very important, especially when light and bright shades of aniline colors are required, to have a pure water bath, free from all foreign ingredients, which may be injurious to the dye. In dyeing with aniline colors it is essential to use only wooden or tin vessels; copper or iron is very injurious to the color. For family dyeing, any earthen or enameled basin will do. When sulphuric acid is mentioned in our recipes, the common commercial quality is meant. Where woolen yarns contain much grease, it is important to wash them well in a bath of soda and soap, at a temperture of 100 degrees to 120 degrees Fahr. In speaking of temperature the Fahrenheit scale is always understood.

Quantity of Analines to be Used.—One pound of analine dyes the following quantity of goods a medium shade: Analine red—One pound dyes 300 pounds wool, or 192 pounds cotton, or 150 pounds silk. Crimson—Same proportion as analine red. Blue or violet—One pound dyes 250 pounds of wool, or 150 pounds of cotton, or 120 pounds of silk. Green, oxidized powder—One pound dyes sixty pounds of silk (night green). Green, iodine paste—One pound dyes twelve pounds silk (atlas night green). Picric acid—One pound dyes 100 pounds of wool or silk, yellow. Two hundred to three hundred pounds of wool, green, according to shade.

Aniline Blue, Soluble in Water.—Reddi h blue, or blue de Lyons, bluish blue, or blue blue, English opal, or night blue. Dissolve the blues by boiling in sufficient water, and filter the solution through paper, flannel or shirting.

Dyeing on Wool.—For every forty pounds of goods, mix one pound of good starch with cold water, so as to make a thick paste, then add to it two and a half pounds sulphuric acid, and put the whole, with the dye, into the bath; stir, and let it boil well before taking the goods into it. This recipe is liked well for both light and dark shades. To avoid

the crocking (rubbing off) of the color, which circumstance is sometimes causing complaints, give, after dyeing, a lukewarm water-bath, in which for every twenty pounds of goods, one-half pound of cream tartar has been dissolved. Turn them five or six times in such a bath, and dry them without further washing. On woolens which have to be scoured, dye a deeper shade than wanted, because the scouring takes off two shades of the color.

DYEING, ON SILK.—Prepare the silk with Marseilles (castile) soap; sour the bath with sulphuric or tartaric acid. Dye and stiffen as with fuchsine.

ANILINE, ORANGE, OR CORALLIN.—Dissolve by boiling one pound carefully in ten pounds of best alcohol.

DYEING, ON WOOL.—Wash the wool well; bring the bath to nearly the boiling point; add the dissolved dye gradually, and it will readily go on the fibre.

DYEING, ON SILKS.—Add to the water-bath (temperature 100 degrees Fahr.) a solution of Marseilles (castile) soap. Take the silk through it, raising the temperature to 130 degrees; then add the dissolved orange to this bath, heating it gradually. When the silk has taken the color, add to the bath a little sulphuric acid, which sets it on the fibre; then handle the silk quickly, heating the bath to 170 degrees, but not higher. Wash well after dyeing.

DYEING, ON COTTON.—Same as for wool.

ANILINE RED, OR FUCHSINE.—Aniline red (roseine) a bright red, used extensively, and answering all common purposes. Aniline red, diamond crystal, preferred for silk and fine woolens, giving a still more brilliant shade than roseine. Dissolve the crystals in the proportion of one pound to two hundred pounds of water, in a stone jar, by pouring boiling water into it gradually, stirring it well meanwhile, till all is dissolved. Then, after the solution has become cool, filter it before use through paper, muslin, or flannel, to avoid specks on the fibre. The sediment on the filter can be boiled again, and will gradually dissolve almost entirely. You can also dissolve the red readily in 95 degrees alcohol. One pound crystals to twenty pounds alcohol.

DYEING, ON WOOL.—Prepare a bath of a temperature of 150 degrees

to 160 degrees; put into it as much of the dissolved dye as will give you the desired shade, and then put in your goods, which, after a lapse of twenty or thirty minutes, will be completely dyed. Wash the goods only slightly, after dyeing, in pure water.

Dyeing, on Silks.—Prepare the silk by carefully washing it in a solution of Marseilles (castile) soap. Dye in a lukewarm (about 95 degrees) bath, adding the dissolved fuchsine gradually; the silk will take the color readily and rapidly. In order to intensify and increase the brilliancy of the color, wash the silk in a bath slightly soured by sulphuric acid, or, better, tartaric acid, after dyeing. If the goods or ribbons require any stiffening, put them through a bath containing a little dissolved gelatine or gum arabic.

Dyeing, on Cotton.—With soap. Boil three-fourths of a pound of soft soap for every ten pounds of goods in water, with an addition of a little olive oil; make a concentrated bath of it in a small vat, at 120 degrees, turn the goods five times, and let them lie in it one hour. Then wring three times, and wash them in cold water, to which is added one-half pound sulphuric acid for every fifty pounds of goods. Turn four times, then wring four times, and dye with fuchsine in a third bath, giving the dye into the bath gradually, which is necessary to get an even shade.

Aniline, Yellow.—This color dissolves entirely by simply boiling it in water and filtering it.

Dyeing, on Silk.—Add the solution to a water-bath, soured by some acetic or sulphuric acid, and dye at a temperature of one hundred and seventy degrees.

Dyeing, on Wool.—Dye same way as for silk, only sour the bath with sulphuric or oxalic acid. You can obtain every shade, from orange to cherry-red, by shading off the yellow of aniline, with fuchsine. An addition of dissolved Marseilles soap will heighten the brilliancy of the color.

Aldehyd, Green Powder, also called Gas Light or Night Green.—The best means for dissolving this color is sulphuric acid. Take for every pound of powder about one pound of sulphuric acid, sixty-six degrees Beaume, or in proportion for every ounce of powder, about one

ounce of sulphuric acid. Stir well, and put the mixture either at once into the hot dye-bath, or else dissolve it before doing so in a rather large quantity of hot water.

DYEING, ON WOOL, FLANNELS, &C.—Prepare the goods as follows: Mix one pound chloride of lime in cold water, then add about one hundred pounds of water to it, and let it settle. Draw off the clear solution and bringing it up to ninety or one hundred degrees Farenheit, put in the yarn, which must have been well washed and be still moist; draw it through for fifteen minutes, then let the yarn cool off, wash again, and put into a new bath of one hundred degrees Fahrenheit, which contains for every one hundred pounds of water, one pound hyposulphate of soda. Draw the yarn through this bath also for fifteen minutes. Let it cool, and then wash again thoroughly. Woolens or yarns prepared in this way will then dye in the green bath without further additions of mordant, and at a temperature of the dye-bath of about one hundred and seventy-five degrees Fahrenheit. In order to obtain light and yellowish shades, add picric acid, which by itself dyes yellow. The preparation must be moderated more or less according to the desired shade; at all events, it must be done carefully and slightly, so as not to injure the goods.

DYEING, ON SILK.—Prepare the silk by careful washing in a solution of Marseilles white (castile) soap. Dye at a temperature of 125 degrees to 175 degrees Farenheit; add the dissolved dye-stuff gradually to the bath, when the silk will take the color easily and rapidly. In order to intensify and increase the brilliancy of the color, wash the silk in a bath slightly soured by sulphuric acid, or, better, cream tartar, after dyeing. If the goods or ribbons require any stiffening, put them through a bath containing a little dissolved gelatine or gum arabic. Add picric acid to obtain yellowish tints.

BISMARCK BROWN.—This color has become very popular, not only by its own beauty, as a bright brown, but also by combining readily with fuchsine in topping, when it yields splendid garnet and maroon shades. Dissolve by adding sufficient warm water to dampen the color, pouring on it more water gradually till it is all dissolved. It is important to observe great care in dissolving; if the water is poured on too fast, the

color will not dissolve, but remain as sediment at the bottom of the vessel.

Dyeing, on Wool.—Prepare a hot water-bath, and add the color; the goods will dye readily. For maroon and garnet, dye first with the fuchsine, or mock crimson, and top off with the Bismarck.

Dyeing, on Silk and Cotton.—Same recipes as for fuchsine, but add no acid to the dye-bath, and give the dissolved color to the bath in three or four installments, so as to obtain even shades.

Crimson.—A kind of cherry color is produced by this dye. Dissolve and dye exactly like aniline red or fuchsine.

Hofman's Violet, or Purple.—Soluble in water. No. 1, reddish shade of purple; No. 2, medium shade of purple; No. 3, bluish shade of purple. The water soluble Hofman's are dissolved by boiling in sufficient pure water. Dampen first with a little boiling water, in order to prevent a caking of the dye. Add gradually more till all is dissolved. Filter the solution through paper, flannel or shirting. These Hofman's violets, soluble in water, are very valuable, not only by reason of their very brilliant shades, but also by the very simple method of dyeing.

Dyeing, on Wool.—The color is dyed like fuchsine, without any acids whatever, only the bath, to which the dye has been added, is brought to the boiling point. Any shade of the primula flower can be obtained, and the simplicity of the process of dyeing has made it also very popular in Europe for family dyeing. It has proved very successful for all Hofman's soluble in water, to add to the bath, together with the dye for every twenty pounds of goods, two pounds of dissolved gum arabic, which helps to make the color even and fast on the fibre. Splendid gray tints are also obtained, if you dye the wool only a light tint.

Dyeing, on Cotton.—Same recipes as for fuchsine.

Dyeing, on Silk.—Same recipes as for fuchsine, but add only a little acid to the dye-bath, and give the dissolved color to the bath in three or four installments, so as to obtain even shades.

Scarlet, or Aniline.—Dissolve in boiling water only, one pound of scarlet to twenty pounds of water.

Dyeing, on Wool.—Add to the boiling bath for ten pounds of wool,

two pounds of Epsom salts, one ounce boracic acid, and as much of the dissolved dye as the light or dark shade you want to get requires. Keeping the goods in the bath on the boiling point one-quarter to half an hour dyes the color thoroughly on the fibre. If you add sulphuric acid to the same dye-bath, and turn the goods in it, you can change the scarlet into a bright orange.

Dyeing, on Silk.—Dye exactly like the orange, but do not add any sulphuric acid to the bath.

Catechu, Brown.—Steep four ounces catechu and half an ounce blue vitriol about one hour in a brass or copper kettle, with the amount of water deemed necessary to work it easily. Then put in the goods and steep, at a scalding heat, from five to ten hours, stirring often, and adding water from time to time to make up for loss in steam. Lift out, cool, rinse in clean water, and dry. If the color is not dark enough, make a bath, using half an ounce of bichromate of potash in five or six gallons of water, and steep the goods in it, at a scalding heat, one hour, stirring often. Lift out, cool, rinse in clean water, and dry. This is sufficient for two pounds of cotton.

Coloring Cotton Red.

Two pounds of redwood; boil this one hour, turn it off into a tub, put in four ounces solution of tin, put in the cotton and let it remain five minutes.

Coloring Cotton Green.

For ten pounds of cotton yarn, boil in a loose sack four pounds of fustic for two hours. Take out the sack and add two ounces of alum. When dissolved put in the yarn: keep it boiling gently one half hour, stirring all the time. Then take out the yarn, add to the water four ounces of indigo paste, and stir well. Put in the yarn and stir gently for fifteen minutes. Leave it until cold, rinse in cold water, and dry in the shade.

Coloring Cotton Brown.

To eight pounds of yarn take one pound of copperas, and as much water as will cover the yarn; bring the water to a boil, put the copperas in and let it dissolve; then pour out in a tub, put in the yarn and let it

remain half an hour. Take weak lye, as much as will cover the yarn, and bring it to a boil; take the yarn out of the copperas-water and let it air one half an hour; then put it into the lye one-half hour; repeat the process until the color is sufficient; wash well in hard water, then in hard soap-suds, soak one hour, and afterward wash in hard water.

Coloring Cotton Blue.

Take two pounds of copperas, one-half pound of prussiate of potash, one pound oil of vitrol. Dissolve the copperas in enough water to cover the goods, and scald two hours. Take out the goods and rinse in cold water; then empty the kettle and put in fresh soft water, sufficient to cover the goods well; add the prussiate of potash, put in the goods and boil twenty minutes; then take out the goods and to the liquor add the oil of vitrol and stir well. Put in the goods again and let them remain until the color is as dark as is desired. Rinse in cold water.

Copper and Brass Kettles, Used for Dyeing, to Clean.—After you have been dyeing any color in your copper or brass boiler, it is frequently tinged with the dye used; it is therefore customary to clean these utensils with a small quantity of oil of vitriol and water, a little fine sand or ashes, and a coarse flannel cloth; it must afterwards be rubbed quite dry.

CEMENTS.

For Fastening Blades, Files, Etc.—Shellac 2 parts, prepared chalk 1, powdered and mixed. The opening of the blade is filled with the powder, the lower end of the iron heated and pressed in.

Black, for Bottles.—Consists of pitch hardened by the addition of resin and brick-dust.

Cement used in the east for uniting jewels, glass and metals—Dissolve 5 or 6 pieces of gum mastic, each about the size of a large pea, in just as much spirit as will render it liquid. Soften some isinglass by steeping it in water; having dried it, dissolve as much of it in good brandy as will make a 2-ounce vial of strong glue, to which must be added two small bits of gum ammoniacum, rubbing until they are dissolved.

For Aquariums.—The following is highly recommended by a correspondent of the Boston *Journal of Chemistry*. Take 10 parts by measure of litharge, 10 parts of plaster of Paris, 10 parts of dry white sand, 1 part of finely powdered resin, and mix them, when wanted for use into a pretty stiff putty with boiled linseed oil. This will stick to wood, stone, metal, or glass, and hardens under water. It is also good for marine aquaria, as it resists the action of salt water. It is better not to use the tank until three days after it has been made.

For Repairing Fractured Bodies of all Kinds.—White lead ground upon a slab with linseed oil varnish, and kept out of contact of air, affords cement capable of repairing fractured bodies of all kinds. It requires a few weeks to harden. When stone or iron are to be cemented together, a compound of equal parts of sulphur with pitch answers very well.

Chinese.—Dissolve shellac in enough rectified spirits to make a liquid of the consistency of molasses. This will join wood so strongly that it will even resist the continual flexion of a bow, as is often shown in Japan, China, and the East Indies. Where this composition is used to join wood for bows, and spears, and lances, the fluid is thinly smeared over each face to be united, a thin piece of muslin interposed, and the whole being pressed tightly together, is left to the next day. This is also used to mend glass, china and fancy ornaments.

For China.—Grind some lime into the finest powder; tie some in a thin piece of muslin, then wet the edges of the broken china with the white of an egg, dust some lime on it, and join immediately.

For Cisterns and Casks.—An excellent cement for rendering cisterns and water-casks tight is made by incorporating thoroughly eight parts of melted glue, of the consistency used by carpenters, with four parts of linseed oil, boiled into varnish with litharge. This cement hardens in about forty-eight hours, and renders the joints of wooden cisterns and casks air-tight and water-tight. A compound of glue, with one-fourth its weight of Venice turpentine, made as above, serves to cement glass, metal and wood to one another. Fresh-made cheese curd, and old skim-milk cheese, boiled in water to a slimy consistence, dissolved in a solution of bicarbonate of potash, are said to form a good

cement for glass and porcelain. The gluten of wheat, well prepared, is also a good cement. White of eggs, with flour and water well mixed, and smeared over linen cloth, forms a ready lute for steam joints in small apparatus.

Cement, Alabaster and Plaster.—Ornaments of alabaster or plaster may be joined together by means of a little white of egg, thickened with finely powdered quick-lime, or by a mixture of newly baked and finely powdered plaster of Paris, mixed up with the least possible quantity of water.

Egg Cement.—White of egg thickened with finely powdered quick-lime. Use: To mend earthenware, glass, china, marble, alabaster, spar ornaments, etc. It does not resist moisture.

German Cement—An excellent cement for glass or earthenware is made as follows: Take two parts gum shellac and one part Venice turpentine; fuse together in an iron pot; and, when partially cool, form into sticks. When wanted for use, melt near a gentle heat. Care must be taken, while fusing the material to keep the vessel closed, as the turpentine is very inflammable; or, two parts litharge and one part each of unslacked lime and flint glass; pulverize separately, and mix. To use it wet up with old drying oil.

Cement to Mend Iron Pots and Pans.—Take two parts of sulphur and one part, by weight, of fine black lead; put the sulphur in an old iron pan, holding it over the fire until it begins to melt, then add the lead; stir well until all is mixed and melted; then pour out on an iron plate or smooth stone. When cool; break into small pieces. A sufficient quantity of this being placed upon the crack of the iron pot to be mended, can be soldered with a hot iron in the same way a tinsmith solders his sheets. If there is a small hole in the pot, drive a copper rivet in it and then solder it over with this cement.

Cement for Leather.—A mixture of India rubber and shellac varnish makes a very adhesive leather cement. A strong solution of common isinglass, with a little diluted alcohol added to it, makes an excellent cement for leather. The following is the compound used by shoemakers for invisible repairing: To ten parts bisulphide carbon and

one part spirits turpentine add enough gutta percha to make a tough, thickly flowing liquid, The surface to be joined must be perfectly free from grease, which is accomplished by laying a cloth upon them and apply a hot iron for a time. The coat is applied to both surfaces, and pressure made till the joints are dry.

Cement for Petroleum Lamps.—A cement particularlaly adapted for attaching the brass works to petroleum lamps is made by Puscher, by boiling three parts resin with one of caustic soda and five of water. The composition is then mixed with half its weight of plaster of Paris and set firmly in half to three-quarters of an hour. It is said to be of great adhesive power, and not permeable to petroleum, a low conductor of heat, and but superficially attacked by hot water. Zinc white, white lead, or precipitated chalk may be substituted for plaster, but hardens more slowly.

A Useful Cement

A useful cement for closing up cracks in stove plates, doors etc., is prepared by mixing finely pulverizd iron, such as can be secured at any druggists, with liquid water-glass, to a thick paste, and then coating the cracks with it. The hotter the fire becomes, the more does the cement combine with its metal ingredients, and the more completely will the cracks become closed.

To Cement Glass or China.

Take white lead, the thick portion which adheres around the side of a paint keg, spread smoothly on the edges, unite the pieces and tie together to keep in place. Lay away in a dry place, and do not use for two or three weeks.

Liquid Glue.

One pound of logwood and three quarts of water; boil three hours. Apply hot. When dry, brush over with a hot solution of two ounces sulphate of iron in one quart of water. Repeat if not black enough, as soon as dry. It will be better if one ounce of powdered gall-nuts is added to the latter solution, though it is not strictly necessary.

To Make Mortar.

Mortar is composed of quick-lime and sand, reduced to a paste with

water. The lime ought to be pure, completely free from carbonic acid, and in the state of a very fine powder; the sand should be free from clay, partly in the state of fine sand, and partly in that of gravel: the water should be pure; and if previously saturated with lime, so much the better. The best proportions are three parts of fine, and four parts of coarse sand, one part of quick-lime, recently slacked, and as little water as possible. The addition of burnt bones improves mortar, by giving it tenacity and rendering it less apt to crack in drying; but they ought never to exceed one-fourth of the lime employed. When a little maganese is added to the mortar it acquires the important property of hardening under water: so that it may be employed in constructing those edifices which are constantly exposed to the action of water. Limestone is often combined with maganese; in that case it becomes brown by calcination.

Black Bottle Sealing Wax.

Common resin, twenty pounds; tallow, five pounds; lamp-black, four pounds. Mix with heat.

Green Sealing Wax.—Shellac, two parts; yellow resin, one part; verdigris, one part. Powder and mix by heating slowly.

Soft Sealing Wax.—Yellow resin, one part; beeswax, four parts; lard, one part; Venice turpentine, one part; color to fancy. Mix with a gentle heat.

French Sealing Wax.—Shellac, two pounds; yellow resin, one pound; Venice turpentine, one pound; Chinese vermilion, three pounds. Melt with a gentle heat, and form into sticks from twelve to twenty-four to the pound.

Common Sealing Wax.—To every one ounce of shellac, take a half ounce each of resin and vermilion, all reduced to a fine powder. Place them over a moderate fire and melt them. Any color will do as well as vermilion.

Sealing Wax for Fruit Cans.—Beeswax, one-half ounce; English vermilion, one and a half ounces; gum shellac, two and a half ounces; resin, eight ounces. Take some cheap, iron vessel that you can always keep for this purpose, and put in the resin and melt it, and stir in the

vermilion. Then add the shellac, slowly, and stir that in, and afterward the beeswax. When wanted for use at any after time, set it upon a slow fire, and melt it so that you can dip the bottle-nozzles in. If you wish the wax tougher, add more beeswax and less vermilion.

Improved Painters' Putty.

Putty is made of common whitening, pounded very fine, and mixed with linseed oil till it becomes about the thickness of dough.

MISCELLANEOUS.

Mucilage, or Tragacanth.

Triturate one-half drachm powdered gum tragacanth in a mortar with three drachms glycerine; add by degrees, with constant trituration, five fluid ounces water. This will produce a mucilage at once, without the objectionable air-bubbles incident to agitation.

ANOTHER.—Macerate a half ounce tragacanth in a half pint boiling water for twenty-four hours. Then triturate until smooth and uniform, and press through linen. If pretty firm this paste will keep well without the addition of an antiseptic, although a little acetic acid or creosote will more effectually prevent fermentation.

GOOD MUCILAGE.—For household purposes this may be made by mixing six ounces gum arabic, six ounces distilled vinegar, with one ounce white sugar. Instead of the distilled vinegar, two parts acetic acid and ten parts water may be substituted.

Common Paste.

To a dessert-spoonful of flour add, gradually, half a pint of water, and mix quite smooth; add a pinch of powdered alum (and some add a pinch of powdered resin) and boil for a few minutes, stirring constantly. The addition of a little brown sugar and a few grains of corosive sublimate, is said to preserve it for years.

FLOUR PASTE.—Water, one quart; alum, three-fourths of an ounce. Dissolve; and, when cold, add flour to make it of the consistence of cream; then bring it to a boil, stirring it all the while.

PASTE FOR PAPER HANGERS.—We believe the best paper hangers paste, as well as a paste for general purposes, is simply wheat or rye

flour beaten in cold water to perfect smoothness, and the whole just brought to a boil, while being constantly stirred to prevent boiling. A little creosote, or carbolic acid, will keep it much better. Any addition to this paste fails to improve it

To Gloss Shirt Bosoms.

Take two ounces of fine white gum arabic powder, put it in a pitcher, and pour on it a pint or more of boiling water, according to the degree of strength you desire, and then, having covered it, let it stand all night. In the morning pour it carefully from the dregs into a clean bottle ; cork it up and keep it for use. A table-spoonful of gum-water stirred in a pint of starch, made in the usual manner, will give to lawns, either white or printed, a look of newness, when nothing else can restore them after they have been washed.

ANOTHER.—This gloss, or enamel, as it is sometimes called, is produced mainly by friction with a warm iron, and may be put on linen by almost any person. The linen to be glazed receives as much strong starch as it is possible to charge it with, then it is dried. To each pound of starch a piece of sperm, paraffine, or white wax, about the size of a walnut, is usually added. When ready to be ironed the linen is laid upon the table and moistened very slightly on the surface with a clean, wet cloth. It is then ironed the usual way with a flat-iron, and is ready for the glossing operation. For this purpose a peculiarly heavy flat-iron, rounded at the bottom and polished as bright as a mirror, is used. It is pressed firmly upon the linen, and rubbed with much force, and this frictional action puts on the gloss. "Elbow grease" is the principal secret connected with the art of glossing linen.

To Shrink New Flannel.

New flannel should always be shrunk or washed before it is made up that it may cut out more accurately, and that the grease which is used in manufacturing it may be extracted. First, cut off the list along the selvage edge of the whole piece ; then put into warm water (not boiling) *without* soap. Begin at one end of the piece and rub it with both hands till you come to the other end ; this is to get out the grease and blue

with which new white flannel is always tinged; then do the same through another water. Rinse it through a clean lukewarm water; wring it lengthwise, and stretch it well. In hanging it out on a line, do not suspend it in festoons, but spread it along the line straight and lengthwise. If dried in festoons, the edges will be in great scallops, making it very difficult to cut out. It must be dried in the sun. When dry let it be stretched even, clapped with the hands, and rolled up tightly and smoothly till wanted.

Washing Silverware.

Many housekeepers wash their silverware in soap and water. This must not be practiced, as it makes the silver look like pewter. When it needs polish take a piece of soft leather and whiting and rub it hard; this will restore its lustre.

CLEANING SILVER.—Four ounces Paris white, one ounce of spirits of ammonia, and one pint of rain water. Put together in a bottle and shake well before using.

CLEANING SILVERWARE WITH POTATO WATER.—Silver and plated articles should be placed about ten minutes in the hot water in which potatoes have have been boiled (with salt), and then be rubbed with a woolen rag, and rinsed in pure water, when the articles will not only be free from tarnish, but perfectly bright. Potato water that has become sour by standing several days answers still better, and is also excellent for cleaning articles of steel and glass water bottles.

To Wash Dishes.

To wash dishes without soap, have your dishwater hot and add a very little milk, as this softens the water, gives the dishes a nice gloss and preserves the hands. It removes the grease, even that from beef, and yet no grease is ever found floating on the water as when soap is used. The stone vessles should be set on the stove with a little water in them when the victuals are taken from them; thus they are hot when one is ready to wash them, and the grease is easily removed. Tinware keeps bright longer cleansed in this way than by using soap or by scouring. The habit so many have acquired of scouring tins is a wasteful policy, as the present style of tinware will not bear it.

House Cleaning.

As the spring days approach, the housewife feels her daily cares increase. Every drawer, piece-bag and closet must be ransacked, overlooked and cleared up for the coming summer. Carpets must be taken up and shaken, beds well beaten, and bedsteads washed in a strong solution of brine to destroy insects. As anything that can lessen the labor of a housekeeper is desirable, we venture to contribute our mite. Save the tea leaves for a few days, and then steep them in a tin pail or pan for half an hour, strain through a seive, and use the tea to wash all the varnished paint. It requires but very little rubbing, as the tea acts as a strong detergent, cleansing the paint of its impurities and making the varnish shine equal to new. It washes window panes and mirrors much better than soap and water; it is excellent for black walnut mirror and picture frames. It will not do to wash unvarnished paint with it. Whiting is unequaled for cleaning white paint. Take a small quantity on a damp flannel cloth, rub lightly over the surface, and you will be surprised at the result. Wall paper may be readily cleaned by tying a soft cloth over a broom, and sweeping down the walls carefully. The dust and ashes of stoves are deposited in every crack and crevice of our rooms, and require vigilant and active treatment for their removal. Carpets absorb greater quantities of them. All who can afford it will find it a great improvement to use straw matting in summer, and in the autumn cover them with carpet linings or even common newspapers, and then put down the carpet over them.

Soaps.

A Useful Soap.—The following is commended by those who have tried it for scrubbing and cleansing painted floors, washing dishes, and other household purposes: Take two pounds of white olive soap and shave it in thin slices; add two ounces of borax and two quarts of cold water; stir altogether in a stone or earthen jar, and let it set upon the back of the stove until the mass is dissolved. A very little heat is required, as the liquor need not simmer. When thoroughly mixed and cooled, it becomes of the consistence of a thick jelly, and a piece the size of a cubic inch will make a lather for a gallon of water.

A CHEAP HARD SOAP.—Many housekeepers in the country know how difficult it is to obtain a good article of bar soap. The yellow soap sold at stores cuts soft as cheese, and rubs away as easily, and unless the housewife orders a box of soap at a time, and piles it up in stacks in the attic or some dry place, the yearly record will show a good sum paid out for soap purchased by the bar. The following recipe will prove a desirable item of economy: Four large bars of yellow soap, two pounds of salsoda, three ounces of borax, one ounce liquid ammonia. Shave the soap in thin slices, and put it into eight quarts of soft water, (rain water is the best.) When the soap is nearly dissolved, add the borax and salsoda; stir till all is melted. Pour it into a large tub or shallow pan; when nearly cool add the amonia slowly, mixing it well. Let it stand a day or two then cut it into cakes or bars, and dry in a warm place. No better soap can be made to wash white clothes, calicoes and flannels, and it is excellent for all household purposes. It costs but three cents per pound, and is made in less than half an hour. This recipe has been sold for five dollars, and will be of service to every family.—*Hearth and Home.*

Whitewash.

Soak with boiling water, half a bushel of unslaked lime, keeping it covered during the process; strain it and add a peck of salt dissolved in warm water; three pounds of rice put into boiling water and boiled to a thin paste; half a pound of pure Spanish whiting, and a pound of clear glue dissolved in warm water. Mix these well and let the mixture stand for several days. Keep the wash thus prepared in a kettle and when it is wanted put it on as hot as possible.

To Soften Hard Water.

Cistern water sometimes grows hard by too long standing. It can be made soft by adding borax. Clothes washed with borax in the water need less rubbing and look whiter. Persons who are troubled with chapped hands can prevent their becoming rough by the frequent use of borax.

Iron Holder.

To make excellent iron-holders, and at the same time utilize the tops

of a pair of worn-out boots, cut the leather into squares and cover two or three thicknesses of it with some suitable material, whipping it closely in place. Over all put a covering of nice white cloth, and as often as necessary remove this outside covering and replace it with a fresh one. It will be found that a whisk-broom will materially facilitate the dampening of clothes, which is a matter that should receive careful attention if the ironing is to be well done. During cold weather when there is so much difficulty in drying clothes, and taking them from the line, it saves tearing many times, to pass along the line and move each pin a few inches to a dry place, and then allow time for the frozen spot—at first covered by the pin—to dry, before attempting to remove from the line.

Rag Carpet.

Eight pounds of warp will make twenty pounds of carpet; always get coarse white warp and color it yourself. One pound of logwood chips and one-half a pound alum for the above quantity. Color yellow with copperas and lye. Allow one-half pound of rags for a yard.

Carpeted Floors.

When a carpet is taken up to be cleaned, the floor beneath is generally very much covered with dust. The dust is very fine and dry, and poisonous to the lungs. Before removing it, sprinkle the floor with very dilute carbolic acid, to kill any germs that may be present, and to thoroughly disinfect the floor and render it sweet.

Clothes-Pin Apron.

Clothes-Pin Apron.—No woman knows until she has worn one, what a convenience a clothes-pin apron is. To make it, cut a short apron out of a single width of calico, and face it up half the depth with a piece of the same calico, hemmed at the top. Put two perpendicular rows of stitching through the center of this pocket, round off the corners, and finish the outside edge with a bias band. Make a stout belt of doubled calico, with a substantial button and button hole, and don't forget, in cold weather, to put a pair of clean canton flannel mittens in one pocket with the clothes-pins.

To Draw a Rusty Nail.

First drive in a little, which breaks the hold, and then it may be drawn out very much easier.

To Restore Scratched Furniture.

Scrape one pound of beeswax into shavings in a pan; add half a gallon spirits of turpentine, and one pint of linseed oil. Let it remain twelve hours, then stir well with the a stick, into a liquid while stirring, and add one quarter pound of shellac varnish and one ounce of alkamet root. Put this mixture into a gallon jar, and stand it before the fire, or in an oven, for a week(to keep it just warm), shake it up three or four times a day. Then strain it through a hair seive and bottle it. Pour a teaspoonful on a wad of baize, go lightly over the surface of furniture, and rub briskly till dry, and in three minutes it will produce a dark and brilliant polish.

Another preparation may be made as follows: Make a mixture of three parts of linseed oil and one of spirits of turpentine. It not only covers the disfigured surface of the wood, but restores it to its original color, and leaves a lustre upon its surface Put on with a woolen cloth, and when dry rub with woolen.

Excelsior Axle Grease.

Tallow, 8 lbs.; palm oil, 10 lbs.; plumbago, 1 lb. Heat and mix well.

Paste.

A correspondent gives the following recipe for a paste for use in making scrap-books : Dissolve a piece of alum the size of a walnut in a pint of boiling water; to this add a couple of tablespoonfuls of flour made smooth in a little cold water, and a few drops of oil of cloves, letting the whole come to a boil. This paste will keep for months. Put in glass jars used for canning, or well cleaned blacking-bottles. Use a half-inch bristle brush, which costs but a few pennies. This paste is handy, too, for domestic purposes.

Poisonous Molds.

Molded bread, cheese, meat or any other eatables is an actual poison,

whether inhaled or eaten. One kind of mold causes the most fatal ship-fever. The mold in damp cellars causes various grades of typhoid fever, diarrhœa, dysentery, etc. Recent chemical researches and microscopic observation seem to show that miasm is nothing more or less than a mold, and that this mold is a cloud of living things, and are drawn into the lungs, and by being absorbed into the blood are sufficient to cause all kinds of deadly fevers. Elevated or dry localities are wholly exempt.

Instructions for the Erection of Lightening Rods.

1. The rod should consist of round iron of about half an inch in diameter; its parts throughout its whole length should be in perfect metallic continuity by being secured together by coupling ferrules.

2. To secure it from rust the rod should be coated with black paint, itself a good conductor.

3. It should terminate in a single platinum point.

4. The shorter and more direct the course of the rod to the earth the better; bending should be rounded and not in acute angles.

5. It should be fastened to the building by iron eyes, and may be insulated from these by cylinders of glass.

6. The rod should be connected with the earth in the most perfect manner, and a good way is to continue the rod horizontally to the nearest well, and then turned vertically downward until the end enters the water as deep as the lowest level. The horizontal part may be buried in pounded charcoal and ashes. The rod should be placed in preference on the west side of the building. A rod of this kind may be put up by any blacksmith. The rod in question is in accordance with our latest knowledge of electricity.

Candy.

Chocolate Caramels.—Two cups of brown sugar, one cup molasses one heaping tablespoonful butter, three tablespoonfuls flour. Boil for twenty-five minutes, then stir in half a pound of grated chocolate wet in half a cup of sweet milk, and boil until it hardens when dropped into cold water. Flavor with a teaspoonful of vanilla. Pour out in shallow pans, and when it hardens into squares cut.

KISSES.—Beat the whites of five eggs with two pounds of sugar and a little citric acid. Flavor with lemon, drop on buttered paper, put into a moderate oven until the tops harden.

MOLASSES CANDY.—One quart of good molasses, one-half cup vinegar, one cup sugar, butter the size of an egg, and one teaspoonful of saleratus. Dissolve the sugar in the vinegar, mix with the molasses, and boil, stirring frequently, until it hardens when dropped from the spoon into cold water; then stir in the butter and soda, the latter dissolved in hot water. Flavor to your taste, give one hard final stir, and pour into buttered dishes. As it cools, cut into squares for "taffy," or, while soft enough to handle, pull white into sticks, using only the buttered tips of your fingers for that purpose.

SUGAR CANDY.—Six cups of sugar, one cup of vinegar, one cup of water, tablespoonful of butter, put in at the last, with one teaspoonful of saleratus dissolved in hot water. Boil fast *without stirring*, an hour, or until it crisps in cold water. Pull white with the tips of your fingers.

Heading off Mosquitos.

On this subject a writer says: Not having the convenience of a cistern, I catch my rain water in barrels. To avoid breeding my own mosquitos, I elevate my barrels so that I can draw the water from the bottom, then pour upon the surface of the water a little thin oil, which soon is diffused over the water; and if it contains "wigglers," undeveloped mosquitos, they will die, and no more will accumulate while the oil is on the water.

To Prevent Potatoes From Sprouting.

An exchange gives the following method of preventing potatoes from sprouting, which we hope will be tried and approved: Take good, sound potatoes and place them in a tub or barrel, and pour boiling water over them, letting them remain in the water until the eyes are scalded so they will not sprout; dry the potatoes thoroughly in the sun, and put them away in a box or barrel in a cool dry place. This will give good mealy potatoes all the time.—*Germantown Telegraph.*

INKS.

VANADIUM INKS.—These are intensely black besides being of much chemical interest. Mixing a solution of vanadate of ammonium with a decoction of nutgalls produces a fine black ink, without any tendency to precipitate. The color is not affected by alkalies and not destroyed by chlorine or acids, the latter turning it blue.

CHROME INKS.—These are made by adding a very small amount of chromate, not bichromate, of potash to a solution of logwood. Only one part of the chromate is required for one thousand parts of the saturated logwood solution, a larger quantity being an injury rather than an improvement to the color. As the coloring matter is dissolved, not merely suspended in the fluid, the addition of gum is unnecessary, and, indeed, objectionable. This ink has the merits of a deep blue-black color, of not being liable to settle, of adhereing well to the paper, and of not corroding steel pens, besides being very cheap.

ALIZARINE.—Digest twenty-four parts Aleppo galls with three parts of Dutch madder, and one hundred and twenty parts of warm water; filter, and mix one and two-tenths parts solution of indigo, five and two-tenths of sulphate of iron, and two parts crude acetate of iron solution. This ink contains no gums and cannot get mouldy; the tannate of iron is prevented from separating by the sulphate of indigo. Alazarine ink may be evaporated to dryness, and formed into cakes; one part with six of hot water, will then form an excellent writing fluid.

ANALINE COLORED.—It is well known that analine colors give very beautiful writing fluids; all red, blue, green, violet, gold and yellow inks be obtained from them in the following way:

Dissolve one-fourth ounce of any of the analines, violet, blue, green or yellow by boiling carefully in one quart of rain water. Filter the solution through shirting or flannel; add one ounce of gum arabic dissolved in one pint of water, let it settle and the ink is ready for use.

Ladies will be pleased if a few drops of perfumery are added.

BLACK.—Bruised Aleppo galls six ounces; soft water six pints; boil together; add four ounces of sulphate of iron and four ounces of gum arabic. Put the whole of it into a bottle and keep it in a warm place,

shaking it occasionally. In two months pour off into glass bottles, and add to each pint a grain of corrosive sublimate, or three or four drops of creosote.

BLUE PATENT.—Common Prussian blue is first macerated in strong sulphuric acid, then repeatedly washed in water and then dried. This process is to render it more soluble in oxalic acid, which is now to be added gradually in the proportion of about one part to six of the Prussian blue, as before macerated, together with sufficient water to yield a dense blue solution.

BLUE FOR RULING.—Take four ounces of vitrol, best quallty, to one ounce of indigo; pulverize the indigo very fine; put the indigo on the vitrol, let them stand exposed to the air for six days, or until dissolved; then fill the pot with chalk, add half a gill of fresh gall, boiling it before use.

GREEN INK.—Cream tartar, one part; verdigris, two parts; water, eight parts. Boil until reduced to a proper color.

INDELIBLE INK.—Nitrate of silver one fourth ounce; hot distilled water three-fourths ounce; where cooled a little add mucilage one-fourth ounce, and sap green or syrup of buckthorn to color; mix well. The linen must first be moistened with liquid pounce, or the preparation, as it is commonly called, dried, and then written on with a clean quill pen. This ink will bear dilution if not wanted very black. The pounce is made of carbonate of soda, one to one and one-half ounces; water one pint; color with a little sap green, or syrup of buckthorn.

India ink ground up with ordinary black writing ink forms a cheap indelible ink for common purposes. It will resist the action of chlorine and most acids, and even ablution with a sponge.

WITHOUT PREPARATION.—Nitrate of silver, one or two drachms; water, three-fourths ounce; dissolve, add as much of the strongest aqua ammonia as will dissolve the precipitate formed on its first addition, then further add mucilage, one or two drachms, and a little sap green to color. Writing executed with this ink turns black on being passed over a hot iron.

PURPLE.—Add a little muriate of tin to a strong decoction of logwood. A little gum may also be added.

BROWN.—Boil one-half ounce of catechu with eight ounces of water until dissolved, and strain. Dissolve sixty grains bichromate of potash in one-half ounce of water, and add it gradually to the solution of catechu until the desired color is obtained. It requires no gum.

RED.—Best ground Brazil wood, four ounces; diluted acetic acid, a pint; alum, one-half ounce. Boil them slowly in a tinned, coppered, or enamelled saucepan, for an hour; strain, add one ounce of gum. Some direct the Brazil wood to infuse two or three days before it is to be used.

SECRET.—The solution should be so nearly colorless that the writing cannot be seen until an agent is applied to render it visible.

Put into a vial one-half ounce of distilled water, one drachm bromide of potassium and one drachm of pure sulphate of copper. The solution is nearly colorless, but becomes brown when heated.

Boil oxide of cobalt in acetic acid. If a little common salt be added, the writing becomes green when heated, but with nitre it becomes a pale rose color.

A solution of acetate of lead, colorless, but becomes brown when it is exposed to sulphureted hydrogen gas.

A solution of sulphate, or preferably, persulphate of iron. It becomes black when washed with an infusion of galls; blue by prussiate of potash. This constitutes colorless ink, which becomes visible when written on paper containing galls, or tannin, or prussiate of potash.

A weak solution of sulphate of copper. The writing becomes blue if exposed to vapor of ammonia.

Mix equal quantities of sulphate of copper and sal ammoniac, and dissolve in water. It becomes yellow when heated.

A weak solution of nitrate of mercury. Becomes black by heat.

Rice water or any solution of starch. It becomes blue when washed with an alcoholic solution of iodine.

Lemon juice, milk, juice of onions and some other liquids become black when the writing is held to the fire.

VALUABLE PRESCRIPTIONS.

Hope's Camphor Mixture.

Aquæ camphoræ four ounces, acidi nitrosi thirty minims, tincturæ opii twenty minims. *Dose*—A tablespoonful every two hours in diarrhœa and dysentery. Few remedies have a more general and wide spread reputation than this; it is now frequently prescribed, more than sixty years after its virtues were originally discovered.

Tonics.

FEVER AND AGUE MIXTURE.—Powdered red Peruvian bark three drachms, confection of opium and lemon-juice each one-half drachm, Port wine three ounces. Mix by trituration in a mortar. Dose, three tablespoonfuls morning, noon and night, the day the fever is off. Some recipes direct powdered serpentaria in addition to the above. Though not an elegant this is a most efficient and valuable combination.

A PREPARATION OF IRON AND CHINCHONA.—Tincture, cinchonæ comp. four ounces, Ferri citratis one drachm, acidi citrici twenty-five grains. Triturate the citric acid and citrate of iron together, and dissolve in the tincture of cinchona and quassia. Liq. ferri citratis two drachms may be used as a substitute for the rather insoluble dry salt. The dose is a teaspoonful, containing two grains of iron.

A BITTER TONIC FOR DYSPEPSIA.—Tincture cinchonæ compound four ounces, tincture nucis vomicæ one drachm. Mix. A teaspoonful three times a day in a little sugar and water. This is one of the best combinations of its kind, though its effect should be carefully watched and its use ommitted when symptoms of muscular contraction appear.

A TONIC CHOLAGOGUE.—Quiniæ sulphatis two drachms, extracti leptandræ one drachm, tinctura stillingiæ four ounces, extracti podophylli 3 drachms, olei sassafras and olei gaultheriæ, of each ten drops, theriaci q. s. ut ft. 8 ounces. Mix. Dose a teaspoonful three times a day. This formula, by Dr. Mayes, of South Carolina, is said nearly to represent the celebrated Osgood's Cholagogue so extensively used in the Valley of the Mississippi and elsewhere.

MIXTURE OF QUININE, FOR CHILDREN.—Quiniæ sulphatis, pulverized,

half a drachm, acaciæ pulveris half drachm, syrupi zingiberis four ounces. Ft. mistura. Dose, a teaspoonful containing a grain of the quinia salt, three times a day.

Nervous Stimulants.

AN ANODYNE MIXTURE.—Take of spirits ætheris comp. and spirits lavandulæ comp., of each one drachm, spirits ammoniæ aromatic forty drops, liquor morphiæ sulphatis one ounce, aquæ three ounces, sacchari two drachms. Mix. Dose, a small teaspoonful every hour until relieved.

Arterial and Nervous Sedatives.

REMEDY IN PULMONARY AND CATARRHAL DISEASES, etc., UNATTENED BY FEVER.—Acidi hydrocyanici forty drops, vini antimonii one-half ounce, syrupi tolutani one ounce, mucil. acaciæ two ounces. This, with several similar combinations of hydrocyanic acid, is highly recommonded by Dr. Horace Green, and published by him among his selections from favorite prescriptions collected from distinguished American physicians, in a scrap-book kept for the purpose. Rendered much more dilute, this is recommended as one of the best of remedies for whooping-cough.

Refrigerants.

EFFERVESCING FEVER POWDERS.—Take of citric acid, dried and powdered, five drachms. Divide into twelve parts, wrapped in white writing paper. Take of bicarbonate of potassa, dried and powdered, six and a half drachms. Divide into twelve parts, wrapped in blue paper. Inclose these white and blue powders alternately in a tin box. Directions.—Dissolve the contents of a white paper in a tumbler, one-third full of cold water, then stir in the contents of a blue paper and drink immediately. A dose is usually given every two or three hours during the prevalence of the fever.

Antacids.

AROMATIC AND ANTACID CORRECTIVE OF INDIGESTIO.N—Sodæ bicarbonatis four scruples, infusion gentianæ comp. two and a half ounces, aquæ menthæ pip. three ounces, tincture of cardamoni comp. one half ounce, Mix. Dose, a tablespoonful as required.

DR. ATLEE'S PRESCRIPTION FOR Neuralgic and Rheumatic Symptoms.—Take of ethereal tincture of guaiacum one ounce, ethereal tincture of colchicum six drachms, ethereal tincture of cannabis Ind. two drachms. Mix. Dose, twenty-five to thirty drops every four hours, on sugar.

Expectorants.

BROWN MIXTURE.—Take of liquorice, in fine powder, gum arabic, in fine powder, and sugar, in coarse powder, each one-half ounce, camp. tincture of opium two ounces, wine of antimony one ounce, spirit of nitrous ether one-half ounce, water twelve ounces. Rub the liquorice, gum Arabic and and sugar with the water, gradually added; then add the other ingredients, and mix the whole together. The dose of this very popular cough medicine is a tablespoonful, or for children a teaspoonful.

MIXTURE OF CUBEBS, etc.—Take of fluid extract of cubebs one drachm, sulphate of morphia one grain, syrup of senega, and syrup of wild-cherry, of each two ounces. Mix. Dose, a teaspoonful occasionally. Cubebs, by its excellent effects upon the mucous surfaces, is well adapted to the treatment of chronic coughs, coryza and sore throat.

A BALSAMIC MIXTURE.—Syrupi tolutanus and syrupi ipecacuanhæ each one ounce, pulverized acaciæ one drachm, tincture opii camp., and tincture lobeliæ, each three drachms, aquæ one ounce. Triturate the gum and water together, and add the other ingredients in a vial. Dose, a teaspoonful.

TOLU COUGH MIXTURE.—Syr. scillæ one ounce, pulverized acaciæ and sacchari, each three drachms, aquæ six ounces, tincture tolutana two drachms. Dose, one teaspoonful.

COCHINEAL WHOOPING COUGH MIXTURE.—Take of carbonate of potassa one scruple, powdered cochineal one-half scruple, sugar one drachm, water four ounces. Make a mixture. Dose for children, one teaspoonful, every two or three hours. An old and very popular remedy.

The use of simple tincture of belladonna in doses of from 1 to 5 drops, three times a day, is useful in most cases of whooping cough.

Lotions.

For Chilblains.—Take of muriate of ammonia one and a half ounce, water four ounces, muriatic acid one drachm, alcohol one and a half ounce. Apply morning and evening.

Thomas's Eye-Water.—Take of sulphate of zinc and chloride of sodium, each one scruple, rose-water (distilled) one ounce. Make a solution, and apply, suitably diluted, to inflamed eyes.

Gargles.

Gargle and Mouth-Wash.—Sodæ boratis one drachm, aquæ rosæ two drachm, Mellis one ounce. Mix then add tincturæ myrrhæ one-half ounce, tincturæ capsici two drachms. Use as a gargle every two or three hours, diluted with water.

Gargle of Alum.—Aluminis one-half ounce, infusi lini one-half pint, mellis q. s..

Ointments.

Tetter Ointment.—Take of calomel, alum (dried), in powder, carbonate of lead, oil of turpentine, each two drachms, simple ointment, one ounce. Triturate the powders together till they are impalpable and thoroughly mixed, then incorporate them with the oil and cerate. This is one of the very best ointments of its class, as proved by trials during a series of years. The mode of using it is to apply it at night, wash off with pure castile soap in the morning, wipe dry, and dust with pure starch.

Pile Ointment.—Take of acetate of morphia five grains, tannic acid one half drachm, liniment of subacetate of lead one-half drachm, simple ointment seven drachms. Triturate the tannic acid first with the liniment, and then incorparate it with the ointment.

Catharic.—Take of powdered resin of May apple (podophylin), one grain; powdered hyoscyamus leaves, eight grains; powdered ginger twelve grains. Mix and divide into four powders. One or two at bed-time in torpor of the liver and bilious disorders. A much safer and better pill than blue mass or other mercurials.

Charcoal as a Disinfectant.—Powder some wood charcoal and

expose it, in open pans, in the place to be disinfected. It has the advantage over lime preparations, of being without odor.

PERMANGANATE OF POTASH.—Take of permanganate of potash, a teaspoonful. Water, a quart. Expose, in saucers, in the sick room. Useful for musty closets and foul cellars. It has no odor itself.

GREEN VITRIOL.—Sulphate of iron, commonly called green vitriol, or copperas, in powder, alone, or mixed with lime, is an excellent disinfectant for privy-wells, slaughter-houses, ditches, etc.

SALT AND MUSTARD EMETIC.—Mix a teaspoonful each of salt and mustard in a teacupful of warm water. Repeat every ten minutes until free vomiting is brought on.

ALUM EYE-WASH.—Take of alum, one grain. Pure water, two tablespoonfuls. Mix. A useful wash, night and morning, for inflamed eyes.

ARNICA EYE-WASH.—Take of tincture of arnica, five drops. Pure water, two tablespoonfuls. Mix. Often of benefit in weak or sore eyes.

GARGLE OF CHLORATE OF POTASH.—Take of chlorate of potash, a teaspoonful. Tinxture chloride of iron a teaspoonful. Water, a tumblerful. Mix. An excellent gargle for ordinary sore throat.

Poisons and Their Antidotes.

If any poison is swallowed, drink instantly half a glass of cool water, with a heaping teaspoonful each, of common salt and ground mustard stirred into it. This vomits as soon as it reaches the stomach. But for fear some of the poison may remain, swallow the white of one or two eggs, or drink a cup of strong coffee—these two being antidotes for a greater number of poisons than any other dozen of articles known, with the advantage of their being always at hand; if not a pint of sweet oil, lamp oil, drippings, melted butter, or lard, are good substitutes, especially if they vomit quickly.

Muriatic Acid (*Spirits of Salt.*)—Mix an ounce of calcined magnesia with a quart of water, and give a wineglassful every five minutes. Soap, chalk, or whiting scraped off the wall, mixed with water, milk, oil, white of eggs, or demulcents of any kind, may be given till magnesi

can be obtained. Vomiting to be afterwards excited by tickling the throat with a feather or the finger.

Sulphuric Acid (*Oil of Vitriol*).—The antidotes to this poison are calcined magnesia or the carbonate of magnesia, finely powdered, and mixed with milk or water as above. These should be administered immediately. In the absence of these give soapsuds, water of wood ashes, milk, sweet oil, gruel, or any mild diluent that first comes at hand, and do not lose a moment in waiting for the most appropriate chemical remedy. External parts, burnt with the acid, should be washed with soap and water.

Nitric Acid (*Aqua Fortis*).—The antidotes are the same as for sulphuric acid.

Prussic Acid, or substances containing it, as *Oil of Bitter Almonds*, *Cherry-Laurel Water*, *Wild Cherries*, etc.—A stream of cold water, as cold as can be obtained, should be poured from a pitcher on the head and spine, and also dashed upon the face and chest. The only antidote known that can be conveniently resorted to is ammonia, which should be administered as soon as possible. If hartshorn is not at hand, give ten or twenty grains of the salts out of a common smelling-bottle, and apply it at the same time to the nostrils.

Oxalic Acid.—Give an emetic and favor copious vomiting by plenty of warm water, and then proceed as in poisoning from muriatic or sulphuric acid.

Aconite.—If vomiting has not been occasioned by the poison, it should be excited at once by some active emetic, and favored as much as possible by tepid drinks or gruel. A cup of very strong coffee, or vinegar diluted with water, may then be given with advantage. If there be insensibility, friction and warm mustard pastes or blisters should be resorted to.

Potash.—Give vinegar diluted with water, lemon-juice, milk, oil, mucilaginous drinks, and induce free vomiting.

Ammonia.—Give the same remedies as in poisoning by potash.

Belladonna.—Stomach-pump, or an active emetic as soon as possible.

Hellebore.—Same as for belladonna.

Calomel.—Give whites of eggs, milk, sweet, sperm, or castor oil, flour beaten up with water, gruel, etc., until a stomach-pump can be obtained.

Contharides (*Spanish Fly.*)—An emetic, followed by mucilaginous drinks.

Copperas.—Same as for calomel.

Verdigris.—Same as for calomel.

Arsenic.—An emetic immediately, and vomiting to be promoted by draughts of demulcent drinks, as milk, gruel, flour and water, broths, etc. There is no antidote to be relied upon as a specific against this poison. Olive oil is extolled by some as acting to envelop the particles of arsenic, and preventing its absorption. It may be given when convenient at hand.

Sugar of Lead.—Give Epsom salts dissolved in water, and incite free vomiting.

Corrosive Sublimate (*Bed Bug Poison*).—The antidotes for this poison are the same as for calomel.

Opium, Laudanum, Morphine, etc.—Give an emetic of mustard and alum, promote copious vomiting, and follow with draughts of very strong coffee or diluted vinegar. Also dash cold water upon the face, and prevent the patient from sleeping by walking him around, pricking with pin, etc.

Lime or Lime Water.—Give vinegar, lemon-juice, or any vegetable acid, and follow with demulcent drinks.

Phosphorus (from matches, etc.).—Give large draughts of water, milk, or gruel, so as to envelop the phosphorus, and exclude it from the air contained in the alimentary canal. Then give magnesia or chalk to neutralize the poison. Oily or fatty substances should not be used. Burns occasioned by this substance should be washed by some alkaline solution, as soda, and afterwards poulticed.

Nitrate of Silver (from hair dyes, etc.).—The antidote to this poison is common table salt. Dissolve a tablespoonful of this in a bowl of water, and let the patient drink of it every few minutes. Mucilaginous drinks should then be administered, followed by a dose of castor oil.

Strychnine.—Give freely of whites of eggs, sweet oil, etc., and produce vomiting as soon as possible. There is no real antidote known.

Pieces of Glass or Powdered Metal.—Give large quantities of crumbs of bread to envelop the particles, and then an emetic of mustard.

Iodine.—In case of an overdose of any of the preparations of this substance being taken, the first object is to evacuate the stomach, promoting the vomiting by large draughts of demulcent liquids, especially those containing starch, as common starch, or wheaten flour, sago, milk, arrowroot, etc. These to be followed by opiates.

Saltpetre.—As there is no chemical antidote for this salt known, it should be cleared from the stomach as speedily as possible, and the patient to drink freely of milk, gum-water or other bland mucilaginous drinks.

Food for the Sick.

Beef Tea.—1 lb. lean beef, cut into small pieces. Put into a jar without a drop of water; cover tightly, and set in a pot of cold water. Heat gradually to a boil, and continue this steadily for three or four hours, until the meat is like white rags, and the juice all drawn out. Season with salt to taste, and when cold, skim. The patient will often prefer this ice-cold to hot. Serve with Albert biscuit or thin "wafers," unleavened, made by a receipt given under the head of Bread.

Mutton Broth.—1 pound lean mutton or lamb, cut small. 1 quart water—cold. 1 tablespoonful rice, or barley, soaked in a very little warm water. 4 tablespoonfuls of milk. Salt and pepper, with a little chopped parsley. Boil the meat, unsalted, in the water, keeping it closely covered, until it falls to pieces. Strain it out, skim, add the soaked barley or rice; simmer half an hour, stirring often; stir in the seasoning and the milk, and simmer five minutes after it heats up well, taking care it does not burn. Serve hot with cream crackers.

Chicken Broth.—Is excellent made in the same manner as mutton, cracking the bones well before you put in the fowl.

Tapioca Jelly.—1 cup of tapioca. 3 cups of cold water. Juice of a lemon, and a pinch of the grated peel. Sweeten to taste. Soak the tapioca in the water four hours. Set within a saucepan of boiling water; pour more lukewarm water over the tapioca if it has absorbed too much of the liquid, and heat, stirring frequently. If too thick

after it begins to clear, put in a very little boiling water. When quite clear, put in the sugar and lemon. Pour into moulds. Eat cold with cream flavored with rose-water and sweetened.

ARROWROOT BLANC-MANGE.—1 cupful boiling milk. 2 dessertspoonfuls best arrowroot, rubbed smooth in cold water. 2 teaspoonfuls white sugar. Vanilla or other essence. Boil until it thickens well, stirring all the while. Eat cold with cream, flavored with rose-water and sweetened to taste.

SAGO MILK.—3 tablespoonfuls sago, soaked in a large cup cold water one hour. 3 cups boiling milk. Sweeten and flavor to taste. Simmer slowly half an hour. Eat warm.

CHICKEN JELLY.—Half a raw chicken, pounded with a mallet, bones and meat together. Plenty of cold water to cover it well—about a quart. Heat slowly in a covered vessel, and let it simmer until the meat is in white rags and the liquid reduced one-half. Strain and press, first through a cullender, then through a coarse cloth. Salt to taste, and pepper, if you think best; return to the fire, and simmer five minutes longer. Skim when cool. Give to the patient cold—just from the ice with unleavened wafers. Keep on the ice. You can make into sandwiches by putting the jelly between thin slices of bread spread lightly with butter.

APPLE WATER.—1 large juicy pippin, the most finely flavored you can get. 3 cups of cold water—1 quart if the apple is very large Pare and quarter the apple, but do not core it. Put it on the fire in a in or porcelain saucepan with the water, and boil, closely covered, until. the apple stews to pieces. Strain the liquor at once, pressing the apple hard in the cloth. Strain this again through a finer bag, and set away to cool. Sweeten with white sugar, and ice for drinking It is a refreshing and palatable drink.

FLAX-SEED LEMONADE.—4 tablespoonfuls flaxseed (whole). 1 quart boiling water poured upon the flax-seed. Juice of two lemons, leaving out the peel. Sweeten to taste. Steep three hours in a covered pitcher. If too thick, put in cold water with the lemon-juice and sugar. Ice for drinking. It is admirable for colds.

MILK PUNCH.—1 tumbler of milk, well sweetened. Two tablespoon-

fuls best brandy, well stirred in. I have known very sick patients to be kept alive for days at a time by this mixture, and nothing else, until Nature could rally her forces. Give very cold with ice.

Egg and Milk Punch.—Is made by the preceding receipt, with an egg beaten very light with the sugar, and stirred in before the brandy is added.

Iceland or Irish Moss Lemonade.—1 handful of Irish or Iceland moss, washed in five waters. 2 quarts boiling water, poured upon the moss, and left until cold. 2 lemons, peeled and sliced, leaving out the peel. Sweeten very well and ice. Do not strain and if it thicken too much add cold water. Excellent for all feverish colds and all pulmonary troubles.

Iceland or Irish Moss Jelly.—1 handful moss, washed in five waters, and soaked an hour. 1 quart boiling water. 2 lemons—the juice only. 1 glass of wine. ½ teaspoonful cinnamon. (Measure scantily.) Soak the washed moss in a very little cold water; stir into the boiling, and simmer until it is dissolved. Sweeten, flavor, and strain into moulds. You may use two glasses of cider instead of one of wine for a fever-patient, putting in a little less water. Good for colds, and very nourishing.

SIMPLE REMEDIES.

Herb Teas.

Are made by infusing the dried or green leaves and stalks in boiling water, and letting them stand until cold. Sweeten to taste.

Sage tea, sweetened with honey, is good for a sore throat, used as a gargle, with a small bit of alum dissolved in it.

Catnip tea is the best panacea for infant ills, in the way of cold and colic, known to nurses.

Pennyroyal tea will often avert the unpleasant consequences of a sudden check of perspiration, or the evils induced by ladies' thin shoes.

Chamomile and gentian teas are excellent tonics taken either cold or hot.

The tea made from blackberry-root is said to be good for summer disorders. That from green strawberry leaves is an admirable and soothing wash for a cankered mouth.

Tea of parsley-root scraped and steeped in boiling water, taken warm, will often cure strangury and kindred affections, as will that made from dried pumpkin seed.

Tansy and rue teas are useful in cases of colic, as are fennel seeds steeped in brandy.

A tea of damask rose leaves, dry or fresh, will usually subdue any simple case of summer complaint in infants.

Mint tea made from the green leaves, crushed in cold or hot water and sweetened, is palatable and healing to the stomach and bowels.

RHUBARB AND EPSOM SALTS.—Take of powdered rhubarb, one drachm, epsom salts, one ounce; spirits of pepperment, two drops; water, a tumblerfull. One or two tablespoonfuls will produce a laxative effect.

WHITE OAK BARK TEA.—Take of white oak, bruised, one ounce. Water, one pint. Boil for half an hour, strain, and add sufficient water through the strainer, to make the tea measure a pint. Useful in persistent diarrhœa.

WHITE WALNUT TEA.—Take of white walnut bark, one ounce. Water, a quart. Boil for half an hour. Dose, a wineglassful as a mild purgative.

CALAMUS TEA.—Take of calamus root, one ounce. Boiling water, one pint. Pour the water on the calamus, and, when cool, give in doses of a wineglassful for the relief of colicky pains in the bowels. Especially useful for children.

DANDELION TEA.—Take of dried dandelion root, sliced and bruised, one ounce. Water, one pint. Boil for ten minutes in a covered vessel, then strain, and pour as much water over the contents of the strainer as will make the strained product measure a pint. Dose, a wineglassful several times a day in biliousness and dropsy.

WORMSEED TEA.—Take of fresh wormseed leaves, one ounce. Milk, one pint. Boil with a little orange peel. Dose, a wineglassful, morning and evening, for the expulsion of worms from the bowels.

Strengthening Tonic.

One-third oz. gum gouiac; one-third oz. columbo root; one-half ℔

raisins; one-fourth lb loaf sugar; put into a quart bottle and fill with wine.

Simple Remedy for Croup.

Half a teaspoonful of pulverized alum in a little molasses. It is a simple remedy, one almost always at hand, and one dose seldom fails to give relief. If it should, repeat it after one hour or a teaspoon of lard and one of molasses.

A Good Remedy for Choking.

Swallow a raw egg.

Cure for Hydrophobia.

Bathe the bite as soon as possible in warm water and vinegar, and when this has dried, pour on a few drops of muriatic acid.

Cure for a Bone Felon.

As soon as the pulsation that indicates the disease is felt, put directly over the spot a fly blister about the size of a five cent piece, and keep it on for six or eight hours, at the expiration of which time, directly under the surface of the blister will be found the felon, which may be easily taken out with the point of a lancet or needle.

Scarlet Fever.

Give the patient warm lemonade with gum arabic dissolved in it. A cloth wrung out of hot water and laid upon the stomach, should be renewed as often as it becomes cool.

Whooping Cough.

After the cough has continued about two weeks, have the patient vaccinated.

Use of Ice.

In health no one ought to drink ice-water, for it has occasioned fatal inflamation of the stomach and bowels, and sometimes sudden death. The temptation to drink it is very great in summer; to use it at all with any safety, the person should take but a single swallow at a time, take the glass from the lips half a minute, and then another swallow, and so on. It will be found that in this way it becomes disagreeable after a few minutes.

Ice in a Sick-Room.

Mention is made in a foreign paper of a plan pursued by an ingenious

physician for insuring a supply of ice for use in sick-rooms during the hottest nights, and without disturbing the patient. This plan is to cut a piece of flannel about nine inches square, and secure it with string round the mouth of an ordinary tumbler, so as to leave a cup-shaped depression of flannel within the tumbler to about half its depth. In the flannel so formed pieces of ice may be preserved many hours—all the longer if a piece of flannel from four to five inches square be used as a loose cover to the ice-cup. Cheap flannel, with comparatively open meshes, is preferable, as the water easily drains through it, and the ice is kept quite dry.

Spring Suggestions.

Do not take off your winter flannels sooner than the first of May, but then change to a thinner article of the same material. They are wisest and healthiest who wear woolen flannel the whole year. Sailors wear it in all latitudes and at all seasons. Arrange to have a fire kept up all day in the family room, however warm it may be out of doors, until the first of May; and in the morning and evening until the first of June. This will prevent malarial diseases in the worst regions. It is because a brisk fire not only creates a draught, and thus purifies the air in the room, but so rarifies the deadly air that it is carried to the ceiling where it cannot be breathed.

To Purify Rooms.

To purify a room, and all rooms need it often, set a pitcher of water in the room, and in a few hours it will have absorbed all the respired gases in it, and the air of which will become pure, but the water utterly filthy. The colder the water, the greater its capacity to absorb these gases. At the ordinary temperature, a pail of water will contain a pint of carbonic acid gas, and several pints of ammonia. The capacity is nearly doubled by reducing the water to the temperature of ice. Hence water kept in a room a short time is unfit for use. For the same reason the water from a pump should always be pumped up in the morning before any of it is used. Impure water is much more injurious than impure air.

Bad Breath.

A weak solution of the permanganate of potassa is recommended to deodorize your breath.

Use of Lemons.

When persons are feverish and thirsty beyond what is natural, indicated in some cases by a metallic taste in the mouth, especially after drinking water, or by a whitish appearance of the greater part of the surface of the tongue, one of the best "coolers," is to take a lemon, cut off the top, sprinkle over it some loaf sugar, working it down into the lemon with a spoon, and then suck it slowly, squeezing the lemon and adding more sugar, as the acidity increases from being brought up from a lower point. Invalids with feverishness, may take two or three lemons a day in this manner, with the most marked benefit, manifested by a sense of coolness, comfort and invigoration. A lemon or two thus taken at "teatime," is an entire substitute for the ordinary supper of summer, and would give many a man a comfortable night's sleep, and an appetite for breakfast, to which they are strangers, who will have their cup of tea, or supper of "relish" and "cake," and berries, or peaches, and cream.

Remedy for Sore Throat.

Dissolve a tablespoonful of salt in about half a glass of water, and with this gargle the throat just before meal time.

Popular Medicines.

Composition Powders.—Take of powdered bayberry root one pound powdered ginger one half pound, powdered cayenne and cloves, each one ounce. Mix by passing through a sieve.

Hot Drops.—Take of capsicum (powd.) one ounce, myrrh (contus.) four ounces, alcohol two pints. Displace.

Harlm Oil.—Ol. sulphurat three pints, Petrol. barbadens one pint, ol. succin.(crude) one and a half pint, ol. terebinth. eight pints, ol. lini four pints. Mix.

Opodeldoc.—Take of common soap sliced three ounces. Camphor an ounce. Oil of rosemary, oil of origanum, each a drachm, alcohol a pint. Digest the soap, by means of a sand bath, with the alcohol till it

is dissolved, then add the camphor and oils, and when they are dissolved pour the liquid into wide-mouth two ounce bottles.

TOILET PREPARATIONS.

BEST COLOGNE.—Take oil of bergamont one wineglassful. Oil of neroli one dessertspoonful. Oil of jessamine one tablespoonful. Oil of garden lavender one wineglassful. Oil of cinnamon one drop. Benzoated tincture three ounces. Tincture of musk one tablespoonful. Deodorozed alcohol one gallon. Rose-water two pints. Mix and allow the preparation to stand a long time before filtering for use.

COMMON COLOGNE.—Take oil of lavender two tablespoonfulls. Oil of rosemary one tablespoonful. Oil of lemon one ounce. Oil of cinnamon one drop. Alcohol one gallon. Mix.

CAMPHORATED ACETIC ACID.—Take of camphor, half ounce. Acetic acid 6½ ounces. Pulverize the camphor by means of a few drops of spirits of wine, and dissolve it in the acetic acid. Used as a fumigative in fevers, an embrocation in rheumatism, and a refreshing and pungent perfume.

AROMATIC VINEGAR.—A pungent and reviving perfume, formerly esteemed a preventive of contagion. Take of acetic acid, very strong, camphor in powder, oil of cloves, of each a sufficient quantity. Mix them and secure in a well-stoppered bottle.

PREVETIVE VINEGAR.—A toilet preparation, to be mixed with water for lavatory purposes and the bath. Take of brandy, one pint, oil of cloves one drachm, oil of lavender one drachm, oil of majoram one-half drachm, gum benzoin one ounce. Macerate together for a few hours, then add brown vinegar two pints, and strain or filter, if requisite to be bright.

VINAIGRE DE COLOGNE.—To Eau de Cologne one, pint add, strong acetic acid one-half ounce, filter if necessary. These may be varied by substituting any other perfume, such as orange-flower or verbena water, observing, where either of these perfumed vinegars is required to produce opalescense when added to water it should contain myrrh, benzoin or Tolu.

TOOTH POWDER—Take precipitated chalk three ounces, powdered myrrh and orris root, each, one ounce, powdered borax, one-half ounce. Thoroughly powder the ingredients and mix them through a fine sieve.

CHARCOAL POWDER.—Take of recently burnt charcoal, in fine powder 6 parts, powdered myrrh, and powdered cinchona bark (pale), each, one part. Mix thoroughly.

CHARCOAL TOOTH-PASTE.—Take of chlorate of potassa a half drachm, mint water one ounce. Triturate to form a solution, then incorporate with—powdered charcoal two ounces, honey one ounce.

CUTTLE FISH POWDER.—Take of powdered cuttle fish one-half pound, precipitated carbonate of lime one pound, powdered orris one-half pound, oil of lemons one ounce, oil of neroli one-half drachm. Thoroughly powder and mix.

A SUPERIOR MOUTH WASH.—Take of old white Castile soap two drachms, alcohol three onnces, honey one ounce, perfume four ounces. Dissolve the soap in the alcohol, and add the honey and perfume.

VIOLET MOUTH WASH.—Take of tincture of orris one-half pint, esprit de rose one-half pint, spirit one-half pint, oil of bitter almonds five drops.

ESSENCE OR SPIRIT OF MUSTARD.—Take of black mustard two parts, water four parts, alcohol one part. Mascerate and distil one part of spirit. To be added to hair washes to supply sulphur to the hair and stimulate its growth.

PERFUMED HAIR OIL.—Take of castor oil ten ounces, very strong alcohol two ounces, essence of jessamine two drachms. Mix.

Any other essential oil may be substituted for the essence of jessamine, and we usually lable the vials according to their perfume, and color the rose oil red.

HAIR RESTORATIVE.—Take for castor oil six ounces, alcohol twenty six ounces. Dissolve, then add—tincture of cantharides (made strong with alcohol) one ounce, essense of jessamine (or other perfume) one-half ounce. Mix. This preparation has the property of rendering the hair soft and glossy, at the same time that, by its tonic and stimulant

properties it tends to arrest its premature decay. To accomplish this it should be rubbed thoroughly into the roots at least once a day.

POMADE.—Take of purified lard four pounds, suet two pounds, oil of lemon one ounce, oil of bergamont one-half ounce, oil of cloves three drachms. Melt the greases then beat them up with a whisk or wooden spatula for half an hour or more, to make the mass white and spongy; perfume with the oils.

PHLLICOME.—Take of white wax five ounces, almond oil two pounds, oil of bergamont one ounce, oil of lemon one-half ounce, oil of lavender two drachms, oil of cloves one drachm. Melt the wax and oil, stir as the mixture cools, and add the perfume.

HAIR DYE.—An excellent application for the hair. Take percipited sulphur, and acetate of lead, each, one drachm, rose water four ounces. Triturate together in a mortar. This is not an instantaneous dye, but should be applied twice a day till it gradually restores the color to its natural shade. The addition of half an ounce of glycerine will take from it a drying property which is undesirable.

BANDOLINE.—Take of gum tragacanth (choice) six ounces, rose water one gallon, otto of rose one-half ounce. Steep the gum in the water, agitating from time to time as it swells into a gelatinous mass; then carefully press through a coarse, clean linen cloth, and incorporate the otto of rose thoroughly through the soft mass.

BEES AND BEE-KEEPING.

CHAPTER XII.

The following instructions are from King's Bee Keepers Text Book:

"The Queen bee is a perfectly developed female, and the prolific parent of the whole colony—the mother of every bee it contains. "The Mother Bee" is the most appropriate and truthful name, as laying eggs appears to be the sole end of her existence, and the only duty she has to perform. This fact is beautifully demonstrated by removing a native and introducing an Italian queen in her stead. If the change is made in November, few common bees will remain by the following May; or if made in June, the yellow workers will begin to appear in a few weeks, and by September scarcely a black bee can be found in the hive. In the height of honey gathering and under the most favorable circumstances the queen bee will deposit about three thousand eggs per day. She is distinguished from the others by her form, size and color, being longer, and darker upon the back than either the drone or the worker. But the Italian queen is much lighter than the Italian drone or worker, the larger part of her body being of a golden yellow.

The queen is of slender structure, with comparatively short wings, and is usually recognized by her measured matronly movements, and by her long, finely tapering abdomen.

She usually lives from three to four years. If her death occurs when there are drones in the apiary and young worker brood or eggs in the hive, or if she is soon to leave the hive with a first swarm, the workers construct large cells, supplying themselves with "royal jelly," and the eggs or larvæ that would otherwise produce worker bees are developed into queens. Only one queen is allowed to remain in the hive. The queen

has a curved sting but will use it only when contending with other queens, as she cannot tolerate a rival queen in the hive.

THE DRONE.

The drones are somewhat shorter, though more bulky, than the queen, and, unlike her, their wings are long enough to cover the entire abdomen. They are much larger than the workers, and have a clumsy, uncouth appearance. When flying, their loud, boistrous hum is easily recognized. Being without a sac for carrying honey, or grooves on their thighs for carrying pollen, they are physically disqualified for performing the labor of the hive. Their proboscis is too short for extracting the nectar from flowers and being destitute of a sting, they cannot assist in protecting the stores from robbery. They are called into existence at the approach of the swarming season to fertilize the young queens. As impregnation is effected while on the wing, the drones leave the hive in considerable numbers about noon, on fine days, and the young queens make their excursions soon afterward. Whenever the service is supposed to be accomplished for the season, they are relentlessly driven forth and destroyed by the workers. A stock of bees that has lost its queen and not reared another, will retain the drones after all others are destroyed, and frequently throughout the winter. Without drones the young queens would remain barren, and the race soon become extinct. The number of drones in a hive is often very large, amounting to hundreds and even to thousands. In a state of nature, or where but one or two hives are kept a greater proportion of drones are necessary, as the young queen, when making her "bridal trip," should be sure of a speedy meeting, for, when roaming about in search of one, she is more liable to accidents. Where several colonies are kept, if each rear a few dozen drones there will be enough, in the aggregate, for all practical purposes. In movable comb hives all excess of drone comb should be removed, and the production of useless consumers thus prevented.

THE WORKER.

The workers, although the most diminutive in size, of the three classes, are alike the wonder and admiration of the student of nature.

Upon them devolves all the labor of collecting and defending the stores building comb, feeding and protecting the queen and brood, and expelling the drones when they are no longer necessary to the well being of the colony. In short, they rule and regulate the whole economy of the hive, performing all the offices except those which have direct reference to the reproduction of the species.

The cells in which the workers are reared, are the smallest in size, those for the drones nearly one-third larger, and a queen cell still larger and of peculiar form, requiring as much material for its construction as fifty worker cells. In strong colonies, having plenty of stores, the queen will often deposit eggs every month in the year, the least brood being reared between October and January. During this time the brood often occupies a small circle in the center of the cluster of bees exactly opposite on each side of a comb. Smaller circles are next occupied in the two adjoining combs. The circle of eggs in the next comb is then enlarged, and more added in others, continuing to spread to other combs, keeping the distance from the center or place of beginning to the outside of the circle about equal on all sides. The effect of this is to produce a concentration and economy of the animal heat for developing the various changes of the brood.

NATURAL SWARMING

The issue of natural swarms is almost wholly dependent upon warm growing weather. June is the great swarming month in the northern states. Yet when the spring is unusually favorable, we get an occasional swarm as early as the middle of May, and many about the last of that month. Again swarming may not commence until July. Bees will often rear drones, construct queen cells and be just on the point of swarming, when a few days of bad weather will cause the drones and embryo queens to be destroyed, and swarming will be postponed indefinitely. As much time must be spent in preparation when this occurs, it will require several weeks before swarms can issue, though the weather be ever so favorable.

The first warm clear day is generally improved, when the mass of the workers, after haststily filling their sacs with provisions for the journey,

rush pell mell from the hive, accompanied by the queen, with great noise and confusion.

After flying a short time they generally cluster on some overhanging branch, more or less elevated. Hives should be kept in readiness, as success depends greatly upon promptness in hiving swarms as they issue, for if left hanging in the heat of the sun, they soon become impatient and often fly off and are lost in consequence.

HIVING BEES.

The process of hiving is extremely simple and pretty generally understood; if the new hive is cool and clean, the bees are not long in taking possession of it. If the swarm has clustered on a tree or bush near the ground, spread down a sheet or piece of canvas directly under or as near the swarm as practicable. If the common hive is used place a board two feet square upon the end of the sheet, and upon that your hive. Have the hive raised about an inch from the board with strips or blocks of wood. If convenient, the hive may now be lifted and the swarm jarred gently into it and then carefully replaced upon the board, or the bees may be shaken upon the sheet from in front of the hive.

HATCHING QUEENS.

In about eight days after the old queen leaves with the first swarm, the most advanced sealed queen is ready to emerge. During this time the old stock is without a hatched queen. The young queen upon leaving her cell, if not restrained by the workers, commences the work of destruction upon her yet imprisoned sisters. She accomplishes this by biting open the side of each cell near its base, and dispatching the unfortunate inmate with her sting. She is yet incompetent for maternal duty, and must leave the hive to meet the drones in the air for the purpose of fertilization. This once accomplished, the workers, awaiting a safe return, greet her with reverence and affection never shown before. They hasten to prepare cells to receive her tiny eggs, and seem to realize that on her the existance and perpetuation of the family depends There is also a perceptible change in the queen's form, her abdomen belng a

little swollen and somewhat lengthened, but not as much as at the height of the breeding season. She now remains the fruitful mother of the prosperous and happy colony.

LOSS OF QUEENS

If the queen is lost or removed from the colony, when there are eggs or young larvæ in the worker combs and drones in the apiary, the workers almost immediately commence to construct queen cells to repair the loss.

If any colony seems unusually excited, see it again in the evening and next morning, and if still suspicious, go to a stock that has swarmed within a week,invert it, drive the bees down with smoke and cut out a *sealed* queen-cell, which may be given to a queenless stock by fitting it into one of the brood-combs near the cluster of bees. Care must be taken not to injure the cell by pressure, or to leave its point resting on the comb. But if such cell cannot be found, take in its stead, from a stock having a fertile queen, a small piece of worker comb containing eggs and larvæ. Give this to the queenless stock by fitting it into an opening in one of the brood-combs or fastening it between two of them up among the bees. If fastened between the combs, let the cells which contain the eggs be placed in a vertical position with the open end down. With movable comb hives the case is different. By their use we may easily ascertain the condition of the colony at any time. In such hives, all stocks that have unimpregnated queens should be examined about the twelfth day from the time the first swarm left, and if no eggs are to be found in the combs by the fifteenth day, the stock is probably queenless. Give them a reserve fertile queen or queen-cell, if either is at hand. If not, take from another hive a frame of worker comb which contains eggs and young brood, and place it near the center of the hive which is without a queen. Queens ordinarily lose their fertility or die of old age when from three to four years old. If this happens in winter or early spring, break up the colony, before its stores tempt others bees to robbery, giving the bees to another colony. Such a stock can seldom be induced to rear a queen at this season if furnished with material, and even though it should, the bees would nearly all be gone before she

could replenish its wasted ranks, should she eventually chance to prove fertile.

QUIETING AND HANDLING BEES.

Before a swarm issues from a hive the bees fill their sacs with honey to last them on their journey and aid them in establishing their new home. While thus filled, they are uncomonly good natured and obliging, seldom showing any rough points of character. Yet lest some luckless wight may have been sleeping on the outside of the hive while his comrades were filling their jackets within, we will give the clustered swarm a slight sprinkling with diluted honey or sweetened water. If they were docile and tractable before, they are doubly so now. We may shake the bees down, hunt out their queen, or perform with them any operation we wish, and they will not sting us unless we compel them to do so. Here we have the true explanation of all the charms, secrets and recipes for taming bees, with which unprincipled venders have long humbugged a too credulous public. The whole art of "taming" is embodied in the following:

A honey bee filled with liquid sweets will not sting of its own accord.

Bees, when frightened, will generally fill themselves with honey, and if given liquid sweets will always accept them.

Bees may be frightened thus:

By blowing upon them the smoke of punk, tobacco or cotton.

By confining them to the hive and rapping the sides lightly with a small stick. At first the bees will try to get out, but finding that impossible, they will rush to their stores and fill themselves with honey.

SURPLUS HONEY STORED IN BOXES.

Those having bees in common hives, and all who wish their honey stored in boxes, will obtain the greatest amount of honey and avoid disappointments by attending to the following conditions:

The boxes should be tight and large, but not over four or five inches high, and protected from the weather by an outer cap.

The bees should be induced to commence in them by attaching pieces of clean empty comb to the under side of the top, and placing the boxes

directly over the breeding apartment, with large openings under each of the boxes to admit the bees.

Early in the season select a few populous stocks, giving a box to each one, and when the bees have commenced in them, give the box to the next strongest, being careful not to give too much room till a start has been made.

Keep the hives cool by shading from the sun, and if the bees cluster on the outside, when flowers are plenty, ventilate by enlarging the holes and giving more room in the boxes if needed.

TO REMOVE HONEY AND EXPEL BEES.

Near sunset remove the cap and raise the end of the box just enough to blow under a little smoke, when the bees will leave the holes, which may be covered with blocks or an empty box turned bottom up. Set the full boxes right side up on strips upon the stand, so that they shall be three-eighths of an inch from the board, and five or six inches from the entrance of the hive. Gently rap on the boxes until the bees begin to leave in good earnest for the hive. Being filled with honey there is no danger of their stinging from the rough treatment received. The humming of those that enter will give notice to the others of their position near their home. Should some remain in the boxes they may be left till morning if the weather is fine, but must be removed early, lest the bees begin carrying the honey into the hive. If preferred, the boxes may be placed upon their sides in a tight box or barrel, and a thin cloth thrown over the top. Seeing the light, the bees will creep up on the cloth, and this be turned over occasionally all except a few young ones will find their way back to the hive.

WHEN AND HOW TO SWARM THE BEES.

Every populous stock, from which a nucleus has been formed, should be swarmed, if the weather is favorable, as soon as the queen in the nucleus has become fertile. This is usually in from six to ten days after inserting the queen-cell, and is readily determined by examining the comb for eggs. We now, unless the yield of honey is very abundant,

confine the young queen in a gauze wire cage. Having filled up the nucleus hive with empty frames, exchange the places of the two hives, and bring the entrance of the nucleus hive where the old hive stood, and where the mass of the old bees will return from the fields, thus throwing out of the old stock swarms of workers into the nucleus hive, while the old bees from the nucleus will enter the old hive and minister to the wants of the numerous brood of the parent stock. The bees must not be swarmed between the hatching and fertilization of the young queen, and should they be swarmed when the honey harvest has received a check from a storm or drought, the bees thus empty of honney and consequently more quarrelsome, being suddenly thrown into the presence of a new queen, (although of the same scent) are inclined to sting her. To prevent this she is caged for thirty-six hours, when the bees from the older stock will mostly have joined the nucleus colony; and she may safely be liberated. But if she was taken from another nucleus, we sometimes let her remain caged a day longer, or smear her with warm honey and let her in among the bees. They immediately commence licking her and forget to sting her.

WINTERING IN THE OPEN AIR.

In October, the exact condition of the stocks should be ascertained, both as to their strength and their supply of stores for the winter. If any are found lacking in both these points, join two together or strengthen them with bees obtained from neighbors, and supply them with extra food. To insure the safety of the stocks till flowers bloom in spring, each should have twenty-five pounds of honey. With a little practice, the amount of stores may be very nearly determined by inspection, or by lifting the cap and removing the hive from the stand. However, if the combs are more than one year old there is much liability of being deceived, when judging by lifting and weighing the hive. The reasons are that old combs are heavier than new, and often contain large quantities of bee bread. Still the experienced bee-keeper will seldom err in his esti- of winter supplies. Should any lack stores, give them a reserve frame of sealed honey, or if this cannot be done, and other stocks are very full

exchange a frame with each. If the lower part of such combs are empty, they may be placed near the center of the needy stocks, as there should be honey directly above the bees; but if full place them a little to one side of the cluster, for the reason that the bees need empty cells to winter in. The comb in each frame should have an inch hole cut through it four or five inches from the top, to enable the bees, in extreme cold weather to reach their stores in the outside combs without any danger of of freezing, by leaving the cluster to crawl around the outside of the frame.

When there are cross-pieces, as in the improved comb frame, the bees seldom fail to leave openings above the cross pieces, which serve as the winter passages. Upward ventilation should be provided for strong winter stocks, by covering the hole in the top with a piece of wire cloth, and filling the basin with fine cut straw or shavings. This will absorb the moisture generated by the bees, thus keeping the combs dry and free from frost, while it permits the foul air to pass off so gradually, that cold currents in the hive are avoided. Stocks standing in exposed situations, may be greatly benefitted by enclosing the hives, except the entrance, with caps made of flags or rye straw being careful to exclude the mice. Set up a broad board to shade the hive, and especially the entrance, during the middle of the day. If this be done, the bees will seldom leave the hive when the air is cool enough to chill them. When a judicious method of swarming has been pursued, and the colonies well cared for, they should be populous and well provisioned for the winter, requiring little trouble in getting ready, or risk in keeping them through till spring Such stocks, if shielded from the peircing wintry winds, and well ventilated, will pass a Siberian winter uninjured. Bees should not be disturbed during the winter, except at the close of every long spell of cold weather; when, if the air be warm onough for them to fly without being chilled, open all the entrances, allowing the rays of the sun to hit the alighting board, when the bees will fly out, void their feces and then return, without loss to the hive.

WINTERING BEES IN CELLARS.

The object of wintering bees in cellars, is to have them in a place of

even temperature, and just cool enough to keep them in a state of inactivity, thereby saving many bees, and greatly lessening the consumption of honey. A cellar for this purpose should be dry, and the hives raised from the floor, to guard against the comb becoming mouldy from excess of dampness. The cellar should be divided by a curtain or other partition, that no ray of light may reach the hive when the door is opened.

The bees should not be taken in until it is evident that winter has commenced in earnest. The hives, if numerous, may be placed on shelves, one above the other, and strong stocks must have abundant upward ventilation. If the stocks are in the movable comb hive, this will be well secured by leaving off the caps, and leaving open the passages through the top bars of the frames. Also, the ventilator below the bottom board should be left unobstructed. A piece of wire cloth or thin muslin, fourteen by fifteen inches square, may be tacked on top of the hive to confine the bees, yet this would be unnecessary if the proper degree of temperature were always maintained, and the light carefully excluded. When the stocks are in common hives, four or five holes should be bored with an inch bit, through the top of the hive and covered with wire cloth. Inch strips should then be laid upon the shelves, and the hives placed upon them in an inverted position. Weak stocks, but partly filled with comb, need less ventilation. In mild weather the air may sometimes be purified by opening the door at night. The temperature should not be allowed to fall to the freezing point, yet forty or fifty stocks enclosed in a small space generate much heat, and may sometimes become uncomfortably warm, which will be known by the uneasy movement of the bees. They should be examined occasionally through the winter, to see that all is right, but disturbed as little as possible. As spring approaches, the strong stocks become more uneasy, and should be taken to their summer stands, during the first warm days of March, setting out a few stocks at a time to avoid confusion by mixing until each has marked its location.

THE AMERICAN GOVERNMENT.

CHAPTER XIII.

The General Government of the United States consists of the Executive, Legislative and Judicial Departments.

The Executive consists of the President—who is elected for four years, and receives a salary of $50,000 a year.

Vice-President elected for four years—salary $8,000.

The Cabinet consists of a Secretary of State, Secretary of the Treasury, Secretary of War, Secretary of the Navy, Secretary of the Interior, Postmaster General and Attorney General, whose salaries are $8,000 each.

The Legislative Department consists of a House of Representatives and Senate. The House of Representatives is composed of 293 members who are elected by Districts—each State being represented in proportion to its population as follows:

STATES.	MEMBERS.	STATES.	MEMBERS.
Alabama	8	Missouri	13
Arkansas	4	Nebraska	1
California	4	Nevada	1
Colorado	1	New Hampshire	3
Connecticut	4	New Jersey	7
Delaware	1	New York	33
Florida	2	North Carolina	8
Georgia	9	Ohio	20
Illinois	19	Oregon	1
Indiana	13	Pennsylvania	27
Iowa	9	Rhode Island	2
Kentucky	10	South Carolina	5
Louisiana	6	Tennessee	10
Maine	5	Texas	6
Maryland	5	Vermont	3
Massachusetts	11	Virginia	9
Michigan	9	West Virginia	3
Minnesota	3	Wisconsin	8
Mississippi	6		

The Senate consists of two members from each State, elected by the Legislature, and serving six years.

The compensation of members of Congress is fixed by law at $5,000 per year, and twenty cents per mile each session to and from Washington, and an $125 each per annum for stationery.

Each territory is entitled to one delegate in Congress, who is not entitled to vote.

THE JUDICIARY DERARTMENT.

This consists of a Supreme Court, Circuit and District Courts. There are nine Supreme Judges, nine Circuit Judges, and fifty-three District Judges, all of whom are appointed by the President, subject to confirmation by the Senate, and hold their offices during life. The salary of the Supreme Judges is $10,000 each, Circuit Judges $6,000, District Judges from $3,000 to $4,000 each.

PENSIONS FOR SOLDIERS.

All surviving soldiers of the war of 1812, and all widows of deceased soldiers of the war of 1812, are entitled to pensions at the rate of $8.00 per month. All soldiers disabled in the military service of the United States, are entitled to pensions as long as the disability continues. The widows of all soldiers who died, or were killed while in the military service, or who have since died from any disability or disease contracted in the service are entitled to pensions, and all children of such soldiers are also entitled to pensions until they become sixteen years of age. Mothers and fathers of sons who were killed in the service are entitled to pensions only when they were dependent on the son, in whole or in part, for their support.

It is not necessary to employ an attorney to procure a pension. The applicant should in all cases give the full name of the soldier, his Company and Regiment, state the ground upon which a pension is claimed, giving his State, county and post office; direct to the Commissioner of Pensions, Washington, D. C. Blanks will be returned, which must be filled up and executed in strict compliance with the instructions accompanying them, and when completed, returned to the Commissioner of Pensions. If more evidence is required, the applicant will be notified. In case the applicant employes an attorney, ten dollars is the legal fee he is entitled to for his services.

THE PUBLIC LANDS.

HOW TO ENTER, PRE-EMPT, TAKE A HOMESTEAD OR TREE CLAIM.

The public lands of the United States which are still undisposed of and open to settlement lie in nineteen States and eight Territories. In each case, except Ohio, Indiana, Illinois, the Indian Territory, and Alaska, land offices are established, in charge of a man known as Register of the Land Office, where the records of all surveyed lands are kept, and all applications concerning lands in each district are filed and inquries answered. The public lands are divided into two great classes. The one class have a dollar and a quarter an acre designated as the minimum price, and the other two dollars and a half an acre. Titles to these lands may be acquired by private entry or location under the homestead, pre-emption and timber-culture laws; or, as to some classes, by purchase for cash, in the case of lands which may be purchased at private sale, or such as have not been reserved under any law. Such tracts are sold on application to the Land Register, who issues a certificate of purchase, the Receiver giving a receipt for the money paid, subject to the issue of a patent, or complete title, if the proceedings are found regular, by the Commissioner of the General land office at Washington.

Entries under the land warrants (given mostly for military services under acts of Congress) have fallen off very largely by the absorption of such warrant, there having been no military bounty land warrants provided for on account of services in the late civil war.

Entries under the pre-emption law are restricted to heads of families, or citizens over twenty-one, who may settle upon any quarter-section (or 160 acres) and have the right of prior claim to purchase on complying with certain regulations.

The homestead laws give the right to one hundred and sixty acres of a dollar and a quarter lands, or to eighty acres of two dollar and a half lands, to any citizen or applicant for citizenship over twenty-one who will actually settle upon and cultivate the land. This privilege extends only to the surveyed lands, and the title is perfected by the issue of a patent after five years of actual settlement. The only charges in the

case of homestead entries are fees and commissions, varying from a minimum of $7 to a maximum of $22 for the whole tract entered, according to the size, value or place of record.

Another large class of free entries of public lands is that provided for under timber culture acts of 1872–78. The purpose of these laws is to promote the growth of forest trees on public lands. They give the right to any settler who has cultivated in two years as much as five acres of trees, to an eighty-acre homestead, or if ten acres, to a homestead of one hundred and sixty acres, and a free patent for his land is given him at the end of three years instead of five. The limitation of the homestead laws to one hundred and sixty acres for each settler is extended in the case of timber culture so as to grant as many quarter sections of one hundred and sixty acres each as have been improved by the culture for ten years of forty acres of timber thereon, but the quarter sections must not lie immediately contiguous.

SALE AND PURCHASE OF LAND.

All contracts for the sale or purchase of real estate, must be in writing.

Never buy a farm or lot without first having a complete abstract showing the chain of title from the entry in the Government land office up to the date of purchase. The abstract should be made out by a careful, competent and reliable abstractor. It should show all conveyances in detail and in the order they were made. It should show all mortgages, all liens or judgments in the various courts, all delinquent taxes, or mechanic's liens, or if there are none, it must be so certified. As soon as a deed for land is received, or a mortgage executed, they should be recorded in the county record of Deeds and Mortgages without a moments delay. Many heavy losses have arisen from neglect to have conveyances properly recorded. A chattel mortgage should be immediately recorded. All agreements for the lease of land should be in writing and signed by all parties in interest, each party keeping a copy of the same. All agreements for the purchase of growing timber or crops should be in writing, as they pass with the sale of the land unless expressly reserved by a written instrument. As a general and safe rule—every thing

agreed upon in a contract or an agreement should be written out distinctly, and care should be taken to say all that is meant, and just what is meant, and nothing else; for it is a rule of law that no *oral* testimony shall control a *written agreement*, unless fraud can be proved. Against fraud nothing stands.

As a rule, all written instruments are construed and interpreted by law, according to the simple, customary and natural meaning of the words used.

ABSTRACT OF IOWA LAWS.

TAXATION OF PROPERTY.

The owners of personal property, on the first day of January of each year, and the owners of real property on the first day of November of each year, *are liable* for the taxes thereon.

The following property is exempt from taxation, viz.:

All animals not hereafter specified, the wool shorn from sheep belonging to the person giving the list, his farm produce, harvested within one year previous to the listing; private libraries not exceeding three hundred dollars in value; family pictures, kitchen furniture, beds and bedding requisite for each family, all wearing apparel in actual use, and all food provided for the family; but no person from whom a compensation for board or lodging is received or expected, is to be considered a member of the family within the intent of this clause.

The polls or estates or both of persons who, by reason of age or infirmity, may, in the opinion of the assessor, be unable to contribute to the public revenue; such opinion and the fact upon which it is based being in all cases reported to the Board of Equalization by the assessor or any other person, and subject to reversal by them.

The farming utensils of any person who makes his livelihood by farming; and the tools of any mechanic, not in either case to exceed three hundred dollars in value.

Government lands entered or located or lands purchased from this State, should not be taxed for the year in which the entry, location or purchase is made.

There is also a suitable exemption, in amount, for planting fruit trees or forest trees or hedges.

Where buildings are destroyed by fire, tornado, or other unavoidable casualty, after being assessed for the year, the Board of Supervisors may rebate taxes for that year on the property destroyed, if same has not been sold for taxes, and if said taxes have not been delinquent for thirty days at the time of destruction of the property, and the rebate shall be allowed for such loss only as is not covered by insurance.

All other property is subject to taxation.

The Township Board of Equalization shall meet the first Monday in April of each year. Appeal lies to the Circuit Court.

The County Board of Equalization (the Board of Supervisors) meet at their regular session in June of each year. Appeal lies to the Circuit Court.

Taxes become delinquent February 1st of each year, payable, without interest or penalty, at any time before March 1st of each year.

Tax sale is held on first Monday in October in each year.

Redemption may be made at any time within three years after date of sale, by paying to the County Auditor the amount of sale, and twenty per centum of such amount immediately added as penalty, with ten per cent. interest per annum on the whole amount thus made from the day of sale, and also all subsequent taxes, interest and costs paid by purchaser after March 1st of each year, and a similar penalty of twenty per centum added as before, with ten per cent. interest as before.

If notice has been given, by purchaser, of the date at which the redemption is limited, the cost of same is added to the redemption money. Ninety days' notice is required, by the statute, to be published by the purchaser or holder of the certificate, to terminate the right of redemption.

EXEMPTIONS FROM EXECUTION.

A resident of the State and head of a family may hold the following property exempt from execution: All wearing apparel of himself and family kept for actual use, and suitable to the condition, and the trunks or other receptacles necessary to contain the same; one musket, or rifle,

and shot-gun; all private libraries, family Bibles, portraits, pictures, musical instruments, and paintings not kept for the purpose of sale; a seat or pew occupied by the debtor or his family in any house of public worship; an interest in a public or private burying ground not exceeding one acre; two cows and a calf; one horse, unless a horse is exempt as hereinafter provided; fifty sheep and the wool therefrom, and the materials manufactured from said wool; six stands of bees; five hogs and all pigs under six months; the necessary food for exempted animals for six months; all flax raised from one acre of ground, and manufactures therefrom; one bedstead and necessary bedding for every two in the family; all cloth manufactured by the defendant not exceeding one hundred yards; household and kitchen furniture not exceeding two hundred dollars in value; all spinning wheels and looms; one sewing machine and other instruments of domestic labor kept for actual use; the necessary provisions and fuel for the use of the family for six months; the proper tools, instruments or books of the debtor, if a farmer, mechanic, surveyor, clergyman, lawyer, physician, teacher or professor; the horse, or team, consisting of not more than two horses or mules, or two yokes of cattle, and the wagon or other vehicle, with the proper harness or tackle, by the use of which the debtor, if a physician, public officer, farmer, teamster or other laborer, habitually earns his living; and to the debtor, if a printer, there shall also be exempt a printing press and the types, furniture and material necessary for the use of such printing press, and a newspaper office to the value of twelve hundred dollars; the earnings of such debtor, or those of his family, at any time within ninety days next preceding the levy.

Persons unmarried and not the head of a family, and non-residents, have exempt their own ordinary wearing apparel and trunks to contain the same.

There is also exempt, to a head of a family, a homestead, not exceeding forty acres; or, if inside city limits, one-half acre with improvements, value not limited. The homestead is liable for all debts contracted prior to its aquisition as such, and is subject to mechanics' liens for work or material furnished for the same.

ESTRAY ANIMALS.

Any swine, sheep, goat, horse, neat cattle or other animal distrained (for damage done to one's enclosure), when the owner is not known, shall be treated as an estray.

Within five days after taking up an estray, notice containing a full description thereof, shall be posted up in three of the most public places in the township; and in ten days, the person taking up such estray shall go before a Justice of the Peace in the township and make oath as to where such estray was taken up, and that the marks or brands have not been altered, to his knowledge. The estray shall then be appraised, by order of the Justice, and the appraisement, description of the size, age, color, sex, marks and brands of the estray shall be entered by the Justice in a book, kept for that purpose, and he shall, within ten days thereafter, send a certified copy thereof to the County Auditor.

When the appraised value of an estray does not exceed five dollars, the Justice may not proceed further than to enter the description of the estray on his book, and if no owner appears within six months, the property shall vest in the finder, if he has complied with the law and paid all costs.

Where appraised value of estray exceeds five and is less than ten dollars, if no owner appears in nine months, the finder has the property, if he has complied with the law and paid costs.

An estray, legally taken up, may be used or worked with care and moderation.

If any person unlawfully take up an estray, or take up an estray and fail to comply with the law regarding estrays, or use or work it contrary to above, or work it before having it appraised, or keep such estray out of the county more than five days at one time, before acquiring ownership, such offender shall forfeit to the county twenty dollars, and the owner may recover double damages with costs.

CONTENTS.

CONTENTS—*continued.*

CONTENTS—*continued.*

CONTENTS—*continued.*

CONTENTS—*continued.*

CONTENTS——*continued.*

HAWKEYE FIRE INSURANCE COMPANY

OF DES MOINES, - - - IOWA.

CASH ASSETS, - - - $620,051.91,

This Company has issued to the Farmers of Iowa over 90,000 of their Policies.

This Company has paid in losses to the people of Iowa nearly Half a Million of Dollars.

This Company does not insure against Wind, Tornadoes or Hail, but has the largest Fire Insurance business of any company in the State of Iowa.

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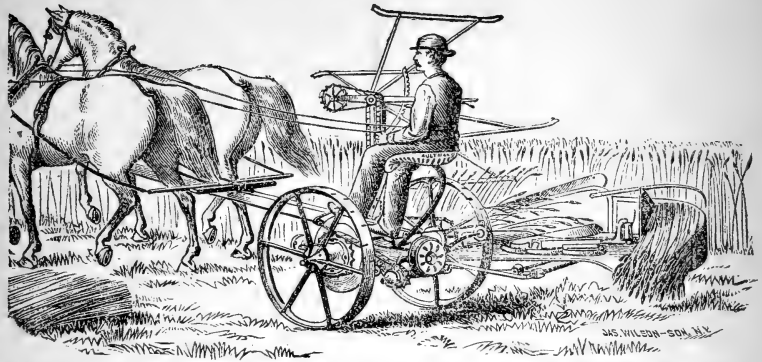

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ESTABLISHED 1867.

Insurance that insures; no assessments; no "passing round the hat"; so much insurance for so much premium—certain in amount, and reliable and prompt in payment.

All approved forms of Life and Endowment insurance at as low rates of premium as any other responsible company in the United States.

Policy holders participate in all surplus and profits resulting from the business. The payment of every policy guaranteed and secured by a deposit of the full liability under it with the Auditor of the State of Iowa.

Total liability of the Company on the 1st day of January, 1881.....	$292,699 75
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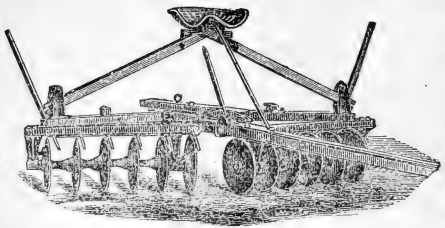

ECONOMIZES TIME; SAVES LABOR AND MONEY; SECURES THE LARGEST YIELD OF CROPS BY THE MOST PERFECT TILLAGE

It has no equal as a *Pulverizer*, *Cultivator*, *Sod-Cutter*, and for tilling all tenacious and tough soils. It is a substitute for the plow, cutting from 6 to to 10 feet in breadth. Less labor and increased crops are the certain results of the use of the Randall Harrow. Half the time saved by using it to prepare soil for seed; and it adapts itself in every condition of surface and soil.

WHAT IT WILL DO:

It will thoroughly Pulverize the Soil.
It will thoroughly cover up seed grain.
It will thoroughly cover up surface manure.
It is often a substitute for the Plow.
It will save half the time and labor in preparing soil for seed.
It will increase your crops. It will save its cost in one season.

Every one who Has used it or Seen it Used it, Speaks in its Praise.

IT IS NO EXPERIMENT BUT A PROVED SUCCESS.

Do not Tramp after and lift your useless old Drag. Ride the Randall, and Save many a Weary Mile.

TESTIMONIAL.

I never bought a machine I was so well satisfied to pay for as the Randall Harrow. I have thoroughly tested it on nearly all kinds of ground, corn stubble, sod breaking and fall plowing. No other implement can approach it for completeness of work and economy of power in surface cultivation. I am sure you will have success, for the Harrows needs only to be used to commend itself as the most valuable implement in use. All purchasers will find, as I have, that you have conferred a favor by placing the Randall Harrow within their reach.—M. W. DUNHAM, Oak Lawn Farm, Wayne, Ill., May 14, 1869.

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