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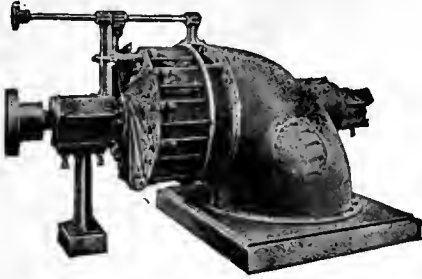
San Francisco, California
2007

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SAMSON TURBINE



When the PUMP cannot be direct connected to the turbine shaft, the power is usually transmitted by gears, shafting, etc. On account of the HIGH SPEED of the SAMSON, for a given power, lighter and consequently CHEAPER transmission machinery can be used.

JAMES LEFFEL & CO., Springfield, Ohio, U. S. A.

Write Department K-2 for Catalog.



SECTION OF MAIN CANAL, SIXTEEN MILES FROM HEADGATE

HOW TO SECURE HOMES IN IDAHO.

Irrigated Farm and Fruit Land in the Famous Snake River Valley.

This advertisement is addressed to the thousands who want homes in a country where the climate is ideal, where opportunities abound and where farming and fruit growing and stock raising are taken out of the speculative column and placed in the class of sure, safe and profitable business enterprises.

If you contemplate locating in Idaho or the West you should understand something about what is necessary to secure irrigated tracts under the Carey Law. The following will assist you:

- 1st. Make your selection of land either in person or by your representative.
- 2d. Procure your water right from us. You must have one share, or acre, of water right for each acre of land.
- 3d. At the time you secure your water right you will make, through us, your application to the State of Idaho for the land.

The price of the land is 50 cents per acre. The price of perpetual water rights ranges from \$15 to \$25 per share according to quality and location of land. One share of water will irrigate one acre of land. The amount furnished each year is sufficient, if placed upon the land at one time, to cover it 30 inches deep. The water is measured at the point where it is delivered to the purchaser, thereby saving him all loss from seepage or evaporation. The average rainfall in Idaho is 13 inches each year.

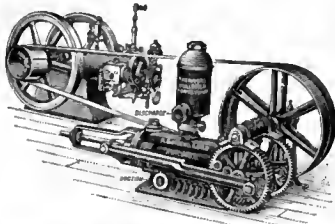
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THE AMERICAN FALLS CANAL AND POWER CO., POCATELLO, IDAHO.

Please mention THE IRRIGATION AGE when writing to Advertisers.

MYERS POWER PUMPS

WITHOUT AN EQUAL ON THE GLOBE



OPERATING
WITH
GAS ENGINE

FIG. 952

HORIZONTAL BULLDOZERS, 3' to 6' CYLINDERS

MYERS
BACK GEARED
WORKING HEAD

TAPPED FOR
3' PIPE

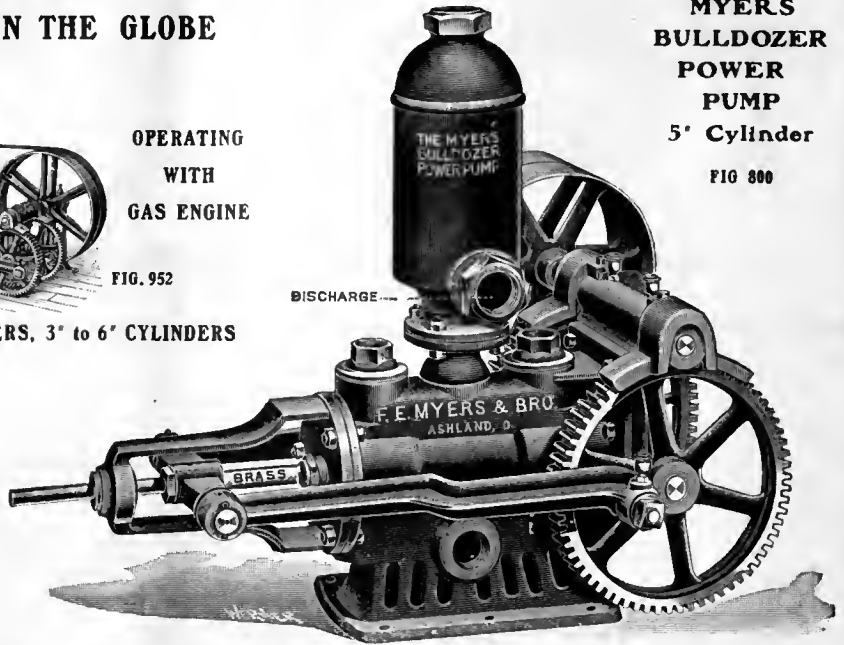
5, 7½ and 10'
STROKE

FOR
BELT, WIND OR
HAND POWER

FIG. 1113



2½" DISCHARGE



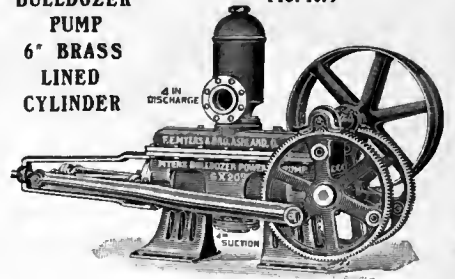
MYERS
BULLDOZER
POWER
PUMP
5' Cylinder

FIG. 800

DISCHARGE

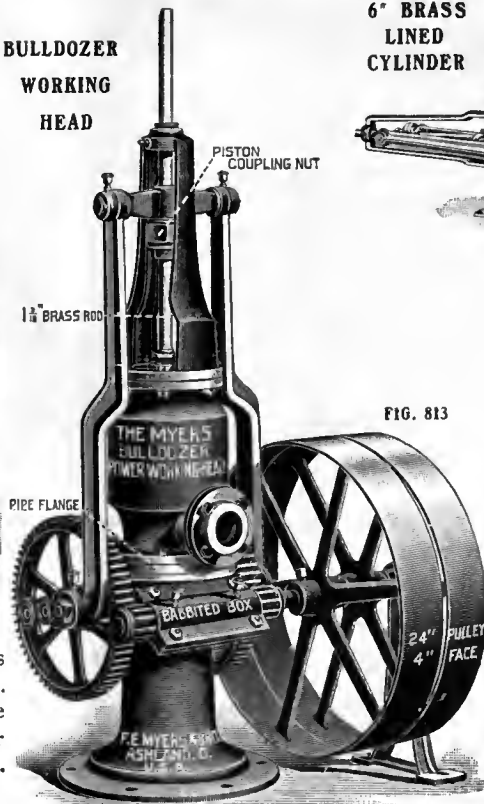
BULLDOZER
PUMP
6' BRASS
LINED
CYLINDER

FIG. 1079



4" DISCHARGE

BULLDOZER
WORKING
HEAD



PISTON
COUPLING NUT

1½" BRASS ROD

PIPE FLANGE

FIG. 813

MYERS BULLDOZER
WORKING HEADS

No. 359

5", 7½", 10' STROKE
DISCHARGE, 2½ or 3 INCHES
SUCTION 2 to 4 INCHES

No. 364

12", 16", 20' STROKE
REGULARLY FITTED 4' DIS-
CHARGE
SUCTION 8' OR LESS

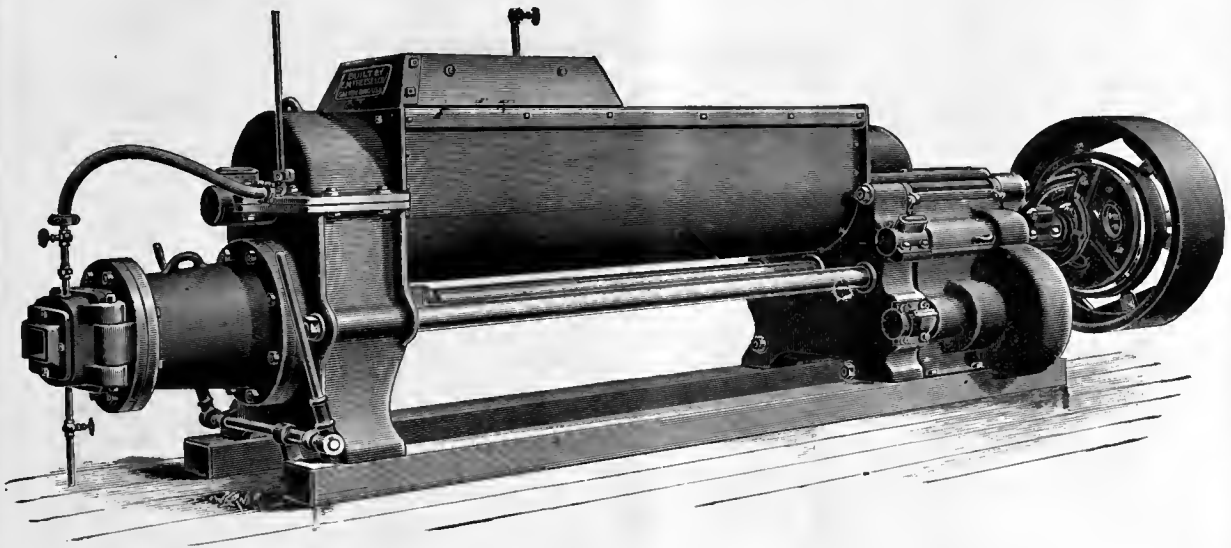
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We want you to acknowledge this Ad. so
that we can acquaint you in detail with the
superior features of Myers Power
Pumps. This is the proper season.
The right time to write is right now.

F. E. MYERS & BRO., ASHLAND OHIO, U.S.A.

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ASHLAND PUMP AND HAY TOOL WORKS

UNION MACHINES WITH PUG MILLS COMBINED



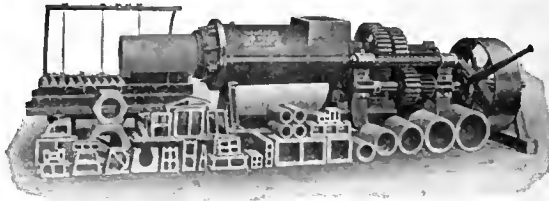
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Outfits for Drain Tile, Hollow Ware, Building
and Paving Brick and other Clay Products

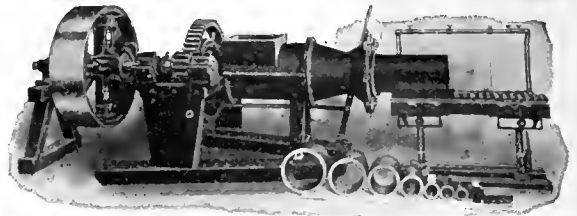
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E. M. FREESE & CO.

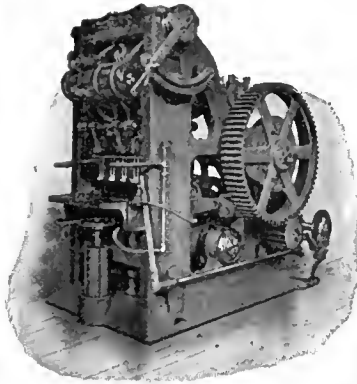
GALION, OHIO



Centennial Auger Machine



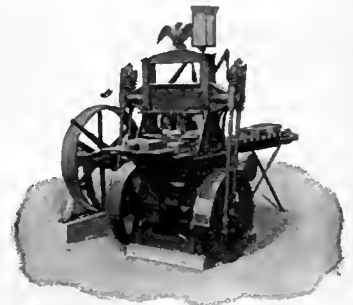
Mascot Auger Machine



Dry Press, 5 styles



Wheelbarrows and Trucks



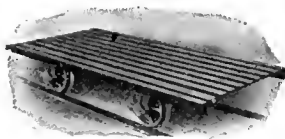
Eagle Repress

Clay Working Machinery

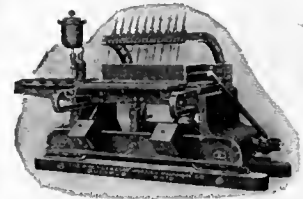
"BUILT RIGHT—
RUN RIGHT"

We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

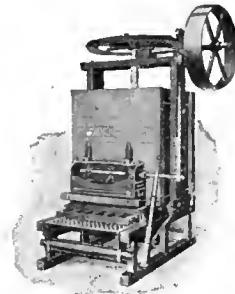
The American Clay Mch. Co...Bucyrus, Ohio



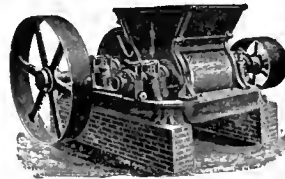
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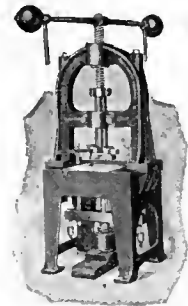
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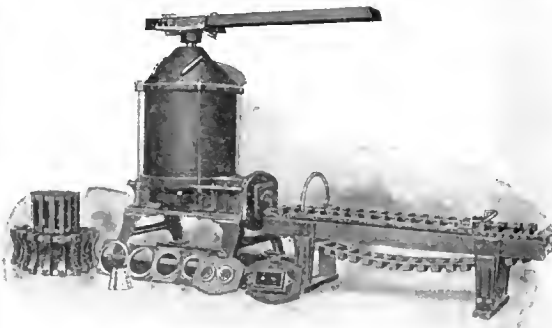
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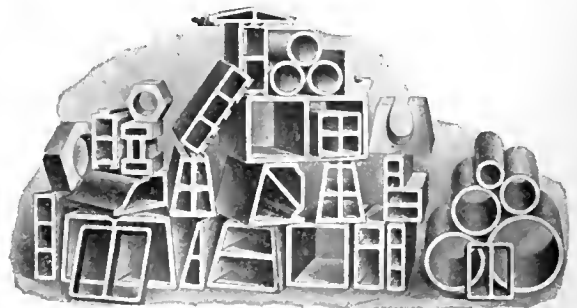
Disintegrators



Hand Power Screw Press



Horse Power Plunger Machine



Products of our Auger Machines

THE IRRIGATION AGE

VOL. XXII

CHICAGO, NOVEMBER, 1906.

No. 1

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

THE D. H. ANDERSON PUBLISHING CO.,
PUBLISHERS,

112 Dearborn Street, - - CHICAGO

Entered at the Postoffice at Chicago, Ill., as Second-Class Matter.

D. H. ANDERSON, Editor
W. J. ANDERSON .. G. L. SHUMWAY
Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

Blazing the Way. Irrigation is blazing the way for civilization throughout the West—and the trail is being blazed with much more rapidity than many imagine.

Irrigation Pays. More fortunes are being made in the irrigated regions of the West than anywhere else in America. Where irrigation is practiced crop failures are unknown. Thousands of farmers from the Middle States have gone West and amassed fortunes, in a comparatively brief period.

Fresno Irrigation transforms the wilderness into a blooming garden. Not so many years ago Fresno, California, for example, was not on the map. The territory tributary to that point comprised monotonous flats that gave no promise of better things. Today Fresno is the entrepot of one of the most prosperous communities in the world, and irrigation wrought the transformation.

New Railroads. At this time there are no less than three railway systems in the United States contemplating an extension of their lines to the Pacific coast. Many miles of new road are also being built in Oregon and Washington. Need of larger facilities for handling freight and passengers is, of course, the cause of the extensions—and irrigation has developed the freight and passengers.

SUBSCRIPTION PRICE.

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To Canada and Mexico, 1.00
All Other Foreign Countries, 1.50

In forwarding remittances please do not send checks on local banks. Send either postoffice or express money order or Chicago or New York draft.

Official organ of the American Irrigation Federation.
Office of the Secretary, 309 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that *The Irrigation Age* is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. *The Irrigation Age* is 21 years old and is the pioneer publication of its class in the world.

Visit the West. If you have never traveled to the Pacific coast, it will be necessary for you to go there if you wish to become acquainted with the opportunities that are to be found in the western wonderland.

Two Amendments. Electors in Washington were asked to vote on two constitutional amendments at the recent election. One of them was that the use of the waters of the State for irrigation, mining, manufacturing and for the removal of timber products shall be deemed a public use. The other was that private property may be taken under such terms, conditions and limitations as shall be prescribed by the Legislature, but that just compensation must be made.

To Reach the Buyer. THE IRRIGATION AGE reaches a class of readers that can be talked to through no other publication. At this writing the West is more prosperous than any other section of the country, and the indications are that this will remain true for many years to come. If you are a manufacturer, and make anything you wish to sell west of the Missouri River, tell your story in THE IRRIGATION AGE. This paper goes to both the dealer and the consumer, and is the leading publication of its class in the world. Ditching and excavating machines, agricultural implements, wagons, gasoline engines, concrete mixers, fencing, etc., etc., are some of the lines in which our readers are particularly interested, and they are all liberal buyers because they have plenty of money.

With this issue THE IRRIGATION AGE begins its twenty-second year. While irrigation, per se, is as old as civilization itself, little had been done in the United States to reclaim any arid or semi-arid lands by means of irrigation at the time the first number of this journal was published. Indeed, very few had any adequate conception of what could be done in the way of reclaiming waste lands. Some learned men in those days scoffed at the idea of any one even being able to make anything grow in the wild lands of the West. Hardly more than half a century ago no less a personage than Daniel Webster, who was then Secretary of State, when asked to favor a small appropriation for the purpose of sending an expedition to explore the western country, balanced a 2-cent piece on the end of his forefinger and gravely announced that he would not exchange the coin for all the territory lying west of the Rocky mountains!

This incident is recited at this time so that the reader today can understand something of the amazing indifference and lack of information that has stood like a Chinese wall between the people and their just rights, keeping them away from a rich heritage to which they were justly entitled. It was against this great wall that THE IRRIGATION AGE directed its batteries more than a score of years ago. One after another of the towering barriers have crumbled before the steady and well directed fire, until today scarcely a vestige of the wall remains. The struggle was long and strenuous—but now the people are coming into their own—they are beginning to reap the fruits of victory. The Reclamation Act has now been in operation over a period of four years, and thousands of acres of waste lands have already been reclaimed—and the good work has just begun!

In this connection it should be noted that manufacturers are beginning to appreciate the good work of THE IRRIGATION AGE. Every acre of land reclaimed by means of irrigation spells a larger demand for everything used on the farm. We take no little pride in our achievements during the last twenty-one years, and we hope to do even more in the years to come.

William E. Smythe, one of the founders of the paper, is still actively engaged in literary work, and while no longer connected with this publication, is doing much toward stimulating interest in irrigation development; and to his early efforts may be attributed much of the success which has been attained through the passage of the Reclamation Law. Numerous other men have been prominent in irrigation work, and, unfortunately for the cause, many unscrupulous individuals have derived personal benefits to which they were not entitled—but to the great number of early workers who spent so much energy and valuable time without receiving or expecting anything in return, the AGE extends

greeting and good wishes on this its 22d birthday. Some of those who did valiant work have passed away, and are not permitted to see the results of their labors; while others, like Newell, Shurtliff, John Henry Smith, Mead, Knight, Keisel, Graves, Johnson, Jaycox, Carpenter, Frost, Moses, Murphy, Fortier and many others are more or less active and doing splendid work in promoting the best interests of irrigation—to these and to the whole company of loyal workers the AGE extends greeting.

Forest Reserve Lands.

The Bureau of Forestry at Washington, D. C., announces that the bill providing for settlement on agricultural lands embraced in forest reservations has been signed by the President and is now effective. This law will throw open for settlement thousands of acres of fertile lands. Following are the more important provisions of the new law:

“Only lands valuable for agricultural purposes and not needed for administrative purposes by the forest service or for some other public use will be classified and listed under this bill. Land covered with a merchantable growth of timber will not be declared agricultural, except upon the strongest evidence of its value for agricultural purposes, both as to its productiveness and accessibility to a market.

“Areas known to have been occupied by actual settlers prior to January 1, 1906, will be examined first, and when such areas are found chiefly valuable for agricultural purposes they will be listed, in order that the occupants may make entry under the act. The mere fact that a man has settled upon land will, however, not influence the decision with respect to its agricultural character.

“Any one who was a bona fide settler on land within a forest reserve before January 1, 1906, but who has already exercised or lost his homestead privilege, may, if otherwise qualified, make homestead entry under the law, but must pay \$2.50 per acre for any lands entered.

“The first preference right to enter lands classified and listed under the act will be given to persons who settled upon such lands prior to January 1, 1906. The second preference right to enter any particular listed tract will be given to persons who apply to have the classification made, but this latter class should not apply for the classification of a tract occupied by a settler before that date; otherwise, they might lose their preference rights.

“Supervisors are often absent from their headquarters, and so cannot be reached at all times by applicants. To avoid any undue advantage of one applicant over another due to this cause, all applications under this act must be forwarded by mail to the Forester, Washington, D. C., by the applicants.

“Applications dated and mailed before the bill be-

came a law will have no value and the Forester will return them at once.

"All applications received in the same mail for the examination for the same tract of land will be treated as simultaneous, and as simultaneous applicants must be notified, a similar notice will be given to the latter of two applicants for the examination of the same tract.

"No examination of more than one quarter section will be ordered upon the application of the same person, but if an application is withdrawn or rejected, a second application will be received for the land.

"All applicants must give the name of the forest reserve and describe the land, examination of which is requested, by legal subdivisions, section, township, range, if surveyed, and if not surveyed, by reference to natural objects, streams or improvements with sufficient accuracy to identify the land."

Preserve the Forests. The growing scarcity of suitable timber for manufacturing purposes has been the subject of a number of addresses delivered before various conventions of manufacturers. It begins to look now as if the people who have permitted the cutting and slashing of the forests were beginning to see the need of some systematic effort to reproduce and preserve what nature gave this country with unexampled bounty.

The Bureau of Forestry at Washington has been created for this purpose and has been doing excellent service in arousing the nation to the need of intelligent study of an important problem. The government has taken hold of the subject with vigor, and in the last ten years many substantial gains have been made. Perhaps 70,000,000 acres altogether have been set aside as forest reservations, and some of the States have followed the lead of the general government in seeking to protect the forest areas, New York and Pennsylvania leading. During the last eight years several schools for professional study of forestry have been established in the United States, so that practical training may be secured at home, where the investigator formerly had to go abroad for his instruction.

The early settlers who inherited respect for the forests due to the feeling in the old world whence they came, learned to look with dread upon the leafy background of their frontier farms, from beyond which came the savage and wild animals, and at last their long cherished respect for the woods gave place to a determination to clear up the rendezvous of the foes of advancing civilization. No one who has studied the steady advance of population westward fails to understand that the clearing of the forests has meant the development of our agricultural resources, so that in one sense it may be said that destruction was the fore-

runner of prosperity. At the same time it is plain that there has been much needless waste and senseless cutting of timber, whose value now begins to be understood, because the shortage of suitable material for manufacturing purposes is reported with a frequency that alarms those most vitally affected. However, it is not too late to start again, and toward this end there should be intelligent and harmonious co-operation of manufacturers and lumbermen with the governmental authorities having charge of this portion of the national resources.

What Irrigation Means.

"Government irrigation means much to Washington," writes Congressman W. L. Jones to constituents in Spokane, "and desert lands will be made to blossom and produce as a garden. Thousands of prosperous homes will be established where heretofore has only been the habitation of the jack rabbit and the coyote. Towns will spring up as if by magic, railroads and electric lines will be established and manufactories will turn the wheels of industries, and our State will become the Mecca of hundreds of thousands of those of the East who long for our pure mountain air and the golden opportunities which we hold out to them."

Congressman Jones says a great deal in a very few words.

If You Want Results. If you wish your advertisement to be in good company—if you wish it to be read and to be given thoughtful consideration by the more progressive class of agriculturists throughout the West and Northwest—insert it in THE IRRIGATION AGE.

ELSEWHERE in this issue we publish an article, entitled "Redeeming the West," by C. J. Blanchard, assistant United States Reclamation Service, which appeared in the September number of *Sunset*, San Francisco. This article explains what the great Klamath project means in government reclamation, and will, of course, be both interesting and instructive to the readers of THE IRRIGATION AGE.

"Estimated Crop Yields" (in Nebraska) is the title of an instructive bulletin issued by the passenger department of the Union Pacific Railroad Company, Omaha, Neb. Another interesting bulletin, issued by the same company, is entitled "Crop Yields" in Kansas.

The University of California has issued a pamphlet entitled "Commercial Fertilizers," by George Roberts, who treats the subject very exhaustively.

The passenger department of the Union Pacific Railroad Company, Omaha, Neb., has gotten out an unusually attractive folder, entitled "Wyoming and Its Attractions." Any one interested at all in this wonderland of the West should write for a copy.

REDEEMING THE WEST.

What the Great Klamath Project Means in Government Reclamation.

BY C. J. BLANCHARD IN *Sunset*,
Assistant, United States Reclamation Service.

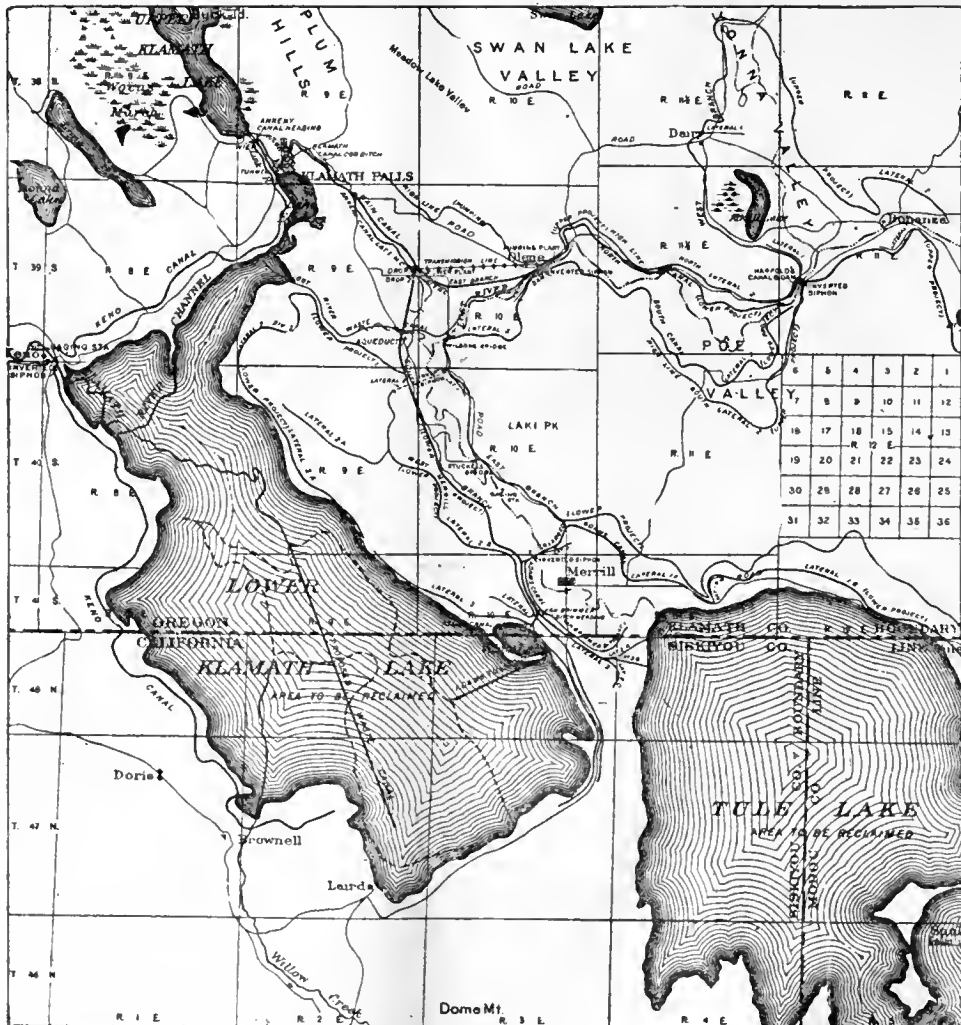
The tremendous significance of the government's vast irrigation work in the West is here shown by these authentic details of the great Klamath project. Appended is a table giving the present status also of all authorized projects, contemplating the ultimate redemption of more than 1,800,000 acres. The consideration of these and kindred matters is the object of the National Irrigation Congress to be held at Boise, Idaho, September 3-8 inclusive.

A famous railroad builder, whose lines of steel connect more than eleven thousand miles of our continent, once said: "Next to the Diety the engineer comes nearer being a creator than men of any other profession. He only wants a cheerful banker to advance the wherewithal for expenses, and he will attack any problem in nature and master every difficulty in construction."

Having such a banker as Uncle Sam behind him, the United States Reclamation Service engineer shows

not the slightest hesitation in tackling propositions which tax his ingenuity to the utmost and call for all of his courage and resource in their accomplishment.

The preliminary work of a national irrigation project involves such a multiplicity of details that the layman when informed of the formula under which the work proceeds, is prone to wonder that actual construction is ever begun. Under the most favorable conditions it is rarely possible to complete the preliminary surveys of one of these large projects in less than a year, and in case the plans provide for the storage of water behind high dams, construction can rarely be ordered until a careful study of the stream flow has been made. This study must be maintained for a sufficient length of time to furnish an accurate record of the character of the stream at all seasons of the year and over a period of several years. But for the fact that the government, through its Hydrographic Branch, had been maintaining



Map of the Klamath Project Embracing Lands in Oregon and California. Showing Sources of Water Supply, and the Vast Region to Be Irrigated.

gauging stations on the most important western rivers for many years, it is doubtful if actual construction could have begun on more than three or four out of the twenty-four projects upon which work is either under way or will commence this spring.

The settlement of questions of purely personal matters, such as adjustment of claims, purchase of rights of way, etc., involving no engineering features, are frequently more trying and consume more time and labor than the work of digging canals and building dams. In every community the human equation is injected in matters of private property, in schemes for personal aggrandizement which endanger the success of the greater work, and which give way unwillingly and usu-

to offer it to homeseekers in eighty-acre farm units, provided they would live thereon, cultivate the soil, and repay to the government in ten years, without interest, the pro rata cost of the irrigation works. These matters were adjusted satisfactorily, the Legislature having expedited the resolution making the donation of lake beds and Congress having been equally obliging in granting permission to destroy navigation. Then came the necessity for harmonizing the vested rights in land and water in the valley, in order that all might be brought into one community of common interest to develop on the broadest plan possible the latent resources of the whole region. The spirit of push and energy which characterizes nearly every progressive movement in the West,



Digging the Main Canal of the Klamath Project; More Than 100 Miles of Main Canal Will Be Required.

Excavating a Tunnel in the Klamath Project; One of the Expensive Details of the Undertaking.



ally only when the pressure of public sentiment threatens the promoter with social ostracism or financial ruin.

The Klamath project, which recently received the approval of the Secretary of the Interior, and for which a contract covering an important unit of construction has just been made, presented a multitude of difficulties of this nature and others which gave the government engineers many hours of discouragement and more than once seemed destined to wreck all their hope of initiating a great work of reclamation there.

This project embraces lands in Oregon and California and presents interstate features which involved new questions for the legal experts of the government and of the states. The irrigable lands include the beds of two navigable lakes which must be drained. The matter of drainage and subsequent damage to navigation required simultaneous legislation on the part of the States and of Congress. The States of California and Oregon by legislative decree gave to the government the beds of Lower Klamath and Tule Lakes, and Congress granted permission to the Reclamation Service to uncover these beds, to irrigate the land so exposed, and

was not lacking in the Klamath Basin. The land owners and the merchants quite generally extended hearty and helpful co-operation, and it is to their industry and forcefulness more than to any efforts on the part of the Reclamation Service that all of the obstacles were finally overcome.

Today the government is in control of the entire water supply and practically all of the land in private ownership has been signed up to come under the government canals. This marks the passing of the private ditch owner and the canal company, and ushers in a monopoly of the water resources of the valley, a monopoly, however, in which the land owner in the valley is a stockholder and in which all have equal voice in its operation and equal share in its benefits. Under the new regime a system of common sense home rule is to obtain which will work for the fullest development of the valley's abundant resources, and which is destined to place this favored region in the forefront among the nation's prosperous and populous agricultural communities.

The Klamath project provides for the reclamation

of about 240,000 acres of fertile valley and lake bottom lands in the Klamath Basin in Oregon and California. It stands out unique among the several stupendous works proposed by the Reclamation Service, and involves features of irrigation, storage and drainage in unusual combination. About fifty-five per cent of the total irrigable area is United States public land, and about sixty-

Clear Lake and winds its devious way for more than sixty miles, finally emptying into Tule Lake, which is only six miles distant from the source of the river. Storage for the Upper project is provided in Clear Lake reservoir by constructing a dam across Lost River two miles below its junction with Willow Creek. The capacity will be 462,356 acre-feet. An auxiliary reservoir,



Tule Lake, Looking Toward Bloody Point; This Lake Is to Be Drained and Reclaimed.



Klamath River, As it Meanders Through the Tule and Swampy Lands Which Will Be Lost to Art, But Gained to Agriculture by the Work of the United States Reclamation Service.

two per cent is located in Oregon. The topographic features as shown on the map are singularly interesting. Nature has kindly placed the water and the land in such nice juxtaposition that the engineering works required are comparatively simple, and the average cost for irrigation per acre is the lowest of any of the projects so far approved by the government.

The Klamath project is naturally divided into two distinct parts—the Upper and the Lower projects—each having a separate source of water supply. The Upper project provides for the irrigation of about 50,000 acres in Langells, Yonna, Poe and Upper Klamath Valleys. These valleys are drained by Lost River, which rises in

known as the Horsefly, with a capacity of 125,000 acre-feet, will be formed by constructing a dam across Miller Creek. The Clear Lake dam will be thirty feet high, twenty feet wide on top, and eight hundred and fifty feet long. The Horsefly dam will be seventy feet high, twenty feet wide on top, and four hundred and eighty feet long. Both dams will be constructed of earth and rock. The total length of the main canals of the Upper project will be seventy miles. There will be three crossings by inverted siphons, two over Lost River, one over Miller Creek, with total length of 3,212 feet. The estimated cost of the Upper project is \$947,776.

The Lower project involves the irrigation of lands

in Klamath and Lower Poe Valleys and the reclamation of Lower Klamath and Tule Lakes, by drainage. The principal source of water supply is Upper Klamath Lake, which has an area of 80,000 acres and is at an elevation of 4,142 feet above sea level. The diversion point for the main canal is at the head of Link River, the outlet of the lake, one mile above the town of Klamath Falls.

The water in Lower Klamath Lake will be drawn into Klamath River. The canals from Upper Klamath Lake will then be extended over the exposed bed to provide for its irrigation. Tule Lake has its only source of supply in Lost River. This supply is to be cut off from the lake and utilized for the irrigation of the irrigable lands in the valley of Lost River. Tule Lake will then dry



The Town of Klamath Falls Is Beautifully Situated Upon the Banks of Lake Ewana.



Link River, the Turbulent Stream Which Connects Upper Klamath Lake With Lake Ewana.

math Falls. Two canals, one on each side of the river, having a total length of fifty miles and a capacity of 1,800 feet per second, will cover the irrigable lands. The branch canals will have a length of fifty-two miles, with one hundred and sixty miles of laterals and a capacity of 1,264 second-feet. The plans provide for four crossings, concrete and steel pipe, the inverted siphons having a total length of 12,535 feet.

The plans for draining Lower Klamath and Tule Lakes are exceedingly simple. The present level of Lower Klamath Lake is preserved by a natural dike or ledge of basalt, which extends across Klamath River near Keno. It is proposed to excavate a canal about nine feet deep through this dike, by means of which most of

up and later its bed will be irrigated from the canal system of the lower project.

The estimated cost of the entire project is \$4,500,000. Contracts for the first nine miles of the main canal were awarded to a Portland, Oregon, firm, for \$377,330, on February 16th, and the work of excavation is already well under way. This canal at the lower end will be forty-five feet wide on the bottom, sixty feet wide on top, and six feet deep. Link River is tapped with a tunnel three-quarters of a mile in length with a cross section of thirteen and a half feet by thirteen and a half feet, and faced with cement its entire length. More than one hundred miles of main canals will be required to supply the whole valley.

As all of the public land is covered with water it can not now be filed upon under the Homestead Act. Settlement will not be possible on these lands until they are fully reclaimed. The large holdings in private ownership are under contract to be subdivided and sold to actual settlers who will reside on the land. A large area is now on the market at prices ranging from \$10 to \$50 per acre and opportunities are exceedingly favorable for intending home-seekers to secure valuable farms at reasonable prices.

In order to facilitate the dissemination of accurate and reliable information concerning this region, its climate, crops, and the opportunities for purchasing property therein, the farmers have formed an association known as the Klamath Water Users' Association at Klamath Falls, Oregon, and home-seekers and investors may address this association with the assurance that their inquiries will receive prompt and careful consideration.

The Klamath Basin lies on both sides of the boundary line of California and Oregon about equi-distant from San Francisco and Portland, and about one hundred and fifty miles east of the Pacific coast between the Cascades and the main range of the Rocky Mountains. It is situated in Modoc and Siskiyou Counties, California, and Klamath County, Oregon, and embraces about one-half million acres, a considerable portion of which is occupied by a string of lakes, the largest being Upper Klamath Lake, and the others, Lower Klamath, Tule, Clear, and Goose Lakes.

The Klamath Indian Reservation is in this basin and contains a large area of irrigable lands which ultimately may be thrown open to settlement under an extension of the government system of irrigation.

The altitude of the basin is about 4,000 feet and the climate healthy. Settlers from any of the northern tier of States will not need to become acclimated here. Surrounding the basin is a region of wild beauty containing some of the greatest natural wonders of the world, among which is the weirdly beautiful Crater Lake. Forest-covered mountains surround the valley and the timber resources of this section are enormous. The estimates of the experts as to the pine and red fir forests tributary to Upper Klamath range from ten to fifteen billion feet.

Owing to the comparatively high altitude and the consequent occurrence of frosts, the growing season is short and the products restricted to grasses, grains, vegetables and hardy fruits. Alfalfa will always be an important crop, the two cuttings annually yielding four tons or more per acre worth \$5 per ton in the stack. Cattle can then be pastured in the same field for the balance of the year and such pasturage rents readily for \$2 per acre. The vast area of out-range surrounding the basin and extending far up the mountains assures the permanence of an important live stock industry providing a first-class market for the hay and forage of the farmers. More than 25,000 head of beef cattle are shipped annually to market from this section now and the horses from this region are in demand by the United States army at from \$125 to \$150 each. Soil experts predict the establishment of beet sugar factories in the valley, as the conditions are particularly favorable for the cultivation of this vegetable. The beets grown experimentally here show a very high percentage of sugar.

Tests show that the Tule lands are especially adapted to the growing of celery, asparagus, potatoes, and fodder for dairy animals.

STATUS OF GOVERNMENT IRRIGATION.

The following figures from official records show how the reclamation of the arid lands is progressing rapidly under the direction of the Reclamation Service. Nearly every project is capable of extension so as to redeem many more thousand acres. The total sum set aside for all three classes of projects is \$32,870,000, and the amount of land to be irrigated is 1,859,000 acres. The average value of irrigated land in the United States is \$47 per acre. This acreage will therefore add \$87,373,000 to the taxable property of the United States in land values alone. According to results in the West the average annual income from irrigated land is \$25 per acre. On this basis an income of \$46,475,000 per annum will be added to the nation's wealth:

PROJECTS UNDER CONSTRUCTION.

STATE.	PROJECTS	Amount Set Aside for Beginning Construction	Acres Irrigable
Arizona	Salt River	\$3,600,000	180,000
Colorado	Uncompangre	2,500,000	125,000
Idaho	Minidoka	1,300,000	60,000
Nebraska and Wyoming	North Platte	3,500,000	100,000
Nevada	Truckee-Carson	2,740,000	100,000
New Mexico	Hondo	250,000	10,000
South Dakota	Belle Fourche	2,100,000	80,000
Wyoming	Shoshone	2,250,000	125,000
Oregon and California	Klamath Falls	1,000,000	236,000
Idaho	Payette-Boise	1,300,000	250,000

PROJECTS FOR WHICH BIDS HAVE BEEN RECEIVED.

California and Arizona	Yuma	\$3,000,000	85,000
Montana	Huntley	900,000	35,000
Montana and North Dakota	Fort Buford	1,800,000	60,000

PROJECTS APPROVED BY THE SECRETARY OF THE INTERIOR.

Oregon	Malheur	\$2,250,000	100,000
Montana	Milk River	1,000,000	200,000
North Dakota	Bismarck		15,000
Pumping	Buford-Trenton	550,000	18,000
Washington	Palouse (postponed)	2,800,000	80,000

P. Maginnis, Kimball, Neb., the well known manufacturer of galvanized steel irrigation flumes and water troughs, has sold over \$12,000 worth of steel flumes for the Big Horn Basin. Mr. Maginnis not only makes excellent flumes, the quality of which is creating a growing demand, but he also advertises in THE IRRIGATION AGE—hence his large sales.

CAN YOU ANSWER THESE QUESTIONS?

Where did alfalfa come from? What soil is best suited to alfalfa? What are the advantages of growing it? How is it best harvested, cured and fed? What kind of grain should be fed with alfalfa? How does it enrich the soil. How should alfalfa be sown? What is the best method of selecting seed corn? How should it be stored? How can you improve the stand and increase the production of corn per acre? What is the best method of testing seed corn? What is a germination box? How is corn best prepared for the planter? What is necessary to get rid of the barren stalks? What are the best methods of cultivating corn? How can the wheat yield per acre be increased? What constitutes a good seed bed? Should clover be plowed under for wheat? Is corn stubble a good place for sowing wheat? How should wheat be sown in order to produce the best results? How should wheat be fertilized? Why does your soil run down? What are

the leading elements of fertility? How can you secure them and keep them in the soil? How much fertility does each crop take from the soil? What is the actual value of farm manure? How should it be applied to produce best results? Will grain crops make good hay? What is the best method of seeding for hay? Is the modern gasoline engine a good power for the farm? What is the best size gasoline engine to buy? What is a four cycle engine? What does it cost to operate a gasoline engine? Is ensilage the best and cheapest feed for dairy cows? What is summer soiling? What are the correct proportions of lean and fat producing materials in a dairy ration? How much milk and how much butter should a good cow produce? What kind of separator should the cow owner buy? What is skim milk worth as food for stock? How much wheat should an acre produce? Is wheat good in the farm crop rotation? Does any crop leave a poison in the soil? Can the wheat yield be increased by seed selection and breeding?

Every one of these questions and a thousand others of interest and value to every farmer are answered in "Farm Science." It is a splendid volume of 128 pages, profusely and beautifully illustrated and containing eight chapters specially prepared by the highest authorities on the several subjects. "Alfalfa Culture in America," by Jos. E. Wing, Expert Agriculturist of Mechanicsburg, Ohio. "Modern Corn Culture," by Prof. P. G. Holden, Iowa Agricultural College, Ames, Iowa. "Best Methods in Seeding," by Waldo F. Brown, Farm Specialist of Oxford, Ohio. "Increased Fertility," by Prof. Cyril G. Hopkins, Illinois College of Agriculture, Urbana, Ill. "Profitable Hay Making," by Prof. Thomas Shaw, late of Minnesota Experiment Station, St. Anthony Park, Minn. "Power on the Farm," by Prof. Fred R. Crane, Illinois College of Agriculture, Urbana, Ill. "Up-to-Date Dairying," by Prof. Clinton D. Smith, Director of Michigan Experiment Station, Agricultural College, Mich., and "Small Grain Growing," by Willett Hayes, Assistant Secretary of Agriculture, United States, Washington, D. C. Every author is a master in his line and every subject is treated exhaustively in all its ramifications. The whole composes the most valuable and authoritative work ever issued along such lines. A book of such value can not be secured at any price. However, any reader of this paper will receive a copy by enclosing three 2-cent stamps and addressing "Farm Science," International Harvester Company of America, Chicago, Ill.

Kindly say to them that you saw this article in our paper.

The passenger department of the Union Pacific Railroad Company has issued an agricultural bulletin giving a synopsis of the experimental work being carried on along the line of the Union Pacific railroad in Wyoming. The data is based on information furnished by B. C. Buffum, director of the Experimental Station, and professor of agriculture, Laramie, Wyo.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation

W. A. FLEMING JONES.

W. A. Fleming Jones is a leading young lawyer of Las Cruces, New Mexico, and the United States commissioner for the Third Judicial District. Before embarking in the practice of law, Mr. Jones was a mining engineer, in which he won marked success, as he has also in the practice of law. Mr. Jones enjoys a fine practice, which is largely confined to public land matters and to matters before the executive departments



W. A. Fleming Jones, Las Cruces, New Mexico.

at Washington, D. C., where a branch office is maintained.

A good deal of his time is occupied in sitting as judge of the United States Commissioners' Court, having jurisdiction in cases where the Federal statutes have been violated. Mr. Jones is well schooled in the practice of his profession, to which he is closely devoted. Mr. Jones takes an active interest in politics and is an enthusiastic Republican. He is a member of the Board of Trustees of the New Mexico School of Mines, and an enterprising citizen as well as a successful lawyer.

CORRESPONDENCE.

EDITOR IRRIGATION AGE, Chicago:

Dear Sir—The Irrigation Congress recently held at Boise gave evidence of abounding vigor and substantial health. A year ago when the surgeon's knife was applied and separated from the body a vigorous parasite, the said parasite was loud in its predictions that the congress would perish. There were no signs of parasites or fungi about the congress this year. On the contrary, the healthy tissue—the body itself—felt the full virility of its beating heart. It was the best congress ever held, both in point of numbers, and interest. The Reclamation Service was there. The Forestry Service was there, private interest was there, critics were there, and all were given an opportunity to be heard. Everything pertinent to irrigation was discussed. Everybody participated in a most pleasurable event, except the old parasite. We missed it, but were happy. The official record will contain the best papers on every conceivable pertinent interest ever collected and published in one volume. Me for the congress every time. It's it!

COMMUNICATED.

NOTES FROM THE NORTHWEST.

SPOKANE, WASH., Oct. 29.—United States Senator Samuel H. Piles, of Washington, gave out the subjoined statement in Spokane recently on the subject of irrigation:

"I consider the irrigation laws next to the homestead laws, and I shall make that subject my principal business at the next session of the United States Congress.

"Irrigation means so much for the State of Washington. It means the making of a beautiful garden out of Eastern Washington and the people of this section may rest assured that I will fight for their interests in the matter of irrigation.

"It is the most important of the present measures being taken up by the government. There are such great opportunities for irrigation in Eastern Wash-



G. L. SHUMWAY,
Associate Editor of THE IRRIGATION AGE, Nominated
for Congress to Represent the Sixth District
of Nebraska.

ington that it is an issue here that can not be overlooked. The homestead law gives the poor man a chance to gain a home, and the irrigation law will give the poor man the opportunity to enjoy a beautiful and fruitful home.

"It expect to see the United States Government get every dollar it has expended in irrigation returned to it, and the results will be the making of beautiful districts and a great increase in the production of the different States."

Dr. A. E. Baldwin, president of the Fruitland Irrigation Company, near Kettle Falls, Wash., has sold his interests to William and Melville Clancy and W. K. Roberts, of Chicago, who will complete the big irrigation ditch started last March. Three miles has been dug and surveys have been made twenty-five miles down the Columbia river, bringing 30,000 acres of land in the upper Columbia valley under irrigation. C. L. Smith, of Spokane, secretary of the Association of

Commercial Clubs in the Inland Empire, says the land is as fertile as any in the Northwest and that it is capable of producing fruit of size, color and flavor equal to any in the famous Yakima and Wenatchee valleys.

D. C. Corbin, president of the Washington State Sugar Company, declares that with irrigation works in operation the Spokane valley will support 100,000 persons. Mr. Corbin expects to irrigate about 100,000 acres the coming year and as there are irrigation projects under way in other parts of the district, the farming population should be increased rapidly in the next few years.

J. W. Holmes, contractor of Portland, Ore., has gone to Lewiston, Ida., southwest of Spokane, to resume work on the Lewiston-Clearwater dam with a 70-ton steam shovel. He will work day and night crews on the earth dam, which will be one of the largest of its kind in the country. It is estimated there are yet to move about 700,000 cubic yards of earth, entailing a cost of about \$150,000, the work to be completed in a year.

Engineer Jacobs, of the government reclamation service, begun work October 1 on the dam across the Yakima river, West of Spokane, at the intake of the Sunnyside canal. It will be 500 feet long, eight feet high and will cost \$30,000.

The department has called for bids for the consideration of a dam at Bumping lake, involving 182,000 yards of excavation, 960 cubic yards of concrete masonry and 980 cubic yards of riprap and rock fill. The work will cost approximately \$100,000. Bids will be opened by the reclamation service at Portland, Ore., November 15.

A. M. Beck, president of the First National Bank at Lewiston, Ida., Amos McAbee, of Priest River, Ida., and W. G. Chaney, of Spokane, are associated in a project to irrigate the lands in Squaw Creek valley, near North Yakima, Wash., west of Spokane, where they will sink thirty wells to secure water for 5,000 acres of land. The ditch work, it is announced, will be completed by January 1, 1907.

John and Alexander Mathews, of Texas City, Wash., south of Spokane, have put into operation in the Snake River a patented current water wheel, which promises to revolutionize methods of irrigation. Water has been supplied on the farm of W. H. Stuart the last three months with satisfactory results. The wheel is made of steel and is ten feet long with a diameter of six feet. It is supplied with steel flaps which catch the water and propel the wheel, which makes ten revolutions a minute. It pumps a 2-inch miners' stream up seventy feet. The wheel is placed flat upon the surface of the water and is held in place by a wooden frame, which allows the wheel to adjust itself to the depth of water. It is claimed that a larger wheel will pump water to almost any height.

H. C. Peters, a capitalist from Puget Sound country, who has bought the rights of the Palouse Ditch Company, is in the country, south of Spokane, to inspect the surveys, and announces that the ditch will be built beginning early next year. The plans show the work is feasible, he says, and when it is carried out thousands of acres of land in the Palouse country will be irrigated.

The Arcadian Co-Operative Irrigation Company, in which Floyd L. Daggett, mayor of Spokane, and a number of Western Washington men are interested,

purposes irrigating 2,000 acres of land in Stevens county, twenty-two miles North of Spokane. The water will be pumped from Dragon creek. Gen. J. D. McIntyre, engineer for the association, says it has a membership of 300, the land being sold in five and ten-acre tracts at \$120 the acre, payments being made on a basis of \$1 the acre per month.

Col. W. M. Ridpath and former United States Senator George Turner, of Spokane, have plans to irrigate 1,165 acres of land and drain 400 acres of land at Priest Rapids on the Columbia river, southwest of Spokane. The ditch will be three miles long, and as soon as it is completed in the spring a system of intensified farming will be taken up.

The Kettle Falls Irrigation Company has been incorporated in Spokane county with a capital of \$500,000 to utilize the water of the Columbia river on several thousand acres of land. H. J. Cole, of Spokane, is one of the promoters of the plan.

The Western Irrigation Company has been incor-

AGRICULTURAL ENGINEERING.

BY C. J. ZINTHEO,

Expert of Farm Mechanics, Formerly United States Department of Agriculture.

"Engineering is the art of directing the great sources of power in nature for the use and convenience of man." The gradual widening of the scope of the word "engineer" is very interesting. It was used as long ago as the time of William the Conqueror, to designate one who had the ability to design and construct works of value such as castles or fortifications, or bridges, especially in connection with military affairs. It soon took on a wider meaning and was properly applied to men having ability to design and construct, or operate works of practical utility in times of peace. The military men having simply been called "engineers," it became desirable to designate those who were doing similar work in times of peace in some way to



Abundant Water for Irrigating Purposes—a Scene in the Northwest.

porated by John Krischwing and his associates with a capital of \$500,000.

The Spokane Valley Land and Water Company has been successful in condemnation proceedings for the riparian rights to an arm of Liberty lake. The jury which heard the case in the Spokane Superior Court awarded R. Madson damages to the extent of \$2,000.

The engineer at the United States Government's Okanogan irrigation project at Riverside, Wash., west of Spokane, announces that sufficient power can be generated from the main canals to pump water for the irrigation of 4,000 acres of land along the east side of the Okanogan river. The land is part of the south half of the Colville reservation.

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1 year, and The Primer of Irrigation

distinguish them from the military engineers, and so they were called "civil engineers." As time progressed those who were able to design or contract something of value in the realm of mechanics, or other fields of human effort, were called "mechanical engineers," "mining engineers," "naval engineers," "electrical engineers," or "chemical engineers." The meaning of the word, as well as its application, has broadened so that at the present time the one who controls the machinery of a ship, as well as the one who handles the throttle of a locomotive, is called an "engineer."

We also have the "irrigation engineer," who solves the problems of distributing water, preparing the land, and designing systems of irrigation, as distinguished from the civil engineer, who perhaps constructs the dams for collecting the water used by the irrigation engineer.

The "drainage engineer" designs and constructs drainage systems for the benefit of our agricultural

areas, and the "highway engineer" designs and constructs the country roads and highways which form the arteries of commerce from the farms.

The three latter classes of engineers need to have, besides the technical training in engineering, very accurate and specific knowledge of agricultural subjects. They must know the physical conditions of the soil and the requirements of plant and animal life on the farm



Prof. C. J. Zintheo,
Formerly U. S. Dept. of Agriculture.

in order to successfully solve the problems of their profession. To this class of engineers should be added two other vocations, namely, the men who design, experiment with, and construct the agricultural implements, and those who prepare plans for the farm buildings. The problems which these men have to solve are all agricultural by the aid of engineering training. In view of these thoughts we are perhaps justified in regarding the men engaged in such work as "agricultural engineers."

Up to the present time the profession of agricultural engineering and the teaching on the subject in our colleges has not been officially recognized as such. In Europe, however, the profession of agricultural engineering has long been established, and there it has the same standing as the other engineering professions.

The agricultural colleges of Sweden have complete courses for the training of agricultural engineers, and have also experimental laboratories for the testing of farm implements. This work has been inaugurated there since 1860, and it has been learned that the experiments conducted are of great value to farmers in choosing their machines, and also of benefit to implement manufacturers, in that they point out defects in construction and weak points in the design of their machines. To show how the implement manufacturers of Sweden appreciate the value of the agricultural engineer and his work, it is only necessary to state that in 1896 the Separator Dairy Machinery Company presented the Department of Agriculture with 100,000

crowns, of which 10,000 crowns are being spent annually for farm machinery investigations.

In Denmark agricultural engineering is a recognized profession in connection with the agricultural colleges, where farm implement experiments have been conducted since 1872.

In Belgium courses of instruction in agricultural engineering are maintained at all of the leading agricultural institution of the country, and considerable attention is given to the investigations along the lines pertaining thereto.

In France the profession is well established and recognized. The Bureau of Hydraulic Agriculture is one of the leading bureaus of the Agricultural Department of France. Some very valuable work has been done in drainage, land terracing, and irrigation, and more recently in the development of farm motors to take the place of horses in the cultivation of the soil. In order to provide a link between the agricultural engineer and the farmer, the French Government instituted its machine testing station near Paris, which is probably the most thoroughly equipped in the world for the scientific study of the principles of construction and efficiency of operation of farm implements and machinery. The study of agriculture in France has been so systematized and the whole country so mapped out that the possibilities and requirements of every district can be readily ascertained whenever there is a question of introducing improvements.

The agricultural colleges of the Netherlands are giving instruction in agricultural engineering, and the Minister of Commerce and Industry has organized a department where agricultural engineers are given facilities for having their mechanism officially tested at the Agricultural Academy of Wageningen.

The agricultural high school at Berlin has a well developed and efficient department of farm machinery, and in the different provinces of Germany, at the agricultural colleges, are offered courses in agricultural engineering. These colleges are also provided with implement experiment stations to which manufacturers can send their machines and have them tested for accuracy of work, strength and durability.

Much has been accomplished in Germany in recent years in encouraging the invention and manufacture of motors, lamps and cooking apparatus which utilize denaturized alcohol. Through this means the somewhat depressed agricultural conditions of the country have been revived, as new and profitable sources for utilizing the raw materials of the farm have been found. Extensive experiments have also been conducted with electric motive power for farm purposes, steam plows and cultivators, and various kinds of dairy machinery and equipments used for the manufacture of alcohol from farm products.

The agricultural engineers of Great Britain are making great developments especially in their colonies, for which they design and construct new machinery. In India the British government has expended \$125,000,000 on its colossal irrigation enterprises, which have in the last ten years resulted in placing 800,000 persons on part of its once arid and abandoned lands. In Egypt the English agricultural engineers have constructed the dykes, excavated the canals, built the waste-gates, or regulators for leveling the water, and by this means have been able to save the fertile lands of the valley

from inundations of the Nile river. In the lower delta of the Nile the drainage engineer, by means of drains, has succeeded in carrying off the alkali dissolved in the soil, and thus making the soil adjacent to the Nile among the most fertile and productive soils in the world.

In Italy irrigation has been practiced for centuries, and their knowledge of utilizing water and producing crops in abundance makes it hard for any one living in the present day in this country, unless he has visited the older sections of Europe, to realize the extent of the possibilities of the agricultural engineer.

In our own country, the Morrill Endowment Acts of 1862 and 1890 were the cause for establishing and maintaining colleges for the benefit of agriculture and

of agricultural engineering in this country and the prospects are now bright that this science will be rapidly developed, and that it will be of great benefit to agriculture.

The subject of irrigation engineering has been taught as a distinct subject at the Colorado State College for the last seventeen years; at Montana Agricultural College during the last eight years, and at the University of California for the last six years. The subject is also given some attention at the Utah, Wyoming and Washington agricultural colleges, and at the Nebraska University, though not in a separate department. The first work leading toward instruction



JOHN HENRY SMITH, SALT LAKE CITY,
First Vice-President the Fifteenth National Irrigation Congress.

mechanic arts in the various States of the Union. The "mechanic arts" part of these institutions have been developed into engineering colleges, and most of them are now offering courses in civil, mechanical, electrical and mining engineering.

It was evidently intended by the Morrill Act that the courses in agriculture and mechanic arts should strengthen and help each other. They have, however, diverged so that the engineering courses are now entirely professional for the varied industries, and the agricultural students have received no mechanical training except the small fraction of time devoted to manual training, such as carpentry and blacksmithing.

Something is beginning to be done along the line

in farm machinery by any American agricultural college was no doubt in Wisconsin, by Prof. F. H. King. He conducted a number of experiments with windmills, pumps and feed grinders, as well as along the line of drainage and irrigation, and taught the subjects to the students under the name of agricultural physics. In 1898 the legislature of Illinois appropriated money for a building for farm mechanics at the university, and since that time a course in farm mechanics has been offered at that institution, and instruction given in setting up farm machinery and similar subjects. This building has now become too small to accommodate the students, and a new and more commodious structure will soon be constructed for that department.

FOR RECLAMATION OF LANDS IN ARKANSAS AND MISSOURI.

A bill of vital interest to a large section of Arkansas has been introduced in Congress by Representative Macon of the First district. It provides for the use of \$3,000,000 of the money that would otherwise become a part of the reclamation fund for the drainage of certain lands in Arkansas and Missouri. In a word, the bill contemplates the construction of a suitable and comprehensive system of drainage lands in the St. Francis basin in the states of Arkansas and Missouri, under the supervision of the Secretary of Agriculture.

Mr. Macon is enthusiastic in the purposes of his bill. To a *Commercial Appeal* correspondent he stated today that it had been estimated that there are to be drained 3,000,000 acres of the finest land in the world, with soil from five to twenty feet deep. The estimated cost of the drainage project is \$3,000,000. Mr. Macon stated that he saw no good reason why his bill should not be adopted, as Chairman Lacey of the public lands committee of the house had committed himself in support of it. Mr. Lacey said, among other things, that he would have opposed this measure prior to the enactment of the Smith law, extending the irrigation act to the state of Texas, as that state had given none of its public lands to the Union when it was admitted to the sisterhood. Therefore if Congress was willing to lend proceeds from the sale of public arid lands to Texas, when no equities existed in favor of that state, he did not see why Arkansas did not reap some benefit from the reclamation act of 1902, when Arkansas had equities by reason of having given public lands to the government.

The provisions of the Macon bill are as follows:

"That all the expense of such construction, including salaries, and the maintenance of works for a period not exceeding ten years, shall be assessed against the lands proposed to be drained in proportion to benefits, said assessments to be levied and the money to be paid in not to exceed ten annual installments, under such laws and regulations duly enacted by the legislatures of said states of Arkansas and Missouri, as in the judgment of the President of the United States shall be adequate to insure the repayment to the United States of all money expended under the terms of this act; provided, further, that all money derived from such assessments shall be paid into the treasury of the United States by the said states of Arkansas and Missouri, and when so paid shall be covered into the reclamation fund, to be used under the provisions of said act of June 17, 1902; and provided, further, that any money paid in by the said states of Arkansas and Missouri in excess of the total amount paid out by the United States when the said works are completed, including the maintenance of the works, shall be returned to the said states of Arkansas and Missouri.

"Sec. 2. That the Secretary of Agriculture is hereby authorized and directed to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this act into full force and effect."

Our readers are requested to send us in the address of friends to whom you wish sample copies of *Irrigation Age* mailed.

RECLAMATION WORK IN NORTH DAKOTA.

"Three principal pumping projects are in various stages of development in the extreme western part of North Dakota," said Mr. H. N. Savage, supervising engineer. "The water supply is from the Missouri River, the low fall of which necessitates the diversion of water and lifting same direct from the stream by pumps. These projects are exceedingly attractive, as an abundant supply of lignite fuel is found in the vicinity, and no long and expensive canal system will be required.

"It is proposed to generate power at a point located directly at the mines, the electrical power generated there being transmitted to the several pumping stations for two of the principal projects. The first pumps will be placed on floating barges. These will, of course, accommodate themselves to changes, not only in water level but to the shifting of the stream, the water being conducted from the pumps on the barges through pipes with flexible joints to the main canal. Additional sub-station lifts will be introduced wherever required. The water being taken from the nearest source of supply directly to the land obviates any long conduits.

"It is proposed at first to construct works to irrigate an area of about 10,000 acres each on the Buford-Trenton, Nesson and Williston projects, provision being made in the first contracts for additional machinery, so that the areas to be irrigated can be increased as rapidly as found desirable.

"*Williston Project*—Advertisements for power generating machinery and pumps for the Williston project have already been made. The bids will be opened at Williston July 9th. Specifications and drawings have been prepared for the main canal and distribution system, and it is expected that bids for their construction will be advertised for in the near future.

"*Buford-Trenton Project*—Drawings and specifications for the Buford-Trenton pumping machinery and for the main canal and distributing system are now being prepared, and it is expected that these will be advertised in the near future. It is proposed to generate the entire power supply for both the Buford-Trenton and Williston projects at the Williston main station, which is located three miles northeast of the town of Williston.

"*Nesson Project*—Stock subscriptions are now being obtained by the water users' association, and it is expected that a contract can be handed to the secretary within a few weeks authorizing the construction of this project.

"Great interest is being manifested throughout the entire West in this extensive development of irrigation by pumping. There are many places throughout the arid region where water can be conducted to land by pumps, and it is believed that these experiments will inaugurate a new era in the reclamation of arid land. Great progress has been made in the last two years in the design and construction of centrifugal pumps, securing efficiency heretofore thought impossible, and reducing the cost of operating to a point where it is expected it will make feasible the taking up of many projects heretofore thought to be impossible financially.

"The results of the experiments with pumping machinery in North Dakota will be watched with great interest by the people in many other sections of the West where the Reclamation Service has located large areas above the line of gravity supply. If the results are satisfactory they will doubtless give a great impetus to the development of pumping systems for irrigation by private capital all over the western country."

THE APPORTIONMENT OF FUNDS.

A few weeks ago announcement was made of the receipts from the sale of public lands in the arid states and territories. When it was discovered that the increment to the reclamation fund was considerably in excess of the estimates there was much rejoicing throughout the entire West.

Letters have been pouring in to the office of the reclamation service from settlers, legislators, and others interested in the movement, requesting the allotment of funds and initiation of irrigation works in various localities.

It is not within the province of the director to apportion reclamation funds, but merely to call the attention of the Secretary of the Interior to feasible projects. The engineers of the reclamation service are not losing sight of opportunities of extending the work, and many projects have been investigated and will be taken under consideration as soon as the funds for their construction become available. The

Secretary of the Interior has already apportioned the fund for some years in advance, and although the receipts from the sales of land may be larger than anticipated by the general land office, yet this increase is more than offset by the recent advance in the price of labor and materials and the diminished efficiency of ordinary labor. The rigid enforcement of the eight-hour law has also contributed to the general increase in costs to the contractor. A number of prominent contractors are failing or on the verge of bankruptcy and prices of construction are running up rapidly. When the contractors become unable to fulfill their contracts the reclamation service is obliged to carry on the work by paying higher prices than the contractors can afford to give. But even under such circumstances the labor supply is unequal to the demand.

Most of the reclamation works are situated in regions remote from large towns, and after eight hours of labor there is little opportunity for relaxation or enjoyment. During the long, hot days the man who is exercising moderately in the sun fares more comfortably than the one who has nothing to distract his attention from his discomfort in the hot bunk house. When life grows too monotonous the men

use of the fund designed for the purpose by congress that the work can be carried to successful completion. Other improvements in other states are needed there is no doubt, but this nation is able to make them without endangering the beneficent work of homebuilding in the West.

It has been said of a Roman emperor "He found Rome brick; he left it marble." So of this generation of Americans let it be said, "They found the West a desert; they left it a Garden of Eden."

NEW IRRIGATION COMPANY.

Articles of incorporation of the Felt, Petersen & Slater Water & Canal Company were filed at Ogden, Utah, June 12. The officers of the concern are: President, C. C. Wansgard; vice-president, James C. Wansgard; secretary-treasurer, Lars Petersen. These, together with E. P. Bingham, R. C. Hansen and Lars Neilson, constitute the board of directors.



Scene on Yakima River, Washington.

throw up their jobs, secure in the knowledge that in these prosperous times they can secure employment elsewhere without much trouble.

Another factor to be considered in the allotment of the reclamation fund is the fact that there has already passed the senate and been favorably reported to the house, a bill taking \$1,000,000 out of the reclamation fund for drainage in North Dakota, and there are a number of other bills pending which, it is asserted, have fair chance of passage if the first bill gets through congress. Under these circumstances the department may not consider it advisable to enter upon any further projects until the probable diminution of the reclamation fund is made known.

Several of the twenty-two projects now under way, as well as numerous others which will be taken up immediately funds become available, will receive a serious set back if the reclamation fund is diverted for other purposes. Citizens of the West are even now impatient that the department is forced to delay in taking up the projects that would make productive millions of acres of arid land and afford homes for a multitude of settlers. All these projects require large sums of money to complete, and it is only by the wisest

The October number of the "Bulletin," which is the official organ of the Portland Chamber of Commerce, Portland, Ore., is a very creditable publication, and should be in the hands of every one who wishes to know something about Oregon.

In the Oregon section of a recent Climatological Report issued by the United States Department of Agriculture, Major Alfred F. Sears, C. E., has a very instructive article entitled "Phenomena of Rainfalls in the Coast Desert of Peru."

Renew your subscription for the
IRRIGATION AGE for 1906. Send us
Post Office or Express money
order for \$1.00.

SHASTA VALLEY.

During the fall, summer and winter of 1904, petitions signed by practically all the resident land owners of Shasta Valley, California, were presented to the engineers of the Reclamation Service, asking that a survey be made to determine the feasibility of irrigating that valley from the Klamath River. A field party was accordingly assigned to the work and during August and September of 1905 a reconnaissance of the valley was made.

Shasta Valley is located in northern California and contains the largest body of farming land in Siskiyou county. It is from two to six miles in width, about twenty-four miles long, and lies at an elevation of from 2,400 to 3,000 feet. It is traveled throughout its entire length by the Southern Pacific Railway, which affords excellent transportation facilities to the markets of San Francisco and Portland. The climate is mild, the temperature ranging from 110° above to 5° below zero. The springs are rather late and frosty. For the last ten years there has been an average rainfall of 17.6 inches, but as not more than half an inch of this comes during July, August and September, irrigation is necessary for successful farming.

There are approximately 100,000 acres of agricultural land in Shasta valley, held for the most part in private ownership. Of this amount about 58,100 acres are irrigable from Klamath River from gravity flow, and it is believed possible to irrigate 10,000 acres more by pumping. A lift of 200 feet would be required, and power could be developed for this purpose, although the cost would probably be excessive. From Little Shasta River and various springs there are now perhaps 10,000 acres under an imperfect system of irrigation.

About sixteen miles below Keno, Ore., the waters of Klamath River can be diverted by an eight-foot weir and carried along the east bank of the river into Shasta Valley, and there applied for irrigation upon 58,100 acres of land. Because of the precipitous canyons the water must be carried for a distance of twenty miles either by a series of long tunnels, or by short tunnels and cement lined canals. The former could be maintained with much less expense when once constructed, but the first cost would be so great that a line contemplating three short tunnels, two siphons and cement lined canals was surveyed.

The total estimated cost of the system as outlined is approximately \$3,784,238, or at the rate of \$65.13 per acre for the construction of works to irrigate 58,100 acres. There are about 5,000 people in the valley, depending upon lumbering, mining, stock-raising and farming for a livelihood. Wheat, oats, barley, vegetables, wild hay, alfalfa and fruits are grown.

With the enthusiasm and enterprise so characteristic of the farmers of California, the land owners have expressed a desire to organize a water users' association and to co-operate in every way possible with the Government if the project is undertaken. In view of the large acreage cost and the present state of the reclamation fund, however, the engineers of the Reclamation Service do not deem it wise to recommend consideration of the project until the Klamath project is beginning to return revenue at least. There are many opportunities for reclamation work in the Sacramento Valley, and in

case a small economical project develops it would be manifestly unfair to the State to begin work which for lack of funds might not be completed for many years when other work could be taken up and completed quickly.

MAKE AN INVESTMENT IN BOISE, THE BEAUTIFUL.

Boise, the beautiful Capital of Idaho, is a city with a great future, and one of the safest places for real estate investments in the world.

The population has increased from 9,000 to 20,000 in the past three years. With the great Boise-Payette irrigation scheme trebling the irrigated land at its doors, and the many other irrigation systems building in southern Idaho, it can not fail to double again in the next five years. This means a tremendous increase in the price of Boise real estate.

We are offering lots in our Londoner, South Boise and Denver additions at prices ranging from \$125 four blocks from car line to \$300 on car line. These lots are being purchased and built on freely by our home-people; having increased in value from 25 to 50 per cent in the past year, and we believe they will double in less than five years, probably in three.

The terms on the lots valued at \$175 or less are \$2.50 per month; on those of a higher valuation, \$5.00 per month; 8 per cent interest on deferred payments. You can pay out as fast as you like, and interest ceases on payments as they are made. Why not buy four of these cheaper lots or two of the higher priced ones. It is the greatest savings bank proposition you ever saw.

You will save up \$10.00 a month you would otherwise spend, and when your lots are paid for you will find you have a nice little stake.

If you will write to the Capital State Bank or the Idaho Trust and Savings Bank, we think they will tell you you can trust us to make as good a selection for you as you could make for yourself.

Should be glad to write you further.

W. T. BOOTH,
211 N. Eighth street, Boise, Idaho.

Every owner of a dog should have a copy of "American Homoeopathic Dog Remedies." It is a compact treatise on the most frequent diseases of the dog, and gives a brief description of the common diseases. The booklet is published by the American Homoeopathic Dog Remedy Company, 28 Cherry place, Chicago, and will be mailed free.

NEW ENGINE AND BOILER CATALOGUE.

The James Leffel & Co., Springfield, Ohio, have issued a very handsome and complete new 52-page catalogue, illustrating and describing their line of steam engines and boilers: The details of construction are plainly shown and fully explained, and the catalogue is one that should be in the hands of any prospective purchaser of work in the steam power line. A copy will be furnished free to prospective buyers, stating their wants and addressing the company as above. In writing for this catalogue please request Catalogue "O."

MYER'S UNIVERSAL PUMP JACK.

The accompanying illustrations show the Myers Universal pump jack, one representing the jack without the pump and the other showing the jack connected to the modern cock spout stand.

The Myers Universal pump jack is back geared 6 to 1, has 5-inch, $7\frac{1}{2}$ -inch, and 10-inch stroke, and



Myer's Universal Pump Jack.

can be attached to any windmill pump, making an equipment adapted for use with belt power, windmill, or hand, designed to be connected up without disarranging the pump or pipes.

It is mounted on a substantial bell-shaped base which surrounds the pump stand, and can be bolted securely to the platform, making a most substantial job.

It is a strong, practical device, and can be connected up to a pump already in the well without disturbing the pump in any manner, and is fully guaranteed. Further particulars can be secured from the manufacturers, F. E. Myers & Bro., Ashland, Ohio.

NATIONAL ASSOCIATION OF AGRICULTURAL IMPLEMENT AND VEHICLE MANUFACTURERS.

At the recent convention of the National Association of Agricultural Implement and Vehicle Manufacturers held in Chicago, the following officers were elected for the ensuing year:

President, H. E. Miles, president of Racine-Sattley Company, Racine, Wis.; treasurer, J. B. Bartholomew, president of Avery Manufacturing Company, Peoria, Ill.; vice-presidents: W. N. Rumely, M. Rumely Company, La Porte, Ind., H. M. Wallis, J. I. Case Plow Company, Racine, Wis., C. G. Rowley,

Aspinwall Manufacturing Company, Jackson, Mich., D. W. Spencer, Johnson Harvester Company, Batavia, N. Y., R. S. Buch, A. Buch's Sons Company, Elizabethtown, Pa., A. E. Mayer, International Harvester Company, Chicago, Ill., W. R. Harrison, W. R. Harrison Manufacturing Company, Massillon, O., S. D. Porter, Acme Harvesting Machine Company, Peoria, Ill., T. B. Carson, Bettendorf Metal Wheel Company, Davenport, Ia., A. H. Patch, Clarksville, Tenn., E. P. Cur-



Myer's Universal Pump Jack Connected to Stand.

tis, Richardson Manufacturing Company, Worcester, Mass., Jos. W. Moon, Jos. W. Moon Buggy Company, St. Louis, Mo., H. M. Wade, U. S. Wind Engine and Pump Company, Batavia, Ill. Executive committee: Newell Sanders, chairman; S. E. Swayne, Robinson & Co., Richmond, Ind., three years; H. M. Kinney, Winona Wagon Company, Winona, Minn., three years; F. C. Johnson, American Seeding Machine Company, Springfield, O., three years; A. J. Brosseau, Gale Manufacturing Company, Albion, Mich., two years. The next convention will be held in Norfolk, Va.

Send \$2.50 for The Irrigation Age
1 year, and The Primer of Irrigation

RECLAMATION SERVICE NOTES.

A contract has been executed with Marcus E. Getter, of Mitchell, Neb., for the construction of ten miles of earthwork, distributing system, Interstate canal, North Platte irrigation project, Nebraska. Mr. Getter's bid was \$5,649.

A contract has been awarded to the Kansas Portland Cement Company, of Iola, Kas., for furnishing 5,000 barrels of Portland cement for the Garden City irrigation project, in western Kansas. The bid of the above named company, at \$1.60 per barrel, f. o. b. cars at Iola, was the lowest received, transportation considered.

Bids are solicited for furnishing 2,500 barrels of Portland cement for the Rio Grande irrigation project, New Mexico. The bids will be opened at Las Cruces, N. M., November 1st. Bids for the construction of the diversion dam at Penasco Rock, and canal work, will be opened October 16th. It is desired to begin construction during the low water stage. The engineers hope to be able to furnish water to about 15,000 acres under the Leasburg diversion next summer.

The board of consulting engineers recently convened at Portland, Ore., to open bids for the construction of main canal and laterals of the distributing system. Umatilla irrigation project, Oregon, received seven proposals, which were transmitted to the Department for action. The work is divided in two schedules, and the Secretary of the Interior today awarded contract for schedule 1, consisting of about fifteen miles of main and lateral ditches, to Thomas Jaques, of Pilot Rock, Ore. Mr. Jaques' bid was \$20,212.50. All bids on schedule 2, which consists of twenty-six miles of main canal and laterals, were rejected on the ground that they were unreasonably high. The Secretary of the Interior authorized the Reclamation Service to prosecute the work by force account. Horses for this work will be shipped from the Klamath irrigation project in the southern part of Oregon, as their use at the latter place is not needed during the winter.

The Secretary of the Interior has rejected all bids received for the construction of structures for the Garden City irrigation project, Kansas, and authorized the construction of the work by force account under the direction of the Reclamation Service. The work consists of the construction of deep and shallow wells, suction pipes, pumping stations, siphons, concrete lined conduits, and fencing. The bids were all greatly in excess of the estimates of the engineers, except one bid for a gate valve, and it is believed that the work can be more economically performed by force account.

A contract has been executed with Henry C. DeLaney, of Williston, N. D., for the construction and completion of canals and structures under the Williston irrigation project, North Dakota. The work involves the excavation of about 220,000 cubic yards of earth, and furnishing labor and material for various structures requiring about 40,000 feet B. M. of lumber, and 1,000 cubic yards of concrete. Mr. DeLaney's bid was \$81,867.

A contract has been executed with Flower & Twing, of Morrill, Neb., for the work provided for in schedule 4, earthwork of distributing system, North Platte irrigation project, Nebraska.

The bid of the contracting company for this work was \$11,711, and the contract calls for the earthwork on about ten miles of lateral.

The engineers in charge of the Belle Fourche irrigation project, South Dakota, are rushing work all along the line, as freezing weather will soon force suspension of operations till spring. The Chicago & North-Western Railway Company has made surveys preliminary to connecting their main line with the Government townsite. There is great difficulty in procuring a sufficient force of laborers, and the contractors are put to great expense by being obliged to continually ship in men from Omaha, Denver, and other labor centers in order to keep the necessary number of men on hand to carry on the work. The contractors are paying from \$2.50 to \$2.75 per day for common labor, and the Government pays \$2.20 for eight hours' work. Authority has been granted for the construction of three miles of canal inside the Belle Fourche reservoir to connect the Inlet canal by way of Dry Creek, with the constructed portion of the South canal, so that water can be delivered to lands under this canal next spring. The engineers believe the work will have reached a point where water can be delivered to about 10,000 acres next season.

Proposals have been requested for the construction of

a diversion dam and headworks on the North Platte River, in Nebraska, in connection with the North Platte irrigation project. The work will involve the excavation of about 100,000 cubic yards of earth and rock, furnishing and placing in structures about 10,000 feet B. M. of lumber, and the construction of about 8,000 cubic yards of concrete masonry. The bids will be opened in Mitchell, Neb., November 1st. Work on the North Platte project has progressed rapidly during the season. The first forty-five miles of the Interstate canal has been furnishing water at several places for irrigation, but preparations for receiving it were incomplete and full use of the canal will not be made until next season. The second section of the canal is under construction and surveys for the third fifty miles are being made. Contracts have been awarded on fourteen schedules of the distributing system and the work on the laterals is already in progress. The Pathfinder dam is progressing favorably and it is expected that about 15,000 cubic yards of masonry will be laid before cold weather forces suspension of work. It is hoped that water can be delivered to about 40,000 acres under this project during 1907.

A contract has been executed with the D'Olier Engineering Company, of Philadelphia, for furnishing and installing pumping machinery for the Buford-Trenton irrigation project, North Dakota. The contract calls for the installation of three transformers of 300 kilowatt capacity, and eight motor-driven pumping units of capacities of 16 and 30 cubic feet per second under heads of 50 and 33 feet respectively, with necessary electrical apparatus and water pipes, in pumping stations near Buford, N. D. The D'Olier Engineering Company will receive \$40,836 for the work. Now that the contract is let and the exact dimensions of the machinery are known, the engineers will determine on the design of the floating barge in which the intake pumps are to be mounted, and labor and material will be secured for the construction of the barge. The water supply for this project is from the Missouri River, the slight gradient of which necessitates lifting the water direct from the stream by pumps. No long and expensive canal system will be required. An abundance of lignite fuel exists in the vicinity and it is proposed to generate power at the mines and transmit it electrically to the several pumping stations for the Buford-Trenton and Williston projects. The first pumps will be placed on floating barges. These will, of course, accommodate themselves to changes not only in water level, but to the shifting of the stream, the water being conducted from the pumps on the barges through pipes with flexible joints, to the main canal. Additional sub-station lifts will be introduced wherever required.

A contract has been executed with John H. Donohue, of St. Paul, Minn., providing for the construction and completion of building for Station 1, power and pumping system, Williston irrigation project, North Dakota. The estimated cost of the work will be \$13,886.

During the month of September 719 feet were added to the excavated portion of the Gunnison tunnel, Uncompahgre irrigation project, Colorado, making a total of 16,031 feet. The progress during the last two months has not been quite up to the usual standard on this tunnel, on account of the extreme hardness of the quartzite rock in one heading and the friable and dangerous nature of the material in the other heading. The work has reached points so far from the portals that the difficulties in ventilation and tramming have increased. Severe storms during the month delayed work on the South canal and caused a loss to the contractor of approximately \$1,000. The scarcity of labor throughout the West is being severely felt on this project in all lines of work, both contract and force account.

A contract has been executed with the Pacific Coast Construction Company, of Portland, Ore., for the construction and completion of the Yellowstone dam and accessory structures, Lower Yellowstone irrigation project, Montana and North Dakota. This dam is to be a rock-filled, timber-cribbed structure, located about eighteen miles northeast of Glendive, Mont., for the purpose of diverting the waters of Yellowstone into a canal extending about eighty miles down the west side of the river for the irrigation of 67,000 acres of land, two-thirds of which lie in Montana. The work requires about 500,000 feet of lumber, 700 piles, 1,600 sheet piles, 11,000 cubic yards of rock rilling and riprap, and eighty tons of steel. The contracting company will receive \$142,825 for its work, which according to the terms of the contract must be completed February 1, 1909.

Bids are requested for the construction of a dam at the outlet of Bumping Lake, Washington, for use in connection with the Yakima irrigation project. The work involves about 182,000 cubic yards of excavation, about 960 cubic yards of concrete masonry, about 980 cubic yards of riprap and rock fill, and about 72,000 feet B. M. of hewn timber. The bids will be opened at Portland, Ore., on November 15, 1906.

By an accident in the southerly heading, Adit No. 3, Corbett tunnel, Shoshone irrigation project, Wyoming, on the 25th, one man was killed and two slightly injured. Contract with Charles Spear for the construction of this tunnel was suspended by the Secretary of the Interior August 4th, and authorization was secured by the Reclamation Service for carrying on the work by force account. Work was resumed August 17th and on September 1st about 500 men were employed. Owing to the delay between August 4th, the date of shut down by contractor, and August 17th, the date when work was taken up by the United States, many places in the tunnel developed defects, and the men were put to work timbering the roof and sides in order to provide for the safety of the workmen.

A contract has been awarded for furnishing and installing pumping machinery for the Buford-Trenton irrigation project, North Dakota, to the D'Olier Engineering Company, of Philadelphia, Pa. Four bids were received for this work, the lowest being that of the Camden Iron Works, of Camden, N. J., at \$40,574.50, and the next lowest that of the D'Olier Engineering Company at \$40,836. Careful consideration was given to these two bids and the conclusion was reached that the last mentioned company's proposal provides for the greater pumping efficiency. The contract calls for the installation of three transformers of 300 kilowatt capacity, and eight motor driven pumping units of capacities of 16 and 30 cubic feet per second under heads of 50 and 33 feet respectively, with necessary electrical apparatus and water pipes, in pumping stations near Buford, N. D.

The Secretary of the Interior has withdrawn from any form of disposition whatever under the public land laws the following described lands for use in connection with the Dubois irrigation project, Idaho: Boise Meridian—T. 8 N., R. 45 E., Secs. 1 to 24 inclusive; T. 9 N., R. 45 E., all; Ts. 8 and 9 N., R. 46 E., all. A portion of these lands is included in the Henry's Lake Forest Reserve, and the withdrawal of such portion is allowed in order that it may serve on the records of the General Land Office as notice that these tracts are necessary to the development of the Dubois project and right of way privileges therein should not be granted unless approved by the Reclamation Service.

The board of consulting engineers of the United States Reclamation Service, which convened recently at Portland, Ore., to open bids for the building of the Cold Springs dam, in connection with the Umatilla irrigation project, Oregon, reports that three bids were received, as follows: Alternate A, or dam with riprap facing, Clement, Strange & Salisbury, of Salt Lake City, \$339,505; rock fill facing, \$345,380. The bid of R. Wakefield, of Portland, Ore., for Alternate A was \$489,058.60, and for Alternate B \$496,788.60. The Puget Sound Bridge & Dredging Company of Seattle, Wash., bid \$471,893.55 for Alternate A and \$486,743.55 for Alternate B. The dam will be constructed near Hermiston, Ore., and involves 694,000 cubic yards of earth and gravel excavation, about 3,100 cubic yards of rock excavation, about 3,110 cubic yards of concrete, and about 35,000 cubic yards of riprap and rock fill. The bids have been forwarded to the Secretary of the Interior for consideration.

Since December, 1896, the Secretary of the Interior has refused to approve applications for right of way over the public lands which involve the taking of the waters of the Rio Grande, on account of the pending questions with the republic of Mexico concerning claims due to the alleged destruction of the water supply of canals in Mexico by the diversion of waters of the Rio Grande in the state of Colorado and territory of New Mexico. There has been much controversy over this question by parties in southern Colorado who had made plans for the construction of irrigation works depending upon the waters of the Rio Grande. The Reclamation Service has made many efforts to adjust matters satisfactorily to all concerned, and in May of this year a modification of the order was made which partially relieved the situation, but was not wholly satisfactory. As a further result of the efforts of the Reclamation Service a treaty was negotiated with Mexico which will provide for an adjustment of the claims of its citizens. This treaty was ratified by the Senate on May 21, 1906, and as a result the Secretary

of the Interior, acting upon the suggestion of the Acting Secretary of State, has now revoked all orders suspending such right of way applications, and provided that each application shall be separately considered on its merits as to whether it interferes with the obligations involved under this treaty or with the operations under the Reclamation Act for a project in Rio Grande Valley, the construction of which has begun.

The bid of Henry C. DeLaney, of Williston, N. D., has been rejected in the sum of \$166,289 for the construction of canals, ditches and structures under the Buford-Trenton irrigation project, North Dakota. The work involves the excavation of about 410,000 cubic yards of earth, and furnishing labor and material for a pumping station and various structures requiring about 140,000 feet B. M. of lumber, about 2,000 cubic yards of concrete, and about 25,000 pounds of structural steel. Mr. DeLaney's bid was the only one received, and was rejected as unreasonably high.

A contract has been awarded to the Pacific Portland Cement Company for supplying 27,000 barrels, more or less, of Portland cement for the Tieton and Sunnyside irrigation projects, Washington. Four proposals were received for furnishing this cement, but taking into consideration the cost of transportation, that of the Pacific Portland Cement Company, Tolenas, Cal., was the lowest. This marks the beginning of the construction work on the Yakima project, of which the Sunnyside and Tieton projects are independent units. The Yakima irrigation system, as planned by the Reclamation Service, will ultimately be one of the largest of the Government projects. The nucleus of irrigation already established in this valley has shown that in fertility of soil and climatic conditions this portion of Washington compares favorably with the best irrigated sections in the West. The people have been very energetic in clearing away some of the preliminary difficulties encountered by the Government in starting the work, and the conditions are very favorable for a large increase in the irrigated area in the next few years. Plans and specifications for the canyon portion of the main canal, Tieton project, were completed in July, and bids for its construction will be opened November 15th. A field party is now engaged in the location of valley portions of the main canal. A wagon road is under construction up Tieton canyon to facilitate operations along that portion of the canal, and every effort will be made to complete the road and have everything in readiness for the actual commencement of canal construction next spring. A farm unit survey has been completed and plans for the distribution system are being studied and prepared. The development of the distribution system of the first unit of Sunnyside project is now occupying the engineers, and plans and specifications are about completed for a concrete weir to replace the movable dam at the head of the Sunnyside canal.

"Chief Engineer, U. S. Reclamation Service, Washington, D. C.—The first stone of the Roosevelt dam was laid by the contractor at 5 o'clock this afternoon. Hill."

This message was read with a great deal of satisfaction by the officials of the Reclamation Service. It marks the beginning of the end of one of the most daring and difficult projects so far undertaken by the Government. The contract for the construction of this dam was executed by the Secretary of the Interior April 21, 1905. Although the company which made this contract is energetic and experienced, the long succession of unusual floods which have occurred in Salt River in the past year has from time to time delayed the attempts to control the river with coffer dams and excavate the foundation. Time after time a large amount of work has been entirely destroyed and the contractors' appliances swept away. It is therefore with a great sense of relief that the news is received that the erratic river has finally submitted to the curb and rein, and a few weeks will see the contractors' works out of danger. The work will thereafter advance rapidly, and benefits from the storage accomplished may be expected during the season of 1907, although the completion of the dam will require a much longer time. The dam will be 284 feet high, 280 feet long at the base and 700 feet long on top. It will back the water up for twenty-five miles, forming a lake with a capacity of 1,300,000 acre-feet, or water sufficient to cover that many acres one foot in depth. The cement mill erected by the Government has a capacity of 350 barrels a day and the saw mill thirty miles up the canyon has cut about 3,000,000 feet B. M. of lumber for use in the various structures. A power canal eighteen miles long with a drop of 220 feet is furnishing power to operate the cement mill and for use in

constructing the dam. When completed this project will reclaim more than 200,000 acres of desert land.

Morris Bien, supervising engineer in charge of land and legal matters in the Reclamation Service, returned recently from an extended trip through the Northwest. He reports that the work of reclamation generally is progressing rapidly, and that there seems to be a feeling of optimism among all classes as to the results. "On the Minidoka project, in southern Idaho," said Mr. Bien, "the land is practically all settled up. Two years ago the Government gave notice that it could not furnish water until the season of 1907, and the promise will be kept. Water will be turned into the canals this fall, and will be furnished to a considerable part of the project next spring. One noticeable feature is the unusually permanent and high class character of the buildings that have been erected by the homesteaders. Some of the settlers have been willing to work for the contractors and in this way have made a good living while waiting for the water. Others have cleared and cultivated small portions of their entries and have raised small crops of wheat and oats of good quality without other watering than the small rainfall during the spring months. Those who have cultivated their ground have managed to realize sufficient return to enable them to make a living. In spite of the opportunities which have thus been developed a large number of the settlers have made no effort to get work or to cultivate the ground, and it may be that many of them will be unable to hold their entries through the next year. Those who are clearing their lands and making the necessary preparations for next season's irrigation will undoubtedly be able to make paying crops and will be in a position to meet the charges for the construction work, payable under the Reclamation Act, the first of which will become due at the end of next season. The developments on the Minidoka project show very plainly that the supply of settlers for the lands made subject to irrigation under the Reclamation Act is ample, and that the man who is willing to work and goes upon the land in good faith to make a home will, in the course of a few years, find himself the possessor of an extremely valuable tract of land as a result of his efforts."

FOR SALE 160 acre water right on irrigation project near Denver, Colorado.
Write HENRY MEISSNER, LEIGHTON, IOWA.

NO MORE BLIND HORSES For Specific Ophthalmia, Moon Blindness, and other sore eyes, BARRY CO., Iowa City, Ia., have a sure cure.

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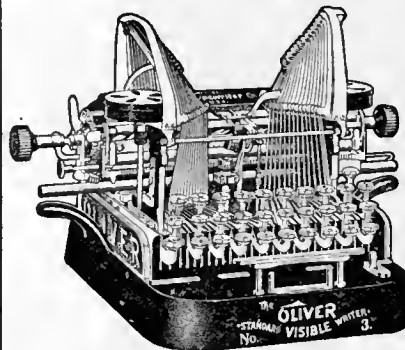
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Its main lines and branch lines fairly gridiron the rich agricultural and stock country of South Dakota. Its mileage in South Dakota is more than 1,200 miles, and by the building of extensions is being rapidly increased.

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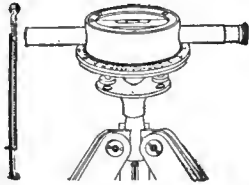
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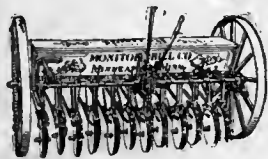
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Idaho is not wild. True, 83½ per cent. of the state is yet unsurveyed; much of its territory is virgin and awaits the foot of man. In mines and timber the state is rich; in agriculture its wealth is fabulous. Ignorance of the attractions to homeseekers offered by this "Gem" state of the Inter-mountain Northwest is little short of criminal. Educate yourself.

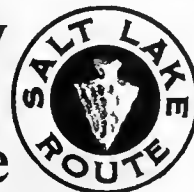
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And the Best Dining Car
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947

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Mr. Anderson, editor of this paper, has recently purchased a quantity of this fencing for use on his experimental farm at Cadillac, Mich., and we refer you to him—he will tell you frankly what he thinks of it.

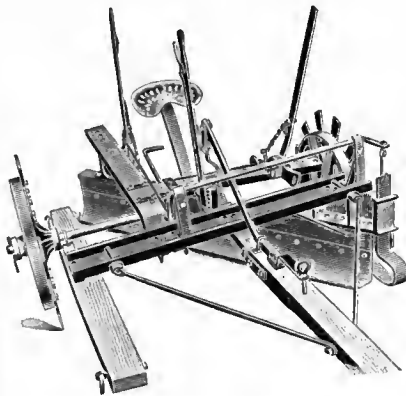
Made with No. 9 top and bottom wires; No. 11 lateral wires and No. 12 crossbars, 12 inches apart. Spaces from bottom up as follows:—3, 3½, 4½, 6, 7, 7, 8, 8.

We make many other styles, from which you may select one especially adapted to your own particular needs, if you wish. We have them all, high and low, close spaced and wide spaced, heavy and light. Our catalog will describe them and is free.

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A new model of grader and ditcher that will interest all highway commissioners, builders of ditch and levee work in the rice belt, irrigation work in the West, and the big farmer everywhere to open up ditches with and to build roads needed on the farm.

If you have road grader work to do in any form, then get a Rural Road Grader and Ditcher, thereby saving more than half in cost of machines and working expenses.

Operated by One Man and Two Teams. Sold on Trial.

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Dear Sir:—You will please find enclosed draft for \$125.00 in payment for one Rural Road Grader and Ditcher, ordered of you April 28, 1906. Would much rather have it than an eight-horse grader. Can do more and better work with it at one-half the expense and can work it where we cannot the larger one, so you can rest assured we are well satisfied with the machine.

Yours respectfully, J. R. FLOYD, R. F. D. No. 1.

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Clearing Land With a Jumbo Stump Puller.

I manufacture the Climax and Chief Pullers also, intended for lighter work.

Capstan Ditching Machines, cutting ditches 4, 6 and 8 feet wide and Bog Land Cutters.

Send for catalog of the machine you are interested in

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in which important questions are tersely answered in brief articles about

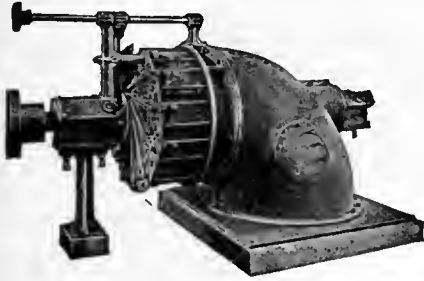
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If you contemplate locating in Idaho or the West you should understand something about what is necessary to secure irrigated tracts under the Carey Law. The following will assist you:

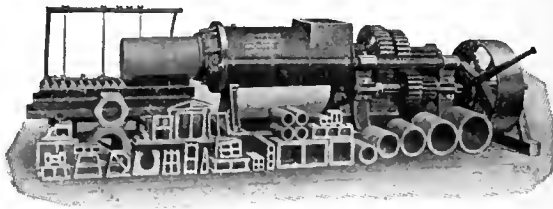
- 1st. Make your selection of land either in person or by your representative.
- 2d. Procure your water right from us. You must have one share, or acre, of water right for each acre of land.
- 3d. At the time you secure your water right you will make, through us, your application to the State of Idaho for the land.

The price of the land is 50 cents per acre.
 The price of perpetual water rights ranges from \$15 to \$25 per share according to quality and location of land.
 One share of water will irrigate one acre of land. The amount furnished each year is sufficient, if placed upon the land at one time, to cover it 30 inches deep. The water is measured at the point where it is delivered to the purchaser, thereby saving him all loss from seepage or evaporation. The average rainfall in Idaho is 13 inches each year.

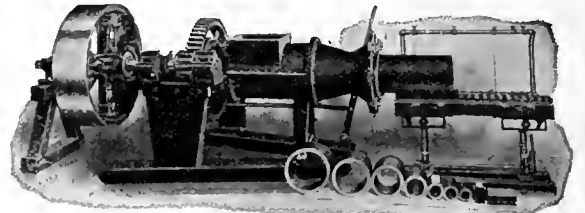
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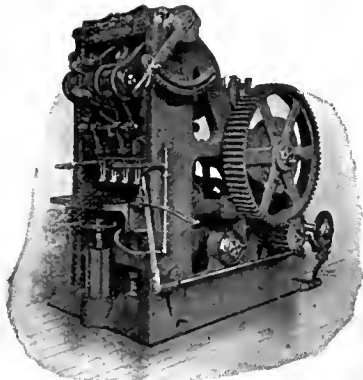
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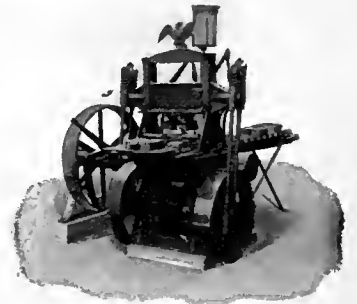
Mascot Auger Machine



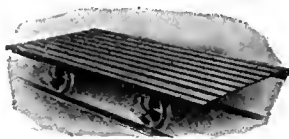
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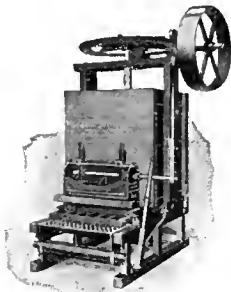
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We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and ail supplies. Send for information or catalogue.

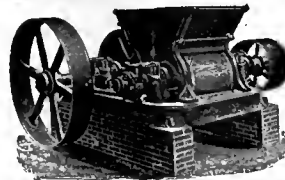
The American Clay Mch. Co...Bucyrus, Ohio



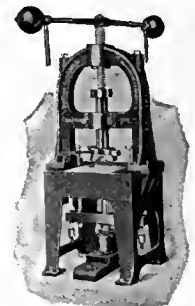
Hand and Power Cutlers



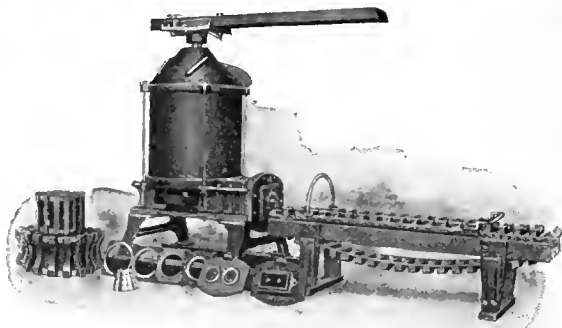
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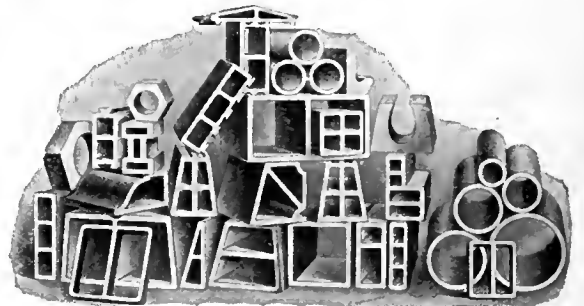
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Hand Power Screw Press

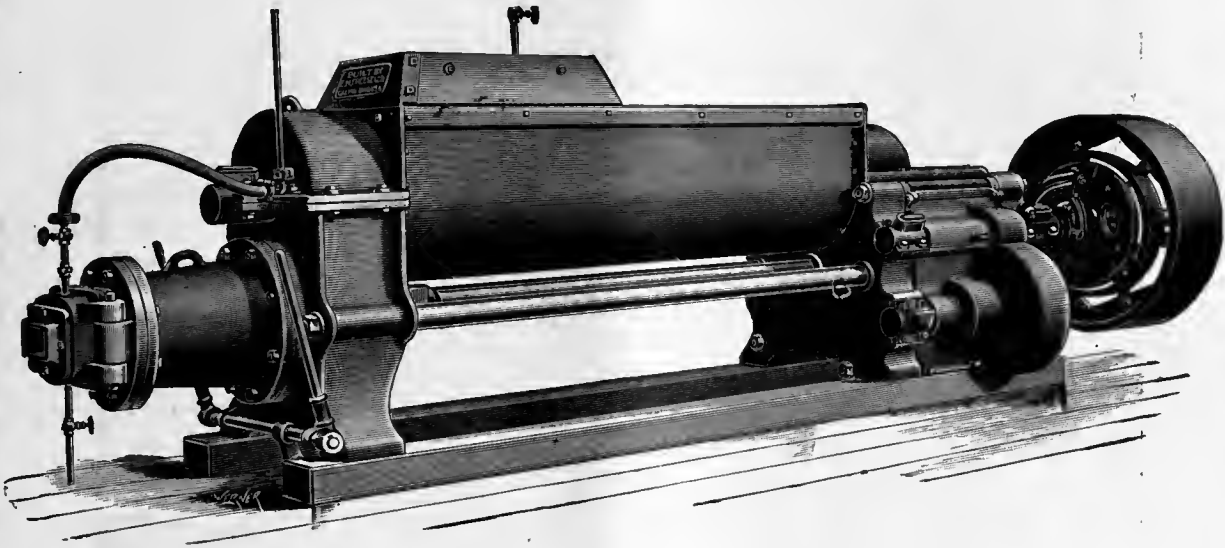


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FIVE SIZES ALL CAPACITIES

Outfits for Drain Tile, Hollow Ware, Building
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Let Me Prove That 10 Acres of this Irrigated Land

Will earn **\$250.00** A Month For You



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Rio Grande Land, Water & Power Co.

I Will Sell It To You For \$2.50 a Week

Irrigated, under
cultivation, ready
to earn at least
\$250 a month.

Not in all the world have I ever heard of so good an opportunity for men of small means.
In this small space I cannot tell you all the steps that have been taken to safeguard your money in every way.
This is investment—not speculation—yet you get returns equal to those from successful speculation.
And all the while you are secured against loss by the finest farm land in the world, and your interest in water-rights that no man could buy for a million dollars.
There is no question like finding gold or striking oil about this proposition.
The land is there for all time.
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You don't have to dig in the ground deeper than to plant seed.
There are no insects that destroy crops in this country.
There is no chance for drought.
There is no chance known to man for a single crop failure, ever.
And the abundant crops of large and in every other way superior hays, grains, vegetables and fruits are equalled in only a very few favored spots, such as the Rocky Ford country. But I am going to prove by case after case that net returns from ten acres of this property rarely are as low as \$3,000 a year and often as high as \$10,000, according to the kind of crops.
The difference is not according to location of land or season or anything of that kind.
The land is near a prosperous and growing city—Albuquerque—the largest city in New Mexico.
Our main irrigation canal to run through the city.
The main line of the Santa Fe Railroad runs through our land from end to end.
And our own electric line is to supply additional cheap and convenient transportation to every section of these lands.

YOU know, or can easily learn from United States Government Reports, that irrigated lands in the Great Southwest, in selected crops, will net \$300 to \$1,000 a year per acre over and above the entire cost of cultivating them.

Anyone who knows the country will tell you that absolutely the surest, easiest way in the world to gain a large and permanent income for a small outlay is to get hold of a few acres of irrigated land in the Great Southwest.

But always before it has required at least a few hundred dollars and it has been necessary for the investor to live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest irrigated land in the world if you can save \$2.50 a week.

You can go and live on it—absolutely assured of an income from it alone of \$3,000 to \$10,000 every year without fail.

Or you can remain in your present position and add that much to what you earn.

For my company will cultivate your property for a small share of the crops.
You don't have to know a thing in the world about farming.

Now, I can and will prove all this from the highest authorities in the land.

All you have to do is—write me and say "prove to me that ten acres of your land will net from \$3,000 to \$10,000 a year above all cost of cultivating it."

I have the proof, so read what my company will do for you.

I will deliver to you at once a Secured Land Contract for ten acres of irrigated land in the Rio Grande Valley.

You must pay my company \$2.50 a week or as much more as you like.

Instead of your having to pay interest on deferred payments, I agree, for my company, to pay you 5% per annum on the money you pay in.

I also bind my company to fully irrigate your land and turn it over to you under full cultivation whenever you desire to mature your contract.

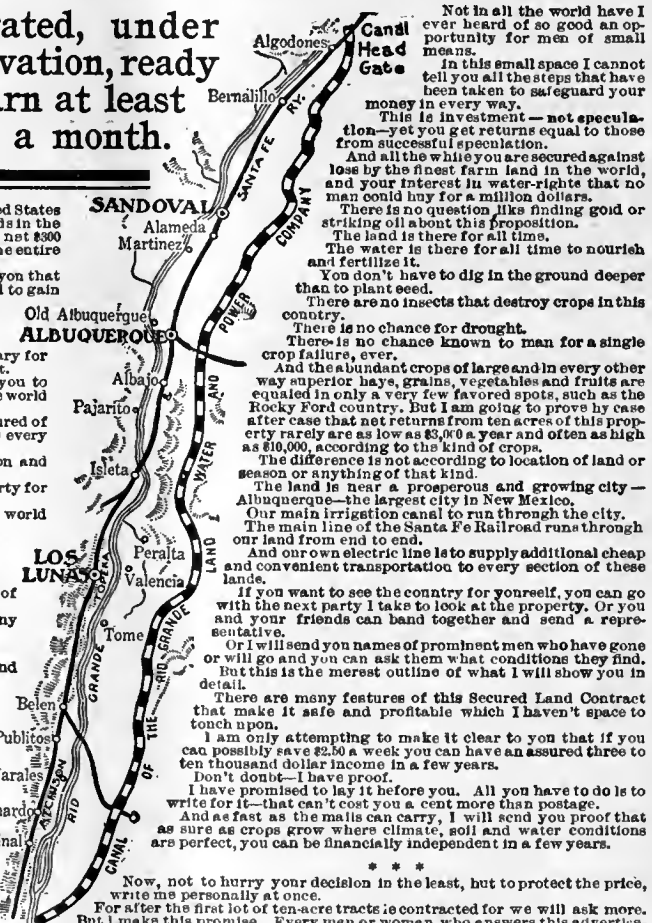
\$2.50 a week will mature your contract in 10 years.

But after you have paid \$2.50 a week for three years, or the same total amount in a shorter time, I agree and bind my company to loan you enough money to make all future payments and mature your contract.

Remember, the land will be fully irrigated and completely under cultivation, so your first year's crop should net you enough over and above the cost of cultivating it to fully pay your loan.

You would then own your land outright and have an assured income of from \$3,000 to \$10,000 a year.

Can you hope in any other way as safe and sure as this to have so large an income in a few years!



If you want to see the country for yourself, you can go with the next party I take to look at the property. Or you and your friends can band together and send a representative.
Or I will send you names of prominent men who have gone or will go and you can ask them what conditions they find.
But this is the merest outline of what I will show you in detail.

There are many features of this Secured Land Contract that make it safe and profitable which I haven't space to touch upon.

I am only attempting to make it clear to you that if you can possibly save \$2.50 a week you can have an assured three to ten thousand dollar income in a few years.
Don't doubt—I have proof.

I have promised to lay it before you. All you have to do is to write for it—that can't cost you a cent more than postage.
And as fast as the mails can carry, I will send you proof that as sure as crops grow where climate, soil and water conditions are perfect, you can be financially independent in a few years.

Now, not to hurry your decision in the least, but to protect the price, write me personally at once.

For after the first lot of ten-acre tracts is contracted for we will ask more. But I make this promise. Every man or woman who answers this advertisement at once can have at least ten acres on these terms unless, of course, all our land should be already contracted for from this one advertisement.

Now, write at once. I can say nothing more in this advertisement except that, if I could, I would not tell you all you can confidently expect from this investment. For you would not believe it without the proof which I cannot put in an advertisement. Address me personally, and believe me sincerely,

E. W. SHUTT, President Rio Grande Land, Water and Power Co.
658 Houser Building, ST. LOUIS, MO.

THE IRRIGATION AGE

VOL. XXII

CHICAGO, DECEMBER, 1906.

No. 2

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

THE D. H. ANDERSON PUBLISHING CO.,
PUBLISHERS,

112 Dearborn Street, - - CHICAGO

Entered at the Postoffice at Chicago, Ill., as Second-Class Matter.

D. H. ANDERSON, Editor
W. J. ANDERSON .. G. L. SHUMWAY
Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

We earnestly request all who are in arrears for subscription to the Irrigation Age to send in remittance before January 1, 1907. Many thousands of our readers are not perhaps aware that the sum total due us reaches a large figure and if each will take the trouble to send in whatever sum is due the action will be heartily appreciated.

Abundance of water, fertile soil, perfect climate and excellent transportation facilities are among the factors that insure success for the irrigationist. There are many localities in the West where all of these conditions are to be found, and where opportunities to become wealthy can be counted by the score. Have you investigated any of these opportunities?

The irrigation idea is spreading. Next summer experiments in irrigation work are to be made in the Willamette Valley, the one place of all places where there would seem to be no need of artificial watering—for it rains so much in that valley that the people who live there are webfooted. Let the good work go on—it is only a question of time when irrigation will be practiced throughout the country.

The year 1906 will go into history as the most prosperous one ever enjoyed by the American farmer. The value of farm products for the year will approach near to the \$7,000,000,000.00 mark, which is an increase of almost 50 per cent in seven years. Farmers in the irrigation belt are always prosperous because they have no crop failures; therefore they are liberal buyers, and always have the money to pay for what they buy.

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To United States Subscribers, Postage Paid, \$1.00
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All Other Foreign Countries, 1.50

In forwarding remittances please do not send checks on local banks. Send either postoffice or express money order or Chicago or New York draft.

Official organ of the American Irrigation Federation.
Office of the Secretary, 309 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 21 years old and is the pioneer publication of its class in the world.

You Should Be Represented. Manufacturers are beginning to appreciate the good work done by THE IRRIGATION AGE in encouraging the redemption of millions of acres of desert land. Every acre of new land brought under cultivation means a larger demand for everything used on the farm. If you are not already represented in our columns we shall take pleasure in quoting you rates.

Montezuma Valley. There are some 60,000 acres of good irrigable lands in the Montezuma Valley, Colo. Of this area about 18,000 acres are now cultivated under a system of irrigating canals approximately 125 miles in length. Additional reservoirs and canals are to be constructed, and the remainder of these desirable lands are to be brought under cultivation at no distant day.

National Federation of Water Users. The National Federation of Water Users has been organized for the purpose of promoting co-operation between the various water users' associations and the United States Reclamation Service. Regular meetings are to be held annually at the same time and place the National Irrigation Congress convenes. The following officers were elected for the ensuing year: E. R. Brownson, president, Williston, N. D.; H. B. Holt, first vice-president, Las Cruces, N. M.; A. J. Splawn, second vice-president, North Yakima, Wash.; H. T. Irwin, third vice-president, Echo, Ore.

Denatured Alcohol. Through Dr. Wiley the Department of Agriculture has undertaken to educate the farmer relative to the manufacture of denatured alcohol. Two bulletins have been issued devoted to the discussion of sources from which alcohol can be obtained, the method of manufacture, and some uses to which it may be put. Judging from what Dr. Wiley has to say on the subject, the manufacture of alcohol on a small scale is not likely to prove very profitable.

The Gunnison Tunnel. The total cost of the Gunnison tunnel, which is now considerably more than half completed, will be in excess of \$2,500,000.

It is difficult for any one who has not been on the ground to appreciate the stupendous nature of this undertaking. To check a large river flowing in a deep, granite canon, carry the great river through five miles of solid rock, and then distribute the water over 150,000 acres of land is an engineering feat of no small proportions.

Tulare Lake. According to trustworthy reports, Tulare Lake in California is filling up, and in time will become completely effaced.

This lake at one time was the largest body of fresh water west of the Mississippi River. It is in the southern part of San Joaquin County, its altitude being about 200 feet above tidewater. Half a century ago its area exceeded 1,200 square miles, but now the area is less than 200 square miles. Occasional floods have raised the level of the lake, but the general tendency has been toward obliteration.

Rice Lands in the United States. About five years ago the people of Texas, particularly those on the gulf coast, began the raising of rice, an entirely new industry in that section. As a result of their efforts the production has gone far beyond their expectation, and it is now estimated that Texas has a rice area of 6,000,000 acres, and half a million acres producing from forty to sixty bushels per acre and finding a ready market at an average price of \$1.25 per bushel. The greater part of Texas rice lands are located tributary to the Colorado, Brazos and Trinity Rivers. There are three essentials in the growing of rice, namely; first the land adaptable to the growing of rice; second the water, facilities for placing it on the land; third, facilities for drainage of land before harvesting. Rice can not be grown without irrigation, which is conducted under two different systems. First, the water is forced through canals from streams as above described; second, by the use of irrigating wells.

A number of large irrigating plants have been built recently, and as an illustration we will mention the

Bay Prairie Irrigation Company, located in Wharton County, which controls 15,000 acres of rice land, with a pumping plant flooding the land at a rate of 50,000 gallons per minute, the land being flooded three times during the season. The canals are built similar to two parallel railroad embankments on the highest ridge of the prairie, the surface of the ridge being the bottom of the canal, so that all water once in the canal will flow out and down upon the surrounding land. Many smaller laterals are constructed to convey water at the same level to more distant fields, the canal company charging one-fifth of the crop as toll. Canals cannot reach all of the land, consequently irrigation wells are used. These wells vary as to depth according to locality, the average being from 150 to 165 feet. The wells are equipped by centrifugal or propeller pumps and driven by 12 to 16-horse power engines, irrigating the smaller tracts successfully and producing the desired results. Gasoline engines are the most economical for driving the pumps. Lands irrigated by pumping through canals are selling at \$40.00 per acre. Lands suitable for irrigating by wells range in price from \$15.00 to \$20.00 per acre. The entire cost of producing rice ready for the market will average from \$17.00 to \$20.00 per acre.

Since the beginning of rice growing in Texas millions of dollars have been made from its production, and large numbers of people from all parts of the United States have become interested in this industry. A number of Japs have recently invested, which is a good indication, as the growing of rice is one of Japan's principal industries. On a recent excursion date six carloads of rice-land buyers passed through the St. Louis gateway en route to Houston, which is the mecca for rice-land buyers. Much more could be said of this wonderful and far-reaching industry if space would permit, but to appreciate the proposition one should make a personal visit to the rice fields, when the crop is being harvested. The rice is cut, bound and threshed in much the same way as wheat. Large mills have been built adjacent to the rice fields in order that the product may be satisfactorily prepared for the market.

THE NEW AGRICULTURE.

"The New Agriculture" is the title of a book written by T. Byard Collins. The work has just come from the press. It deals with the subject of agriculture from a new viewpoint and in an authoritative manner. Irrigation, new fertilization, new transportation, new methods, new machines—all come in for a share of attention. The illustrations are unique and of special value. All who are interested in any way in agriculture should secure a copy of this most timely addition to the literature of agriculture. A full table of contents, together with sample illustrations, will be sent on request to the publishers, Munn & Co., New York, N. Y.

EDITORIAL NOTES.

BY G. L. SHUMWAY.

President Roosevelt is not playing fair. His friends in the last Congress—those who made possible his most signal successes—were turned against by the chief executive in the last election.

Probably the policies of the President had no more staunch defender in the United States Senate than Fred T. Dubois; yet Mr. Roosevelt's appeal and Mr. Taft's personal effort resulted in his defeat.

Perhaps this is well, for Senator Heyburn, an antagonist of the forestry policies which the administration has inaugurated, comes out of the contest strengthened by a republican colleague, and can do battle royal for a revolution in the methods of that department.

The representative of the Associated Press who reported the Boise Congress and Gifford Pinchot, have been guilty of a weak attempt to do with the press what they failed to do at the Congress—discredit Senator Heyburn. The reporter seemed to get his inspiration from the forest king, who in turn did not inspire correctly, or treat with proper consideration any incident or event that failed to make him the hero of the hour.

After crossing the continental divide we picked up dailies which mentioned that event of Mr. Heyburn's attack upon the policies of the Forestry Department. The reports stated that he was hissed and not permitted to proceed until he apologized.

We who were there appreciate that this was an incorrect report, and that the inordinate vanity of our Forest King is responsible for its origin. Heyburn was hissed, but the truth and sentiment and poetry of the words which followed produced a revulsion of feeling, and swept the Congress from disapprobation to spontaneous and tumultuous approval.

When the American Irrigation Federation met and effected a permanent organization, a report was given to the Associated Press representative who immediately retired with it to Mr. Pinchot's apartments, from which it never emerged.

If that institution is a disseminator of information of public interest we would advise that the censorship of Gifford Pinchot be eliminated in the future. Coloring the Heyburn episode, or smothering an account of the Irrigation Federation meeting will not injure

either, but it does serve to illuminate the pinheads that have managed to get up in official circles. Thousands were present and know the facts, and representative men from all parts of the country will carry corrected reports to their respective localities.

The Forestry Service has attached itself to the great and splendid work of Federal irrigation, to be carried along with it, sharing a portion of the glory of that institution. The theory that forests on the mountains hold back flood waters is largely theory only. If mountain slopes were as destitute of timber as the peaks above the winds of winter would whip and beat the snows into compact bodies and rifts, instead of the loose fluffy material that fills the treetops and covers the ground in the forests, which the first spring rain carries away.

As Mr. Heyburn said: "The daffodils bloom in the forest while the bare old mountain peaks are white with snow." And I have gathered ripe wild strawberries near the timber line of the Big Horn mountains, where only a few hundred feet away packed snow still covered the earth, although exposed to the rays of the summer sun.

Every tree contains some warmth, and the snow around its trunk is usually the first to melt, leaving "wells" to the ground. These perforations honeycomb the snow accumulations of the forest and hasten its transition into liquid form. That portion which runs away passes the fields where it might serve for irrigation before the irrigation period is on, and the quantity which goes into the earth is lost to irrigation, for it later passes into the fibers of trees and undergrowth. Springs of the intermountain country usually come from great depth, or through subterranean channels from the snows lingering above the timber line, and are scarcely affected by surface vegetation, trees or chaparral.

Forest reserves on the west side of the Cascade Mountains are certainly of no benefit to irrigation. Two-thirds of Washington's forest reserves are on the western slope, and if beneficial to irrigation the waters must be used on the Pacific Ocean, Puget Sound or on lands already supplied with forty to sixty inches annual rainfall.

It was proposed to extend Nebraska's forest reserves—not because they would in any way benefit irrigation, for the sand hills are east and below the irrigation belt—not for planting trees, although a few acres are annually planted—but to extend Mr. Pinchot's policies of overlordship, and compel an industry

which our puritanic Secretary of the Interior has wrecked, to pay a tribute, and to divert moneys which are now supporting Nebraska's splendid educational institutions, into a fund which the Forest King is manipulating. The effect would be to condemn into a wilderness forever a territory sufficient to sustain 20,000 families, 100,000 people and 5,000 rural schools.

The solution of the question of public grazing lands is simple, and does not need soil experts or civil engineers. A few common surveyors, and a few appraisers with good horse sense and rugged honesty and a local knowledge born of experience, and a capable recorder, can do the work. Public grazing lands should be classified, appraised, and blocked into range units capable of sustaining a given number of stock. These units should be open to entrymen. Conditions imposed should be: Payment of 10 per cent of appraised value, and continuous and perpetual interest upon deferred amount, occupancy and individual use, residence upon or in vicinity of tract, fencing and protection. Title subject to contest and cancellation for non-compliance with any of these requirements, or lapse by default of interest payment.

Should subsequent developments prove a unit more profitable for other purposes, or available for irrigation projects, the provisional ownership may be cancelled, by repayment of moneys and interest, and for improvements if any are taken, the provisional owner having privilege to select from within the range unit not to exceed 160 acres as a homestead. The fund thus created by provisional sale of public grazing lands, after deducting fixed fees, should be expended as follows: 5 per cent to state, 10 per cent to county, 10 per cent to public roads, 25 per cent to the school fund, 25 per cent to the national irrigation fund, and 25 per cent for inaugurating new methods of culture for improvement of the range, for reseeding, and for introducing new grasses and forage plants.

We have digressed to elucidate a plan which we have suggested by letter under date of November 20th, to President Roosevelt and others, and now "Back to the Woods"—your pardon, the Forestry department. Its attempted amalgamation of itself to the Reclamation Service has caused much criticism of the latter. There is little in common between them.

Planting trees and covering waste lands with growing forests is a splendid work, and under proper management the department will reflect much permanent glory, and do the world magnificent service, but it must take a new tack. At present it scatters

too much; it spreads itself until its original purposes are lost to view. It should stick to the text.

One of its erroneous tenets has struck a snag in a recent court decision wherein a prosecution for trespass upon a "reserve" was not sustained. Briefly stated, executive rulings are not laws, and an executive can not assume to himself powers and authority not provided by statute. Perhaps the autocrat of forestry will also find that bureaucracy is not an American idea, and that press censorship is not a prerogative of his office, and that official capacity requires a broader intelligence than is exhibited by him in the recent Boise episodes.

Inasmuch as the President's letter to the Irrigation Congress was top heavy with forestry, we are led to opine that our busy executive permitted the "messenger boy of the President" to write his own eulogy, the said "boy's" vanity hiding his blushes as he read it.

While the letter seemed almost to subordinate Chief Engineer Newell's part in national reclamation, that man and his work has been steadily rising in the estimation of former critics for some time past. And one of the pleasurable events of the Congress was the manifest realization by all that the principle of Federal irrigation was approaching the critical period, and should have united support to prove it all that its originators had promised.

IRRIGATION IN NORTH ATLANTIC STATES.

In this report will be found data relative to irrigation as practiced in Maryland, Delaware, Pennsylvania, New Jersey, New York, Rhode Island and Massachusetts. The territory investigated lies in the humid district of the United States, where the annual rainfall is between forty and fifty inches and where irrigation is not always necessary for the growth of crops and has been confined to truck farms and meadow lands. Truck farmers in the vicinity of large cities frequently use city water at a cost of \$1.00 to \$1.50 per 1,000 cubic feet, or \$44 to \$65 per acre-foot. In spite of this prohibitive price when compared with western practice, those farmers practicing irrigation in the district covered seem to find it profitable. This is probably due to the fact that the yearly value of the truck crops is estimated as being increased 30 to 50 per cent. As the cost of irrigation usually lies between \$30 and \$100 per acre it is fair to assume an acreage profit of \$200 or more per acre due to irrigation. The report was written by A. J. Bowie Jr., United States Department of Agriculture, and comprises 167 pages.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation

DO YOU WANT TO KNOW ABOUT THE GREAT WEST?

If You Do, The Irrigation Age Will Be Your Best Source of Information.

There is a widespread demand, all over the East for information about the western states and territories, and there is no single periodical or book that supplies the facts desired. Each railway company, in its literature, tells of the lands along its lines, but goes



Irrigated Potato Field, Western Nebraska.

no further. Each city, company or enterprise, follows the same rule. All printed matter is local—there is no publication which has for its field the Great West, beyond the Missouri River on to the Pacific Ocean, and undertakes to describe the lands, productions, climate, cities and mineral resources of that Magnificent Empire.

During the year 1907 THE IRRIGATION AGE will enter this field. It will, from time to time, take up in a general way, and in many instances the definite details of, farm productions, growth of cities, extension of railways, conditions of climate, adaptability to health, of many or all the western states and territories, including, possibly, Alaska.

IRRIGATION AGE WILL BE VALUABLE.

Such a fund of information will make this magazine of great value to all who have interest in the West, who think of becoming residents of that region; or who desire to visit any part of it for health or pleasure.

These facts will be worth many times the small price of \$1 charged for a year's subscription, even to any enterprising person who merely desires to keep informed in a general way about the West. To those more directly interested, a single issue of the AGE might be worth hundreds, even thousands, of dollars.

A general article on Southern California appears in this issue. It gives a glance at the leading cities and towns of that popular section. It would cost anyone not familiar with the facts at least \$300 to personally go and find out the situation as set forth in that story.

Other articles will go more into detail as to crops, prices of lands, climate, business conditions. In addition to these valuable descriptive articles, this magazine will contain many other pages of useful matter on the problems and progress of irrigation enterprises and reclamation subjects; discussions by able men of the West of the development there, as well as multitudes of

facts and points in connection with farming, towns, mines, men—everything involved in the growth of the Great West.

Send in subscriptions now, and get the 1907 volume complete—One Dollar!

A GLIMPSE OF SOUTHERN CALIFORNIA.

The Principal Cities and Towns of That Famed "Land of Sunshine."

During the winter season thousands of eastern people will visit Southern California, many of them for the first time.

Those who have not had experience frequently go with the idea that California is a land entirely free from rigors of winter as experienced in Iowa and Ohio. And this is true. But it is a mistake to suppose that clothing suitable for June in Des Moines will do for January in Los Angeles, Pasadena, Long Beach, Santa Barbara, Fresno or any of the towns south of San Francisco.

All visitors should take along their winter clothing, not for blizzards and temperatures below zero, but for cool days and nights such as we have in October in Iowa and Illinois. Winter is the rainy season there, and during a period of rainfall the air is cool and not only is warm clothing very comfortable, but a little heat in the room to take off the chill is both desirable for comfort and a protection to health.

Those who thus provide will enjoy California. Los Angeles is one of the most enterprising cities in America, energetic as Chicago, with far less smoke. It has elegant hotels and all kinds of housing accommodations from \$1 to \$50 a day. It possesses good theaters, fine churches, excellent schools, an extensive



Irrigated Onion Field in Colorado.

library. Table fare at modern restaurants is very reasonable. There is also a Battle Creek Pure Food Cafe, one of the best on the Coast.

LOS ANGELES, PASADENA AND OTHER TOWNS.

Los Angeles now claims a population of about 235,000 people and is growing in a marvelous manner. It is surrounded by a number of suburban towns that are very pleasant and popular winter resorts. To the northeast, near the mountains, is Pasadena, a high-class home city of possibly 25,000 population. This place is several hundred feet higher than Los Angeles, with a more dry and rarefied air. It is a quiet, clean city, morally and atmospherically, with fine modern hotels, as well as comfortable apartment houses and cottages

for winter visitors. Its churches, schools, clubs and social advantages are of the best.

Riverside, to the east, belongs in the same class with Pasadena, and Redlands, though smaller, is a beautiful little home city. For energy and movement in all that is modern, Long Beach, twenty miles south of Los Angeles, is phenomenal. It has connection with the former every few minutes by electric cars, and no one should fail to see this brilliant coast city of 20,000 people when in that region. San Pedro is on the same bay, but is more of a commercial point. Redondo, Venice, Santa Monica and other shore towns west of Los Angeles are well worth a visit.

One of the rarest points of interest that may be visited from Los Angeles is Santa Catalina Island, situated a few miles off shore in the Pacific ocean. No one should miss that, nor a trip to Mt. Lowe, near

is in the midst of the great raisin vineyards of California. South of Fresno are Visalia, capital of one of the richest sugar beet regions of the West; Hanford, another county seat town standing in a garden spot of great fertility. Southward is Bakersfield, located in a fertile country, and head-quarters of the greatest coal oil field in the State. All this valley is hot in summer, but healthful. In winter it is only a little cooler than Los Angeles, and is a good place in which to spend the cold months. At Fresno oranges may be seen on the trees in December, January and February. Palms are too common to mention.

No one has seen Southern California who omits San Diego, located on San Diego Bay over 100 miles south of Los Angeles. It is a handsome, progressive city of 32,000 people, on a natural harbor which promises to become a port of international importance.



Shenandoah Valley, Colorado. Looking East on Line of Denver & Rio Grande Railway.

Pasadena. Other good towns are San Bernardino, Pomona and Whittier. Santa Ana is in the midst of a very rich orchard region, and is highly prosperous.

Northwest from Los Angeles some distance is Santa Barbara, one of the fashionable and popular seaside resorts. This point divides interest with the best towns in Southern California, and is attractive in summer as well as winter.

IN THE GREAT SAN JOAQUIN VALLEY.

Over the mountain chain to the north is the San Joaquin Valley, one of the richest spots in the United States. Its lower half is south from San Francisco, with the prosperous town of Fresno as its center. This place is a city of not less than 25,000 population, and

SAN DIEGO'S CLIMATE, PROGRESS AND ATTRACTIONS.

The climate of San Diego is the most perfect in North America, both winter and summer. The city is in a frostless and practically a stormless region and is making fine progress. U. S. Grant Jr., son of the great general, lives there and is largely interested in the city. He is building the U. S. Grant Hotel, costing \$600,000, one of the finest public houses west of New York. The Hotel del Coronado, by-the-sea, is one of the greatest seaside residential houses in the world. There is a large area of rich land back of the city, now being reclaimed with irrigating works, which is already adding to the prosperity of the town.

San Diego homes are made charming at all times

by an abundance of flowers. The beautiful hibiscus tree spreads its big tiger lily-shaped blooms every month in the year. Palms are everywhere. Great century plants, with center stalks twelve and fifteen feet tall, are frequently seen. Flowering vines climb over hundreds of homes.

There are rainy days during winter in Southern California but there is abundance of sunshine, and when there one would never know how cold and fierce the winds blow and how snows blockade in the East, unless he has had experience.

The Hawaii Agricultural Experiment Station has issued a bulletin covering the work of the station.

THE RIO GRANDE PROJECT.

The Rio Grande irrigation project covers a large area above and below Albuquerque, N. M. All of the survey work has been done and a force of men is now at work digging one of the big canals. Two reservoirs will be built for the storage of water, and they will be so located as to catch the flow from the arroyos leading out of the mountains, in addition to depending upon the river for water supply. Two hundred thousand acres will be irrigated at first and how much more will depend mainly on the water supply.

While en route from Albuquerque, N. M., to Las Vegas recently, the editor of THE IRRIGATION AGE was



Harvesting in San Louis Valley, Colorado—on the Denver & Rio Grande Railway.

NATIONAL DEPARTMENT OF HEALTH.

At the last meeting of the American Association for the Advancement of Science at Ithaca, June 30, 1906, a committee was appointed under resolutions of that body, to promote the establishment of a national department of health by agitation in all legitimate ways for the purpose of creating a public sentiment in its favor. The naming of the members of the committee is in the hands of Prof. Irving Fisher, Yale University, chairman of this section of the American Association for the Advancement of Science. The names of the Committee of One Hundred selected will be announced shortly. The movement in general already has the support of the principal journals of medicine and hygiene in the United States.

interviewed by a reporter for the "Santa Fe New Mexican" relative to the Rio Grande project, and a part of the interview is reproduced herewith:

"This Rio Grande irrigation project looked like such a big thing and meant so much for the Rio Grande Valley that I thought I would go to the scene of operations and see what was being done before exploiting it in THE IRRIGATION AGE. There is no question but what it will be of inestimable benefit to that section of the territory. The men behind the enterprise have a comprehensive plan and they seem to have ample capital to meet the demands of this big undertaking. Of course I am not a civil engineer and am not passing on the proposition from an engineering standpoint. The project looks good to me and I believe it will be all that is claimed for it.

"One feature about irrigation projects that may be developed whether by federal or private control which always makes them attractive is that they are always sure of a good market or a growing market for their products. New Mexico must eventually be

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looked upon as the market for the mining districts throughout the great Southwest. It seems to me that the people here have but a faint conception of the markets which will be created by the development of mines at present unheard of. New Mexico has the mineral wealth to develop and the field is open to the world. New Mexico also has the soil which wedded with water will produce sufficient to supply the present and the future demand for agricultural products.

"The class of people these irrigation projects bring to a locality is well illustrated by the Twin Falls tract in Idaho. There 270,000 acres have been reclaimed within two years and thousands of good live farmers have located in that region from every State in the Union. Some of the men now located in this irrigation area sold their dairy farms back in Illinois at \$100 an acre and bought this new land with the water rights for about \$35 per acre. The Twin Falls land under irrigation will produce under proper cultivation as much in one year as the high priced farms back east can in five years. In Illinois, Indiana, Wisconsin, Missouri, Iowa and the other great farming States of the Middle West \$6 or \$7 net a year per acre is considered a good proposition, but out here in the West the irrigated land will produce from three to five times that much and in some instances ten times as much and on cheaper land at that. I know of three different farms on this Twin Falls tract that paid out absolutely with their first crops, even after accounting for the expense of clearing away the sage brush and breaking up the ground. What is being achieved in Idaho can be accomplished in New Mexico."

REAL RESULTS FROM IMMIGRATION ADVERTISING.

BY R. C. ROHRBACHER, OF SPOKANE, WASHINGTON.

There is, perhaps, nothing that is at once more indefinite and more positive, if you will permit that paradox, than the results obtained from advertising, and I believe that this is particularly true of the results derived from advertising for immigration. Yet it is possible to check up on the results of this character of advertising to a certain extent, and the manager who keeps a close record of tangible returns can demonstrate beyond question that the "real" results of a properly conducted publicity campaign for settlers are enormous and more than sufficient to justify all that is expended.

The careful manager will keep a record, however, more to afford a basis of comparing the relative efficiency of various mediums and ideas than to produce convincing evidence that advertising pays. To the advertising man whose experience qualifies him to occupy a position as manager, the fact that good advertising pays has long since become an axiom. It is his concern merely to see that he gets the best advertising possible—that he makes his dollars buy all they will pay for. He realizes that the great volume of results can never be traced, that what is visible indicates the tendency, and that the more general and less specific the campaign the greater the ratio of actual to traceable results.

Evidence of real results from immigration advertising are manifest in the great westward movement of population. Hundreds of thousands of people

in every field of industry and endeavor have broken away from home associations in the congested East to find new homes in the less populous and less developed West within the past few years, and it is a conspicuous fact that those parts of the country that have been most active in advertising their resources are the localities that have received the largest number of settlers. The gateways of the middle West have been dividing points for this great tide of emigration. One stream has flooded the Canadian northwest with American brains and brawn; another, cleaving to Uncle Sam, has sought its destiny in the great southwest and California, while yet another and smaller has made its way to the Pacific northwest, where it has been absorbed. The greatest of these has responded to the greatest call.

Here are results from advertising for immigration that are commanding the attention of the civilized world. Here are results that are so eloquent as to stir the fountain heads of emigration to a counter activity unprecedented in history. Imagine Boston organizing a publicity movement to keep her citizens at home, raising \$100,000 for a defensive campaign of advertising! Imagine the state of Virginia bidding for farmers to populate her rapidly thinning rural districts! Think of Iowa actually falling off in population in the past five years! Of Minnesota losing rural population! Of more than half the towns and cities of the State of New York losing inhabitants!

Study the census reports. There you will find testimony of real results that are becoming a matter of concern to the older commonwealths. There you will find evidence that advertising for immigration pays.

I think it is a fair assumption that everyone who is here today is here as a direct or indirect result of publicity. No one ever came here without first reading or hearing of the country. Those who were born here owe to some form of publicity, personal, organized, or accidental, the fact that their forbears were here before them.

And how many of those who have come do you suppose it would be possible to trace to direct advertising? Comparatively few, no doubt. Even in the Canadian northwest, that great northland that has been built up almost entirely by immigration advertising, and which has expatriated more American citizens than constitute our standing army—even there it is possible the records of publicity returns take account of a very small percentage of the actual settlers, excepting as they attribute all immigration, as may rightly be done, to advertising.

In Spokane, where we keep the closest possible check, we have had approximately 5,000 direct inquiries within the past six months. We have answered them and have followed them up. We have received hundreds of letters, from intending settlers, telling when they would arrive and revealing facts concerning their circumstances, and I have personally met many of these who have redeemed their words. Others, and they are many, are thoroughly determined to come, and are only waiting until they can dispose of property and business interests to do so. The great majority of these are farmers—the people we need if we are to build prosperous towns and cities.

These results are gratifying and they convince us that we are doing good; but the unidentified results are

those that are our greatest achievements. Unfortunately we will not receive the credit due us for these. Our people are enthusiastic—cocksure that our country must grow, regardless of advertising campaigns, and they are right. Advertising can only accelerate growth; but so long as it can do that the “real” results will warrant the expenditure of every dollar we can raise to pay for immigration advertising.

NORTHWESTERN NOTES.

SPokane, WASH., November 26.—Irrigation is more than king in the Inland district, embracing 250,000 square miles in eastern Washington, northeastern Oregon and northern Idaho as far south as the Snake River. It is emperor in the Spokane district, in which thousands of dollars will be expended the next few



Irrigation Apple Orchard, Wenatchee, Wash.—Great Northern Railway.

CHICAGO POULTRY SHOW.

The annual Poultry, Pigeon and Pet Stock Show to be held in Chicago January 23 to 30 inclusive, 1907, will be an improvement on any of the series of high class shows heretofore held under the management of the National Fanciers' and Breeders' Association. There will be a large number of exhibits of stock, incubators, brooders, appliances, foods, remedies and all things pertaining to the poultry, pigeon and pet stock industry.

Send \$2.50 for The Irrigation Age
1 year, and The Primer of Irrigation

years in making the country bloom like the rose of proverb.

The Umatilla Ditch Company, composed of Spokane and Pendleton, Ore., men, will build a plant to water 9,000 acres of land south of Spokane, 3,000 acres of which will be under the ditch next spring. Water will be taken from the Umatilla River. P. P. Broesbeck is president of the company with headquarters in Spokane.

Jay Lynch, agent of the Yakima Indian reservation, has received advices from Washington, D. C., that the Indian Department has appropriated \$15,000 to extend the irrigation work on the reserve. This means that 20,000 additional acres of the richest land in the Yakima valley will be put under cultivation. The land is covered with sage brush. It will at once be con-

verted into rich bearing fruit and hop lands. W. H. Redman is the engineer in charge. More than 50,000 acres of land has been reclaimed by the Government at an expenditure of \$75,000.

Members of the Tieton Water Users' Association and the Reclamation Service have locked horns over the location of the Athamm lateral of Tieton canal, and appeal will be made to the Secretary of the Interior for the settlement of the question.

To provide irrigation for the town of Trent, involving an outlay of \$15,000 to flood 363 acres of land seven miles east of Spokane, the Trent Power & Irrigation Company has been formed with these officers: H. Ward Wright, president; Frank MacKean, secretary and manager; J. A. Narup, vice-president and treasurer. The Hydro-Electric Development Company, of which Mr. MacKean is president and manager, has the contract for the work, and will construct a diverting dam in the Spokane River and carry the water by a canal to the western boundary, where an electric power plant will be erected.

J. E. Tupper, surveyor of Garfield County, south of Spokane, says the federal appropriation will be asked to make a survey and determine the feasibility of diverting water from the upper Tucannon near the mouth of Cummin's Creek for irrigation. It is planned to construct several large reservoirs in the mountains by which an immense quantity of water can be stored during the freshet season. Mr. Tupper believes the water can be conducted to the reservoirs at a reasonable cost. From these reservoirs water could be distributed over the Dutch and Dataha flats, irrigating some of the best lands in the State.

The general land office has just given out a statement that nearly \$500,000 was contributed by the State of Washington to the reclamation fund last year. The receipts from all sources were \$4,822,084, much larger than the estimate made less than a year ago by the Secretary of the Interior, when that official was trying to determine the probable extent of the reclamation fund between then and 1908.

F. H. Ray, assistant state bank examiner and member of the irrigation code commission of Montana, while in Spokane a few days ago, announced the details of a code submitted to Gov. John K. Toole to be sent to the incoming legislature. These points are emphasized: The just and early adjudication of the many conflicting, uncertain water rights now recorded, and this at the least possible cost. The full and prompt protection of water right users without costly litigation; to afford the persons of companies now owning or hereafter acquiring a water right clear and indisputable title to the same; to make of beneficial use the basis, measure and limits of rights; to prevent waste; to have all records relating to water rights tabulated by stream systems and accessible to the public at the State Engineer's office, so that the title may be easily ascertained.

C. E. Lum, of North Yakima, Wash., west of Spokane, has been awarded the contract by the Reclamation Service for two crib dams at Lakes Cle Elum and Kichelos, to cost approximately \$40,000. One will raise the waters of Lake Cle Elum thirteen feet above the present level, and the other will raise the waters of Lake Kichelos ten to twelve feet higher, to conserve the waters at the head of Yakima River.

Members of the Sunnyside Water Users Associa-

tion met at Prosser, Wash., west of Spokane, recently for the purpose of inducing holders of water contracts with the Washington Irrigation Company to sign contracts with the Government, which will extend the Sunnyside canal. The maintenance fee will be reduced to 60 cents per acre, as against \$1.50 charged by the Washington Irrigation Company. The proposition was well received and most of the members joined in the Federal plan.

Work has been begun on the Government irrigation scheme in Okanogan County, west of Spokane. The direct benefit of the project will be for Alma, Riverside and all river towns. Conconully will be the supply end of the system, furnishing the water, the reservoir and the altitude to give flow and power. It will make the Pogue prairie blossom with orchards like the proverbial rose.

The Chelan Electric Company, which recently bought the control of the Chelan Water Power Company, has just secured the riparian rights of a number of land owners along the Chelan River, four miles, and will put in an irrigation plant in Chelan County, west of Spokane.

Four hundred acres of land in the Spokane valley will be served with water by the Trent Power & Irrigation Company, recently organized by Spokane and Chicago men. The company has been incorporated for \$15,000. The dam will be built by Frank MacKean, engineer of the Hydro Electrical Engineering Company of Chicago. The plant will cost \$10,000.

MAKE AN INVESTMENT IN BOISE, THE BEAUTIFUL.

Boise, the beautiful Capital of Idaho, is a city with a great future, and one of the safest places for real estate investments in the world.

The population has increased from 9,000 to 20,000 in the past three years. With the great Boise-Payette irrigation scheme trebling the irrigated land at its doors, and the many other irrigation systems building in southern Idaho, it can not fail to double again in the next five years. This means a tremendous increase in the price of Boise real estate.

We are offering lots in our Londoner, South Boise and Denver additions at prices ranging from \$125 four blocks from car line to \$300 on car line. These lots are being purchased and built on freely by our home people; having increased in value from 25 to 50 per cent in the past year, and we believe they will double in less than five years, probably in three.

The terms on the lots valued at \$175 or less are \$2.50 per month; on those of a higher valuation, \$5.00 per month; 8 per cent interest on deferred payments. You can pay out as fast as you like, and interest ceases on payments as they are made. Why not buy four of these cheaper lots or two of the higher-priced ones? It is the greatest savings bank proposition you ever saw.

You will save up \$10.00 a month you would otherwise spend, and when your lots are paid for you will find you have a nice little stake.

If you will write to the Capital State Bank or the Idaho Trust and Savings Bank, we think they will tell you you can trust us to make as good a selection for you as you could make for yourself.

Should be glad to write you further.

W. T. BOOTH,
211 N. Eighth street, Boise, Idaho.

AGRICULTURAL ENGINEERING.

BY C. J. ZINTHEO,

Expert of Farm Mechanics, Formerly United States Department of Agriculture.

(Concluded.)

The North Dakota Agricultural College has for a number of years maintained a similar course in farm mechanics, and has the co-operation of farm implement salesmen, who come to the college and give talks to the students, and by having the machines brought right into the classroom before the students, explain the construction of the machines that they sell. They have also in connection with their mechanical engineering department a course in farm motors for the agricultural students, in which valuable practical training is given.

The Wisconsin Agricultural College has established a department of farm engineering, and next spring expects to erect a large, concrete, three-story building for

The Iowa State College, at Ames, has, however, made the greatest progress in the establishment of a complete course in agricultural engineering. The work was organized two years ago, under the name of farm mechanics, as a part of the course in agronomy. A very substantial, fireproof, four-story building was constructed at a cost of about \$70,000. The course as outlined extends over three years, beginning with the sophomore college year. All students in the agricultural courses are required to take one year of the work, which embraces the study of the principles and practices of tile drainage, road construction, farm implements, farm motors, carpentry, blacksmithing and mechanical drawing. In the junior and senior years elective courses are offered in farm agriculture, farm implement design and dairy engineering; also research work on the various lines for those who wish to specialize on the subject. The name of the course has been changed to agricultural engineering, and a post-graduate course is offered which



How Alfalfa yields in the Snake River Valley, Idaho.—Scene along American Falls Canal.

the accommodation of the department. Two men are devoting their whole time to teaching and experimenting on the subject.

The Nebraska School of Agriculture has completed a farm mechanics' building and is teaching the subject to the short-course students, as well as to the collegiate students.

The Indiana Agricultural Department of the University of Purdue has this year engaged a man to teach farm mechanics to the agricultural college students.

The Colorado Agricultural College has inaugurated a course in farm mechanics, but has not as yet secured a man in charge of the work.

The Agricultural College at Cornell, New York, will devote a large part of their new agricultural building now under construction to the study of farm mechanics.

is open to agricultural and engineering students, and which leads to the degree of Master of Agricultural Engineering. In this advanced course are enrolled several students who are preparing themselves to teach the subject in other colleges. Three men are devoting their full time to instruction in the courses. About \$25,000 worth of machinery and farm implements, including \$7,000 worth of modern road machinery, has been loaned to the department by manufacturers for instructional and experimental purposes.

While several different names have been used in connection with the instruction of the fragments of such courses, such as agricultural physics, farm mechanics, rural engineering, farm equipment, farm engineering, etc., yet a complete college course of this kind should naturally be called agricultural engineering, while it would, perhaps, be appropriate to designate the

instruction offered to short-course students, or in agricultural high schools, as farm mechanics. In most cases where instruction of this nature is now carried on in colleges, it has been inaugurated as a branch of instruction in agronomy. While this may answer as a beginning, the importance of the allied branches of agricultural engineering, taken together, entitles it to be made an independent department of instruction, having equal rank with agronomy, animal husbandry, dairying and horticulture, as they have been established in a number of institutions.

The opportunities for professional agricultural engineers are as numerous as in any of the leading professions. With the advent of the large irrigation developments of the West and the large drainage projects of the Mississippi valley, there will be need for men who are trained in agriculture as well as engineering lines. A prominent British engineer who has for years been connected with the administration works in India, visited this country recently to study developments or methods of pumping and distributing water. His conclusion was that what we lacked and must have in the near future is men to administer the works now built and the large works to be built by the Federal Government. The construction of these works, he said, can properly be carried out by graduates of the civil engineering colleges, because they involve only civil engineering problems, but their administration will require men who know farming as well as engineering; who, in addition to the usual equipment of the civil engineer, have a knowledge of how water should be applied to crops, and what regulations should govern the relations of irrigators to each other. In the administration of streams or the distribution of water from canals, our systems are much inferior to those of European countries.

There can be no question but that the best solution of this problem will be greatly prompted by bringing into this work a body of highly trained young men; and it is both the duty and opportunity of our agricultural colleges to give this training. Nor is the need of such engineers limited to the United States. The reclamation of arid lands and their irrigation is going on today in all parts of the world—in Africa, Australia, India and the islands of the Pacific. Everywhere men especially trained in this branch of the engineering profession are eagerly sought for and have open to them wide opportunities for usefulness and power. In every irrigated country, drainage must sooner or later supplement irrigation, while the drainage of irrigated lands is already an important question in some of the States.

It has been found that the vast areas of alkali lands in the West can only be reclaimed by thorough under-drainage. Drainage of alkali land and irrigation drainage are problems of decidedly different nature from those which come before the drainage engineer of the Middle West or the East, who is called upon to design a system for the removal of excess of water from the surface of the land. The modern drainage engineering problems, therefore, involve knowledge of engineering, soils and economics. Since large areas have to be dealt with, district or community organization is a necessity, and a common agreement of a large number of people brought about. This can only be done by having the engineering work in the hands of men capable of inspiring confidence in the accuracy of their estimates

of cost and the reliability of their forecasts as to the results. Men who understand soil conditions and the best requirements for farm crops, and who at the same time know how to plan a system of tile drains and open ditches, or who can plan the distribution of the irrigation water for a given district, will be very much in demand.

The telephone, rural delivery, the automobile and the traction engine are revolutionizing the conditions of farm life and bringing the city and country closer together. How far they are destined to make the farmer independent of the railroads can not now be foretold; but one thing is certain, that ability to compete with it in speed and safety means that mud and dust must be, as far as possible, eliminated. The automobile which travels thirty miles an hour requires a speedway of different construction, composed of different materials from that which served fairly well for the horse cart. The good-roads movement is spreading rapidly, and in many States are now established State Highway Commissions. There is need of men in this service who have been trained in road construction and who understand how to construct dirt as well as macadam roads, and who know how to operate road machinery to the best advantage.

The Department of Agriculture has for a number of years been carrying on investigations along some of the lines of work included in Agricultural Engineering. The Office of Public Road Inquiries has several special agents in the field for the purpose of collecting and disseminating useful information regarding roads and road building. They are co-operating in the construction of experimental roads and also with the State Highway Commissions in places where the State-aid plan is in vogue. The Division of Tests in the Bureau of Chemistry is doing a useful work in testing different road materials and in the study of clays for road making. The school for road building, which serves as a post-graduate course for engineering students, prepares men for disseminating accurate knowledge on highway construction.

The irrigation and drainage investigations have made comprehensive study of methods and cost of preparing land for irrigation, the tools used in grading land and building laterals, methods of measuring water, the rate of rise of soil water during the irrigation period, the use of cement and concrete instead of wood in irrigation structures and a study of irrigation laws. Co-operative experiments have been conducted with several western States to study the duty of water and the most economical and scientific ways of applying it to crops. Also the effect of the time of irrigation and the quantity of water on the quality and yield of crops. Experiments are also conducted and measurements taken on the many types of irrigation pumping plants, as well as the motive power used in operating these various pumps, all of which is of great practical importance.

The irrigation and drainage investigations have recently been enlarged to include farm machinery and farm building investigations. In these lines much useful work may be accomplished. Experiments are under way to learn the value of cement and concrete in farm building construction. Plans are made to learn the value of denaturized alcohol as a substitute for gasoline in internal combustion engines. The usefulness of

farm machinery investigations and experiments is greater than the average agriculturalist imagines. Our prominent authorities on plant breeding state that the production of plants can be increased 10 per cent by better breeding, without altering the other conditions of production, and that these other conditions of production can also be increased in nearly like amount by better farming; but that the increase by better breeding can be had at a much less cost than the increase from better farming. From experiments already conducted, the indications are that the production of plants can be increased about 20 per cent by improving the accuracy of planters and seeders so that the plants may be distributed uniformly over the field, and this at very little cost except to about twenty manufacturers of these machines.

It will require but little thought to convince any one that every agricultural college should have a course

in 1894 this labor was reduced to 11½ hours, or from a cost of \$3 in labor, to \$1.29. The agricultural implements in the United States saved in human labor in 1899, the sum of \$681,471,827. The American farmers of today with less than one-third the labor of the country, produced enough food to support not only themselves, but the other 67 per cent of people living in the cities, and exported farm products during the year 1904 to the value of \$960,000,000. The American farmers buy annually \$100,000,000 worth of implements, and the total value of the implements and machinery on the farms in this country is \$761,261,550. In no other country is such extensive use made of farm machinery, and the scarcity of farm laborers will tend to increase its use in the future rather than otherwise.

It is also quite apparent that experiments with new varieties of implements in the semi-arid regions of the West will be the means of extending the cultivated area



A Lateral Canal, and Land Irrigated by the Spokane Canal Company.

of instruction in the construction and use of farm machinery. This country is the largest manufacturer and user of farm machinery, and it is largely because of this that we have become the greatest agricultural country.

To give an idea of the vast sums of money that are invested in farm implements, take for example, the following five States: Iowa has \$57,960,000 invested; New York \$56,006,000; Pennsylvania \$50,917,240; Illinois \$44,977,310, and Ohio \$36,354,150.

The success of agricultural pursuits depends primarily upon the accomplishment of the largest possible results at a minimum cost. For this reason agricultural implements are bound to become more and more important, because mainly through them can the farmer reduce the cost of production. To illustrate this it is only necessary to state that in 1830 it took over three hours labor to raise one bushel of wheat, while in 1896 it took ten minutes, making a difference in the cost of labor in one bushel of wheat, between 17¾ cents and 3½ cents. In 1850 the labor represented in a bushel of corn was four and one-half hours, while in 1894 it had been reduced to forty-one minutes. In 1860 the labor in one ton of hay in bales represented 35½ hours, while

very materially, by the conservation of soil moisture, and that with drought-resisting crops and dry farming methods of soil cultivation, millions of acres which are now a total waste will become productive.

The extra cultivation needed in this method of farming requires motive power other than horses for propelling the implements, and experiments ought to be conducted to determine the possibilities of utilizing steam and other forms of motive power instead of horses. In some sections of the country where steam is used as motive power instead of horses, it is claimed that from forty to eighty acres per day can be ploughed, seeded and harrowed in one operation, and that the cost varies from 30 to 60 cents an acre. With the universal use of this method of soil cultivation in Arizona, the cost of production will be greatly reduced.

The subject of power for the extended trip through the transition period. The features, several of which rapid favor as a farm motor, the charm and mystery greatly extended in doing work is going on appeals work on the farm. No defined the history of this country, is available from which has been inhabited at different making use of irrigation in the first, whose ruined canals

and structures are found in many places, but little is known. The wind-swept drift of centuries has choked these channels and their dwellings are crumbling into dust with the weight of ages. The modern ditch-making machinery in laying out new systems uncovered many of these old ditches, some of which were cut from the solid rock long before the age of metals.

"The drive from the town of Mesa, a fertile oasis in the semi-tropical desert, to Roosevelt is one not to be forgotten. From a region of almost tropical luxuriance you have merely to cross a canal to enter upon a wide expanse of desolation wherein the giant cactus is a prominent feature of the landscape. For twenty miles the Government road stretches out across this desert plain to the foot of the Superstition mountains, a most peculiar and freaky formation, regarded with superstitious awe by the Maricopa Indians. Entering the mountain area the road winds by easy grades up the range, affording views of wonderful beauty painted in marvelous colors.

"Transcontinental travelers cannot afford to miss this trip, for the Roosevelt road is now regarded as one of the most striking scenic journeys in this country. The night in Fish Creek canyon, where a hospitable host and hostess make the traveler welcome, is a delightful memory. The road has afforded opportunity to inspect a profound canyon which heretofore was not accessible. It is a miniature Grand Canyon of the Colorado.

"The climb along the dizzy ridges until the Government camp above Roosevelt is reached would be little less than terrifying but for the broad and comfortable roadway which Uncle Sam has carved from the solid rock. The view from the mountains above the dam site is wonderfully inspiring. Below you the river, like a silver thread, rushes through a dark and narrow canyon. To the east lies a broad flat across which Tonto creek and Salt river have cut their channels. On the other side of the canyon the contractors' camp covers a broad area. Looking far below in the canyon through a confusion of cables and wires, an army of men are at work thirty feet below the river bed laying great rocks two and three tons in weight in layers of cement upon the bedrock of the stream. These men look but little larger than toys, but the fruit of their toil is visible in the beautiful curve of stone now rising slowly but surely from the bottom of the river.

"On the hill to the right the Government cement mill gives noisy evidence that Uncle Sam as a manufacturer is undismayed at the prophecy of experts who knew he couldn't make good cement. Night and day his plant goes on grinding out the best cement ever made, and the skips are carrying it out on cables and dropping it down to the works in the canyon. If your nerves are steady and your legs are strong, you must not fail to go down the ladder to the powerhouse which the engineers have cut out of the solid walls of the canyon. Its walls, roof and floor are solid rock. The power canal, seventeen miles long, carries the water to the top of the hill and then through a tunnel drops it sheer 220 feet upon the great turbines. Here electricity is generated for all purposes. It furnishes the contractor his power, it runs the rock crusher and the pumps, it lights the camps, the city of Roosevelt, and illuminates the canyon throughout the night. It is a most inspiring scene to stand on the top of the cliff at night and through the myriads of electric globes watch the toilers far below you laying the huge blocks of sandstone.

"The world's greatest dam is building, a ponderous structure 294 feet high and 800 feet long on top. Every rock in it is inspected, and every rock is also washed thoroughly before being put in place. Watchful inspectors hover about the work, noting every movement. The Roosevelt dam is going to check a mad and turbulent river. It is going to make the largest artificial lake in the world. It is also being built to endure forever, for not stronger are the everlasting hills than will be this massive masonry monolith. Down in the Salt River valley the city of Phoenix is taking on metropolitan airs. Its citizens are fully realizing that Uncle Sam's great work is going to make a metropolis there, a modern city surrounded by the richest and most prosperous agricultural community in the world."

RECLAMATION SERVICE NOTES.

A contract has been executed with the Pacific Portland Cement Company, Consolidated, of San Francisco, Cal., for furnishing 27,000 barrels, more or less, of Portland cement for the Sunnyside and Tieton irrigation projects, Washington. The cement is to be furnished at \$2 per barrel, f. o. b. cars at the company's mills, Tolenas, Cal.

Proposals are asked for the construction of structures on the main canal and laterals from the headworks to the town of Newlon, Lower Yellowstone irrigation project, North Dakota and Montana. The work involves approximately 10,000 cubic yards of excavation, 1,400 cubic yards of concrete, 2,200 cubic yards of rip rap, 90,000 pounds of square steel bars, and 300,000 feet board measure of lumber. The bids will be opened at Glendive, Mont., December 15th.

The Secretary of the Interior has granted an extension of time for 45 days from October 15th, to Orman & Crook for the completion of the work under their contract for the construction of dam and canals, Belle Fourche irrigation project, South Dakota. The scarcity of labor is responsible for the delay in the work, and the engineers report that the extension of time will not interfere with their plans.

A report has been received by the chief engineer of the reclamation service from the board of consulting engineers recently convened at Mitchell, Neb., to open proposals for the construction of a diversion dam and headworks, North Platte irrigation project, Nebraska-Wyoming. No bids were received on Schedule 1, consisting of the earth embankment, and but one bid on Schedule 2, the concrete structures. Mr. G. F. Atkinson of Colorado Springs, Col., was the contractor who submitted a proposal for the work of Schedule 2, and the aggregate of the several items was \$142,720.

An extension to March 15, 1907, has been granted to the D'Olier Engineering Company of Philadelphia, for furnishing an electric power plant for the Garden City irrigation project, Kansas. According to the terms of the contract the power plant was to be installed by January 20th, but owing to some delay in design, work has not yet begun on the power house and the project engineers recommended the extension.

The reclamation service has formally released three cubic feet of water per second of time, from the Clealum River, for the use of the City of Clealum, Wash., and its inhabitants, for domestic and municipal purposes.

Piper Bros, of Pueblo, Col., contractors in charge of canal construction on the Huntley irrigation project, Montana, have formally transferred to the reclamation service their contract, plant, material, supplies and commissary. The government will complete the contract by force account, and has already organized a force and work is under way.

Owing to the unusual floods which have occurred on the western side of the Cascades and which practically suspended railroad traffic for a time, rendering it impossible for contractors to present bids on the date fixed, the Secretary of the Interior has extended the time of opening bids on the main canal of the Tieton project and on the dam on Bumping Lake, Wash., to November 19th at 2 o'clock p. m.

The Secretary of the Interior has executed a contract with Thomas Jaques, of Pilot Rock, Ore., for the construction and completion of about fifteen miles of main canal and lateral ditches, Umatilla irrigation project, Oregon. The work involves about 165,000 cubic yards of excavation and according to the terms of the contract must be completed by May 1, 1907. The amount of Mr. Jaques' bid was \$20,212.50.

A contract has been executed with Pickering & Rush, of Morrill, Neb., for the construction and completion of Schedule 13 of earthwork of distributing system, Interstate canal, North Platte irrigation project, Wyoming-Nebraska. Schedule 13 consists of about eight miles of laterals and involves the excavation of 37,900 cubic yards of material and 1,000 cubic yards of overhaul. The bid of the contracting party was \$6,052.50.

An extension of time to June 1, 1907, has been granted to W. D. Lovell, of Minneapolis, for the completion of his contract for structures under the Huntley irrigation project, Montana. Since the date of making this contract the amount of work required has been greatly increased, and the equivalent of the work called for in the contract was completed within the specified time.

Bids were advertised for the construction of a diversion dam and headworks, North Platte irrigation project,

Nebraska-Wyoming, to be opened November 1st. The only bid received was one on Schedule 2 by G. F. Atkinson of Colorado Springs, Col. The Secretary of the Interior has rejected this bid as excessive, and has authorized the prosecution of work at the headgates by force account. It is necessary to advance this portion of the work as rapidly as possible in order that water may be delivered in the spring of 1907. The remainder of the work will be readvertised.

An extension of time to May 31, 1907, has been granted to the Deadwood Construction Company, of Deadwood, S. D., for the completion of their contract for structures, Division 4, main canal, Lower Yellowstone irrigation project, Montana-North Dakota. According to the terms of the contract this work was to be completed on December 1st, but owing to the occurrence of excessive rains, difficulty in securing labor, and additional work required under the specifications, it became necessary to extend the time of completion.

During the month of September 719 feet were added to the excavated portion of the Gunnison Tunnel, Uncompahgre irrigation project, Colorado, making a total of 16,031 feet. The progress during the last two months has not been quite up to the usual standard on this tunnel, on account of the extreme hardness of the quartzite rock in one heading and the friable and dangerous nature of the material in the other heading. The work has reached points so far from the portals that the difficulties in ventilation and tramming have increased. Severe storms during the month delayed work on the South Canal and caused a loss to the contractor of approximately \$1,000. The scarcity of labor throughout the West is being severely felt on this project in all lines of work, both contract and force account.

The Secretary of the Interior has authorized the reclamation service to construct under force account or by small contracts to be entered into by the engineer, 13.3 miles of canal on the Okanogan irrigation project, Washington. This work consists of an extension of the main canal for a distance of 5.6 miles, and of the lower main canal for a distance of 7.7 miles. The region is remote from railroad transportation and it is difficult to secure satisfactory bids. It is therefore believed to be to the best interests of the government to carry on the work as above outlined.

The purchase of a 70-ton steam shovel has been authorized for use in the construction of the Cold Springs dam, Umatilla irrigation project, Oregon. On the 5th instant, the department authorized the reclamation service to construct this dam by force account and in order that no time might be lost in initiating work emergency bids were obtained on steam shovels for early delivery. The shovel is to be delivered November 20th, and will cost the government \$9,000. It will be furnished by the Marion Steam Shovel Company, of Marion, Ohio.

A contract has been executed with Henry C. DeLaney, of Williston, N. D., for the construction and completion of canals and structures under the Williston irrigation project, North Dakota. The work involves the excavation of about 220,000 cubic yards of earth, and furnishing labor and material for various structures requiring about 40,000 feet board measure of lumber, and 1,000 cubic yards of concrete. Mr. DeLaney's bid was \$81,867.

The Secretary of the Interior has executed a contract with Marcus E. Getter, of Mitchell, Neb., for the construction of ten miles of earthwork, distributing system, Interstate canal, North Platte irrigation project, Nebraska. Mr. Getter's bid was \$5,649.

The reclamation service has been authorized to purchase in open market 5,000 barrels of cement for use on the Yuma irrigation project, California and Arizona. There has been some difficulty in obtaining cement that will not set too quickly at high temperature. There are now about 350 men at work on Laguna dam. The river has fallen rapidly and the work is progressing favorably. Work is being pushed on the Gila Valley dikes, and a force is working for the protection of the embankments against erosion by building abatti. A great deal of satisfaction is felt at the present condition of affairs on the Lower Colorado River. Owing to the rapid fall of the river the work of returning the Colorado to its original channel is progressing satisfactorily. It is believed that if conditions continue favorable for two weeks longer the California Development Company will have successfully closed the gap. Three steam showels are in operation, and the cars which run in trestles across the gap unload directly into the river.

The reclamation service will purchase from J. F. Donahoo, Washington, D. C., two grooved embankment rollers

for rolling puddled material, at \$300 each, the rollers to be used as a portion of the plant required for the construction of Cold Springs dam, Umatilla irrigation project, Oregon.

Proposals are asked for furnishing high pressure gates for the storage of water for the Shoshone and North Platte irrigation projects, Wyoming. The work consists of furnishing and installing complete in the excavations furnished by the United States, at the Shoshone dam near Cody, and the Pathfinder dam near Casper, seven gates of the sluicing type arranged at the Shoshone dam in a group of three, and at the Pathfinder dam in a group of four. The bids will be opened on December 20, at 876 Federal Building, Chicago. Particulars may be obtained at the office of the Chief Engineer, Reclamation Service, Washington, D. C., or from H. N. Savage, Supervising Engineer, Huntley, Mont.

The Secretary of the Interior has granted an extension of time to W. O. Morrison, of Denver, Col., for the completion of his contract on structures, Interstate canal, North Platte irrigation project, Neb. According to the terms of the contract the work was to be completed by December 1, 1906. Owing to the difficulty in securing material and labor the work has been delayed. The engineers also report that the actual amount of work involved exceeds by about 30 per cent the amount estimated at the time the contract was awarded. The Secretary of the Interior has therefore extended the time on the work, as follows: Seventy per cent of the amount covered by the original contract to be completed by December 1, 1906; one hundred per cent of the work covered by the original proposal, which covers the completion of all structures which would in any way interfere with the flow of water in the canal, by April 1; the entire work, covering the completion of other structures, such as bridges, overflows, etc., by July 1, 1907.

The reclamation service will purchase the property of the Jesse D. Carr Land and Live Stock Company, for use in connection with the Klamath irrigation project, Oregon-California. The authority carries with it permission to make a payment of \$170,000, or about 90 per cent of the total purchase price. Although the natural advantages of the project are great, there have been many annoying delays in adjusting the details of acquiring property of corporations and land owners required by the government in connection with the Klamath project. This step therefore will be hailed with much satisfaction by all parties concerned, as indicating material progress. The property acquired by this purchase embraces the Clear Creek reservoir and certain other lands essential to the project. A large part of the delay was due to the failure of the company to perfect title to the property which it desired to sell. Until proper abstracts of title were presented to the department of course no purchase could be consummated. The retention of ten per cent of the purchase price by the government is only pending the perfection of title to a small portion of the property. Another difficulty encountered in the construction of his project was the lack of transportation facilities. Railroad men have about completed arrangements for the extension of a line into the basin, and indications point to a remarkable development in this section in the near future.

Proposals are asked for the construction of laterals and waste ditches near Glendive, Mont., in connection with the Lower Yellowstone irrigation project, Montana and North Dakota. The work consists of about 74 miles of lateral ditches and about 34 miles of waste ditches, involving the excavation of approximately 500,000 cubic yards of earth, and furnishing such material and doing such other work as may be necessary for the completion of the work. The bids will be opened at Glendive, Mont., on December 15th.

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and structures are found in many places, but little is known. The wind-swept drift of centuries has choked these channels and their dwellings are crumbling into dust with the weight of ages. The modern ditch-making machinery in laying out new systems uncovered many of these old ditches, some of which were cut from the solid rock long before the age of metals.

"The drive from the town of Mesa, a fertile oasis in the semi-tropical desert, to Roosevelt is one not to be forgotten. From a region of almost tropical luxuriance you have merely to cross a canal to enter upon a wide expanse of desolation wherein the giant cactus is a prominent feature of the landscape. For twenty miles the Government road stretches out across this desert plain to the foot of the Superstition mountains, a most peculiar and freaky formation, regarded with superstitious awe by the Maricopa Indians. Entering the mountain area the road winds by easy grades up the range, affording views of wonderful beauty painted in marvelous colors.

"Transcontinental travelers cannot afford to miss this trip, for the Roosevelt road is now regarded as one of the most striking scenic journeys in this country. The night in Fish Creek canyon, where a hospitable host and hostess make the traveler welcome, is a delightful memory. The road has afforded opportunity to inspect a profound canyon which heretofore was not accessible. It is a miniature Grand Canyon of the Colorado.

"The climb along the dizzy ridges until the Government camp above Roosevelt is reached would be little less than terrifying but for the broad and comfortable roadway which Uncle Sam has carved from the solid rock. The view from the mountains above the dam site is wonderfully inspiring. Below you the river, like a silver thread, rushes through a dark and narrow canyon. To the east lies a broad flat across which Tonto creek and Salt river have cut their channels. On the other side of the canyon the contractors' camp covers a broad area. Looking far below in the canyon through a confusion of cables and wires, an army of men are at work thirty feet below the river bed laying great rocks two and three tons in weight in layers of cement upon the bedrock of the stream. These men look but little larger than toys, but the fruit of their toil is visible in the beautiful curve of stone now rising slowly but surely from the bottom of the river.

"On the hill to the right the Government cement mill gives noisy evidence that Uncle Sam as a manufacturer is undismayed at the prophecy of experts who knew he couldn't make good cement. Night and day his plant goes on grinding out the best cement ever made, and the skips are carrying it out on cables and dropping it down to the works in the canyon. If your nerves are steady and your legs are strong, you must not fail to go down the ladder to the powerhouse which the engineers have cut out of the solid walls of the canyon. Its walls, roof and floor are solid rock. The power canal, seventeen miles long, carries the water to the top of the hill and then through a tunnel drops it sheer 220 feet upon the great turbines. Here electricity is generated for all purposes. It furnishes the contractor his power, it runs the rock crusher and the pumps, it lights the camps, the city of Roosevelt, and illuminates the canyon throughout the night. It is a most inspiring scene to stand on the top of the cliff at night and through the myriads of electric globes watch the toilers far below you laying the huge blocks of sandstone.

"The world's greatest dam is building, a ponderous structure 294 feet high and 800 feet long on top. Every rock in it is inspected, and every rock is also washed thoroughly before being put in place. Watchful inspectors hover about the work, noting every movement. The Roosevelt dam is going to check a mad and turbulent river. It is going to make the largest artificial lake in the world. It is also being built to endure forever, for not stronger are the everlasting hills than will be this massive masonry monolith. Down in the Salt River valley the city of Phoenix is taking on metropolitan airs. Its citizens are fully realizing that Uncle Sam's great work is going to make a metropolis there, a modern city surrounded by the richest and most prosperous agricultural community in the world."

RECLAMATION SERVICE NOTES.

A contract has been executed with the Pacific Portland Cement Company, Consolidated, of San Francisco, Cal., for furnishing 27,000 barrels, more or less, of Portland cement for the Sunnyside and Tieton irrigation projects, Washington. The cement is to be furnished at \$2 per barrel, f. o. b. cars at the company's mills, Tolenas, Cal.

Proposals are asked for the construction of structures on the main canal and laterals from the headworks to the town of Newlon, Lower Yellowstone irrigation project, North Dakota and Montana. The work involves approximately 10,000 cubic yards of excavation, 1,400 cubic yards of concrete, 2,200 cubic yards of rip rap, 90,000 pounds of square steel bars, and 300,000 feet board measure of lumber. The bids will be opened at Glendive, Mont., December 15th.

The Secretary of the Interior has granted an extension of time for 45 days from October 15th, to Orman & Crook for the completion of the work under their contract for the construction of dam and canals, Belle Fourche irrigation project, South Dakota. The scarcity of labor is responsible for the delay in the work, and the engineers report that the extension of time will not interfere with their plans.

A report has been received by the chief engineer of the reclamation service from the board of consulting engineers recently convened at Mitchell, Neb., to open proposals for the construction of a diversion dam and headworks, North Platte irrigation project, Nebraska-Wyoming. No bids were received on Schedule 1, consisting of the earth embankment, and but one bid on Schedule 2, the concrete structures. Mr. G. F. Atkinson of Colorado Springs, Col., was the contractor who submitted a proposal for the work of Schedule 2, and the aggregate of the several items was \$142,720.

An extension to March 15, 1907, has been granted to the D'Olier Engineering Company of Philadelphia, for furnishing an electric power plant for the Garden City irrigation project, Kansas. According to the terms of the contract the power plant was to be installed by January 20th, but owing to some delay in design, work has not yet begun on the power house and the project engineers recommended the extension.

The reclamation service has formally released three cubic feet of water per second of time, from the Clealum River, for the use of the City of Clealum, Wash., and its inhabitants, for domestic and municipal purposes.

Piper Bros, of Pueblo, Col., contractors in charge of canal construction on the Huntley irrigation project, Montana, have formally transferred to the reclamation service their contract, plant, material, supplies and commissary. The government will complete the contract by force account, and has already organized a force and work is under way.

Owing to the unusual floods which have occurred on the western side of the Cascades and which practically suspended railroad traffic for a time, rendering it impossible for contractors to present bids on the date fixed, the Secretary of the Interior has extended the time of opening bids on the main canal of the Tieton project and on the dam on Bumpington Lake, Wash., to November 19th at 2 o'clock p. m.

The Secretary of the Interior has executed a contract with Thomas Jaques, of Pilot Rock, Ore., for the construction and completion of about fifteen miles of main canal and lateral ditches, Umatilla irrigation project, Oregon. The work involves about 165,000 cubic yards of excavation and according to the terms of the contract must be completed by May 1, 1907. The amount of Mr. Jaques' bid was \$20,212.50.

A contract has been executed with Pickering & Rush, of Morrill, Neb., for the construction and completion of Schedule 13 of earthwork of distributing system, Interstate canal, North Platte irrigation project, Wyoming-Nebraska. Schedule 13 consists of about eight miles of laterals and involves the excavation of 37,900 cubic yards of material and 1,000 cubic yards of overhaul. The bid of the contracting party was \$6,052.50.

An extension of time to June 1, 1907, has been granted to W. D. Lovell, of Minneapolis, for the completion of his contract for structures under the Huntley irrigation project, Montana. Since the date of making this contract the amount of work required has been greatly increased, and the equivalent of the work called for in the contract was completed within the specified time.

Bids were advertised for the construction of a diversion dam and headworks, North Platte irrigation project,

Nebraska-Wyoming, to be opened November 1st. The only bid received was one on Schedule 2 by G. F. Atkinson of Colorado Springs, Col. The Secretary of the Interior has rejected this bid as excessive, and has authorized the prosecution of work at the headgates by force account. It is necessary to advance this portion of the work as rapidly as possible in order that water may be delivered in the spring of 1907. The remainder of the work will be readvertised.

An extension of time to May 31, 1907, has been granted to the Deadwood Construction Company, of Deadwood, S. D., for the completion of their contract for structures, Division 4, main canal, Lower Yellowstone irrigation project, Montana-North Dakota. According to the terms of the contract this work was to be completed on December 1st, but owing to the occurrence of excessive rains, difficulty in securing labor, and additional work required under the specifications, it became necessary to extend the time of completion.

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The reclamation service will purchase the property of the Jesse D. Carr Land and Live Stock Company, for use in connection with the Klamath irrigation project, Oregon-California. The authority carries with it permission to make a payment of \$170,000, or about 90 per cent of the total purchase price. Although the natural advantages of the project are great, there have been many annoying delays in adjusting the details of acquiring property of corporations and land owners required by the government in connection with the Klamath project. This step therefore will be hailed with much satisfaction by all parties concerned, as indicating material progress. The property acquired by this purchase embraces the Clear Creek reservoir and certain other lands essential to the project. A large part of the delay was due to the failure of the company to perfect title to the property which it desired to sell. Until proper abstracts of title were presented to the department of course no purchase could be consummated. The retention of ten per cent of the purchase price by the government is only pending the perfection of title to a small portion of the property. Another difficulty encountered in the construction of his project was the lack of transportation facilities. Railroad men have about completed arrangements for the extension of a line into the basin, and indications point to a remarkable development in this section in the near future.

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The Secretary of the Interior has temporarily withdrawn from settlement, entry, or other form of withdrawal under the public land laws, except the Homestead Law, the following described tracts for use in connection with the Grand River irrigation project, North Dakota: Fifth Principal Meridian, North Dakota—T. 129 N., R. 98 W., Secs. 27, 28, 31, 32, 33, 34, 35 and 36; T. 129 N., R. 99 W., Secs. 26, 29, 30, 31, 32, 33, 34, 35 and 36; T. 129 N., R. 100 W., Secs. 19, 20, 21, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35 and 36. Black Hills Meridian, South Dakota—All fractional townships 23 N., Rs. 8, 9 and 10 E.

The following public lands under this project are withdrawn from any form of disposition whatever under the public land laws; Fifth Principal Meridian, North Dakota—T. 129 N., R. 101 W., Secs. 10, 11, 13, 14, 15, 23, 24, 25, 26, 27, 34 and 35.

The Reclamation Service will purchase forty yard dump cars from the Kilgore Peteler Company, Minneapolis, Minn., at \$168.75 each; sixty-five tons of rails from the Hoftius Steel and Equipment Company of Seattle, Wash., at \$34 per ton, and 125 tons of rails from the Kilgore Peteler Company at \$33 per ton. Also the purchase from the Ernst Wiener Company, of New York City, of ten switches at \$35 each. This equipment is to be used in the construction of the Cold Springs dam, Umatilla irrigation project, Oregon, which is being carried on under force account by the Reclamation Service.

A contract has been executed with the Billings Construction Company, of Billings, Mont., for the construction of the Corbett dam and auxiliary structures, under the Shoshone irrigation project, Wyoming. The Corbett dam is a reinforced concrete structure located on Shoshone River about 8 miles northeast of Cody, Wyo., and the contract involves about 10,000 cubic yards of excavation, 5,000 cubic yards of concrete, 9,000 cubic yards of earth and gravel embankment and the placing of 250,000 pounds of steel reinforcement. The bid of the contracting company was \$56,750, and according to the terms of the contract the work must be completed on or before April 1, 1907.

An extension of three months' time has been granted to the United Iron Works of Oakland, Cal., for the completion of their contract for furnishing gates and lifting devices for use in connection with the Payette-Boise irrigation project, Ida. This extension is allowed by reason of the fact that the manufacturers were not furnished with the details and designs in time to comply with the original agreement.

The Secretary of the Interior has authorized the purchase of four ten-inch by sixteen-inch locomotives of thirty-six-inch gauge, at \$3,000 each, from the American Locomotive Company, of New York City. These locomotives are to be used as a portion of the construction plant for hauling excavated materials for the Cold Springs dam, Umatilla irrigation project, Oregon, which is to be constructed under the direction of the Reclamation Service by force account.

In response to requests for proposals for furnishing 2,500 barrels of Portland cement for use on the Truckee-Carson irrigation project, Nev., the following bids were received: Pacific Portland Cement Company, \$2 per barrel, f. o. b. cars at company's mill, Tolenas, Cal.; Portland Cement Company, of Utah, Ltd., \$2.75 f. o. b. cars, Salt Lake City, Utah. The bids are awaiting action by the Secretary of the Interior.

Proposals are asked for furnishing about 55,000 pounds of steel bars for reinforcing concrete, about 12,800 pounds of structural steel, and about 9,000 pounds of cast iron gates, guides, stands, etc., for use in connection with the Rio Grande irrigation project, New Mexico. The bids will be opened at Las Cruces, N. M., on November 15th.

A contract has been executed with the Deadwood Construction Company, of Deadwood, S. D., for the construction of Schedule 5, earthwork of distributing system, Interstate canal, North Platte irrigation project, Nebraska. Schedule 5 consists of the earthwork on about 14 miles of laterals, involving the excavation of about 66,300 cubic yards of material. The bid of the contracting company was \$12,615.

Proposals are asked for the construction of the diversion

dam and headworks, in connection with the North Platte Irrigation project, Wyoming-Nebraska. The work involves the excavation of about 90,000 cubic yards of earth and rock, furnishing and placing in structures about 10,000 feet board measure of lumber, and the construction of about 8,000 cubic yards of concrete masonry. The bids will be opened at Mitchell, Neb., January 9, 1907. This work was previously advertised and but one bid received, and that for only part of the work. The Secretary of the Interior rejected this bid as being excessive, and authorized the prosecution by force account of certain work near the headgates which was necessary in order that water may be delivered in the spring of 1907.

The contractors on the Pathfinder dam, North Platte irrigation project, Wyoming-Nebraska, are making every effort to get the masonry as high as possible before severe weather sets in, and with this idea in mind have put every available man, including the carpenters, on the concrete work. Twenty-five hundred cubic yards were laid during the month of October. There was one week of continuous stormy weather, and during the enforced idleness sixteen laborers left the camp. The labor problem does not improve, and on this account only half the capacity of the plant for laying masonry was reached in the past month. Work on the Interstate canal and lateral system was also somewhat delayed by stormy weather and the inability to obtain men and teams, but fair progress was made. Concrete work for the screen lateral outlets on the first 45 miles of canal were completed and rye was sown on the embankments to protect them from erosion by wind and rain. A field party is at work making preliminary location of the third fifty miles of the Interstate canal, and about 25 miles were completed in October.

The engineer in charge of the Strawberry Valley Irrigation project, Utah, reports that 120 feet of the tunnel were completed on the first of the month. Only one shift of eight hours was worked on the tunnel during the greater part of October, as the men were busily engaged in getting ready the buildings necessary to house the men and animals during the winter season. An engine house, powder house and blacksmith shop also have been erected. The road is completed to the east end of the tunnel. This road was one of the important preliminaries to construction, as everything had to be hauled 24 miles from the railroad to the west end and about 31 miles to the east end of the tunnel. The electrical drills which are being given a trial are doing very good work, and it is hoped they will prove a success. A great deal of difficulty is experienced in procuring the services of miners for tunneling. Large quantities of dead wood which is plentiful on the hillsides have been hauled into camp in anticipation of the heavy snows which may be expected in that altitude.

The Secretary of the Interior has awarded contract to J. P. Nelson, of San Antonio, Texas, for the construction of diversion dam, other structures and six miles of canal, Rio Grande irrigation project, New Mexico. The work is in the vicinity of Las Cruces, and involves the furnishing and driving of about 35,000 linear feet of round piles and 170,000 feet board measure of sheet piles, constructing about 2,600 cubic yards of concrete, excavating about 321,000 cubic yards of earth, and other related works. This unit, the first to be undertaken under the Rio Grande project, is known as the Leasburg diversion. It is for the purpose of delivering water from the river into the present Mesilla Valley canals, which have no permanent headings. Construction will be pushed as rapidly as possible with the hope that water may be delivered during the next irrigating season.

On October 26th the first of the concrete lining was placed in the Gunnison tunnel, Uncompahgre irrigation project, Colorado. Work was begun on this tunnel on January 11, 1905, and on the first of the present month 16,788 feet had been excavated, 757 feet having been excavated during October. The progress made the past month is considered exceptionally good when the character of the material encountered is considered. Several hundred feet of the concrete floor in the west end of the tunnel is already completed. The concrete plant promises to be a very economical one. Gravel is obtained on the top of the hills surrounding the main shaft, which is located 4,950 feet from the west portal. The gravel beds contain gravel and sand of excellent quality in about the right proportion for concrete, and the material is handled only twice between the pit and the wall of the tunnel. Plans are being prepared for an improved form of

drop for the South canal and for the headgates of the Gunnison tunnel. All outside work suffered considerably from the unprecedented snow storms, and it is reported that many thousand dollars worth of fruit which still remained on the trees was ruined.

The summer campaign of the Reclamation Service is practically over, and the organization of field forces is being readjusted to suit the winter work, except in the extreme southern portion of the arid region where climatic conditions favor the continuance of field work throughout the year. Although but little more than four years have elapsed since the passage of the Reclamation Act, the work has progressed so rapidly that one or more projects are now under way in each arid state and territory, and on fourteen of these projects the work has reached a stage where it is expected water can be supplied to a portion of the lands under them, amounting to nearly 400,000 acres, next season. This means the addition of 5,000 homes to the West, and the return of nearly \$1,000,000 per annum to the reclamation fund to be used again for the reclamation of more land. It is not probable that this entire acreage actually will be irrigated next season. Under a few of the projects a small portion of the land is still public domain. In some sections the settlers will not have fulfilled their part of the work by preparing the land to receive the water, and constructing the lateral ditches for conveying it over their fields. It is expected, however, that the major portion of this area will receive water from the Government systems in 1907. It is believed that with the practical demonstration which the irrigation of the first units of the projects now under way will furnish, by the time the systems reach completion there will not be an acre of available land under them. The operations of the Reclamation Act have stimulated development in the West in many lines. Private enterprise is already engaged upon similar irrigation works, and new lines of railroad are extending into the most remote sections of the inter-mountain country in order to reach the large tracts of land under the irrigation projects which will support a dense population in a few years. This development has resulted in a woeful scarcity of labor, and unceasing efforts are necessary in order that the irrigation works may not be seriously delayed from this cause. Inquiries as to the location of irrigation systems and local conditions are received every day at the office of the Reclamation Service in Washington from mechanics, and others who desire to locate in the West.

The Secretary of the Interior today executed a contract on behalf of the United States, and approved the bond of Contractor F. Nelson of San Antonio, Texas, for the construction and completion of a diversion dam and canal, Rio Grande irrigation project, New Mexico. The contract calls for the construction of 6 miles of canal, with 321,000 cubic yards of excavation, the furnishing and driving of 35,000 linear feet of round piles and 170,000 feet board measure of sheet piles, and 2,600 cubic yards of concrete for the sum of \$100,187.50. The letting of this contract launches the Government on the great work of constructing the Rio Grande project, one of the largest and most expensive of the irrigation works of the Reclamation Service.

This project contemplates the construction of a huge dam near Engle, N. M., to store water for the irrigation of 180,000 acres, 110,000 of which lie in that territory. The cost of the entire system is estimated at \$7,200,000. The main item of cost is the dam, which will require 300,000 barrels of cement, a large amount of machinery, gates, etc., entailing a heavy outlay for freight. It is estimated that the dam will cost approximately \$5,300,000. It will be 225 feet high, 180 feet thick on the bottom, and 20 feet on top. It will be 1,150 feet long on top of crest. The reservoir thus created will have a capacity of 2,000,000 acre-feet, or twice that created by the Assuan dam in Egypt, and will be the largest artificial lake in the world. Owing to the great demand made on the reclamation fund in other localities, the money for this entire project is not yet available. Recognizing the importance of early action in this section, however, the Secretary of the Interior, on December 2, 1905, allotted the sum of \$200,000 for the immediate construction of that portion of the project known as the Leasburg diversion. It is this dam with canal to connect it with the old Las Cruces system for which contract has just been let. Work will be pushed rapidly during the winter, and it is hoped that water can be supplied to 15,000 acres in Mesilla Valley during the irrigating season of 1907.

An important conference of members of the Reclama-

tion Service will be held in Oklahoma City, Okla., December 5th, 6th and 7th. Chief Engineer F. H. Newell, Assistant Chief Engineer A. P. Davis, and C. J. Blanchard, Statistician, will probably be present from Washington, and will meet a number of supervising and project engineers from the Southwest. As the conference occurs during the first annual session of the National Drainage Congress, the subject of national drainage will undoubtedly receive careful attention. In the four years which have elapsed since it was formed, the Reclamation Service has demonstrated in a thoroughly practical way that the Government can reclaim successfully broad acres of desert and create therein prosperous and happy agricultural communities. It is but natural, therefore, that the advocates of national drainage works for the vast swamp land areas of the United States should look to the Reclamation Service to take charge of the work. Irrigation and drainage go hand in hand. Most of the large irrigation projects now under construction by the Government provide for elaborate drainage systems, so that the problem of draining the swamps of the country can be solved without difficulty whenever Congress in its wisdom shall authorize the beginning of the work. Much of the preliminary work in the several states has been done already. Detailed surveys of vast areas of submerged lands have been made and maps and other data are on file in the office of the United States Geological Survey. The engineers and topographers who have been preparing these maps of partly submerged areas, and who have been measuring the water which flows into or away from them, are entering heartily into the plans for reclamation and are greatly pleased at the awakening of public interest in the matter. The drainage congress will find in the well organized body of men in the Geological Survey and the Reclamation Service willing assistants to any general plans that may be proposed.

A board of consulting engineers which recently made a thorough field examination of the lands under the La Plata irrigation project has submitted a report to the Chief Engineer of the Reclamation Service in Washington. The La Plata project is located along the northern side of the San Juan River in northwestern New Mexico, the greater portion of the land lying along the La Plata River, a tributary of the San Juan. Farmers in this valley formerly received an adequate water supply from the La Plata River, but recent appropriations in Colorado divert all the normal flow before it reaches New Mexico. The normal flow has been greatly decreased in late years by the deforestation of the mountain slopes of the drainage basin, so that the river in this section is now practically dry after the spring run off except during passing storms. As a result orchards are dying and many farms have been deserted, and the settlers who remain are receiving a very inadequate water supply. When the attention of the Reclamation Service engineers was called to the situation in 1904, it was thought possibly the water supply might be regulated by storage reservoirs, or supplemented by a diversion from Las Animas River, which lies just to the east of the La Plata drainage basin. A feasible reservoir site was located on the La Plata River at the state line. An investigation of the Las Animas valley disclosed a good reservoir site just above the town of Durango, but the site is traversed by a railroad, and the heavy cost of moving this railroad would fall upon the irrigators. The diverting canal would have to be carried through town lots and very valuable mining property, making the right of way through Durango alone an expensive one. Then the dividing ridge between the two drainage basins presents another obstacle, and a tunnel three miles long through the mountains would add further to the expense. The soil in the La Plata Valley proper and on the various mesas which could be irrigated is unusually well adapted to the successful growing of all kinds of grains, grasses, vegetables, deciduous fruits and melons. The yield in all cases when sufficient water is properly applied is large, and the products of fine grade, but the engineers have found the cost to be in excess of anything that the limited area with its present lack of transportation facilities could bear. In view of the limited fund available and the many more attractive schemes which are being presented for consideration, the engineers have recommended that this project be abandoned for the present at least.

F. H. Newell, Chief Engineer of the Reclamation Service, has returned from an inspection trip, having examined the condition of construction work in North Dakota, Montana, Idaho, Washington, Oregon, California, Arizona and New

Mexico. Mr. Newell said: "In general the work is progressing favorably, and construction has reached a point where results can be seen. The chief drawback at the present time is the difficulty of securing competent laborers. Men who can be had for this western work are, as a rule, restless and rarely stay more than a few days or weeks at any one point. They travel from job to job, staying just long enough to get well fed and accumulate a few dollars, then leave for the next place. The large amount of railroad construction, as well as the number of contracts under way with the Reclamation Service, make it possible for laborers to strike a new job wherever they stop. A contractor having on an average a thousand men at work will have on his pay roll for the month from 2,000 to 3,000 names. There is a small army of laborers tramping backwards and forwards along each railroad line, the greater part at present being headed, of course, for California and the Southwest in general. The difficulty in obtaining and holding good labor and the increase in the cost of materials have resulted in putting out of business a number of smaller contractors and sub-contractors, especially those who took their contracts six months or a year ago. The outlook for the future is also so uncertain that it is extremely difficult for contractors to bid with any degree of confidence, and hence there are very few proffers for future work. This condition holds not only for the Reclamation Service, but also for the railroads. On one extension four different contractors in succession have thrown up the work during a period of six months. The largest work of the Reclamation Service now in hand is the Roosevelt Dam in Arizona, the foundation of which is now in and is approaching the river level. If the floods in the Salt River do not occur for a month or two, the foundations which cover about an acre in extent, will be above water level. The Laguna dam on the Colorado River, 12 miles above Yuma, is being successfully pushed by J. G. White & Co., of New York City, and its success is now assured through the closing of the break in Colorado River some 30 miles below on Mexican territory. The gap was closed by the Southern Pacific Company, after weeks of great exertion and the expenditure of many hundreds of thousands of dollars."

According to a recent land office report the present status of the reclamation fund, composed of all moneys received from sales of public lands in the arid states and territories, is as follows:

State or Territory	Increment to fund during fiscal year ending June 30, '06.	Total reclamation fund to June 30, 1906.	Restricted fund 51 per cent
Arizona	\$ 54,649.71	\$ 298,417.90	\$ 152,193.13
California	248,647.12	2,571,704.81	1,311,569.45
Colorado	508,866.67	2,478,600.56	1,264,086.29
Idaho	301,234.62	2,335,934.14	1,191,326.41
Kansas	75,370.50	215,245.19	109,775.05
Montana	500,746.32	2,647,433.77	1,350,191.22
Nebraska	77,373.12	749,222.69	382,193.57
Nevada	45,597.92	110,527.04	56,368.79
New Mexico	202,015.97	723,365.27	368,916.29
North Dakota	933,803.07	5,374,395.01	2,740,941.46
Oklahoma	411,050.35	3,538,753.72	1,804,764.40
Oregon	461,231.65	5,230,661.99	2,667,637.61
South Dakota	262,308.72	1,285,480.85	655,595.23
Utah	70,211.56	432,287.95	220,466.85
Washington	494,182.57	3,545,615.58	1,808,263.95
Wyoming	234,744.23	1,420,545.65	724,478.28
Total	\$4,882,084.10	\$32,958,192.12	\$16,808,677.98

The figures representing moneys received during the past fiscal year may be slightly revised when the reports have been finally audited by the Treasury Department.

N. E. Webster, Jr., Accountant for the United States Reclamation Service, has returned from Columbus, Ohio, where he was in attendance upon the annual convention of the American Association of Public Accountants, October 23d to 25th. Mr. Webster is a certified public accountant of the State of Michigan, and a Fellow of the Michigan Association of Certified Public Accountants, and at the recent convention he was elected a member of the American Association. Much interest was manifested at the convention in the subject of co-operation with the general government in its efforts to improve accounting methods. A committee was appointed to prepare an advisory report to the Keep Commission on the subject, and Mr. Webster, who is chairman of the committee on accounting, was consulted as to the interest of the Government service in modern ideas of bookkeeping and auditing. In its desire to adopt such progressive ideas the Reclamation Service has been among the foremost of the various bureaus of the Government service. The idea has

been that as this was not only a work of great magnitude, but one wherein the Government was virtually acting as trustee for the people of the Western states, its accounting system should be of a character comparable with that of its engineering, and no pains have been spared to accomplish this result. For this purpose a committee consisting of the Chief Accountant, a disbursing officer, and a representative of the Price Waterhouse & Company, public accountants of New York, recently visited the Uncompahgre, Truckee-Carson, Salt River, and Yuma irrigation projects, and have made a report looking to a uniform system for the bookkeeping at all field offices.

CORRESPONDENCE.

The following letter was received from Mr. W. J. Nagel of Santa Fe, New Mexico, and was referred to Prof. Samuel Fortier, irrigation engineer in charge of the Pacific district, and Professor Fortier's reply is herewith published in full for the benefit of those who may desire similar information:

Santa Fe, N. M., Oct. 24th, 1906.

Editor Irrigation Age, Chicago, Ill.:

I find in your last on pages 377 and 385 that the duty of water under the Gage canal is 25 inches, combined with the rainfall, 33 inches. In my opinion this is more than needed. I have a nice orchard and use not more than 8 to 10 inches, the rainfall is on the average 14 inches, and I raise a fine crop of apricots, peaches, pears, prunes and limes and apples you have ever seen, and I think 10 to 12 inches, besides 14 inches rainfall, will raise a fine alfalfa crop and all kinds of vegetables. In my opinion it is more water wasted than judiciously used. For orchard I prefer the deep furrows, as it costs less labor and less evaporation. Yours, W. J. NAGEL.

Berkeley, Cal., Nov. 28, 1906.

Editor of Irrigation Age,
112 Dearborn Street, Chicago, Ill.

My Dear Sir: Your letter of November 21, enclosing a communication from Mr. W. J. Nagel of Santa Fé, New Mexico, on the subject of duty of water in irrigation, has been received. In my address before the last Irrigation Congress on this subject, which you published in your last issue, I stated that the average duty of water on the orchards under the Gage canal in the vicinity of Riverside, Cal., for the past seven years was 25 inches, and when increased by the natural rainfall it was 33½ inches in depth over the surface. Your correspondent thinks this is too much water. He claims that he raises fine apricots, peaches, pears and prunes on from 8 to 10 inches of irrigation water and about 14 inches of rainfall.

As is well known, the duty of water varies in different localities and under different conditions. I might name more than a score of conditions which influence it. In the two cases under consideration there is quite a difference in the length of the irrigation season. The citrus orchards under the Gage canal are irrigated from ten to twelve months every year. The irrigation season for the deciduous fruit trees in New Mexico is much shorter. This is only one out of many differences which may exist.

To show that water is economically used in Southern California, the following comparison will suffice: Over 20,000 acres of orange and lemon orchards are irrigated by the three companies named below. The average duty of water under each is as follows:

	Rainfall in acre-feet.	Rainfall and irrigation in acre-feet.
Gage Canal System.....	2.08	2.79
Riverside Water Co.....	2.43	3.09
Temescal Water Co.....	1.83	2.41

According to the data collected by irrigation and drainage investigations of the office of experiment stations the average duty of water in Western America from 1899 to 1904, inclusive, was more than five acre-feet.

The last general average not only indicates the extent of the waste of water, corroborating Mr. Nagle's views, but it also indicates the truth of the statement made by me—that, compared with other irrigated districts of the West, water is both skilfully and economically applied in Southern California.

Very truly yours,
SAMUEL FORTIER,
Irrigation Engineer in Charge Pacific District.

The foreign commerce of the United States has crossed the \$3,000,000,000 line. In the twelve months ending with August the imports were \$1,254,399,735 and the exports \$1,759,417,898, a total for the twelve months of \$3,013,817,633.

The imports have exceeded \$100,000,000 in practically every month of the last year, but August is usually a light month for imports, and thus the record of more than \$100,000,000 for the month of August is made for the first time in the figures of the month just ended, which show imports of \$105,588,604, against \$96,000,000 in August of 1905. The export figures for August amounted to \$129,454,760, against \$118,000,000 in August, 1905.

The growth of commerce is distributed through a large class of articles. Meat and dairy products exported amounted to \$16,768,067, against \$14,212,278 in August of last year and \$11,219,518 in August, 1904. Canned beef, however, shows a marked decline compared with the corresponding months of earlier years. Breadstuffs aggregated \$13,000,000, against \$7,500,000 in the same month of 1905. Cotton, however, falls considerably below the August record of 1905, being a little over \$9,000,000, against \$17,500,000 in 1905. The growth in imports occurs chiefly in manufacturers' materials and manufactures.

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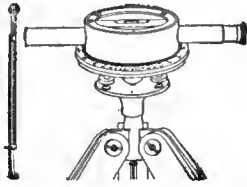
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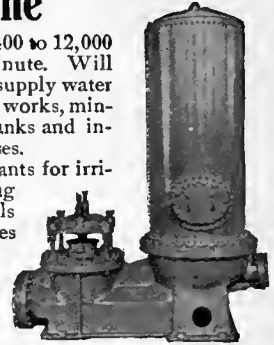
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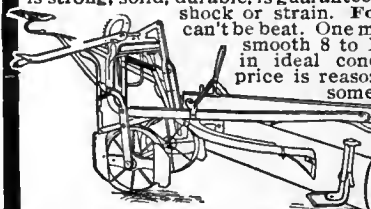


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When you are planning your SUMMER TRIP send for "MICHIGAN in SUMMER" containing many photographs and brief descriptions of the resorts, MACKINAC ISLAND, PETOSKEY, HARBOR SPRINGS, RAY VIEW, NEAFAWANTA, WEUQUONSSING, TRAVERSE CITY, OMENA, ODEN, NORTHPORT, Etc. the Indian Play—"HIAWATHA" at Wa-ya-ga-mug, and the direct line to all Northern Michigan Summer resorts. Fishermen should have "WHERE TO GO FISHING" Send 3c in stamps to C. L. LOCKWOOD, Gen. Pass. Agt. Grand Rapids, Mich.

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RIFE Automatic Hydraulic RAM

(Pumps Water by Water Power)

Town Water Works
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Elevates water 25 for each foot fall. Operates under 2 to 50 feet fall. 5,000 in Operation. 30 days trial. Catalogue free. Write your Dealer.

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Galvanized Steel Irrigation Flumes AND WATER TROUGHS



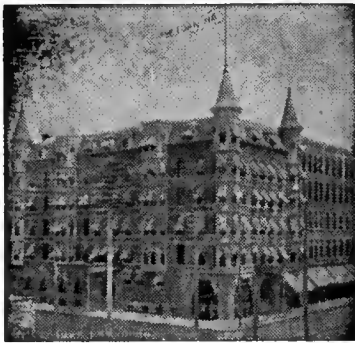
Galvanized steel is rapidly taking the place of wood for fluming purposes and with The Maginnis Patent splice fluming is made easy. Any boy can put the Maginnis Steel Flume together or take it apart. Steel flumes and troughs "Ship Knock down" Third Class freight. Let me figure on your flume. All flumes guaranteed.

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ONE FARE PLUS \$2

For the round trip with minimum of \$7 every Tuesday during September, October, November and December, 1906, inclusive, from St. Paul and Minneapolis to points in

Minnesota, North Dakota, Manitoba, Western Ontario and the Canadian Northwest

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Montana and Idaho, Northeastern Oregon, Eastern Washington and Eastern British Columbia

See the finest agricultural lands in the Great Northwest. Low rates afford an excellent opportunity to secure a farm in a rich and growing country, where yields are large, where excellent markets are near at hand and where irrigated districts present splendid opportunities and sure crops. Tickets bear final return limit of 21 days, with liberal stopover privileges.

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Between St. Paul and Minneapolis and the Pacific Northwest



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301

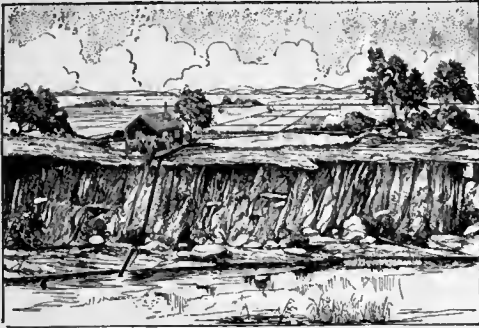
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The value of arid land can often be increased from \$1.00 to \$100.00 or even \$500.00 an acre by the use of Fairbanks-Morse Mechanical Irrigation Machinery.

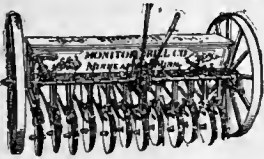
Send for our new illustrated pamphlet Practical Irrigation No. 650 P1

Fairbanks-Morse & Co.
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Monitor Double Disc Drills

Are Especially Adapted For Use in the Arid and Semi-Arid Regions.



**STRONG,
DURABLE,
LIGHT-
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Take less seed and produce greater yield per acre of better grade of grain than any other machine made. Cannot be clogged in mud, gumbo, adobe or any other soil. Pretty strong talk—isn't it? We have proof.

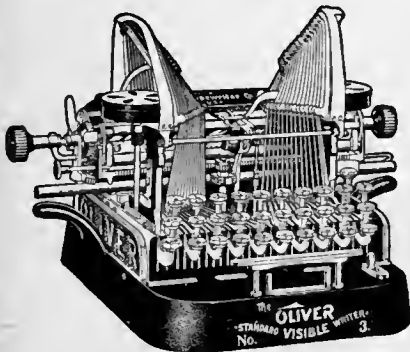
Ask For Catalogue No. 19 Free.

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MINNEAPOLIS,

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Technically Correct In Every Detail



The Oliver Type-writer is the highest embodiment of mechanical excellence in a Visible Writing Machine. It is so minutely perfect that it will write on a postage stamp—so comprehensive in its scope that it adapts itself to every writing requirement of the business world.

In the vital essentials of Visibility, Accuracy, Speed, Legibility, Perfect Alignment,

Powerful Manifold, Durability and Ease of Operation,

The **OLIVER** Typewriter

The Standard Visible Writer

stands first. We can give profitable employment to several young men as Local Agents for the Oliver. If open for engagement, get in touch with this office at once.

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The New Scenic Line between the

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Beautiful Scenery
Elegant New Equipment
Smooth Roadbed
And the Best Dining Car
Service in the West

Two trains leave Salt Lake City daily—"Los Angeles Limited" and the "Overland." If you are going West or have friends coming East, a postal to the undersigned will secure for you complete information.

Low round trip rates from all Eastern Points in effect April, May, June and July.

Low colonist rates September 15th to October 31st.

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Send \$2.50 for The Irrigation Age one year and The Primer of Irrigation, 300 page book.

PEERLESS FENCING—"Without a Rival."

947

A four-foot general purpose fence close spaced enough to turn pigs, high enough to turn all kinds of stock and strong enough for all general purposes—is coming to be recognized as the most desirable style to buy.

Mr. Anderson, editor of this paper, has recently purchased a quantity of this fencing for use on his experimental farm at Cadillac, Mich., and we refer you to him—he will tell you frankly what he thinks of it.

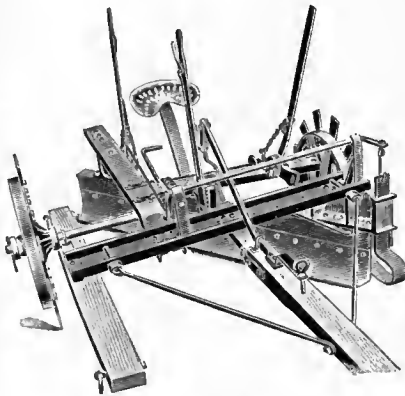
Made with No. 9 top and bottom wires; No. 11 lateral wires and No. 12 crossbars, 12 inches apart. Spaces from bottom up as follows:—3, 3½, 4½, 6, 7, 7, 8, 8.

We make many other styles, from which you may select one especially adapted to your own particular needs, if you wish. We have them all, high and low, close spaced and wide spaced, heavy and light. Our catalog will describe them and is free.

Representation through dealers or agents sought in all new territory.

PEERLESS WIRE FENCE CO., Ltd.

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Rural Road Grader and Ditcher

A new model of grader and ditcher that will interest all highway commissioners, builders of ditch and levee work in the rice belt, irrigation work in the West, and the big farmer everywhere to open up ditches with and to build roads needed on the farm.

If you have road grader work to do in any form, then get a Rural Road Grader and Ditcher, thereby saving more than half in cost of machines and working expenses.

Operated by One Man and Two Teams. Sold on Trial.

[TESTIMONIAL.

SPENCER, IOWA, May 19, 1906

C. D. Edwards, Albert Lea, Minn."

Dear Sir:—You will please find enclosed draft for \$125.00 in payment for one Rural Road Grader and Ditcher, ordered of you April 28, 1906. Would much rather have it than an eight-horse grader. Can do more and better work with it at one-half the expense and can work it where we cannot the larger one, so you can rest assured we are well satisfied with the machine.

Yours respectfully, J. R. FLOYD, R. F. D. No. 1.

Chairman Trustees, Meadow Township, Clay County.

Clearing Land With a Jumbo Stump Puller.

I manufacture the Climax and Chief Pullers also, intended for lighter work. Capstan Ditching Machines, cutting ditches 4, 6 and 8 feet wide and Bog Land Cutters. Send for catalog of the machine you are interested in.

B. L. VINEYARD & CO., Eagle Lake, Texas, General Southern Agents, Manufacturers Machinery Co., New Orleans, Louisiana, Agents for Louisiana and Arkansas, F. E. Widmann, Pueblo, Colorado, General Agent.

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"About the South" is the name of a 64-page illustrated pamphlet issued by the Passenger Dept. of the

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In which important questions are tersely answered in brief articles about

Southern Farm Lands, Mississippi Valley Cotton Lands, Truck Farming, Fruit Growing, Stock Raising, Dairying, Grasses and Forage, Soils, Market Facilities and Southern Immigration

along the lines of the Illinois Central and Yazoo & Mississippi Valley railroads, in the States of Kentucky, Tennessee, Mississippi and Louisiana, including the famous :: :: ::

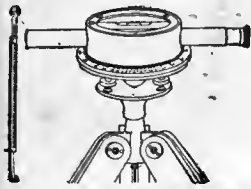
YAZOO VALLEY OF MISSISSIPPI

Send for a free copy to J. F. Merry, A. G. P. A., i. C. R. R., Dubuque, Iowa. Information concerning rates and train service to the South via the Illinois Central can be had of agents of connecting lines, or by addressing A. H. HANSON, G. P. A., Chicago, Ill.

BEFORE YOU BUY A LEVEL

Write for descriptive circulars of the

BOSTROM IMPROVED FARM AND BUILDERS' LEVELS



Practical up-to-date instruments that anyone can use. Recommended by professional men of repute and by the most progressive farmers of the country for irrigation, drainage and building purposes. Prices: **\$12.50** and **\$25.00** including Telescope, Tripod and Rod.

BOSTROM-BRADY MFG. CO.

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Pump for Sale

The Trustees of the Pueblo Water Works will receive bids up to and including Tuesday, January 15th, 1907, at 4 p. m. for one Duplex Condensing Crank and Fly Wheel Pumping Engine of Seven and One-Million gallons daily capacity. This pump is complete and has never been used. Too small for present owners.

NOTE—The Board reserves the right to reject any and all bids.

Suitable for Waterworks or Irrigation.

For further particulars write or see

D. E. BURKE, Superintendent
Pueblo Water Works, Pueblo, Colorado

Help.

We want help immediately to aid us in selling the output of three factories just added to our rapidly growing business.

We want energetic and capable men and women in all parts of the union, in either city or country, who are willing to devote all or part of their time, earning an income from \$15 to \$75 per week.

We have a place for you. With or without experience. Home and neighborhood work for ladies and girls in forming clubs and canvassing. Grocery, drug and general stores and cigar canvassing for men.

Write today for our unequalled offer, give age, experience, if any, and your ideas of work.

We have a large, popular and profitable line to offer you.

THE PEOPLES MERCANTILE CO.,
607 Vine St., Cincinnati, Ohio.

DON'T INCORPORATE

until you have first written us for a copy of the laws of Arizona, now universally conceded to be the most liberal in the United States; private property exempt from corporate debts, no franchise tax, do business anywhere, cost very small, can commence business same day the articles are received. Write for our pamphlet giving copy of the corporation laws of Arizona and detailing the many advantages of organizing thereunder.

ACME INCORPORATING COMPANY
Corporation Agents, Organizers and Promoters
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NO MORE BLIND HORSES For Specific Ophthalmia, Moon Blindness, and other sore eyes, **BARRY CO.,** Iowa City, Ia., have a sure cure.

Niagara Hydraulic Engine



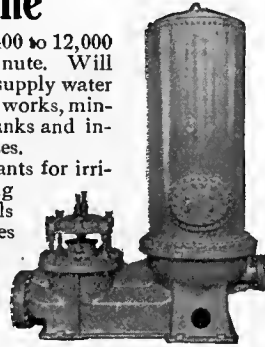
Using from 2 to 350 gallons per minute. Elevating 35 feet for each foot-fall.

Niagara Hydrokinetic Engine

Using from 400 to 12,000 gallons per minute. Will automatically supply water for town water works, mining, railroad tanks and industrial purposes.

Complete plants for irrigation, utilizing as power, falls from 18 inches to 50 feet.

Write for catalogue C and guaranteed estimate.



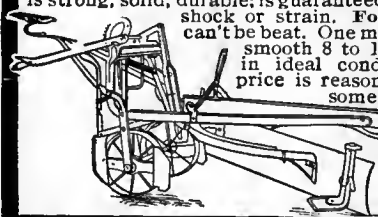
NIAGARA HYDRAULIC ENGINE CO.,
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Dig Irrigation Ditches Quicker

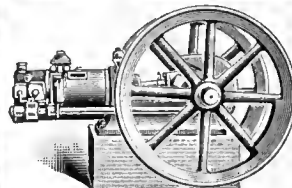
Two horses can manage a 20th Century. It weighs only 500 pounds, all steel and malleable iron except pole. It's a "hammer" as a Nebraskan says, for ditches and laterals. Blade is 6 feet long, can be tilted either up or down and turned right or left to any angle up to 50 degrees. Because built all of metal the

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is strong, solid, durable; is guaranteed to stand every reasonable shock or strain. For leveling and grading it can't be beat. One man and a team can level and smooth 8 to 12 acres a day leaving land in ideal condition for seeding. The price is reasonable. Write for our handsome booklet that shows the Grader in operation and explains details.



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White City, Kansas



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Gas, Gasoline, Alcohol and Producer

Pumping combinations adapted to all uses.

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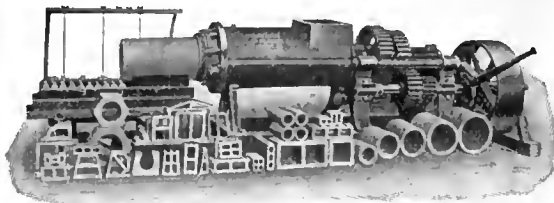
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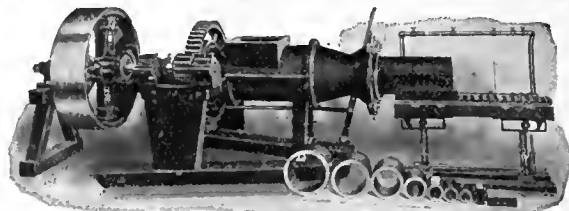
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E. R. Dalbey & Co., El Paso
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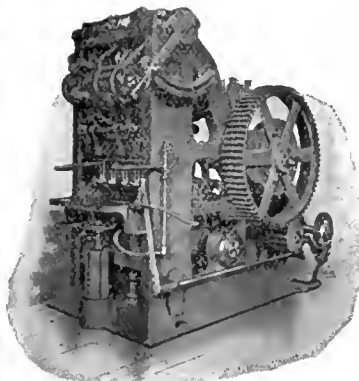
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Centennial Auger Machine



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Dry Press, 5 styles



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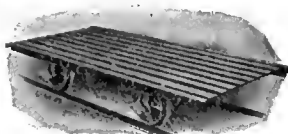
Eagle Repress

Clay Working Machinery

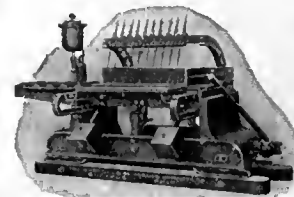
**"BUILT RIGHT—
RUN RIGHT"**

We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

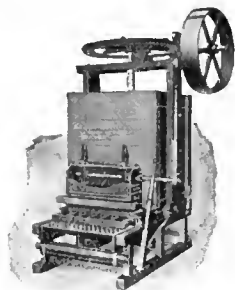
**The American Clay
Mch. Co...Bucyrus, Ohio**



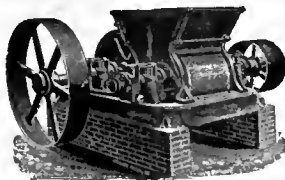
Dry Cars, all kinds



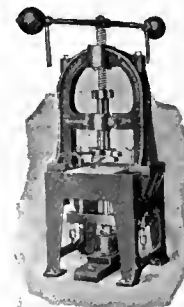
Hand and Power Cutters



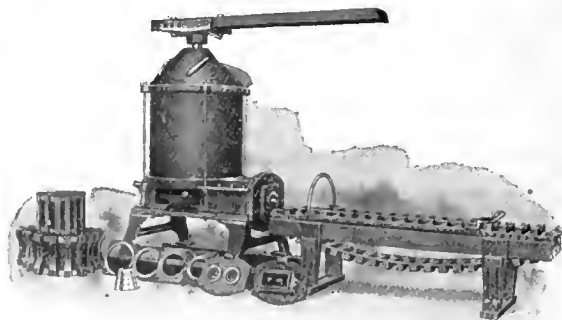
Soft Mud Machines, Horse and Steam Power



Disintegrators



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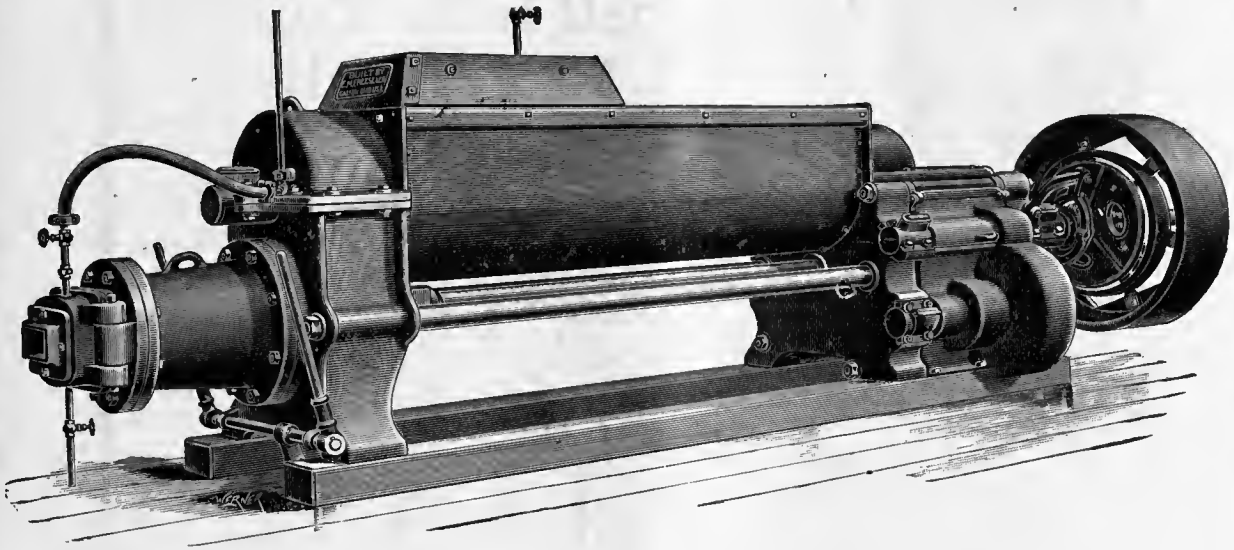


Horse Power Plunger Machine



Products of our Auger Machines

UNION MACHINES WITH PUG MILLS COMBINED



FIVE SIZES ALL CAPACITIES

Outfits for Drain Tile, Hollow Ware, Building
and Paving Brick and other Clay Products

If interested write us for particulars and estimates.

E. M. FREESE & CO.
GALION, OHIO

Let Me Prove That 10 Acres of this Irrigated Land will earn \$250.00 A Month For You



E. W. SHUTT, President
Rio Grande Land, Water & Power Co.

I Will Sell It To You For \$2.50 a Week

Irrigated, under cultivation, ready to earn at least \$250 a month.

Not in all the world have I ever heard of so good an opportunity for men of small means.

In this small space I cannot tell you all the steps that have been taken to safeguard your money in every way.

This is investment — not speculation — yet you get returns equal to those from successful speculation.

And all the while you are secured against loss by the finest farm land in the world, and your interest in water-rights that no man could buy for a million dollars.

There is no question like finding gold or striking oil about this proposition.

The land is there for all time. The water is there for all time to nourish and fertilize it.

You don't have to dig in the ground deeper than to plant seed.

There are no insects that destroy crops in this country.

There is no chance for drought.

There is no chance known to man for a single crop failure, ever.

And the abundant crops of large and in every other way superior hay, grains, vegetables and fruits are equalled in only a very few favored spots, such as the Rocky Ford country. But I am going to prove by case after case that net returns from ten acres of this property rarely are as low as \$3,000 a year and often as high as \$10,000, according to the kind of crops.

The difference is not according to location of land or season or anything of that kind.

The land is near a prosperous and growing city — Albuquerque — the largest city in New Mexico.

Our main irrigation canal to run through the city.

The main line of the Santa Fe Railroad runs through our land from end to end.

And our own electric line is to supply additional cheap and convenient transportation to every section of these lands.

If you want to see the country for yourself, you can go with the next party I take to look at the property. Or you and your friends can band together and send a representative.

Or I will send you names of prominent men who have gone or will go and you can ask them what conditions they find.

But this is the merest outline of what I will show you in detail.

There are many features of this Secured Land Contract that make it safe and profitable which I haven't space to touch upon.

I am only attempting to make it clear to you that if you can possibly save \$2.50 a week you can have an assured three to ten thousand dollar income in a few years.

Don't doubt — I have proof.

I have promised to lay it before you. All you have to do is to write for it — that can't cost you a cent more than postage.

And as fast as the mails can carry, I will send you proof that as sure as crops grow where climatic, soil and water conditions are perfect, you can be financially independent in a few years.

Now, not to hurry your decision in the least, but to protect the price, write me personally at once.

For after the first lot of ten-acre tracts is contracted for we will ask more. But I make this promise. Every man or woman who answers this advertisement at once can have at least ten acres on these terms unless, of course, all our land should be already contracted for from this one advertisement.

Now, write at once. I can say nothing more in this advertisement except that, if I could, I would not tell you all you can confidently expect from this investment. For you would not believe it without the proof which I cannot put in an advertisement. Address me personally, and believe me sincerely,

E. W. SHUTT, President Rio Grande Land, Water and Power Co.
658 Houser Building, ST. LOUIS, MO.

YOU know, or can easily learn from United States Government Reports, that irrigated lands in the Great Southwest, in selected crops, will net \$300 to \$1,000 a year per acre over and above the entire cost of cultivating them.

Anyone who knows the country will tell you that absolutely the surest, safest way in the world to gain a large and permanent income for a small outlay is to get hold of a few acres of irrigated land in the Great Southwest.

But always before it has required at least a few hundred dollars and it has been necessary for the investor to live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest irrigated land in the world if you can save \$2.50 a week.

You can go and live on it — absolutely assured of an income from it alone of \$3,000 to \$10,000 every year without fail.

Or you can remain in your present position and add that much to what you earn.

For my company will cultivate your property for a small share of the crops.

You don't have to know a thing in the world about farming.

Now, I can and will prove all this from the highest authorities in the land.

All you have to do is — write me and say, "Prove to me that ten acres of your land will net from \$3,000 to \$10,000 a year above all cost of cultivating it."

I have the proof, so read what my company will do for you.

I will deliver to you at once a Secured Land Contract for ten acres of irrigated land in the Rio Grande Valley.

You must pay my company \$2.50 a week or as much more as you like.

Instead of your having to pay interest on deferred payments, I agree, for my company, to pay you 5% per annum on the money you pay in.

I also bind my company to fully irrigate your land and turn it over to you under full cultivation whenever you desire to mature your contract.

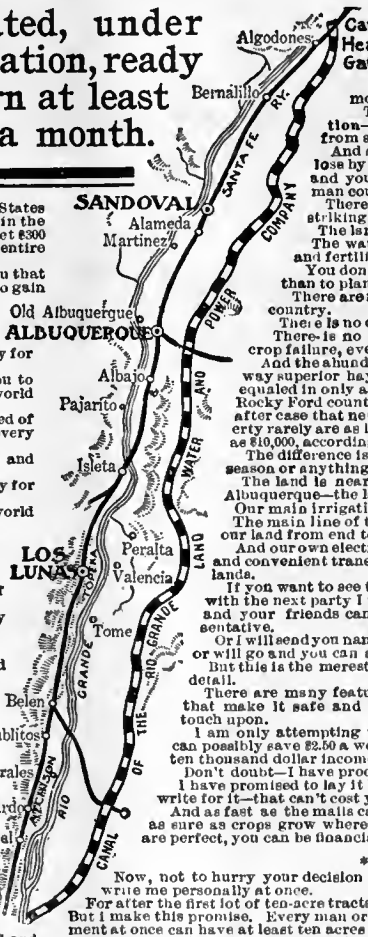
\$2.50 a week will mature your contract in 10 years.

But after you have paid \$2.50 a week for three years, or the same total amount in a shorter time, I agree and bind my company to loan you enough money to make all future payments and mature your contract.

Remember, the land will be fully irrigated and completely under cultivation, so your first year's crop should net you enough over and above the cost of cultivating it to fully pay your loan.

You would then own your land outright and have an assured income of from \$3,000 to \$10,000 a year.

Can you hope in any other way as safe and sure as this to have so large an income in a few years?



Can you hope in any other way as safe and sure as this to have so large an income in a few years?

THE IRRIGATION AGE

VOL. XXII

CHICAGO, JANUARY, 1907.

No. 3

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

THE D. H. ANDERSON PUBLISHING CO.,
PUBLISHERS,

112 Dearborn Street, - - CHICAGO

Entered at the Postoffice at Chicago, Ill., as Second-Class Matter.

D. H. ANDERSON, Editor
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Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

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To United States Subscribers, Postage Paid, \$1.00
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All Other Foreign Countries, 1.50

In forwarding remittances please do not send checks on local banks. Send either postoffice or express money order or Chicago or New York draft.

Official organ of the American Irrigation Federation.
Office of the Secretary, 309 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that *The Irrigation Age* is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. *The Irrigation Age* is 22 years old and is the pioneer publication of its class in the world.

Snake River Valley. The three principal bodies of land capable of irrigation in the Snake River Valley of Idaho make the grand total of about 2,050,000 acres. When reclaimed and fully improved they will have an average value of at least \$50 an acre, or over \$100,000,000, and can sustain a population of 1,600,000 people in comfort—all the inhabitants of Nebraska. The climate of these lands is fine, and Idaho is going to be one of the most attractive home states in the West.

Not Yet Too Late.

Speaking of the national reclamation service now being conducted in more than a dozen states and territories, under the direction of the United States Geological Survey, Senator Francis G. Newlands of Nevada has said: "The work has been done with quickness, with efficiency, and with honesty; not a breath of scandal thus far has tainted any of the work entered upon." The reclamation fund collected has exceeded \$30,000,000, and the results accomplished have been of great benefit to the entire nation, but they are quite limited in comparison with the total to be realized when all the projects now contemplated are fully developed. Senator Newlands and many others see in this successful management of this public service by the Nation a warrant for extending similar scientific direction of the government to its coal and other mines not lawfully appropriated, and to the public timber domain. Had this plan been done years ago the government would probably now realize enough revenue therefrom to bear a large share, if not all, of its expenses.

Washington-Oregon Irrigable Lands.

About 700,000 acres of land have been, or are projected to be, irrigated in the states of Washington and Oregon, and it is probable that in time the aggregate will be 1,000,000 acres or more. The principal problem is to make storage reservoirs, as the minimum flowage of the supply streams is generally fully appropriated now. But during the flush periods enough water wastes down the river channels to reclaim all the land tributary to the streams capable of overflow by gravity methods. These storage reservoirs are necessarily of vast capacity and great cost and only through the great good fortune of the National Reclamation service will many of them be possible. Many of these enterprises will be described in detail from time to time in *THE IRRIGATION AGE*.

Not Boom Talk.

It may sound like "boom talk" to many who are not familiar with irrigated lands to say that those who seek new homes can find some of the best opportunities offered anywhere in America in the regions where the rainfall is too light for successful farming and where crops must be made by flowage from canals and ditches. But the assertion is true, decidedly so. Almost without exception irrigated soils are very strong and fertile. By turning on the water just where the crops need moisture their development goes forward unchecked to maturity. The result is high-grade grains, rich and luxuriant grasses and some of the most perfect fruits grown anywhere in the United States. Where the water supply is sufficient crop failures are

practically unknown. There are no drouths to spoil business calculations. The irrigated regions are, almost without exception, healthful, possessing dry, wholesome atmospheres free from malaria, with warm days and cool nights. This magazine will give information every month about the irrigated regions and every homeseeker should read it regularly.

The most beautiful view of snow-clad mountain peaks to be had in the United States is, probably, that which may be enjoyed from the heights behind Portland, Ore. On a clear day in springtime four sublime snow-mantled cones rise out of the dark sea of forest and foothills, with a majesty that is awe inspiring.

A few degrees east of north is Mount St. Helens, a perfect pyramid of scintillating whiteness, towering 10,000 feet above the forests of Washington. It is sixty-five miles distant, but seems about ten. In line right behind it, thirty-five miles further away, is the famous Mount Ranier (or Tacoma) over 14,000 feet in altitude, but so perfectly blanked by St. Helens that the former is ordinarily invisible. Eastward from St. Helens is Mount Adams, 12,470 feet in height, but not as impressive as St. Helens or Ranier.

Straight east of Portland, forty-five miles away, is another snow-white peak, 11,225 feet in elevation, more majestic than St. Helens. This is the famous Mount Hood, one of the most picturesque heights in America. Southward, in the same range, is Mount Jefferson, a towering white spur of the Cascades.

One may see all these great peaks from one position on the hills west of Portland, and the spectacle is almost worth a trip across the continent.

An article on the Imperial Valley, or "Salton Sink," appears elsewhere in this issue. Since it was written from Washington say that President Roosevelt has taken up the matter of closing the inflow of waters from the Colorado river, with characteristic clear-sightedness and energy. He strongly urged Mr. Harriman of the Southern Pacific company to stop the break at once and at all hazards and that Congress will be asked to authorize some financial assistance. The reports estimate, on a very conservative basis, the property at stake to be \$13,000,000. There are 500,000 acres of land on the California side, besides 250,000 acres just across the line in Mexico that may be made into farms, or most of it. It is believed that when once fully reclaimed this land would sell for at least \$100 per acre on an average. Hence, the 500,000 acres on the American side of the line might be worth, in a few years, not only \$13,000,000, but \$50,000,000 or more. Besides, the torrent threatens to cut back up the channel to the government dam above Yuma,

and if that were destroyed, as is said to be possible, the added loss in construction work, as well as the failure to reclaim the valuable body of land depending on that dam, would add many millions more to the actual and prospective loss. If \$2,000,000 has to be spent in throttling the voracious current of the Colorado river it will, it would appear, be a good investment. This nation cannot afford to lose such a splendid domain as this really Imperial region is certain to become—almost every forty acres of which may be made to give a family a good living and whose aggregate products may reasonably be expected to be worth a grand total annually of \$25,000,000—maybe twice that sum. Save the Imperial Valley!

The steel trust hires a good many men, and so do some of the great railroad corporations, but the people are still their own largest employer. A new census bulletin shows that it takes 271,169 persons to run the executive civil service of the United States. The army and navy take about 100,000 more; so that in all there are nearly 400,000 persons on Uncle Sam's pay-roll.

There has been a good deal of speculation concerning the causes of the "apathy" in the late presidential campaign. One very marked cause may be found in the changed conditions of government employment. Where those of us who can look back a quarter of a century were enjoying the delirious excitement of our first political contests, almost all the places in the civil service depended on the result of the election. A hundred thousand men were fighting for their jobs, and a million more were fighting to get them away. No wonder there was enthusiasm. No wonder men were willing to put on oilcloth capes and cambric caps and carry torches with the oil dripping down the backs of their necks while they sang "Jim Garfield's at the front."

Now, out of 150,883 employes dealt with by the detailed returns, 124,737, or 82.9 per cent, are in the classified civil service. About 48,000 have been in the service for over eight years—that is to say, since before the last change of parties in the control of the government. Over 10,000 have been in office for twenty years or more, which means that they have served under at least six administrations, including four political revolutions.

But the rule that a change of parties meant a new deal used to be general enough to keep practically the entire public service hustling in campaigns, and the fact that the great majority of office-holders are now secure in their jobs corks up the principal source of partisan energy.

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EDITORIAL NOTES.

BY G. L. SHUMWAY.

GOVERNOR BRYANT B. BROOKS, of Wyoming, has joined issues with President Roosevelt, and with such Trojans as he and Senator Heyburn, of Idaho, in arms, we may see some sparks fly before the dawn of many days, and the President will find them foemen worthy of his steel.

THE President has stirred the giant spirit of the West, of which they are prototypes, by persistently following policies which are deemed detrimental to western development, and by inferences, and otherwise, assailing western character. The statements of Governor Brooks ought attract the executive's attention, provoke investigation, and inspire our President to recede from some of the positions which subordinates may have pushed upon him.

THE governor states that while 20 per cent of Wyoming's public grazing land is embraced in forest preserves, only 2 per cent of the range stock is found therein. If the range under federal supervision has only 10 per cent of its efficiency, if open, federal aggression has wrought enormous losses to the West.

MR. BROOKS further states that after 40 years' operation of all the land laws—pre-emption, homestead, tree-claim, desert, Carey, timber and stone, mineral, and land grants—about 10,000,000 acres of Wyoming's area has passed from government control. To acquire all of the state's mineral and timber lands, he estimates by the rate of past acquisition, will require approximately 8,000 years. In the few recent years, the government has included as much as 10,000,000 acres of the state in forest reserves. By the executive's recent mineral land order about 16,000,000 acres more are in the exclusion. About half of the public lands of the state are denied to entry.

THE aggrandizement of our federal government is seriously affecting our public schools. Isolated school sections embraced in forest and other reserves, cease to contribute to our state educational institutions, because without other range they are useless to stockmen. The meager earnings of lands exploited by Mr. Pinchot, and the small allotment which the Forest King allows the states as a sop to induce silence, while he rims and trims the state schools, is wholly out of proportion in the light of justice.

A RECENT message of the President contains the statement that he has directed the Secretary of the Interior to issue no more patents of land, until a personal examination of the land is made to ascertain if the law has been complied with. In other words, all claimants are presumed to be thieves, and with their witnesses, perjurers, until some special agent drifts around, and makes a written assurance that they are all right.

THE law outlines specifically various methods of securing patents. Can the President annul specific law? Shall special agents' reports have more potency than a strict compliance with law? Must claimants curry and incur the good will of spying strangers, rather than ob-

tain the voluntary sworn respect of his neighbors? If so, then put the spies on oath in their reports, and under bonds to tell the truth.

HONORABLE homemakers in the West protest against this accursed spy system—it is an intrusion of unbidden eyes, inspecting personal and private altars. It is foreign to American ideas and ideals, and belongs not to free America, but to crumbling dynasties of the past. The West will never knuckle down to these migratory persecutors, and the President is wrong in his order.

No doubt a general opinion exists in the east, that there have been enormous land frauds all over the west. It is one of the idiosyncrasies that has arisen from this wave of reform, and it will require long and tedious effort to obliterate it, but the President of the United States could better employ his time than to inflame a slander upon our people.

THERE is a great noise if there is a petit larceny of a few acres of inferior land—it diverts public attention from enormous inroads on the treasury, like that \$25,000 a year expense item for the President. This one item, in one administration, will amount to more in cold cash than the value of a hundred sections of public grazing lands. Why, bless you, I could designate 100,000 acres that would sell under the hammer for less than the amount which Congress recently presented to the members of the President's cabinet. And alleged conspiracies relating to small fractions of the area are sending men to the penitentiary and involving expenditures in federal prosecutions of more than the land is actually worth.

THAT the administration can err is emphasized by the land unit regulation under irrigation projects. Every developing locality is calling for settlers, and the inducement of a mere living is not sufficient to attract. The Truckee-Carson project, for instance, has only about 20 per cent of the lands occupied that are ready with canal and laterals. Call it gambling instincts, speculation, or whatever you will, but the fact remains the water is there and the settlers are not, and the west will not fill up until that extreme interpretation is abandoned.

THE administration is wrong in other matters. Actual service to the grazing districts of the west will require something besides forest and grazing reserves, which relegates areas embraced into hopeless wilderness forever. No question is ever settled until it is settled right, and no home is ever a home until the title to the home is vested in the homemaker. My letter to the President, dated Nov. 20th, which I referred to in December IRRIGATION AGE, outlines a plan for provisional ownership to prescribed range units by actual residents, and will solve the problem in the interests of the actual home-builders.

PARTS of the President's "land" message sounds like a voice from the past. It speaks of range conditions which existed five to ten years ago, as though they existed now. Range controversies were practically eliminated by those fences which Mr. Roosevelt says must go. His orders will be obeyed, but since the message.

cattle rustling, which passed out more than half a decade ago, has broken loose again. An "open" range encourages the lawlessness.

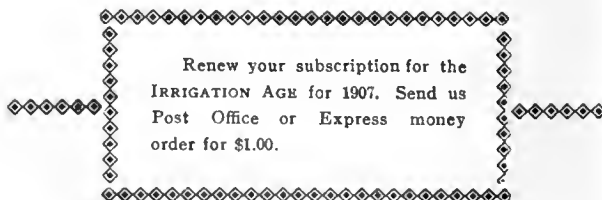
WE plead forgiveness for calling attention to Mr. Roosevelt's contribution to the recent campaign fund, and Chairman Sherman's acceptance thereof, which was a violation of the Civil Service law, with heavy penalties attached. The "forgetfulness" on the part of one who was many years a member of the Civil Service Commission, and who is now its head, struck official Washington as a joke. But while "Washington chuckles" over this unlawfulness, it is no joke when an infraction of federal laws occurs west of the Missouri. Nothing short of prison stripes and bars, with accessories of heavy fines, are the penalties for ignorance of law, or forgetfulness here.

MR. PRESIDENT, many of us in the West can hardly reconcile ourselves to a belief that you, with your many splendid attributes, can wish us harm. We believe you have been imposed upon by members of your official family. You are creating havoc, wrecking our pillars of progress, and shattering home altars which were builded at tremendous sacrifice.

I have seen children of these pioneers playing in the sand with naught but sand and gravel for their playthings. I have seen them hungry for the sound of a human voice, stand and shout to hear their own voice come back from the hills. Hungry for human companionship, they named the echo, and endowed the golden rod with imaginary personality. The fathers of these children, who have braved the loneliness and solitude of isolated valleys of the sand hills, are battling for their liberty, because they thought God and their country would encourage, and not persecute, them.

MR. PRESIDENT, it is wrong—all wrong. You are destroying respect for government. These children are growing into maturity full of hatred for some terrible monster which is persecuting their fathers—a Thing overshadowing their young lives which is as inexplicable to them as it is to us. If they grow and abide by the laws of our country, under such conditions, it will be a reverence born of fear.

THE offenses are not sufficient to justify the prosecutions. Offenders can be brought to a realization of unlawful acts, with civil action, and no Americans exist, who will more quickly respond to and obey the law, than the people of the west, when once they understand the law. Custom has almost made these so-called offenses common law, and if you make criminals of these so-called offenders, neither they, their neighbors, or their progeny, can ever have the original profound respect for our country or its institutions.


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IRRIGATION UNDER THE CAREY ACT IN CONTRAST WITH GOVERNMENT RECLAMATION.

BY WALTER H. GRAVES.

The reclamation of the arid lands of the United States by irrigation has been in progress now for more than half a century and during that period many valuable lessons have been learned by those engaged in the field of irrigation. Of all such lessons perhaps none has been so thoroughly taught by experiment and learned by experience as that concerning the relationship existing between the land and the water in the proper administration and successful operation of an irrigation scheme.



Mr. Walter H. Graves.
Boise, Idaho.

In the final analysis in differentiating between success and failure in any irrigating project, it will be found that the land and water are inseparable and must be under one control, and that the owner of the land must also be the owner of the ditch that supplies the water. Any system or scheme of reclamation that contemplates the separation of either the ownership or the administration and control of land and the irrigation system that supplies it with water is doomed to failure, and offers ample provision for future loss and interminable controversy.

Of course this idea of combined ownership and control of both land and conjunctive irrigation facilities implies the obligation of the first cost for the construction of all the necessary irrigation works, and also the expense of operation and perpetuation, which must naturally be borne by the land owners or the beneficiaries.

These statements are easily recognized as irrigation axioms.

The irrigation development of the country began with individual effort. The settler having located his holding under the provisions of the homestead or desert land act, constructed, owned, controlled, operated and maintained his ditch, and this embodied the whole reclamation problem in its simpler form and met all its requirements. The next stage in the process of development involved the first complicating element, namely, the principle of association or unification of effort which was derived from the very necessities of the case, and yet the theory of combined ownership and control of both land and ditch was not called in question.

By this time hydro-agriculture had advanced to a stage where reclamation upon a scale even too great for community effort became a necessity, for it was not to be supposed that the emigrant or settler who found it necessary to seek a home in the isolated regions of the arid domain would have the means or by combining with any number of similarly situated neighbors would unitedly have the means to undertake the construction of the costly irrigation works that would be necessary to meet the requirements of the case.

At this point in the process of reclaiming the arid lands it became apparent that the investment of capital upon a large scale would be required to meet the demands of advancing settlement, and as the demand for

additional land was increasing rapidly the field of irrigation industry began to present inviting opportunities for the investment of capital.

Under these circumstances it was not a difficult matter for adroit promoters to figure out with a pencil and a piece of paper very attractive and alluring investments in irrigation projects.

Many investors were induced to embark hastily in doubtful and ill-considered projects after a most casual and indifferent investigation, only to discover later that their investments had no basis of security whatever.

A popular illusion, and the one that probably was the source of more failures in the field of irrigation investment than any other, was the belief that an irrigation project supplying water to the owners of the underlying lands for hire or for an annual rental at so much per unit could be made profitable.

Other investors were deluded in the belief that a ditch constructed to cover and supply an area or district of unoccupied public domain, and depending upon subsequent occupation and settlement could be made profitable.

The fallacy in the proposition first mentioned lies in the divided control and ownership of the land and water, and I will reiterate the statement for the sake of emphasizing it, that no irrigation scheme can be made a success where the ownership of the land and the ditch are in separate hands.

The source of failure in the second case mentioned, even where the scheme contemplated the sale of the ditch to the water users by pro-rating the shares of stock to the acreage supplied, arose from the fact that the expenses accruing from the interest charges and the cost of operation and maintenance before an income was realized became too great to be borne by the projectors without some basis of credit or security and without some assurance of ultimate reimbursement.

There were enough of these failures to give rise to the very prevalent opinion that most if not all "private enterprise" irrigation schemes were failures, and this assertion is often made—generally for sinister reasons.

There was another class of investors, however, that entered the field and made a more careful and thorough investigation of the underlying principles of investment and security as related to irrigation projects, and who discovered that in a properly designed enterprise and where the land and a conjointly related water right was made the basis of credit there was ample security for whatever investment became necessary to accomplish the reclamation. It was found that the increment in the values created obtained with the reclaimed land and that the detached water-right represented by the carrying capacity of the ditch had no inherent value, or at least no value sufficiently staple and abiding to furnish adequate security for the investment required. The fundamental step with this class of investors was to secure the title to or at least a guaranteed control of a sufficient area of land to justify the expenditure required in the undertaking, and it was generally found that there was a sufficient area of additional land to be reclaimed to make the investment an exceedingly profitable one. A careful examination of the records of irrigation investment will disclose a distinct line of demarcation between these two classes of enterprises. In that class based on speculation in the delivery of water to the land owners perhaps 90 per cent of the undertakings have been financial failures. The other ten per cent

being redeemed by advantageous circumstances or by conditions so exceedingly favorable that they were profitable in spite of their mistaken conception. As to the other class, where the investment was secured by the reclaimed and irrigated land, it was entirely safe to say that not a case of financial failure can be cited, and while this fact came to be generally recognized in course of time, investment in irrigation enterprises began to wane for the lack of suitable opportunities.

It was difficult to find a location where bodies of land of sufficient area suitable for reclamation the title or control of which could be secured as a foundation for such an enterprise. It was probably the recognition of this difficulty that inspired the passage of that congressional enactment now generally known as the "Carey Act," but which was first decreed under the title of "An Act to Provide for the Sale of Desert Land in Certain States and Territories," approved March 3d, 1877, and subsequently modified by amendments passed in 1894 and in 1897, which constitutes the law as it is now in force and operation.

Briefly stated this law provides for the cession or grant to certain States, in which there may be situated desert lands, one million acres of such desert lands to each State under certain conditions, the purport of which is that the land is to be reclaimed and occupied by settlers in tracts not to exceed 100 acres each and such reclamation to be completed within ten years from the date of entry. The gist of the law, however, is that provision whereby a lien is authorized to be created by the State to which such lands are granted against all the lands reclaimed for the cost of such reclamation together with a reasonable interest thereon until the State, or its agent, shall have been reimbursed. This provision enables the State to offer the investor a substantial and satisfactory security for the money required in the construction of the necessary irrigation works. When the State shall have submitted satisfactory proof that the land has been occupied in good faith and that a sufficient supply of water has been furnished to reclaim the same, the Secretary of the Interior shall then issued to the State a patent for the land, which in turn is issued to the settler upon the payment of 50 cents per acre, which money goes to the State as a trust fund to be applied to the reclamation of other desert lands. When this law was passed few, if any, of the States to which it was applicable were in position to avail themselves of its benefits.

To carry into effect the terms of the law required much new State legislation and the creation of the necessary administrative machinery and a number of years elapsed before the real import and the benefits of the law came to be generally recognized and understood, and it is only within the last few years that the stamp of popular approval has been placed upon this act of propitious legislation.

Those most familiar with its practical operation, and who have had the best opportunity to study its scope and field of usefulness are its most enthusiastic advocates and predict that in the end the development of the State will be better promoted and the interests of the communities concerned better conserved through the agency of the Carey Act than through the National Reclamation Act.

Without effort or expense the national government passes over its desert land to the settler with all possi-

ble assurance that it is being improved and made productive, and thereby contributing its share to the public welfare. It transfers the responsibility of providing the means for reclaiming the land, protecting the investor who furnishes the money for accomplishing this and also of safe-guarding the interests of the settler, to the State which is the proper custodian of this responsibility.

While it may be admitted that the national government has some measure of responsibility in securing the best results in the utilization and reclamation of its public domain, it has by indifference and negligence shirked this responsibility so long that other agencies more directly and intimately concerned have acquired a vested right in that responsibility. The pioneers in the field of irrigation after struggling with the most adverse conditions and hardships, and after expending hundreds of millions of dollars, have created conditions, developed communities, established systems of local laws and have acquired a practical knowledge and experience that entitles them to a prior right in the exercise of jurisdiction and control in the work of reclamation. Therefore any plan or scheme that seeks to transfer the control and administration of irrigation affairs from the several States to the general government at Washington is regarded as an encroachment upon the rights of the State and an interference with individual prerogative acquired under local custom and law and meets with more or less hostility on the part of those largely interested in irrigation affairs.

The popularity of the Carey Act arises from the fact that it seems to conserve to the best advantage all the varying interests involved in the problem of reclamation.

Procedure under the Carey Act of Idaho is as follows:

An association, a corporation or a community of settlers may apply to the State Board of Land Commissioners for the segregation of the area of public land that it is desired to reclaim. In doing this it is necessary to file with the board a statement, accompanied by maps, plans, etc., showing the source of the water supply, its character and the manner of its diversion, a description of the works proposed, an estimate of the cost, the price per acre that will be charged for a water-right and the legal sub-divisions to which the water is to be applied and such other information as the board may require for a full and complete understanding of the case. The application is then submitted to the state engineer for investigation, and if reported upon favorably the board then considers it in relation to its various legal requirements, and if it meets with all of the state requirements it is then sent to the secretary of the interior, with the request that the land be segregated and placed under the provisions of the Carey Act, and it again passes under official scrutiny. If favorably received by the interior department the State Board enters into a contract with the parties interested for the construction of the works. This contract provides not only for the construction, which must be done under the supervision of the State Engineer and to the satisfaction of the Board, but it also provides for the payments by the settlers, as the works will belong to the settlers when finally paid for, the time for final payment being ten years. The control and administration of the works shall remain in the hands of the construction company for such a time as may be pre-

scribed by the board, when it shall be turned over to the water users.

For the purpose of securing the necessary money the construction company is allowed to mortgage its equity in the project, the security, of course, being the contracts with the settlers for the purchase of the water-right, which in reality is the price the settler pays for his land, with his proportionate share in the ditch. The only conditions imposed upon the settler are that he shall occupy and improve his land until he secures his patent, which he may obtain at any time when he completes his payments, and that he is limited to the ownership of 160 acres until the project passes out of the control of the state and into the hands of the settlers, when he can purchase the entire settlement if he has the ability and means for doing so, as every American citizen claims the inalienable right to acquire and dispose of property without supervision, restriction or hindrance, providing, of course, he does it in an honest and legitimate manner.

All things considered, a more satisfactory plan or scheme for reclaiming the desert domain could hardly be devised.

The total acreage embraced in the various Carey Act projects already accomplished and now under way in Idaho is about 500,000, and probably another 500,000 acres would have been in process of reclamation by now had it not been for the encroachments of the National Reclamation Service and the withdrawal by the Government of practically all the remaining irrigable lands of the state, amounting to nearly four millions of acres.

The total number of reclaimed desert accredited to the Carey Act in all the various states would probably amount to several million acres, notwithstanding the fact that it has never been found necessary to maintain an energetic "press bureau" or extensive advertising agencies to advocate its merits or proclaim its achievements.

Let us now consider briefly the National Reclamation Law and the plan of its operation in contrast with the Carey Act. It has been in force now nearly four years—certainly a sufficient length of time for the officials in charge of its execution to have formulated a plan or scheme of operation.

In making these comments I do not wish to be understood as offering any protest against the National Reclamation Law, for there is no reason to suppose that it will not eventually accomplish results largely to the advantage of the western states, but rather to invite attention to certain phases of its interpretation and methods of its execution, and also to the obvious purpose and laborious effort of some of the officials charged with the responsibility of its execution to employ it as a means of personal aggrandizement and advertisement, thereby lowering the dignity of the law and serving to cheapen it in popular estimation.

It is difficult to judge as to the manner of determining the site for a government project. Presumably the selection is made at the instigation of private interests or by the favor of the official in charge. However it may be, the selection is made and procedure begins in most cases by the organization of a "Water Users' Association," which every land-owner living in the district to be reclaimed—and most of the projects are located in districts already more or less occupied—is required to join, and the methods employed to force the land owners into these associations

in most instances are certainly open to criticism. This is the first step in the sacrifice of personal liberty and voluntary action that characterizes the idea of government irrigation control.

The conspicuous feature of the Water Users' Association is that the subscriber is required to convey through it to the Secretary of the Interior a lien or mortgage on his property, or the property that he may acquire through the exercise of his homestead right. The object of this is to furnish the means of enforcing obedience to all and whatever requirements that may be deemed proper or expedient by the officials in charge, and to force the payment of whatever charge or expense that may be assessed against him. Up to this time it is impossible to form any idea as to what the charges that will probably be assessed against the land reclaimed may be. There is every indication that the reclamation service will fully sustain the reputation of the government for expensive construction, for it must be remembered that not only the actual cost of construction, but all incidental expenses of whatever sort (including innumerable trips of an army of employes across the continent) must be charged to the various projects and eventually dug out of the ground by the settler. In the aggregate these incidental expenses would amount to a very respectable interest charge upon the money invested in a Carey Act project.

It does not matter, however, for whatever the cost may be it will have to be paid by the water-user, and it will have to be paid when due, for there is no possible way of escaping it or deferring it until he can dispose of his crop, or until he make a turn to raise the money in case of a crop failure. He certainly cannot mortgage his land, as the government already holds a mortgage upon it. He must meet this payment when due the first year as promptly as he is expected to do it in the tenth year, however hard he may have struggled to make his sage-brush land produce something to live upon, much less than raising a crop that will enable him to meet his payments.

To illustrate: Supposing a settler entered a 160-acre homestead tract under a government project, and assuming that the cost of his water amounted to \$3 per acre—the average estimated cost—his annual payment would be \$480, and add to this his maintenance assessment, estimated at \$1.50 per acre, his total annual payment would amount to \$720. Before he could expect to make this amount out of the land it must be fenced, cleared of sage brush, plowed, supplied with irrigating ditches, etc., and sown to crop, and this much would have to be done in any event, but it is fair to presume that he would have to have a house to live in, a barn for his stock, a well, and a suitable supply of farming equipment. Uncle Sam is popularly supposed to be a benevolent being, but he is inexorable when it comes to enforcing his laws, and his benevolence and generosity cannot be relied upon in this case. To enter into a reclamation project contract with him under these circumstances is a hazardous undertaking, unless the settler is supplied with a capital of at least \$5,000 to start with.

Presuming that this settler and his neighbors constitute the community under a three million dollar project (and this is a modest estimate judging from the official reports), they would have to raise annually \$500,000 to be sent to Washington. Is there any farming community in Idaho that can raise three millions of dollars to be sent out of the state, even in ten

years? It would bankrupt Boise Valley to do it with all of its acquired wealth.

Another condition that the water-user subscribes to when he joins the association is that he agrees not only to personally occupy and cultivate his land, but to continue to abide there. He cannot hire any one to take his place, nor can he rent it to another, and, moreover, he agrees to limit his property holding to whatever acreage the government prescribes for him, which may be any amount from 10 acres to 160 acres. The only way to escape this restriction or bondage is to sell out to some one qualified and willing to take his place and move to a Carey Act project.

The reclamation plan contemplates the election of a board of directors by the water users' association, which shall manage the affairs of the association, but their acts will always be subject to the approval of the Secretary of the Interior or his agent, which is to say that the actual management and the administration will remain in the hands of the reclamation bureau.

The ownership of the ditch, or whatever the works consist of, will always remain in the government, which means, of course, the control of the works will always remain in the hands of the government's agents, and the relationship of the water-user will be that of "renter" rather than a co-owner, as in the Carey Act project.

Nearly all of the western states have devised a code of irrigation laws based upon the principle of state ownership, therefore state control, of all the sources of water supply. These laws are so related and interwoven with all the affairs of the state polity that they are practically fundamental to the entire system of state jurisprudence. These laws have been framed to suit the local conditions that exist in each state, and are too diverse to be harmonized or adjusted to suit any system of national control or administration, and any plan or theory advanced that would threaten to revoke or revolutionize these existing systems and the existing rights based thereon, would certainly meet with popular disfavor. Therefore, it is entirely safe to say that the state will always maintain an administrative control of its water supplies.

It is difficult to conceive how conflict of authority can be avoided where the state is in control of the water supply and the national government is in control of the irrigation system.

There are other phases of the national reclamation act that appear to present problematical difficulties that call for consideration, but it would be tiresome to refer to them at this time.

This is a time of popular acclaim for the reclamation act. It is a far-reaching and beneficent experiment on the part of the government, and it is to be hoped that its ambitious and over-zealous sponsors will not attempt to make it overshadow and obliterate the other factors in the field of irrigation industry—the Carey Act, for instance.

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WILL RECLAIM LARGE AREA.

The thriving little village of Shiocton, Outagamie County, Wisconsin, known to fame as the home of Eben E. Rexford, a writer on floriculture and author of the now famous song, "Silver Threads Among the Gold," is about to become doubly famous as the "Garden City," for at its eastern border is a large "marsh" of about 4,000 acres, containing a deep rich deposit of black soil, especially adapted to the culture of vegetables of the following varieties: Celery, onions, sugar beets, cucumbers, asparagus, cauliflower, potatoes, strawberries and bulbs.

The surrounding country has reached a high state of cultivation and is held at more than \$100 an acre, its high class of improvements outrivaling any district in America, and the numerous thriving cities in

beautiful tract and fit it for its higher uses. The matter was brought to the attention of Frank A. Bridge, president of F. A. Bridge & Co., 140 Dearborn street, Chicago, Ill., and other banking institutions.

Mr. Bridge, whose picture appears below, is known to his many friends as a man of indomitable courage and possesses that stern, unswerving determination that brings things to pass. He has unmistakable fitness as a leader of men and, although only thirty-five years of age, possesses all of the qualities that entitle him to a place in the front ranks of "captains of industry." Mr. Bridge set about to drain this tract and create of it a district of especial merit. Believing always that mistakes are better avoided than corrected, he engaged the services of the eminent hydraulic engineer, Thomas T. Johnston, to determine whether or not it could be drained.



Frank A. Bridge, Banker, Pres. Shiocton Garden Land Co.

the Fox River valley, with their many manufactories, are indisputable evidence of the value of the soil. This so-called "marsh" has, up to the present time, lain unmolested by man, except to furnish in spots hay in dry seasons.

Nearly two score of persons possessed the legal title to the tract and at no time has there been a concerted effort on their part to drain the land. It remained for one man to think out a plan to drain this

After ascertaining that the project was entirely feasible from an engineering standpoint, the titles were gone over thoroughly by the Hon. Thomas E. Milchrist, ex-United States district attorney for northern Illinois, counsel for Mr. Bridge, and finding the titles in every way perfect, Mr. Bridge set his associates about to secure options on the entire tract. In this he succeeded and a corporation was formed, under the Wisconsin laws, to be known as the "Shiocton Garden

Land Company," to take over titles to this tract of land.

The officials of the company are: President, Frank A. Bridge; vice-president, Fred R. Aukes, postmaster, German Valley, Ill.; secretary, Norris V. S. Mallory, and Henry W. Coffman, of German Valley, Ill., treasurer.

The directors are Mr. Bridge, Henry W. Coffman, Lewis Fosha, Fred R. Aukes, Norris V. S. Mallory and A. H. Wieman.

A contract was let to the Hartford Construction Company of Chicago for the excavation of about nine miles of canal. Two large steam dredges have been employed in the work. The main ditch is twenty-four feet wide on top, eight feet deep and eight feet wide at the bottom. The outlet will be into Wolf river, which flows through Shiocton and is navigable for

THE STATE OF OREGON.

An Outline of Its Topography, the Range of Its Agricultural Productions and Resources.

By R. L. ROWE.

Oregon is one of the big commonwealths of the Union, being eighth in size (not including Alaska) of all the states and territories.

It has 96,560 square miles, which is nearly three times the area of Indiana. It had a population in 1900 of 413,536, and by the end of 1905 this number had increased to 550,000, as estimated by the governor. It may justly claim 600,000 people with the end of 1906.

The Cascade range of mountains runs from north to south so far as to cut off about one-third of the state at the west end. The Coast range of mountains makes



What Celery Will Do on "Shiocton Marsh."

medium-sized boats at this point. The lateral ditches are somewhat smaller.

Mr. Matthew Crawford of Cuyahoga Falls, Ohio, a well-known horticulturalist, who investigated the soil conditions of the "marsh," will establish an experimental station for the demonstration of the soil's peculiar adaptability to the raising of different vegetables, and it is the purpose of the company to produce the highest quality of vegetables for direct sale to the leading hotels of the country. Mr. Crawford will also raise bulbs and flower seeds in large quantities for J. C. Vaughn. His present contract is for over 2,000,000 bulbs.

When thoroughly drained, the company purposes to retail the land in small tracts for truck gardeners, its location being the center of a vast market for this kind of produce. Its railroad facilities and nearness make it possible to reach Chicago, Milwaukee and other points with perishable produce in a few hours.

a high run along the west side of this third, close to the Pacific ocean. The valley between these ranges is one of the garden spots of Oregon or any other state. It begins near Portland and continues southward for about 125 miles, when it is broken up into smaller basins by narrowing of the space between the ranges.

The first 100 miles would probably average fifty miles in width between foot hills, and is a land of beauty, of high rolling farms and orchards, level as well as undulating fields, interspersed with picturesque groves, traversed by numerous rivers and smaller streams flowing from the mountains into the central drainage aqueduct, the Willamette, a handsome river navigable for nearly 100 miles above Portland.

IS LAND OF GREAT FERTILITY.

This Willamette valley of 5,000 to 6,000 square miles—larger than Connecticut—will, in a future not very distant, support in prosperity at least a million

people. It will grow great crops of hops, wheat, oats, barley, hay, corn, apples, peaches, cherries, grapes, strawberries, and other fruits, vegetables of a high grade, besides being an excellent stock and poultry country. It is never very cold nor extremely hot.

Along the mountain ranges on either side are magnificent forests of merchantable timber, representing many billion feet. In the southern end of these ranges, especially the Coast, are rich deposits of gold and other minerals. Some bituminous coal also exists. The waters of the Columbia river is one of the great salmon fishing fields of the West coast region.

EAST OF THE CASCADES.

East of the Cascade range, near the Columbia river, right in the shadow of Mount Hood, is the fa-

the soundest, best flavored apples that go to the American markets—in fact, they are frequently shipped all the way to London, England. The Grande Ronde valley yields various other farm products.

Southwest from the Grande Ronde basin is the Baker City wheat and fruit region. Rich gold mines exist in the Blue range west of Baker City. Hundreds of thousands of sheep are pastured in the mountains in this corner of Oregon. Considerable timber exists along the mountain slopes.

GREAT AREAS OF ARID LANDS.

The south end of this east half of Oregon is used mainly as a stock range, as it lacks the water for reclamation. It is an expanse of territory big as several states. Indeed, one county, for instance, located in the



Shiocton "Marsh" Produces Immense Crops of Garden Truck.

mous Hood river fruit district, where some of the soundest, choicest apples and strawberries produced in the West grow. Farther south, about the center of the state in a north and south line, is being developed the Des Chutes River Irrigation system, or several of them, which will result in the reclamation of large bodies of rich and productive land. The water is taken from mountain streams that never fail.

Still farther south is the noted Klamath Lake district where another extensive irrigating system is being worked out. There is a large amount of fine timber along the eastern slopes of the Cascade mountains.

Pendleton is a prosperous city situated in the north end of the east section, possessing about 6,000 population. It is in the midst of the great wheat region which extends northward into the state of Washington. eastward, in a basin formed by the Blue mountains, is the Grande Ronde valley, named from a river that arises in the mountains and flows down through it. This valley is a picturesque spot, and grows some of

southeast corner, Malheur by name, has an area of 9,784 square miles, and is larger than Vermont, twice the size of Connecticut. Harney county is still bigger, and Lake and Cook are nearly as large—say each is six times the area of Rhode Island!

"Is this land worthless?" is a natural inquiry. Up in Crook county big crops of wheat are grown and much of the soil is excellent for farming. Southward it varies, some of it being cultivated, large portions being too dry for cropping without irrigation, and there are no water supplies. Other areas are hardly worth an attempt at reclamation. But in the future means may be found—artesian wells, for instance—for making a large percentage of what now seems waste lands bloom with vegetation.

There are many opportunities for homeseekers in Oregon. Those who can afford it would do well to investigate the conditions there. This magazine may refer more in detail to the progress and possibilities of the state during the coming year.

DANIEL WEBSTER'S MISTAKE.

Arriving there after his ride of 3,000 miles across the continent, Dr. Whitman immediately sought the then Secretary of State, Daniel Webster. He described to him the vast empire lying west of the continental divide, the Columbia river, with its magnificent forests and its valleys, second to none in the world, in their fertility and beauty. He told him, clearly and graphically of the land whence he had come. What was the reply that he received? Taking from his pocket a two-cent piece, Webster balanced it on his forefinger and answered that he would not give it for all the territory to the west of the Rocky mountains; that the United States embraced then more territory than they could properly care for; that they held more Indians already than they could properly look after; that it would cost more to fortify the

about twelve hundred set out for the Columbia valley. Were there ever more gallant pioneers? They took with them about four hundred head of horses, oxen and cattle. They took, of course, their wives and their families. Let Oregon never forget them! All that she is she owes to these brave men and women, and the little children that went with them.—Charles Willard Coe, in *Sunset Magazine*.

LEVELING INSTRUMENTS.

The following letter from the State Agricultural College of Colorado, Department of Agriculture, Fort Collins, Colorado, is self-explanatory:

October 9, 1906.

Bostrom-Brady Mfg. Co., Atlanta, Ga.

Gentlemen—We have your valued favor of the 2d inst., together with your circulars describing your



Dredging Operations on Shiocton Marsh.

Western coast of the Pacific and the "Great American Desert" than they would ever be worth; that he understood the Rocky mountains were an almost impassible barrier. Dr. Whitman assured him that, with his wife and companions he had gone in a wagon across the continent; that in the judgment of himself and those with him, the United States should colonize and own what he had described; and that the fifty-ninth parallel extended to the Pacific ocean should be the nation's northern boundary. Like all men whose judgments are predetermined, Webster was not impressed. What a wakening he would receive today, could he be recalled from his grave! Dr. Whitman then addressed his appeal to the President, who was more inclined to listen. Whitman had sacrificed too much to be easily put aside. Finally, the authorities consented that he should take all the emigrants who would follow him to Oregon. Before the spring had drawn to an end

leveling instruments for farm purposes. I will state that the past three years I have been in connection with the Farm Mechanics Department of the Iowa State College, and remember that we had in connection with our farm leveling department two levels of your manufacture. I will state further that I taught the work in the farm drainage at that institution, for the past three years, and required our students taking drainage work to use your levels. We found they gave very good results.

We frequently get inquiries in regard to cheap makes of levels, and we are certain from the experience we have had with your levels at other places that we can recommend them for almost any class of farm work. We are

Yours very truly,

H. M. BAINER,

Prof. of Farm Mechanics.

A CORRECTLY PROPORTIONED DITCH.

The Requisites in a Ditch to Form a Permanent Waterway.

Land reclamation, whether it be the removal of hydrostatical, or excess, water from the soil in humid climates or conveying water to the land in arid regions, involves primarily the construction of ditches or canals. In lands too wet for cultivation, even when reclaimed by an underdrainage system, the outlet is nearly always by means of an open ditch and since means for the removal of the water from the end of the drain must be provided before laying the tile, the first consideration is the outlet ditch. In irrigated districts ditches are not only required to deliver the water to the land, but, experience has proved, they are also necessary to remove the surplus water else the productiveness of the soil is quickly destroyed by the accumulation of alkali. What constitutes a perfect ditch, therefore, ought to be of special interest to every one interested in land tillage. The velocity of water flowing in an open ditch

gives the following table of mean velocity of water at different depths in a rectangular ditch 10 feet wide with a grade of 3 feet to the mile.

Depth in Feet.	Mean Velocity in Feet per Second.
0.5	1.4
1.5	2.3
2.0	2.6
2.5	2.8
3.0	2.9
4.0	3.2
5.0	3.4
6.0	3.6
8.0	3.8

While the above table shows the more rapid flow of deep ditches, it is manifestly not the proper shape for a drainage ditch for several reasons. It is desirable in a ditch for drainage purposes that the current shall scour the bottom sufficiently to prevent the accumulation of silt. When flowing only 6 inches deep and 10 feet wide it is obvious that the friction of the large surface over which the water is spread will so retard the flow that all silt will be deposited on the bottom and



Fractional Map of Wisconsin. * Indicates Location of Shiocton Garden Land Company's Property.

depends upon the grade, the depth of the stream and the character of the banks and bottom. Drainage engineers recommend that a ditch be of sufficient size that it will flow only four-fifths full at flood height. If the flow were constant a rectangular shaped ditch would have greatest capacity, but since the quantity of water carried by all drainage ditches is variable and nothing but solid rock will stand when the banks are vertical, a perfectly shaped drainage ditch is one whose bottom has the shape of the arc of a circle and with banks sloped to an angle which enable them to withstand the action of the elements. In fine clay soils this is usually 1 to 1. In loose, loamy or sandy soils slopes of 1½ to 1 or 2 to 1 are usually required.

In engineering for land drainage, Mr. C. G. Elliott

rapidly fill the ditch. It is also evident that where a ditch is made with vertical sides the banks are certain to cave through the action of frost and erosion, not only obstructing the waterway, but through deflection of the current from side to side the distance the stream must flow is increased and as a consequence diminishes the grade. It is also well known that once an irregular channel is formed, the tendency of flowing water is to increase the deflected movement undermining the banks and adding to the quantity of silt in the stream.

In laying out a drainage ditch, therefore, the first consideration should be that the banks are sloped to an angle that will enable them to withstand the action of the elements and the ditch should be as deep as practical with the available outlet. When the grade is

sufficient to admit of a deep waterway a drainage ditch should be from 6 to 12 feet deep and the ditch should not be over 4, 6 or 8 feet in width on the bottom, except where a ditch of unusually large capacity is required. By digging a deep ditch, narrow on the bottom, the velocity of the flow is increased, making the ditch self-cleaning and where land is underdrained a free flow of water is obtained at the mouth of the tile preventing the underdrainage system being choked with silt.

the solid strata of the earth and it is therefore obvious that if a ditch can be shaved out of the virgin earth and the excavated soil removed to such a distance that it will be prevented from being returned through the action of frost, erosion or wind and banks and bottom left perfectly smooth and true to grade, the best ditch possible to produce in earth construction is obtained.

Several State engineers have made many specifications for ditches calling for a width of bottom of from 8 to 12 feet and a width of berm of only 4 feet and many persons have understood this to be the engineers' recommendation of a perfectly shaped ditch, however, they have invariably acknowledged that these specifications did not produce a ditch of perfect form, but were made to enable them to be constructed by ditching machines, which could not produce a narrower bottom or wider berm.

It is obvious that where a ditch is excavated with practically vertical banks and a large quantity of the excavated earth is piled immediately adjacent to the ditch that this added weight increases the tendency of



Rear view of Austin Drainage Excavator, showing perfect slope of banks and wide, clean berms.

In excavating the ditch it should be done in a manner that will enable it to be made perfectly true to the engineer's specifications, the banks and bottom must be made as firm as it is possible to make them and the waste banks must be constructed at a distance from the ditch that will prevent them being returned through the action of the elements.



Ditch 12 feet deep, with 4-foot bottom and $1\frac{1}{2}$ to 1 slope built by the Austin Drainage Excavator in Cass County, Ind., illustrating ditch that is perfectly self-cleaning where there is a variable flow of water.

banks to cave and it is only a question of a few years at most until a large proportion of the excavated soil will be returned to the waterway. To obtain a perfect ditch the banks must not only be shaved out of the solid strata of the earth to an angle that will prevent tendency to cave, but a berm of from ten to fifteen feet is required to prevent the excavated earth being returned to the ditch.

We are illustrating herewith ditches excavated by dipper dredges and the Austin drainage excavator, showing the machines in operation, the results obtained in the new ditches and other illustrations showing the conditions of ditches made by these different methods when one to three years old. Two views of the Austin drainage excavator in operation are shown, one a front view illustrating the manner in which this machine propels itself forward or backward by means of a track placed on each side of the ditch enabling it to operate in either direction. The other view, taken from the rear, shows how this machine shaves out a ditch from the solid strata of the earth, slopes the bank to any

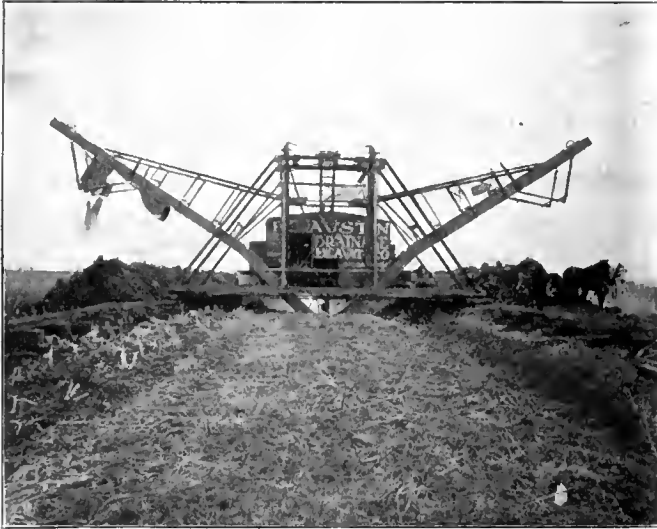


Photograph of a ditch one year old constructed by the Austin Drainage Excavator, demonstrating that ditches constructed in this manner maintain their original shape and become permanent waterways.

No system of excavating an irregular channel and grading down banks and bottom to the desired slopes can produce a ditch with as firm banks and bottom as

angle, leaves both banks and bottom perfectly smooth and delivers waste banks at a distance from the ditch, producing broad, clean berms which prevent the spoil banks being returned to the ditch.

A photograph of a ditch made by this method in central Illinois, which was one year old at the time the view was taken, fully demonstrates that if a ditch be made in this manner, resistance to the flow of water in all parts of the banks is equal, and as a consequence there is no tendency of the banks to cave, the current is not deflected from side to side and the ditch becomes a permanent waterway of its original maximum capacity.



Front view of Austin Drainage Excavator in operation, showing manner in which machine rests on track on both sides of ditch.

A view of a dipper dredge is shown operating in central Illinois only two miles distant from where the Austin drainage excavator illustrated was at work and soil conditions in the two ditches were identical.



View of a dipper dredge in operation, showing the vertical banks and waste bank constructed immediately adjoining ditch.

This style of dipper dredge requires water in which to operate and as a result the exact form of the excavation cannot be determined until the ditch is completed.

This machine can only construct practically vertical banks and it will be seen in the photograph that the waste bank is delivered in a position where a large portion of it is certain to be returned to the ditch. This condition is also shown in view of a new ditch constructed by a dipper dredge and illustrates why ditches dug by this method require reconstruction within a few years' time. In the view of a comparatively new ditch made in northwestern Iowa by a dipper dredge it will be noted that the banks have caved practically throughout their entire length, portions of the banks have been carried to the center of the ditch, obstructing nearly the entire channel, and it is evident that this entire ditch will require reconstruction in a short time.

In the ditch building in Cass County, Indiana, by the Austin drainage excavator and which is twelve feet deep with a four-foot bottom and a one and one-half to one slope, if carrying a variable quantity of water and a minimum flow were equal to six inches of water in the rectangular shaped ditch, with a ten-foot width of bottom in Mr. Elliott's table given above, it is obvious that the water in this ditch would have more than double the depth and consequently more than twice the velocity as the same amount of water in the rectangular shaped ditch and this ditch will therefore be self-cleaning under conditions which would make the rectangular ditch fill rapidly with silt.



An illustration of a three-year-old ditch built by dipper dredge in northwestern Iowa, showing banks caved practically throughout their entire length and demonstrating why ditches built in this manner require frequent reconstruction.

We are illustrating a perspective of the Austin drainage excavator constructing a ditch eight feet deep with a six-foot width of bottom and showing the slope of banks, width of top and width of berm when the ditch is made by this method with a one to one slope and also with a one and one-half to one slope. It will be noted that since the excavating bucket travels in a steel guideway transversely of the ditch, and as the entire guide frame is lowered as the ditch increases in depth, a bucket in excavating shaves off a thin slice down one side, across the bottom and up the opposite side and travels out on the opposite arm to discharge its load. By this method of excavating the entire machine is under perfect control of the operator at all times and it is possible to shave off a fraction of an

inch the entire width of the ditch, enabling one to make a ditch absolutely true to the engineer's specifications.

The same principle that applies to the construction of drainage ditches is also true of those made for irrigation purposes except that it is not desirable to have an irrigation ditch with so great a grade. By shaving out an irrigation ditch from the solid strata of earth, leaving banks and bottom perfectly smooth, the banks remain firmer than when constructed in any other manner, and as a consequence there is less seepage. In districts where water carries silt possessing cementing qualities, if the ditch is perfectly shaped and the wetted perimeter is perfectly smooth, a very small quantity of this silt will cement the ditch, making it practically impervious to seepage, an advantage that can hardly be overestimated when it is taken into consideration that there are many irrigated ditches in the West which 75 per cent of all water turned into the ditches is lost through seepage in the mains alone.

Agricultural scientists are constantly devoting greater attention to the subject of ditches. The success attained in reclaiming the 150,000,000 acres of arid lands and 1,000,000 acres of swamp lands in this country, which it is estimated can be converted into fertile areas, depends almost entirely on the construction of ditches. It is not, however, in the reclaiming of the present worthless lands that the country will derive the greatest benefit from the construction of ditches. There is scarcely a county in the humid section of America in which land already under cultivation cannot be increased in productiveness from 25 to

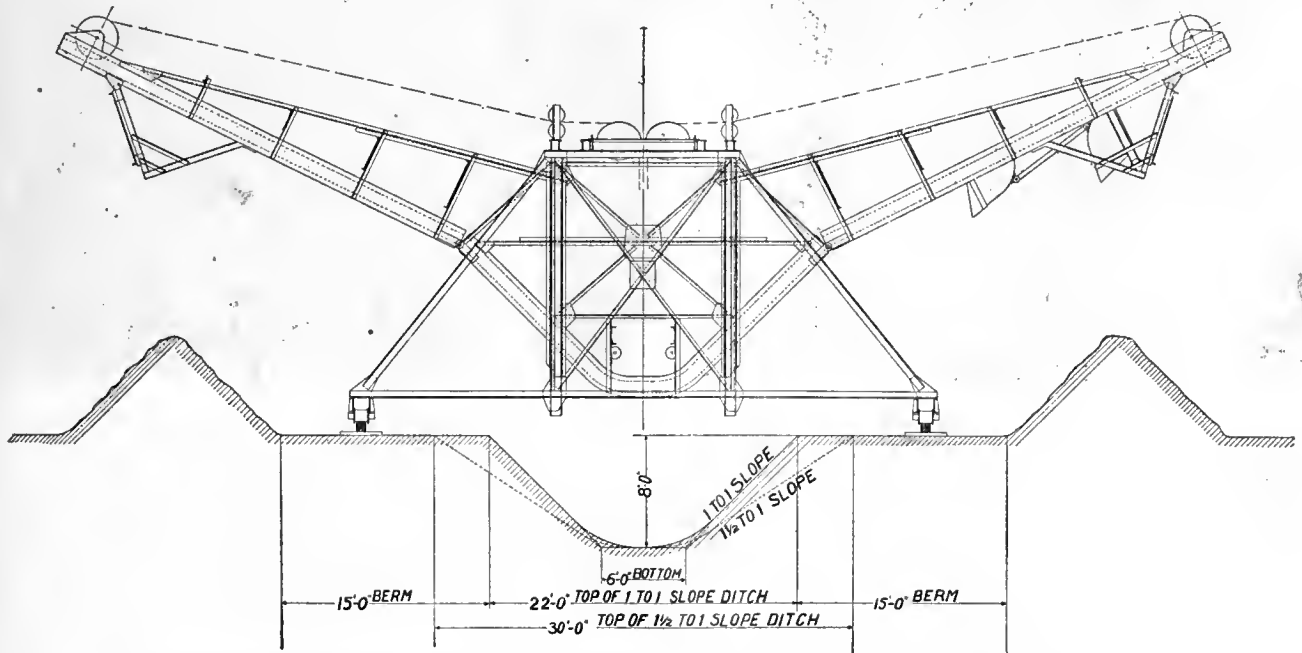
the state for drainage. It is probable that the wet lands of Iowa are proportionately not greater than in most central states. How to make a perfect waterway,



A recently constructed ditch built with dipper dredge, showing the vertical banks and waste banks constructed immediately adjacent to the ditch and demonstrates why ditches constructed in this manner cave and are filled by erosion in a short time.

therefore, ought to be of the greatest interest to every one interested in the improvement of agricultural lands.

The initial expense of reclaiming these lands by scientifically correct ditches is not greater than excavating irregular channels with no thought of Nature's



Perspective view of Austin Drainage Excavator excavating a ditch 8 feet deep and 6 feet on bottom, showing shape of ditch and width of berm when banks are sloped 1 to 1; also shape of ditch with same width of bottom when banks are sloped 1 1/2 to 1.

50 per cent through the construction of ditches combined with underdrainage.

The drainage engineers of Iowa State College, at Ames, Iowa, estimate that in that state 41.7 per cent of all agricultural lands are without adequate drainage and that \$406,235,500 could be profitably spent in

laws and in the one case the first cost represents the entire expense of producing a permanent waterway, while in the other an irregular channel is dug which becomes rapidly choked by caving banks and accumulated silt and cost of maintenance will in a short time exceed original expense of construction.

RECLAMATION SERVICE NEWS.

The Colorado River Trouble.

In response to inquiry, Mr. F. H. Newell, Chief Engineer of the Reclamation Service, stated that so far as he was aware no official action was under consideration with reference to the situation on the lower Colorado River. It is assumed that the California Development Company, with the assistance of the Southern Pacific Railway, will repair the recent break, and that with the experience had it would be possible to put the river back in its proper channel with little delay and relatively less expense than before. The equipment is on the ground and the men and materials are presumably available.

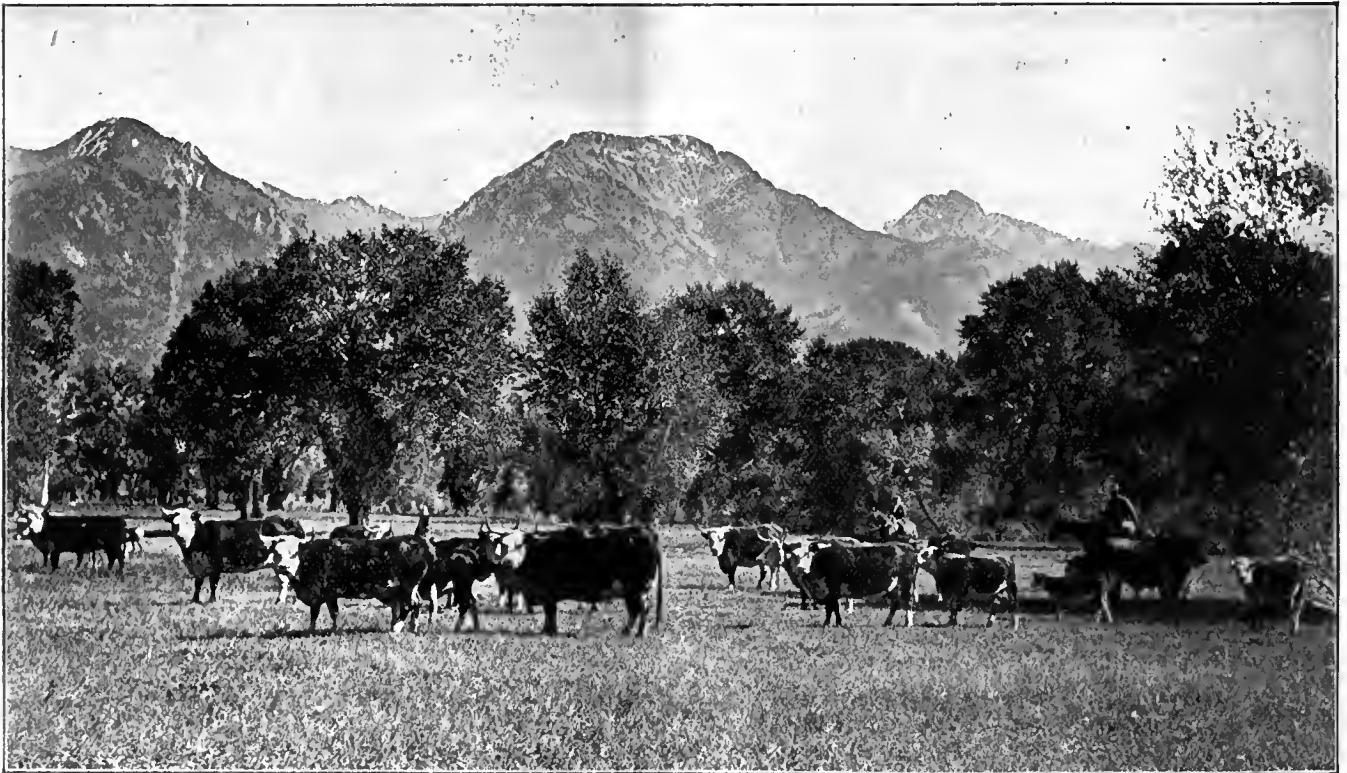
As regards the future permanence of the work, this is a point which is serious, but it is believed by the engineers on the spot that the dikes can be built in such manner as to be secure. On the opposite side of the river from the broken dikes the Reclamation Service has built similar dikes which have stood recent floods and which, with occasional repairs, give promise of being fairly secure.

On being asked whether the Government would not immediately go to the aid of the threatened settlers, Mr. Newell

and no authority. The government officials are watching the developments and assume that the owners of the canals will get together within a few days and, presumably with the backing of the Southern Pacific Railroad, push forward the repair of the break in the river bank. The railroad has such great interest at stake, not only in the preservation of its main line, but in the business from the Imperial Valley, that it obviously cannot afford to see millions of dollars of property and securities go to loss.

Prompt action must be taken in order to close the break before the regular spring rise. There is no time for delay and even if Congress should act promptly, which it probably will not, it would be impracticable to proceed excepting with the equipment already belonging to the railroad company. In other words, if the exigency is to be met, it must be through the agencies already on the ground.

The officials have granted authority to the Reclamation Service to construct by force account a canal approximately three miles in length, to be used in connection with the power plant to be constructed for the generation of electricity at the mouth of Spanish Fork River, Strawberry Valley irrigation project, Utah.



A Herd of Thoroughbreds in a Colorado Valley.

stated that he did not see how this could be done without an act of Congress and an especial appropriation of some \$2,000,000. The work must be done on Mexican territory, and some form of convention or treaty must officially be had before Government officials could cross the line. On the other hand the employes of the railroad or of the canal company could do so without further formalities.

As to the probability of obtaining an appropriation or authority from Congress, this seems very remote. The members of Congress who have taken most interest in the matter express doubt of the probability of Congress making an appropriation, and, in fact, appear to hesitate to introduce any bill to this effect, believing that even the introduction of a bill might serve to complicate matters by forming an excuse for the present owners to throw up their hands. If it could be said that the Government might undertake the work, the responsible parties would unquestionably take refuge behind such a statement.

Mr. Newell further stated that the Reclamation Service had nothing to do with the matter, and, beyond expressing deep sympathy, was powerless, as it had no available funds

Uncompahgre Difficulties.

A telegram from Montrose, Colorado, recently contained the information that water had been struck in the west end of Gunnison Tunnel, Uncompahgre Valley irrigation project, and is flowing into the works at the rate of about 4,000,000 gallons per day. Work will necessarily be suspended until means have been devised to carry off the flow and the water is under control.

Most satisfactory progress has been made on this tunnel since the work was taken over by the Government, and it is now considerably more than half way through the mountain. It is not probable that this interruption will be serious. The engineers now expect to have the tunnel completed and water flowing through it for irrigation purposes by June of 1908.

Late advices from Montrose state that the water flowing into the tunnel is so highly impregnated with carbonic acid gas that it is impossible for the men to enter the tunnel. The water probably comes from a large underground reservoir which will drain out in time. It may be necessary to blow the gas out by means of pipes.

North Dakota Projects.

"Rapid progress has been made on the several pumping projects in North Dakota," said Mr. F. H. Newell, Chief Engineer of the Reclamation Service, who recently returned to Washington from a visit to the Dakotas and Montana.

"These projects contemplate taking water from the Missouri River for use on adjacent lands. A thorough reconnaissance of the State has been made in co-operation with the State Engineer, Mr. A. L. Fellows, and it has been found that there are very few localities where any considerable area of land can be irrigated in the ordinary way by gravity ditches. There are tracts of from 5,000 acres to 10,000 acres and upward scattered along the stream in the western part of the State, but in each locality it will be necessary to store the water at considerable expense, more than can be considered at present, owing to the distance from lines of railroad.

"A general review of the situation in North Dakota indicates that development through irrigation must be along lines which are somewhat unique, namely, by pumping water from the river instead of taking it out by gravity. It is fortunate that throughout the part of the State where pumping is feasible there are considerable beds of lignite, thus affording a cheap fuel. Taking advantage of this, the Reclamation Service is endeavoring to make a demonstration of the feasibility of procuring water in this way.

"One of the chief difficulties encountered in pumping from Missouri River is the fact that the stream is continually cutting its banks, and thus it becomes almost impossible to locate any structure like a pump on the banks unless enormous expense is incurred in protecting it from the scour of the stream. This is particularly the case where the banks are somewhat low, as they are along the irrigable areas. The engineers of the Reclamation Service have, however, attempted a solution of this difficulty in a very ingenious manner. They are building the power house and placing the heavy machinery for developing power at the coal mines, and are conveying the power by electric conduits to pumps which are located not in substantial buildings on the banks, but upon barges moored to the shore.

"It is the intention during the winter season to draw these barges out of the river and haul them to points where they will be safe from ice gorges and sudden freshets. After the spring floods have subsided the barges can be launched and suitable connections made so that the pumps will deliver the water into several basins located at sufficient distance from the shore to be safe from encroachment by the shifting river.

"The work on construction of settling basins, power houses, and distribution system is well advanced, and it is expected that the machinery will be put to the test in the spring. The difficulty, however, of securing labor and of getting machinery is such that it is impossible to make predictions with any degree of assurance.

"There is a body of land of about 20,000 acres which will be placed under irrigation by gravity. This tract lies in the extreme western end of North Dakota between the Yellowstone and Missouri rivers. This land will be reached by canals which head on the Yellowstone River about twenty miles below Glendive, Montana. The land is of excellent quality, and will be susceptible of a high degree of development.

"Reclamation work in Montana has advanced rapidly in spite of the difficulties of securing adequate labor. Many of the contractors have failed or have been on the verge of bankruptcy owing to the difficulty of securing laborers and the advance in price of the necessities of life.

"On the Huntley project, which is situated on the northern end of the Crow Indian reservation, the main canal and distributing system are nearly completed. About 2,000 small structures have been built for distributing the water, these consisting mainly of headgates, drops, turn-outs, culverts and bridges.

"On the lower Yellowstone, in the extreme eastern end of the State, the headgates of the main canal have been constructed, these being placed flush with the bank of the Yellowstone River in a high bluff, in such position that it is not believed that ice gorges will injure them. The dam on the Lower Yellowstone has been let after much delay, owing to the difficulty of securing favorable contracts. The main canal is reaching completion and a considerable part of the distributing system is also well along.

"On the Sun River work is progressing favorably on the subdivision of the lands and the preparations for early con-

struction. There are a large number of legal questions and matters connected with rights of way yet to be settled.

"On the St. Mary River the canal construction is well under way, both by Indian labor and by machinery. This work is not only of great magnitude, but it is situated at an altitude such that the long winter seriously interferes with rapid progress."

The recent unusual and unprecedented floods in the Cascade Mountains in Washington did but little damage to the works of the U. S. Reclamation Service. The principal damage was to the roads which had been constructed to take in the heavy machinery, and the total loss will probably not exceed \$10,000. The dams being constructed at the mouths of several lakes were but little injured, while the large dam in the Yakima River was not injured at all.

The Government was exceedingly fortunate, as the flood which came down the Yakima Valley was the largest ever known in the history of the country and caused the loss of property probably in excess of half a million dollars. The railroads and power companies were the principal losers. A great deal of farming property was flooded.

It is not expected that the flood will cause any serious loss of time in the progress of the Government's construction work in the Yakima Valley.



Completed Section of the South Side Canal, Uncompaghe Valley, Colo.

The proper officials have executed a contract on behalf of the United States and approved the bond of the Kansas Portland Cement Company, of Iola, Kansas, for furnishing 5,000 barrels of Portland cement for the Garden City irrigation project, Kansas. This cement is to be furnished for \$1.60 per barrel, f. o. b. cars at Iola.

The Secretary of the Interior has granted an extension of time to June 1, 1907, to William D. Lovell, of Minneapolis, Minnesota, for the completion of Division 2, main canal, Huntley irrigation project, Montana.

The Secretary of the Interior has granted authority to the Reclamation Service to construct by force account a canal approximately three miles in length, to be used in connection with the power plant to be constructed for the generation of electricity at the mouth of Spanish Fork River, Strawberry Valley irrigation project, Utah.

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Perkins Talks.

Mr. E. T. Perkins, Engineer and Traveling Auditor for the Reclamation Service, is in Washington for a few days on official business. He has inspected all of the irrigation projects now under construction by the Government during the past season, and reports that, considering the scarcity of labor and the blockade on transportation lines, the work is progressing splendidly in all parts of the West. "In fact," said Mr. Perkins, "the work of the Reclamation Service is progressing more rapidly than that under way by railroads or private corporations."

"I have just come from Oklahoma City, where I attended the first annual meeting of the National Drainage Association. The work of this association looking toward the drainage of swamp lands owned by the United States promises in the near future to be as important as the irrigation of the arid lands of the West."

"This first session was remarkably successful. Seventeen States and Territories were represented by a high class of delegates, who organized the National Drainage Association and gave a decided impetus to the question of national drainage, endorsing the bill recently presented by Senator Flint of California, entitled "A Bill for the Establishment of a Drainage Fund and the Construction of Works for the Reclamation of Swamp and Overflowed Lands."

The next session of the Association will be held in St. Paul, Minnesota, some time during October, 1907.

Orland Project.

The Secretary of the Interior recently conditionally allotted the sum of \$650,000 from the reclamation fund for the construction of the Orland irrigation project, in California. The conditions to be fulfilled before the project is finally approved for construction are as follows:

1st. That 12,000 acres of land be pledged by the owners in a form to be approved by the Department such that the lands will be held bound to repay the cost of construction under the terms of the Reclamation Act.

2d. That satisfactory arrangements be made and agreements completed for the adjustment of water rights or for options to purchase certain properties and rights.

3d. That satisfactory arrangements be made for the purchase of the lands needed for reservoir purposes.

4th. That the owners of the lands agree to subdivide and sell their holdings in excess of 160 acres in farm units of not to exceed 40 acres.

This is the first unit of the Sacramento Valley project, which it is hoped may in time be undertaken by the United States. The lands to be irrigated in the vicinity of Orland lie along Stony Creek, and the waters of this creek regulated by storage are to be used in the irrigation of the land.

There is no uncertainty about the results. Irrigation on a small scale has long been practiced in this part of the Sacramento Valley. Vineyards and orchards will rapidly take the place under irrigation of the grain fields, which of late years have proven unremunerative.



Two Rows of Pear Trees, Palisade, Colo., on D. & R. G. Ry.

Midland Bridge Company Lucky.

The Secretary of the Interior has awarded contract to the Midland Bridge Company, of Kansas City, Missouri, for furnishing steel and cast iron for reinforcement and structural use in connection with the Rio Grande irrigation project, New Mexico.

The contract calls for 55,000 pounds of steel bars for reinforcement of concrete, about 12,800 pounds of structural steel, and about 9,000 pounds of cast iron gates, guides, stands, etc., to be delivered within sixty days after award of contract.

The bid of the Midland Bridge Company was \$2,885.

Rio Grande Project.

The Secretary of the Interior has executed a contract with the Midland Bridge Company, of Kansas City, Missouri, for furnishing steel and cast iron for the Rio Grande irrigation project, New Mexico.

The contract calls for about 55,000 pounds of steel bars for reinforcement of concrete, about 12,800 pounds of structural steel, and about 9,000 pounds of cast iron gates, stands, etc., and will amount to about \$2,885.

In order to expedite work on the Milk River irrigation project, Montana, the Secretary of the Treasury has appointed L. R. Stockton, Assistant Engineer in the Reclamation Service at Browning, Montana, Inspector of Customs, without compensation, to be under the direction of the Collector of Customs at Great Falls, Montana.

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Work on Belle Fourche Dam.

Owing to the cold weather, work on the dam embankment, Belle Fourche irrigation project, South Dakota, has been discontinued and probably will not be taken up again before April. The total progress on this embankment to date is 219,000 cubic yards. The closing down of work on the dam made available a large force of men for other work. The men employed by different contractors, as well as those under the direct supervision of the Government engineers, have been placed on canal excavation, finishing structures, etc., as soon as unfavorable weather made concrete and embankment work impossible.

In many respects this is one of the most remarkable irrigation projects yet undertaken by the Government. It involves the construction of one of the greatest earth dams in the world, a structure over one mile long, 100 feet high in the highest place, and 20 feet wide on top. Its cubical contents will be nearly half those of the Pyramid of Cheops, which is estimated to have occupied 900 years in construction. The Belle Fourche dam will be completed in less than one year. This dam will create a reservoir 60 feet deep, with a water surface of about 9,000 acres when full.

More than one thousand new farms will be created by this project in a valley where the principal product has been

Roosevelt Dam.

A message was received at the office of the Reclamation Service early in December, stating that a flood carrying about 60,000 second-feet of water had swept down upon the Roosevelt dam in Arizona. The contractor saved almost all of his machinery. Another report received later conveys the assurance that no actual damage to the dam itself was sustained, but that there would be a delay in the work of about a month in clearing out the pit.

Probably no engineering work in this country has attracted more attention than the construction of the Roosevelt dam, which is being erected by the Government in Salt River. The contractor, J. M. O'Rourke, of Galveston, Texas, laid the first stone of the dam on September 20th, and the Government officials have watched with almost breathless interest as block by block the great curve of stone has steadily grown, and it is with a sense of relief news is received that the dam has reached a point where it can withstand with little damage the sudden floods which have repeatedly destroyed the works during the past year.

The dam will be 294 feet high and 800 feet long on top, and will form a lake twenty-five miles long, with a capacity of 1,300,000 acre-feet. The work is progressing rapidly and it is expected that water will be furnished for irrigation dur-



Two-year-old Peach Orchard, Palisade, Colo., on D. & R. G. Ry.

low grade range cattle, and the value of lands, which now ranges from \$5 to \$10 per acre, will be increased to \$75 and upward.

With assured forage crops, the ranchmen can greatly increase their herds, and with winter feed the quality of the stock will be materially improved and the prices correspondingly better. Small grains, such as oats, wheat, rye and barley, and such fruits as apples, pears, plums, cherries and small fruits, can be raised. Sugar beets will also probably prove a profitable crop. The demand for farm and garden products is great on account of the proximity of the mining regions of the Black Hills. The mining industry will undoubtedly undergo a fresh boom, as food supplies at a reasonable price and increased transportation facilities make the working of low grade ore profitable.

New lines of railroad are already being built which will connect this valley with Minnesota's Twin Cities, and already the population of Belle Fourche has more than doubled.

The Government officials hope to be able to furnish water for about 10,000 acres during the season of 1907.

ing the season of 1907, although the completion of the dam will require a much longer time. A brief summary of the work completed to date shows that a power canal 19½ miles long, with a drop of 220 feet, is completed and furnishing power to operate the cement mill and for use in constructing the dam. Ten thousand four hundred linear feet of tunnels have been constructed, forty bridges built, and sixty-eight structures, such as headworks, flumes, culverts, etc., completed. A cement mill with a capacity of 350 barrels a day has been erected, and 43,000 barrels of first class cement have been manufactured. The sawmill thirty miles up the canyon has cut about three million feet board measure of lumber for use in the various structures. One hundred and thirty-five miles of road have been built and about one hundred miles of telephone installed. The work so far accomplished involved the excavation of 975,000 cubic yards of material, the laying of 38,000 cubic yards of concrete, the driving of 20,000 linear feet of piling, and drilling and boring 3,560 feet. When completed, the project will reclaim more than 200,000 acres of desert land.

Fortunate Bidder.

A board of consulting engineers of the Reclamation Service recently convened in Portland, Oregon, to open bids for the construction of about twelve miles of main canal in Tieton Canyon, near North Yakima, Washington, with diverting dam, headworks, tunnels and other appurtenant structures, received but one proposal. This was submitted by Mr. Theodore Weisberger, of North Yakima, Washington, for the work of Schedules 5-A, 6-A and 7-A.

The Secretary of the Interior has awarded Schedules 6-A and 7-A to Mr. Weisberger, and authorized the construction of Schedules 1-A, 2-A, 3-A, 4-A and 5-A by force account.

Mr. Weisberger's contract amounts to \$230,371.10, and calls for the furnishing, distributing and laying of concrete shapes in open canal, flumes and tunnels.

The contractors were delayed by the failure of the manufacturing companies to promptly deliver the structural materials.

By What Authority?

The Reclamation Service has purchased two lots in the town of North Yakima, Washington, upon which it proposes to erect an office building in connection with the Yakima project.

The Secretary of the Interior has granted an extension of sixty days' time to the Canton Bridge Company, of Canton, Ohio, for the construction of five highway bridges over the main supply canal, Belle Fourche irrigation project, South Dakota.

The Secretary of the Interior is advertising for proposals for furnishing steel and cast iron for use on the North Platte irrigation project, Nebraska. The bids will be opened at Mitchell, Nebraska, January 24, 1907.

About 125,000 pounds of steel bars for reinforcement of concrete, about 16,000 pounds of structural steel, and about 50,000 pounds of cast iron gates, guides, stands, etc., are required.



Grand Valley, Colo., Gooseberry Bush.

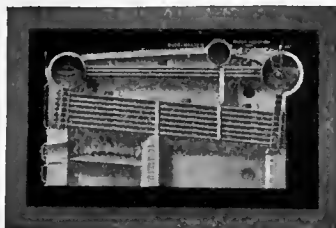
The engineer in charge of operations on Gunnison Tunnel Uncompahgre irrigation project, Colorado, reports that 17,374 feet were completed December 1st, and nearly a mile of masonry floor was laid in the west end.

The progress on tunnel work during November was 586 feet, less than that made any previous month. This falling off was due to the unusual difficulties encountered. In the east end the material is quartzite of such a degree of hardness that it is very difficult to drill. In the west end the strata changed several times, necessitating change of tools. Men who were experts with coal augurs, for instance, had scarcely any knowledge of piston drills. A great deal of pumping was necessary to remove the water which came into the headings. Experienced drillmen are very scarce. Wages are high, but the unusual activity in the mining industry makes it difficult to secure assistance.

It is believed that better progress will be made during the present month. Canal work is being pushed as rapidly as possible in order that when the tunnel is completed the distributing system will be ready to carry the water over the land. It is expected that the tunnel will be ready for operation in June, 1908.

The Secretary of the Interior has granted authority to the Reclamation Service to construct the dam at the outlet of Bumping Lake, Washington, by force account. This dam is to be used in connection with the Yakima irrigation project, and owing to its remoteness from railroad it apparently was not an attractive undertaking to contractors, for no bids were received for its construction when it was advertised recently by the Secretary of the Interior.

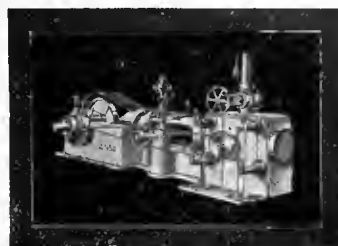
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Heavy Duty, 10x16.....12	Heavy Duty, 15x20.....10
Heavy Duty, 11x16.....5	

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St. Paul Gas Light Company, 2400 H. P. W. T. Boilers.....	June 1	June 1
Superior Portland Cement Company, 2400 H. P. W. T. Boilers.....	December 14	October 31

High Pressure Boilers

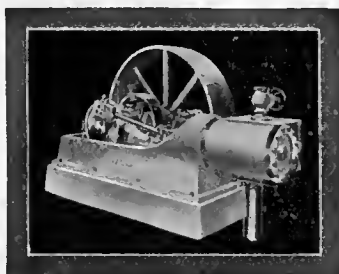
American Car & Foundry Company, St. Louis....	2-72x18	1 day
Atlanta and Birmingham Construction Company, Fitzgerald, Ga.....	8-72x16	15 days
New River Company, McDonald, W. Va.....	18-72x18	20 days
Southern Pacific Ry. Company, Los Angeles, Cal.	11-54x16	5 days
Union Sulphur Company, Sulphur, La.....	20-72x18	10 days

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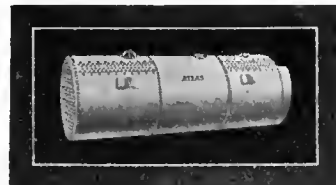
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that line, or who desire to have a successful fruit garden.

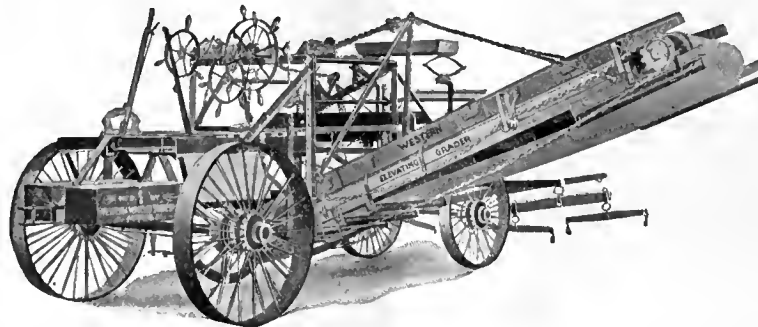
The work is far more instructive than can be indicated in a brief review of this kind. For instance, Chapter 1, on "The Site and the Soil," shows the ad-



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Garden," by S. W. Fletcher. It is a "Practical and Suggestive Manual for the Home Garden," of nearly 300 pages, profusely illustrated with halftones and designs. It is helpful for all who expect to engage in fruit tree growing or are now working out plans in

vantage of a sloping over a flat site, and this one point made clear to many for the first time might mean the difference between success and failure, and therefore this chapter might be worth hundreds of dollars to thousands of people. The same chapter shows the in-



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fluence of wet lands on fruit trees and what to do in such cases, the adaptation of soil, usefulness of tillage. This section alone is worth the price of the book to any amateur fruit grower.

Many other chapters are equally useful, some possibly more so. The titles in successive order are as follows: Planning the Garden; Selecting the Plants; Choosing the Varieties; Varieties Suggested for the Fruit Garden; Planting the Orchard; Tillage and Substitutes for Tillage; Saving and Adding Fertility; How to Prune and Train Fruit Trees; Fighting the Enemies of Fruits; How to Pick Store Fruit; How to Renovate a Neglected and Unprofitable Orchard; Quality Quinces in the Back Yard; How to Grow Grapes Successfully at Home; Raspberries, Blackberries and Dewberries; Currants and Gooseberries; Home-Grown Strawberries; Tropical and Subtropical Fruits; Valuable New or Seldom Grown Fruits; Why Some Fruit Trees Do Not Bear; Winter Protection for Fruits; Incidental Care of the Fruit Garden; Home Propagation; Dwarf, Trained and Forced Fruits; Appendix: Miscellaneous Rules and Recipes. There are 182 pictures and diagrams.

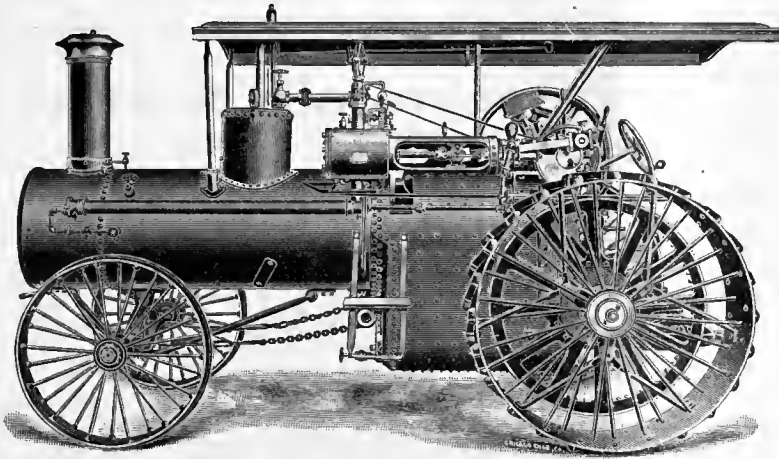
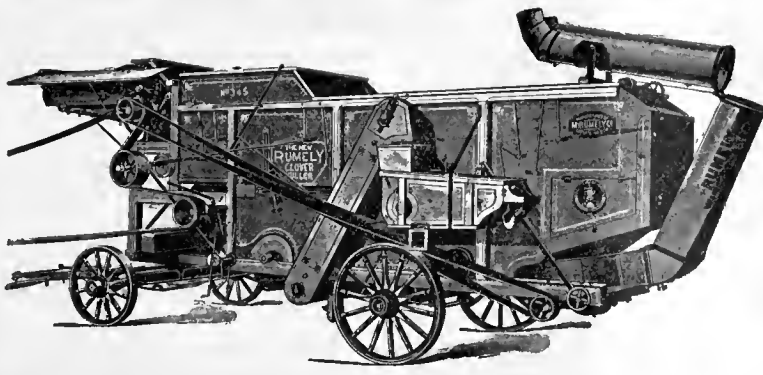
It will be seen that this book is a general guide for all ordinary phases of fruit tree and garden work. Doubleday, Page & Co. (1906), New York.

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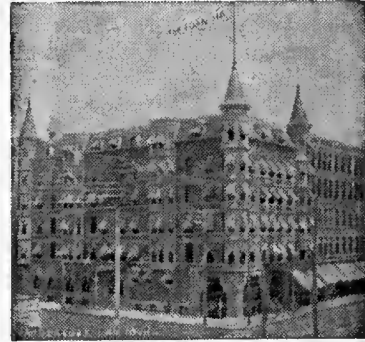
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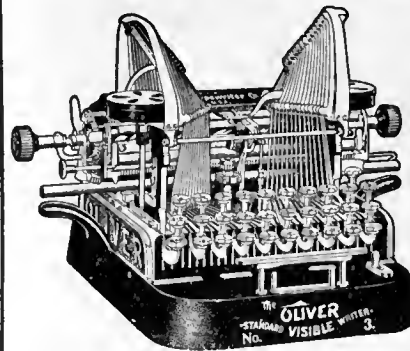
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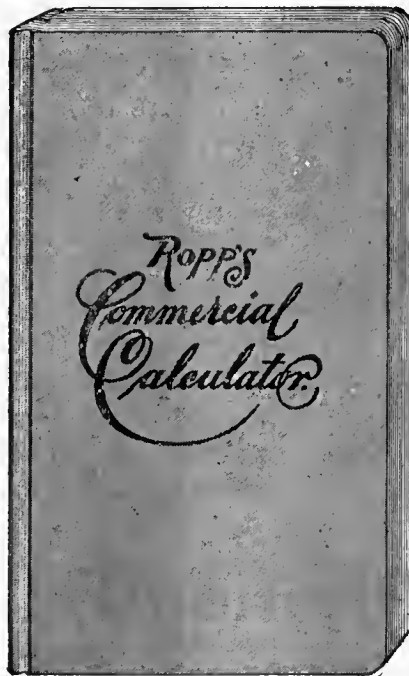
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BIG, RED APPLES

Peaches, Prunes, Melons, or Make
Hay when the Sun Shines?

BUY LAND IN THE PAYETTE VALLEY IDAHO

A good investment to be growing along with the boys and turned over to them later.

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Unimproved is worth \$40.00 per acre with good water right.

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Drop us a card and send us the names of your friends. It is good enough to pass along.

Now, if you don't believe all this, write to any one living in the Payette Valley. They will all tell you the same thing, or best of all, come and see for yourself.

Special Rates on Railways. ☞ For Further Information
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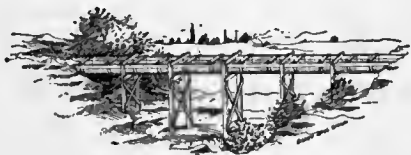
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Galvanized steel is rapidly taking the place of wood for fluming purposes and with The Maginnis Patent splice fluming is made easy Any boy can put the Maginnis Steel Flume together or take it apart. Steel flumes and troughs "Ship Knock down" Third Class freight. Let me figure on your flume. All flumes guaranteed.

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(Pumps Water by Water Power)

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FOR SALE CHEAP ON EASY TERMS

I own over 16,000 acres of good unimproved cut-over timber land, lying practically in a solid body adjacent or tributary to the City of Cadillac, the most progressive town in Northwestern Michigan. Price \$5.00 per acre and upwards according to location and amount of purchase. I also own or control several finely improved farms. I have written accurate and comprehensive booklets about this area, its location, soils, climate, markets, transportation facilities and other features which would interest homeseekers and I hold myself personally responsible for each statement therein. My literature is well illustrated with engravings taken from actual photographs on the lands. I send same free. Write today. This is your opportunity, don't miss it. Values are raising rapidly, get settled now and take advantage of the improvements others are making. Address:

"The basis of my business is absolute and unvarying integrity"—Samuel S. Thorpe.

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A dollar in anything get my book "How to Judge Investments." It tells you all about everything you should know before making any kind of an investment, either for a large or small amount. This book gives the soundest advice and may save you many dollars.

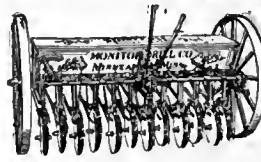
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Monitor Double Disc Drills

Are Especially Adapted For Use in the Arid and Semi-Arid Regions.



**STRONG,
DURABLE,
LIGHT-
DRAUGHT**

Take less seed and produce greater yield per acre of better grade of grain than any other machine made. Cannot be clogged in mud, gumbo, adobe or any other soil. Pretty strong talk—isn't it? We have proof.

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MONITOR DRILL CO.

MINNEAPOLIS,

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PEERLESS FENCING—"Without a Rival."

947

A four-foot general purpose fence close spaced enough to turn pigs, high enough to turn all kinds of stock and strong enough for all general purposes—is coming to be recognized as the most desirable style to buy.

Mr. Anderson, editor of this paper, has recently purchased a quantity of this fencing for use on his experimental farm at Cadillac, Mich., and we refer you to him—he will tell you frankly what he thinks of it.

Made with No. 9 top and bottom wires; No. 11 lateral wires and No. 12 crossbars, 12 inches apart. Spaces from bottom up as follows:—3, 3½, 4½, 6, 7, 7, 8, 8.

We make many other styles, from which you may select one especially adapted to your own particular needs, if you wish. We have them all, high and low, close spaced and wide spaced, heavy and light. Our catalog will describe them and is free.

Representation through dealers or agents sought in all new territory.

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**ADRIAN,
MICH.**

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Rural Road Grader and Ditcher

A new model of grader and ditcher that will interest all highway commissioners, builders of ditch and levee work in the rice belt, irrigation work in the West, and the big farmer everywhere to open up ditches with and to build roads needed on the farm.

If you have road grader work to do in any form, then get a Rural Road Grader and Ditcher, thereby saving more than half in cost of machines and working expenses.

Operated by One Man and Two Teams. Sold on Trial.

TESTIMONIAL.

SPENCER, IOWA, May 19, 1906

C. D. Edwards, Albert Lea, Minn.

Dear Sir:—You will please find enclosed draft for \$125.00 in payment for one Rural Road Grader and Ditcher, ordered of you April 28, 1906. Would much rather have it than an eight-horse grader. Can do more and better work with it at one-half the expense and can work it where we cannot the larger one, so you can rest assured we are well satisfied with the machine.

Yours respectfully, J. R. FLOYD, R. F. D. No. 1.

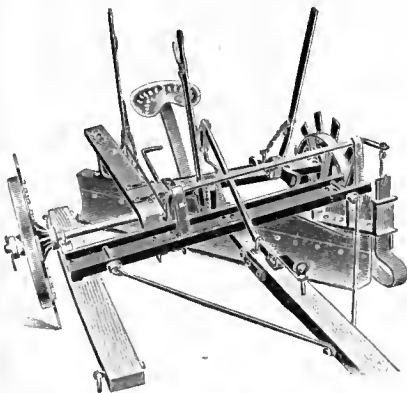
Chairman Trustees, Meadow Township, Clay County.

Clearing Land With a Jumbo Stump Puller.

I manufacture the Climax and Chief Pullers also, intended for lighter work. Capstan Ditching Machines, cutting ditches 4, 6 and 8 feet wide and Bog Land Cutters. Send for catalog of the machine you are interested in.

B. L. VINEYARD & CO., Eagle Lake, Texas, General Southern Agents, Manufacturere Machinery Co., New Orleans, Louisiana, Agents for Louisians and Arkansas, F. E. Widmann, Pueblo, Colorado, General Agent.

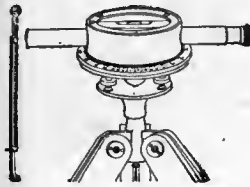
C. D. EDWARDS . . . **Albert Lea, Minnesota**



BEFORE YOU BUY A LEVEL

Write for descriptive circulars of the

BOSTROM IMPROVED FARM AND BUILDERS' LEVELS



Practical up-to-date instruments that anyone can use. Recommended by professional men of repute and by the most progressive farmers of the country for irrigation, drainage and building purposes.

Prices: \$12.50 and \$25.00 including Telescope, Tripod and Rod.

BOSTROM-BRADY MFG. CO.

55 W. Alabama St. - - ATLANTA, GA.

Pump for Sale

The Trustees of the Pueblo Water Works will receive bids up to and including Tuesday, January 15th, 1907, at 4 p. m. for one Duplex Condensing Crank and Fly Wheel Pumping Engine of Seven and One-Million gallons daily capacity. This pump is complete and has never been used. Too small for present owners.

NOTE—The Board reserves the right to reject any and all bids.

Suitable for Waterworks or Irrigation.

For further particulars write or see

D. E. BURKE, Superintendent
Pueblo Water Works, Pueblo, Colorado

Help. We want help immediately to aid us in selling the output of three factories just added to our rapidly growing business.

We want energetic and capable men and women in all parts of the union, in either city or country, who are willing to devote all or part of their time, earning an income from \$15 to \$75 per week.

We have a place for you. With or without experience. Home and neighborhood work for ladies and girls in forming clubs and canvassing. Grocery, drug and general stores and cigar canvassing for men.

Write today for our unequalled offer, give age, experience, if any, and your ideas or work.

We have a large, popular and profitable line to offer you.

THE PEOPLES MERCANTILE CO.,
607 Vine St., Cincinnati, Ohio.

DON'T INCORPORATE

until you have first written us for a copy of the laws of Arizona, now universally conceded to be the most liberal in the United States; private property exempt from corporate debts, no franchise tax, do business anywhere, cost very small, can commence business same day the articles are received. Write for our pamphlet giving copy of the corporation laws of Arizona and detailing the many advantages of organizing thereunder.

ACME INCORPORATING COMPANY
Corporation Agents, Organizers and Promoters
PHOENIX, ARIZONA.

NO MORE BLIND HORSES For Specific Ophthalmia, Moon Blindness, and other sore eyes, BARRY CO., Iowa City, Ia., have a sure cure.

Niagara Hydraulic Engine



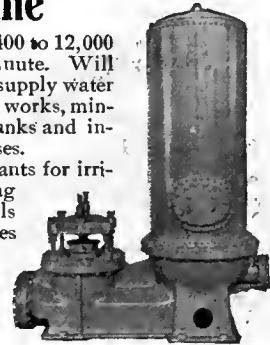
Using from 2 to 350 gallons per minute. Elevating 35 feet for each foot-fall.

Niagara Hydrokinetic Engine

Using from 400 to 12,000 gallons per minute. Will automatically supply water for town water works, mining, railroad tanks and industrial purposes.

Complete plants for irrigation, utilizing as power, falls from 18 inches to 50 feet.

Write for catalogue C and guaranteed estimate.



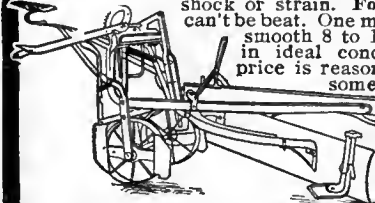
NIAGARA HYDRAULIC ENGINE CO.,
140 Nassau Street, New York

Dig Irrigation Ditches Quicker

Two horses can manage a 20th Century. It weighs only 500 pounds, all steel and malleable iron except pole. It's a "bummer" as a Nebraskan says, for ditches and laterals. Blade is 6 feet long, can be tilted either up or down and turned right or left to any angle up to 50 degrees. Because built all of metal the

20th CENTURY GRADER

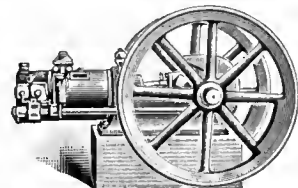
is strong, solid, durable; is guaranteed to stand every reasonable shock or strain. For leveling and grading it can't be beat. One man and a team can level and smooth 8 to 12 acres a day leaving land in ideal condition for seeding. The price is reasonable. Write for our handsome booklet that shows the Grader in operation and explains details.



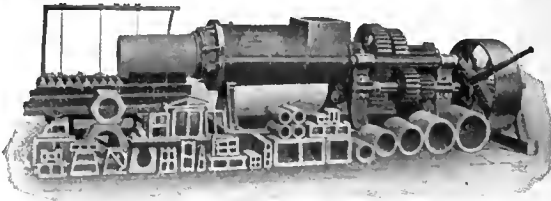
White City Grader Co.
Dept. F
White City, Kansas

Profits may be increased

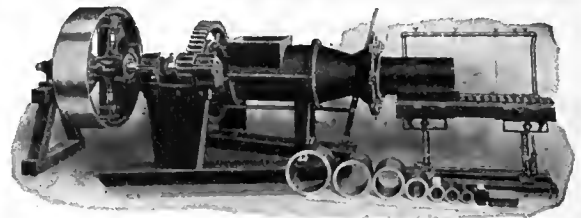
in any manufacturing business by installing the right kind of a power plant. "Otto" Engines, whether Gas, Gasoline or Alcohol, are at once economical and dependable, but the "Otto" Suction Gas Producer cuts the cost of power down to the minimum. Nearly 100 successful plants as references. "Otto" Producers Work. "Otto" promises and guarantees are made good.



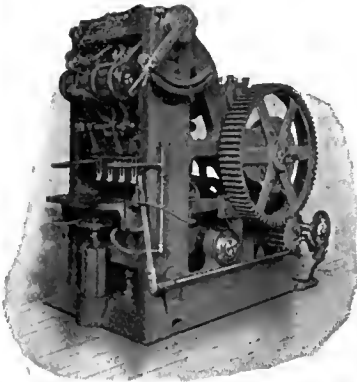
Otto Gas Engine Works, Phila., Pa.



Centennial Auger Machine



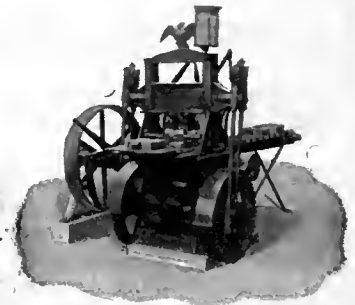
Mascot Auger Machine



Dry Press, 5 styles



Wheelbarrows and Trucks



Eagle Reprass

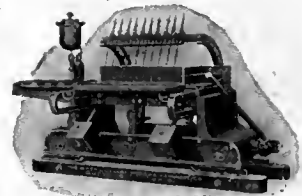
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"BUILT RIGHT—
RUN RIGHT"

We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

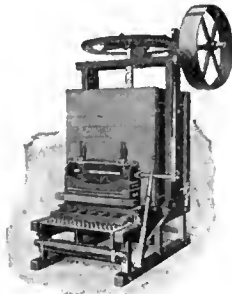


Dry Cars, all kinds

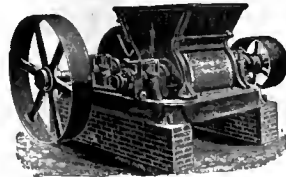


Hand and Power Cutters

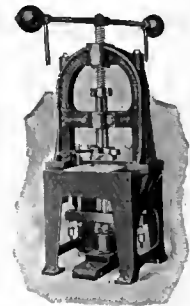
The American Clay Mch. Co., Bucyrus, Ohio



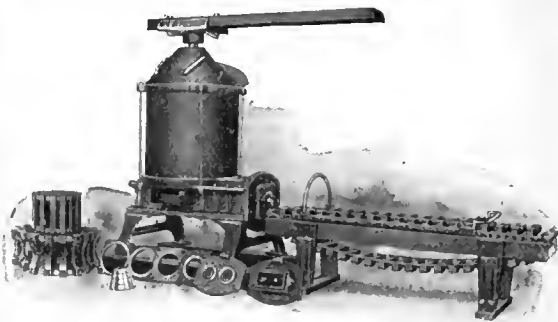
Soft Mud Machines, Horse and Steam Power



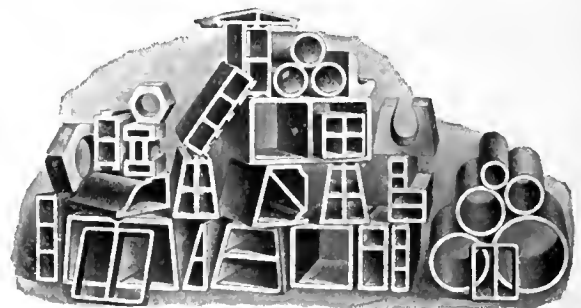
Disintegrators



Hand Power Screw Press

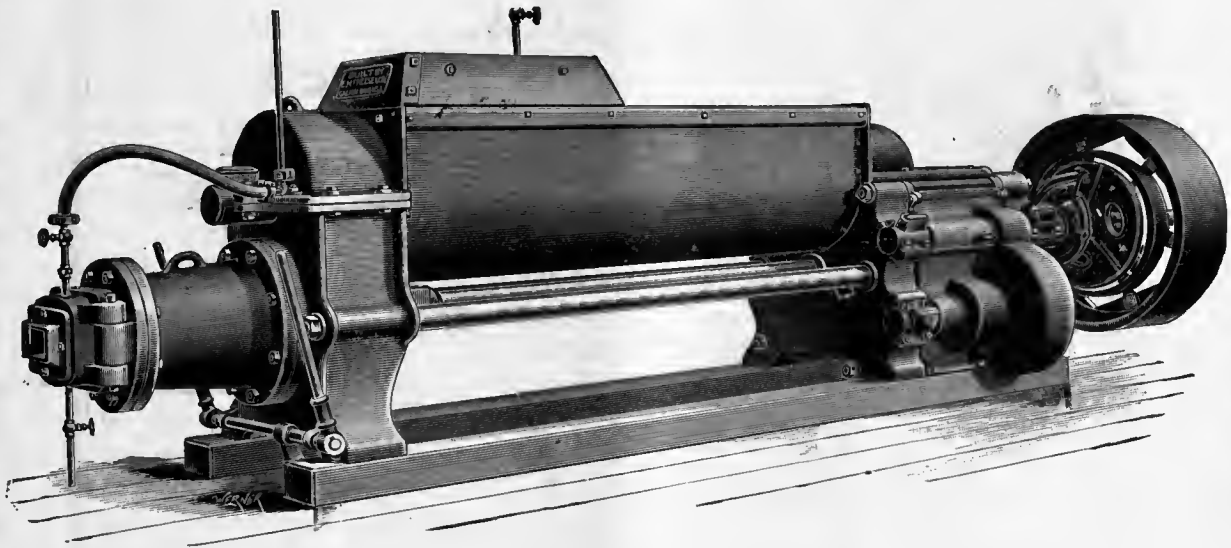


Horse Power Plunger Machine



Products of our Auger Machines

UNION MACHINES WITH PUG MILLS COMBINED



FIVE SIZES ALL CAPACITIES

Outfits for Drain Tile, Hollow Ware, Building
and Paving Brick and other Clay Products

If interested write us for particulars and estimates.

E. M. FREESE & CO.
GALION, OHIO

Let Me Prove That 10 Acres of this Irrigated Land Will **\$250.00** A Month For You earn **\$250.00** Month For You



E. W. SHUTT, President
Rio Grande Land, Water & Power Co.

I Will Sell It To You For \$2.50 a Week

Irrigated, under cultivation, ready to earn at least \$250 a month.

Not in all the world have I ever heard of so good an opportunity for men of small means. In this small space I cannot tell you all the steps that have been taken to safeguard your money in every way. This is investment — not speculation — yet you get returns equal to those from successful speculation. And all the while you are secured against loss by the finest farm land in the world, and your interest in water-rights that no man could buy for a million dollars. There is no question like finding gold or striking oil about this proposition. The land is there for all time. The water is there for all time to nourish and fertilize it. You don't have to dig in the ground deeper than to plant seed. There are no insects that destroy crops in this country. There is no chance for drought. There is no chance known to man for a single crop failure, ever. And the abundant crops of large and in every other way superior hays, grains, vegetables and fruits are equalled in only a very few favored spots, such as the Rocky Ford country. But I am going to prove by case after case that net returns from ten acres of this property rarely are as low as \$3,000 a year and often as high as \$10,000, according to the kind of crops. The difference is not according to location of land or season or anything of that kind. The land is near a prosperous and growing city — Albuquerque — the largest city in New Mexico. Our main irrigation canal to run through the city. The main line of the Santa Fe Railroad runs through our land from end to end. And our own electric line is to supply additional cheap and convenient transportation to every section of these lands.

YOU know, or can easily learn from United States Government Reports, that irrigated lands in the Great Southwest, in selected crops, will net \$300 to \$1,000 a year per acre over and above the entire cost of cultivating them.

Anyone who knows the country will tell you that absolutely the surest, safest way in the world to gain a large and permanent income for a small outlay is to get hold of a few acres of irrigated land in the Great Southwest.

But always before it has required at least a few hundred dollars and it has been necessary for the investor to live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest irrigated land in the world if you can save \$2.50 a week.

You can go and live on it — absolutely assured of an income from it alone of \$3,000 to \$10,000 every year without fail.

Or you can remain in your present position and add that much to what you earn.

For my company will cultivate your property for a small share of the crops.

You don't have to know a thing in the world about farming.

Now, I can and will prove all this from the highest authorities in the land.

All you have to do is — write me and say, "Prove to me that ten acres of your land will net from \$3,000 to \$10,000 a year above all cost of cultivating it."

I have the proof, so read what my company will do for you.

I will deliver to you at once a Secured Land Contract for ten acres of irrigated land in the Rio Grande Valley.

You must pay my company \$2.50 a week or as much more as you like.

Instead of your having to pay interest on deferred payments, I agree, for my company, to pay you 6% per annum on the money you pay in.

I also bind my company to fully irrigate your land and turn it over to you under full cultivation whenever you desire to mature your contract.

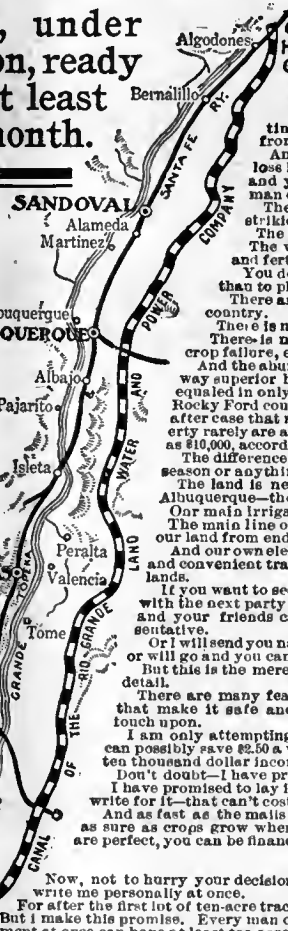
\$2.50 a week will mature your contract in 10 years.

But after you have paid \$2.50 a week for three years, or the same total amount in a shorter time, I agree and bind my company to loan you enough money to make all future payments and mature your contract.

Remember, the land will be fully irrigated and completely under cultivation, so your first year's crop should net you enough over and above the cost of cultivating it to fully pay your loan.

You would then own your land outright and have an assured income of from \$3,000 to \$10,000 a year.

Can you hope in any other way as safe and sure as this to have so large an income in a few years!



Now, not to hurry your decision in the least, but to protect the price, write me personally at once.

For after the first lot of ten-acre tracts is contracted for we will ask more. But I make this promise. Every man or woman who answers this advertisement at once can have at least ten acres on these terms unless, of course, all our land should be already contracted for from this one advertisement.

Now, write at once. I can say nothing more in this advertisement except that, if I could, I would not tell you all you can confidently expect from this investment. For you would not believe it without the proof which I cannot put in an advertisement. Address me personally, and believe me sincerely,

E. W. SHUTT, President Rio Grande Land, Water and Power Co.
658 Houser Building, 5T. LOUIS, MO.

THE IRRIGATION AGE

VOL. XXII

CHICAGO, FEBRUARY, 1907.

No. 4

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

THE D. H. ANDERSON PUBLISHING CO.,
PUBLISHERS,

112 Dearborn Street, CHICAGO

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Official organ of the American Irrigation Federation.
Office of the Secretary, 309 Boyce Building, Chicago.

Entered at the Postoffice at Chicago, Ill., as Second-Class Matter.

D. H. ANDERSON, Editor
W. J. ANDERSON .. G. L. SHUMWAY
Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

The Climates in One County.

The most southerly of California counties is San Diego, and none is more interesting. It extends from the Pacific Ocean to Arizona and is bordered on the south by Mexico.

The surface rises gradually from the sea to the San Jacinto mountains range, which runs across the county about forty miles from the shore. Of this slope there is a zone along the ocean that is frostless and nearly stormless, one of the most perfect climatic conditions the year around in North America.

Back of this, a little higher, there is a two-season zone, a long, dry summer and short, cool, somewhat rainy winter, with some frost. Then comes a third zone, still more elevated, with more marked seasons, colder in winter, with an increased rainfall.

Near the mountains there is a real four-season climate—spring, summer, fall and winter. In a short ride one can go from the land of everlasting May and everblooming flowers to a region where sleighbells jingle and overcoats are needed.

These San Jacinto mountains are really a continuation of the Sierra Nevada range. They reach an altitude in some places in San Diego county of 6,000 feet. The rainfall in the four-season zone is 35 to 40 inches, about the same as Illinois, and crops can be grown without irrigation. The total precipitation diminishes gradually toward the sea, until, in the lowest zone, the mean rainfall is 10½ inches.

On this slope there are about 600,000 acres of tillable land, much of which is very rich and productive.

Interesting to Advertisers.

It may interest advertisers to know that *The Irrigation Age* is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. *The Irrigation Age* is 22 years old and is the pioneer publication of its class in the world.

Irrigation Congress.

The executive committee of the National Irrigation Congress, which is to be held at Sacramento, Cal., in September or October of this year, are actively at work making preparations for that event.

Mr. W. A. Beard, chairman of the executive committee, informs us that funds are now being collected with which to properly advertise the congress and entertain delegates who will attend. It is expected that fully 5,000 delegates will attend this congress, owing to the fact that a greater effort than has ever been put forth before will be made to secure a large attendance. Sacramento, as well as the whole State of California, will do all possible to secure a large attendance of delegates from the Eastern and Central States, hoping thereby to be able to demonstrate the great possibilities for home-making and commercially, in the State of California.

An effort will be made to have the governors of each State appoint a full quota of delegates and this fact will be brought to the attention of each executive, so that the committee may be fairly well assured that all delegates named will attend.

The appointing of the delegates from the Eastern and Central States has heretofore been made in a sort of slipshod manner, and there was no definite knowledge in connection with the appointment as to whether they were interested in irrigation, or would take an interest and attend the congress.

As stated before, the committee will depend upon the governors to give the matter careful consideration and appoint only those who express a desire or willingness to attend.

In our issue of January, in which appeared **Roosevelt and Assistants.** editorial notes by G. L. Shumway, that gentleman attempted to explain from his viewpoint the situation of affairs in the West, and he took occasion to mildly criticise the plans of federal officials.

We are publishing in this issue other comments by Mr. Shumway, which will no doubt attract wide attention, owing to the fact that he gives inside information of actual conditions as viewed from contact and association therewith.

While the editor is fully convinced of the sincerity and honest purpose of Mr. Shumway, it is his impression that his views concerning the head of the forestry department are slightly overdrawn. The fact of the matter appears to be that too much authority is vested in Mr. Pinchot and some of his assistants. These men are unquestionably honest, but, like many others who hold positions which have become important through Western development, have assumed an authority far in excess of the intent of the law which formed the office now filled by them. There is no doubt but that the gentleman discussed by Mr. Shumway intends to be fair. His action, however, has created much adverse criticism, and it is our impression that sooner or later some other administration than the present will curb him, and the people will be given liberty to bring their grievances before others in authority, when justice will be done to all interested. It must not be understood that any direct criticism is suggested concerning the President of the United States. The fact of the matter is that all who have studied President Roosevelt's administration will agree that his intentions are eminently fair. It is also a clearly defined fact that his confidence has been abused by department heads, not that there is the slightest inclination, in our opinion, among these men toward what is known as graft, the mistakes made being more in the line of a desire or inclination toward self-aggrandizement, a tendency to form cliques and combinations in Washington, which will have more or less influence with congressmen and senators and permit individual heads of departments to carry out plans in a direction which suits them best, rather than in such form as to benefit the large majority of those interested in the West.

Senator Heyburn of Idaho has given some inside information concerning the forestry conditions in his State and some conditions prevailing in other Western States where large bodies of timber are to be found.

There is no doubt that many of the errors complained of by Mr. Shumway and others would have been corrected had Secretary Hitchcock continued in office. This gentleman, as well as Secretary Wilson, has been severely criticised by the press, but it will be learned some day that both of them aimed at fairness in all their suggestions and decisions.

The management of the Missouri Pacific **Instruction by Train Method.** Railway seems to be more alive to the possibility of development under drainage and irrigation than are many of the other lines which traverse the West.

This company will run, so we are informed, a drainage and good-roads train over its lines in Arkansas and Louisiana, January 28 to February 11, and public meetings will be held at prominent points, the first stop to be at Wynne, Ark., on the 28th.

This enterprise will be in charge of D. E. King, industrial commissioner of that system. J. O. Wright of the office of irrigation and drainage investigations, United States Department of Agriculture, will present the subject of drainage at each meeting by talks illustrated by maps, diagrams and lantern slides.

This is the first attempt to promote drainage by the popular train method, and the commissioner of the Missouri Pacific is to be commended for advancing the interests of the farmers of the valley lands as well as his road by teaching drainage.

A notable feature in connection with the increased interest in the subject of drainage is the large number of new drainage contracting firms which have come into existence and which now seem sufficient to meet the demands, a matter upon which experts had some doubts two years ago. Manufacturers of excavating machinery are also multiplying, which is indicative of the general growth of interest in the subject.

Colonel Maxson.

We are presenting in this issue a portrait of Col. H. B. Maxson, second vice-president, National Irrigation Congress. Colonel Maxson has held the office of secretary for the past eight years, and has taken an active part in all of the congresses during that time. He is a man of prominence in his own State—is chairman of the Republican County Central Committee of Washoe county, Nevada, is clerk of the Board of Education of Reno, Nevada, and fills, as well, other positions of importance in his State and district.

We are presenting elsewhere in this issue a report prepared by Colonel Maxson as secretary of the Fourteenth National Irrigation Congress held at Boise, Idaho, in September, 1906.

Colonel Maxson was also commissioner from his State to the World's Fair at Omaha, in 1898, and at Paris, in 1900, and filled the same position by appointment from the State of Arizona, at the New Orleans' Exposition in 1885, so it may be seen that he is no "spring chicken" in public service.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation

Angora Goats.

Owners of angora goats who contemplate exhibiting their animals at any of the fairs this fall will be interested to know that the American Angora Goat Breeders' Association offers a special award to the successful exhibiter of the best group or flock of Angora goats exhibited at any of the state, county or other fairs.

The American Angora Goat Breeders' Association was organized in 1900 and maintains the only record of thoroughbred Angora goats in America. It is the national organization representing and championing this breed of live stock in the United States. It has 500 members representing nearly every state and territory, and has over 58,000 animals recorded on its pedigree register.

It is the purpose of the association to encourage the breeding of Angora goats, to improve and perfect the breed and to protect and promote the interests of this breed of live stock.

The association obtains and diffuses information regarding the history, character, care and raising of Angora goats; it holds a national competitive exhibit of animals annually at Kansas City, at which liberal premiums are provided, and also patronizes and supports other Angora goat exhibits throughout the country to the encouragement and benefit of the Angora goat breeders of the United States. The headquarters of the association are at Kansas City, Mo., though the resident office of the secretary, John W. Fulton, is at Helena, Mont.

Many inquiries concerning Angora husbandry are reported as having been received at the office of the association from this state which has led to the conclusion that the subject is one of considerable interest here and especially so among owners of waste brushy land, as Angora goats, due to being natural browsers, are very successful in clearing and reclaiming such tracts. The poorest pastures and range lands—inexpensive locations—are well adapted to Angora goat raising, and for this reason Angoras are quite aptly styled, "The Poor Man's Friend."

Much interesting literature on Angora husbandry is now available. A list of the various publications and free bulletins on this subject may be had by addressing the secretary of the association.

Many of the illustrations used in the February issue are furnished us by the firm of D. H. Bane & Co., colonization agents and sellers of irrigated lands, Railway Exchange building, Chicago. This firm deals almost exclusively in lands along the line of the Santa Fe Railway and is doing good work in colonizing hitherto undeveloped territory.

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Send \$2.50 for The Irrigation Age one year and The Primer of Irrigation, 300 page book.

EDITORIAL NOTES.

BY G. L. SHUMWAY.

Was ever there a constitutional amendment adopted which made our nation a socialistic commonwealth? It seems to be conceded that federal interest in public land is now proprietary. Policies of an administration do not alter laws or the constitution, and any assumption along that line is outside of legitimate executive duties.

HERETOFORE, unclaimed areas were commons, upon which any citizen had a right to travel or tarry, and was free to cultivate and use, but now the man with the white covered wagon becomes a trespasser whenever he enters public domain. Heretofore he gathered cow-chips for his campfire without a permit from some "little father" at Washington. Heretofore the prairie and the mountains were the free range of the pioneer. Now wherever he goes it is by the indulgence of the administration, and he must suffer an espionage that is humiliating to any honest man.

SENATOR CARTER's protest against the \$750,000 appropriation to pay expenses of special agents, hits the nail squarely on the head. "I resent the wholesale imputation against the integrity of every settler, and venture to assert that the people of the West are as honest as the special agents sent out to find fault with them."

THE old guerilla chief, Colonel Mosby, is accredited with an interview attacking Senators Deitrich and Millard, and otherwise maligning the West. The redoubtable colonel is busy alternately denying and acknowledging the authenticity of the interview, which of itself would be amusing if it did not bear upon one of the tragedies of the West. Here is a little of it:

"Even some of the cattlemen—among them Comstock and Richards, who were convicted the other day—threatened my life if I did not leave the State. I scorned their threats on my life, and defied them. I am afraid of no man or set of men, as my record in the war will show." "Record"—(a guerilla was responsible to no law)—and then that happened nearly half a century ago. That is one trouble with the President's advisers—they are years behind. "Afraid"—only cowards malign character to further their own ambitions. Only cravens will use the power of federal authority to poison public opinion, or manufacture sentiment against accused.

I READ the abominable rot, then looked out upon the prairies of Nebraska, and saw, instead of lawlessness, the smallest percentage of illiteracy and crime of any State in the Union. I saw a triumph of peaceful

industry, the crop of 1906, which in the markets is worth more than all the products of all the mines in the Rocky mountains. Her million and a half people are busy in the arts of peace.

BY LISTENING to Mosbys and Wheelers, the President has committed a grievous wrong, and some of Nebraska's splendid citizens are the victims. The dismissal of United States Attorney Baxter and United States Marshal Matthews, were spontaniety born of misinformation. If the unimpeachable evidence of those who know them counts for anything, the President could do no better deed than to apologize to them, and give their traducers deserved punishment.

I REPEAT: "Put special and secret service agents on oath in their reports, and under bonds to tell the truth." The people of the West have already had too much annoyance from migatory, fly-by-night irresponsible guessers, and we want our patents when we have complied with the law. If we must endure spies, give us protection from blackmail and error.

MR. PRESIDENT, some of us are of the opinion yet, that you are being imposed upon by favorites of your official family, and that the most of these land prosecutions are inspired by men with sinister intentions. Men, knowing your inherent and impulsive antipathy to wrong, are using those very attributes to further their extensive fraudulent conceptions, which you have not detected. Though keen and swift is your executive intelligence, your busy mind, engrossed with mighty missions, has "overlooked a bet."

PAUSE a moment and consider: Does your deliberate judgment apprehend that the alleged offenses on the part of Western settlers, merits the remedies you propose? Can you imagine an excuse for the Land Department publishing photos of crude initial cabins of claimants, and making a sweeping declaration that they were fraudulent, or of charging with conspiracy men whose alleged offense is a desire to acquire a few sand dunes? When was the law enacted which forbids men to act as immigration agents, or forbids one man to pay another's expenses, or build houses; or exchange money for the products of a claimant's homestead? Is payment for pasturage any different from paying for hay, corn, wheat, or any other product? Is it unlawful to offer money for land—an offer which claimants might or might not accept, or from which the profferer himself may later recede? In event of these Sand-hillers acquiring a considerable portion of this land, its value is but little—similar land in title will bring under the hammer from fifty cents to two dollars per acre.

RECENTLY I met a Sand-hiller who is under indictment. Twenty years ago he went out there full of hope,

and today his nearest neighbor is a mile away. The lonesomeness, the isolation, the struggle of this score of years has made him probably \$15,000 in property. It is a serious thing to accuse such as these of conspiracy. A humorously (?) inclined friend asked him when he expected to serve his term, and this his answer: "I don't know and I don't care. You can't hurt a man who has spent twenty-one years in the sand hills, by putting him anywhere else on earth, or under the sod." Our government, through this accursed system of special agents, has crushed many such dauntless spirits, and persistence is continuance of the crime.

MR. PRESIDENT, prosecution of this class of "offenders" serves to throw dust in the eyes of the public, and while diverting attention, a "joker" in congress, and a few orders emanating from our forestry department creates from an obscure lumberman a rival of Rockefeller. The "lieu lands" joker, which in 1897 was attached to a small appropriation for the forestry department, was ostensibly to aid homesteaders who were isolated by forest reservations to change their locations, whereas, in fact it permitted land grant railways and associates to enter upon a carnival of pillage.

CONGRESSMAN James L. Miller has done well to introduce his resolution calling for an investigation of the lumber trust, but it should include a searching inquiry of its association with our government forestry department. A thousand loud-mouthed special agents ferreting out petty thieves, and finding fault with honest settlers, will not hide that gigantic crime of the last decade, in which the head of our forestry service was either interested or negligent.

DESIGNEDLY or otherwise, our forest reserves had previously been made to include about 4,000,000 acres belonging to land grant railroads and associates—lands naturally destitute, or which had been stripped of their timber. In lieu of these worthless tracts, magnificent forests of the Northwest were selected.

DESIGNEDLY or otherwise, the Klamath forest reserve was made to include 800,000 acres of naked road grant lands, which were worth scarcely as much as the grazing lands over which there is now so much ado, but the lieu lands selected by the Weyerhouser interests are worth millions of dollars.

DESIGNEDLY or otherwise, Rainer forest reserve was made to include a vast acreage of denuded lands and barren rocks of the Northern Pacific land grant. The lands selected in lieu thereof are in Idaho's magnificent white pines and are worth millions. With the help of our forestry department, the people of America

have lost a heritage of millions and hundreds of millions, and Weyerhouser interests have the plunder.

THE whole people are more directly interested than the mere loss of the money value at this time. Practically all available forest lands are now controlled by Mr. Weyerhouser. Forest reserves have shut out a majority of independent operators and custom mills. To buy lumber one must pay tribute to the lumber king. The lumber bill of a small cottage now costs \$200 to \$300 more than it did a few years ago. Barns, fences, corneribs, graneries, railroad ties—all have advanced, and new development is compelling continuation of tribute. The West country alone has paid billions of dollars for lumber in the past few years, and one-third of the sum is arbitrary advances, made possible through our national forestry policy.

THE old ways of acquiring fortunes by stealing government timber were too slow for these masters of finance, yet the public conscience is stilled by vigorous prosecutions of petit malefactors. The public goose is still laying golden eggs for the conspirators. Extensions of forest reserves has reached such a limit over public lands, that "outside" timber lands have advanced from \$5.00 and \$6.00 per acre to \$100 and \$500 per acre.

CHIEF Forester Pinchot now occasionally sells the timber from prescribed areas, but (it seems singular) in such bodies that individuals and small custom operators are eliminated. Lieu lands now control the mouths of most of the canyons—the ways of ingress and egress to the timber offered for sale. Dummies, representing Weyerhouser interests appear and buy in amounts of ten or fifteen million feet, or upward, as offered, and buy for a song, because small independent mills can not purchase in such quantities, and if they could, they would find it necessary to pay tribute for rights of way, and suffer dictation from both the government and the lumber trust.

SPECULATION to a limited extent, perhaps inspires and brings out qualities of men. Probably speculation is one of the elements that enters into the building of new communities, but we would give the real builder, the primary individual, a chance to speculate in his own small way, and not permit the government to aid conspiracies which will confine operations to financial giants.

MR. PRESIDENT, the present petty prosecutions undoubtedly are inspired for a purpose. The "joker" appears in your message upon the public lands subject. We believe the recommended alterations were suggested by a close official who has won your confidence.

IF THE desert land act is repealed, or cumbered with more abominable red tape, if the commutation clause of the homestead act is repealed, if the spy system upon homesteaders is not discontinued, enterprise will be driven toward land grant properties, which will increase the value of all grant lands 25 to 50 per cent, and make millions of dollars for the big owners.

FOREST reserves have destroyed a majority of the custom lumber mills of the West. The rest will quit when the timber and stone act is repealed, and the building world will be at the mercy of F. W. Weyerhouser, who, while kindly of manner and soft of speech, and retiring of disposition, yet possesses insatiate greed and lust for power.

DO YOU appreciate that the American Forestry Association, of which F. W. Weyerhouser is a central figure, molds our federal forest policies? Mr. Pinchot, head of the forestry service and Mr. Weyerhouser, head of the lumber trust, are both vice-presidents of this institution, if we are correctly advised. The *St. Paul Press*, dictated to and dominated by associates of Mr. Weyerhouser, is the most ardent defender of the policies inaugurated by Mr. Pinchot, that he has in all the States.

NO FEDERAL policy should need untruth to uphold it. Director Walcott, head of the Geological Survey, after the attack of Senator Heyburn upon our national forestry policies, felt called upon to spread a report that Mr. Heyburn was or had been attorney for Weyerhouser interests, which the senator assures us is without a fabric of foundation. Whether Mr. Walcott spoke ignorantly or consciously prevaricated matters not. I repeat, the policy that will not stand the searchlight of truth is an unworthy policy, and a man or bureau that will resort to assassination of character to defend policies needs investigation.

The Vulcan Iron Works Company, steam shovel manufacturers of Toledo, Ohio, have, during the past year materially increased the capacity of their plant. New machines, of the latest and most improved types, have been installed. In fact, every device for facilitating the work in the shops, such as heavy steam hammers, lathes, boring, turning, milling, punching, and shearing machines, besides two large water-tube boilers with a capacity of 200 H. P. each, and a new Ingersoll-Rand air compressor with a capacity of 750 feet, have been added, making this one of the most complete and compact plants in the country for the manufacture of steam shovels. Another very important feature is the completion of an entire new and separate shop for taking care of repair work.

These conditions were brought about by the increasing demand for Vulcan heavy duty shovels, the company having just closed the most prosperous year in their history, and have even brighter prospects for the coming year.

AN IDAHO FRUIT RANCH.

Mr. Hall's Canyon Home.

While in the West recently the editor of THE IRRIGATION AGE made a trip of some 80 or 90 miles south of the Oregon Short Line Railway from Mountain Home, Idaho, and took in several of the newly developing valleys along the Snake river.

While on the return trip the party stopped for a time at the ranch of Mr. George P. Hall, one of the most successful fruit growers in the entire West. Mr. Hall has a ranch extending up and down the Snake on the north side about twenty miles south of Mountain Home on which he has 3,000 peach and apricot trees. These cover an area of about 15 acres, and owing to the fact that his crop is harvested and marketed ahead of any other similar crop in that State, the top price is secured for same and his income from this particular tract is exceedingly large.

Mr. Hall boxes and ships about 10,000 cases of fruit each year. The lowest price per case is 60 cents, these being sold to and distributed by peddlers. Eighty cents is the price received per case where the fruit is



delivered to the railway station 20 miles away and his retail price in small lots is \$1 per case.

It will be readily seen from the above figures that Mr. Hall's income from these 15 acres is very large. On one acre what is known as the champion peaches are produced. A yield of 2,900 cases are obtained from 220 trees. At the lowest price named, 60 cents per case, a very fair idea of his income may be obtained.

Mr. Hall informs us that trees begin to bear when they are three years of age and improve from year to year. The trees on this ranch are not long-lived, owing to the climatic conditions which force the growth of the tree itself as well as the fruit.

Mr. Hall says he never plows for trees in planting. He first turns the water, which is taken from the springs in the rim rock of the canon in which he is located, over the land, and after the course which the water will naturally take is determined, the trees are then planted regardless of definite lines, in an irregular form along the water course. It is safe to say that Mr. Hall clears from \$8,000 to \$9,000 per year from 15 acres of fruit.

It should be remembered, however, that other products, including live stock and small fruits, easily

pay the running expenses of the entire ranch, which leaves his income from the fruit clear.

We are presenting in this issue illustrations of the road leading down into the canon toward Hall's ferry and ranch, and in this connection is an opportunity to thank both Mr. and Mrs. Hall for their hospitality and kindness to the writer and party during their stay with them.

In going over the above matter, it occurred to the writer that this will illustrate clearly to those in



Mrs. Hall and Guests "Killing Time."

doubt what is possible on a small acreage when the climate and water conditions are favorable, and will answer many of our correspondents who have made inquiry as to the possibility of producing such large returns as are suggested by the Rio Grande Land, Water & Power Company people on their tract near Albuquerque, N. M. It is difficult for one not acquainted with conditions in the west to comprehend what enormous results may be obtained from one acre of ground, where all the conditions are favorable, and while Mr.



Dinner Time at Hall's Ranch—In Summer Time the Well Screened Porch is used as a Dining Room.

Hall's case is an exceptional one, there are many others to be found throughout the West nearly, if not quite, as good.

Send \$2.50 for The Irrigation Age
1 year, and The Primer of Irrigation

NORTHWEST NOTES.

Spokane, Wash., January 29.—Private irrigation plans are on foot in various parts of eastern and central Washington to reclaim more than a million acres of land, probably the most pretentious of these enterprises being in Quincy county, west of Spokane, where David R. McGinnis, an irrigation expert, has submitted a report showing that by an expenditure of \$8,000,000 for a plant and line and \$4,000,000 for distributing canals, an area of 540,000 acres, worth \$54,000,000 when irrigated, can be reclaimed. The plan proposed



Irrigation Canal near Garden City, Kas.

is to carry water from the Wenatchee river at Tum-water canyon and by means of a 96-inch pipe siphon it across the Columbia river from Wenatchee and land it on the plateaus a short distance east of the town of Trinidad. From there it would be taken by ditches and laterals throughout the Quincy country.

Spokane, Wash., January 29.—Construction work on the Tieton unit of the Yakima irrigation project to cost \$1,400,000, will begin the middle of next month and it is expected to have the mammoth canal assume shape before the end of the year. Hundreds of men are already at work and Joseph Jacobs, engineer in charge, is one of the busiest men in Washington. Excavating will be done by the government by day's work and probably 500 men will be in the field as soon as the winter breaks. The first point of attack will be on



Vineyard in the Arkansas Valley.

the great tunnel across the divide, nearly a mile long. Theodore Weisenberger, of North Yakima, has a contract to build twelve miles of concrete work of the main canal, and will handle about \$250,000 worth of labor, as the government will furnish the steel and cement. Other contracts will be awarded in February. The successful completion of the gigantic Yakima project will give Mr. Jacobs a standing as one of the

leading irrigation engineers of the United States, and that means of the world. There is every indication that he is going to prove equal to the task. If he does not, at any rate, it will not be because he lacks persistence and industry. A. P. Davis, assistant engineer of the reclamation service, visited the Sunnyside dam recently and expressed himself much pleased with the manner in which the work is progressing.

Spokane, Wash., January 29.—Work has been started by the Trent Power and Irrigation Company on the power plant to be built at Trent, eight miles east of Spokane. Construction of the dam will be done by Frank MacKean, of the Hydro-Electric Company, of Chicago, the contract for the dam having been let for \$10,000. It will be built of concrete and masonry, 16 feet high and 552 feet in length. The race will be 50 feet wide, carrying 8 feet of water. The dam is to cross the Spokane river north of Trent and run to one of the islands in the middle of the channel, making the dam in two parts. The power house will be equipped to develop 1,500 horsepower with a full capacity of 2,500 horsepower ultimately. Water for irrigation will be taken from a number of wells 20 feet deep. Sixty thousand dollars will be expended at present in building the dam, power house and reservoir. Ultimately \$110,000 will be spent in developing all the available power. There will be a 16-foot head of water above the turbine in the power house, which is to be 4,000 feet down the river.

Spokane, Wash., January 31.—Filing has been made by Howard Amon, of Kennewick, Wash., on 11,000 cubic feet of water, to be taken from the Snake river at a point at the head of Five Mile rapids. The project includes the damming of the Snake river, which, in turn, will necessitate the construction of locks to admit of navigation. Twenty thousand horsepower will be developed, which can be increased as the demand for power increases. The power will be used principally for pumping water to irrigate large tracts of land in the vicinity of Richland, Pasco and Kennewick and the surrounding country. The cost of the dam, locks and power plants will be approximately \$500,000.

Spokane, Wash., January 31.—Ferdinand Martize, of Quincy, Wash., is organizing the Moses Lake Irrigation Company, with a paid-up capital of \$250,000, which will be expended in a plant west of Spokane. It is purposed to build a dam at the foot of Moses lake and to raise the level of the water in the lake and to supply water for a large district. It is a natural irrigation district and a big body of desert land lies along the valley between the hills and the Chicago, Milwaukee & St. Paul's route. All of this can be irrigated with but little trouble. It is perfectly level, and the digging of the ditches will be a matter of small expense.

Spokane, Wash., January 31.—Winter irrigation of the Hudson Bay district below Freewater and Milton, southwest of Spokane, is now in progress, irrigation from the big ditch and its laterals covering an area of 20,000 acres of fruit and alfalfa lands. All the water from the Walla Walla and Tualum rivers below the Peacock mills at Milton is available for winter irrigation, which has proved to be a successful system in this district. The water is allowed to flow over the land until it is thoroughly saturated for several feet below the surface, the deeper the saturation the better, and much of the alfalfa land is literally soaked during the winter months.

REPORT OF THE SECRETARY OF THE NATIONAL IRRIGATION CONGRESS, HELD AT BOISE, IDAHO.

Fourteenth Session.

COL. H. B. MAXSON, SECRETARY, RENO, NEVADA.

Mr. President and Members of the Convention:

This session closing my eighth term as secretary of this congress, I desire to leave a brief history of the work that has been accomplished in the past by members of this congress, aiding by their counsel and assist-



Col. H. B. Maxson, Vice-President National Irrigation Congress, Reno, Nevada.

ing by their advice the great Government Departments in bringing about the National Reclamation Law.

The first move made by Congress in this matter was on February 14, 1889, in the United States Senate, when the following resolution was adopted:

Resolved. That a select committee of seven Senators be appointed by the president of the Senate, to be known as the Select Committee on Irrigation and Reclamation of Arid Lands, and whose duty it shall be to consider the subject of irrigation and the best mode of reclaiming the arid lands of the United States, and that said committee shall have leave to sit during the

recess of the Senate, and shall report to the Senate at the meeting of Congress in December next what legislation is necessary for such irrigation and reclamation.

Under the foregoing resolution, the president of the Senate appointed United States Senators Stewart, Allison, Plum, Hiscock, Gorman, Reagan and Jones, of Arkansas. After the adjournment of Congress at that session this committee met at St. Paul, Minn., on August 1, 1889, from which place they journeyed west and south and east again, carrying their investigations into every arid land State, and at the following session of Congress made a full and complete report of their findings in the arid West, and said report was published in five volumes by the Government Printing Office in 1890. This report, however, deals mostly with the amount of arid lands which might be reclaimed in the West, but leaving the matter of storing the floods, saving the forests and impounding the waters, to the Scientific Departments of the Government, and they, following upon the reports of the arid West, made by the Senate Committee, immediately began investigations of the waterfall in the arid regions, the storing of waters, and the construction of reservoirs and canals with which to reclaim this arid empire, and the departments having this matter in charge have made the most thorough investigations possible, and made their reports to the Government each year, which are there available for the information of any one who may desire.

The first session of the National Irrigation Congress was held at Salt Lake City in September, 1891, which was the year following the report of the United States Senate Committee on Irrigation and Reclamation of Arid Land, and was attended by representative men of the far West, who gathered in the city of Saints, where the greatest object lessons of the West have been made by an industrious people, demonstrating what a wonderful empire could be made with national enterprise. Many of those who attended that session were not heard of for years afterward, until the few who had the cause at heart for truthful and loyal purposes and for love of country, had advocated the cause and educated the public mind, until national irrigation was becoming popular and probable.

For the first five sessions very little was done, and very little progress was made beyond the exchange of ideas, and advising ways and means to accomplish the purpose.

At the sixth annual session, held at Lincoln, Neb., a committee on national legislation was appointed consisting of Maxson of Nevada, Mills of Idaho, and Nettleton of Colorado, all of whom appeared before the Committee on Arid Lands, at the national congress at Washington, D. C., and their report was printed in full at the seventh session of the National Irrigation Congress, held at Cheyenne in 1898.

The session of 1899 did not bear fruit, and the members left that session somewhat discouraged, but the same year, however, brought forth greater and more important developments, in the irrigation discussions, at the Trans-Mississippi Congress, held at Wichita, Kas., where the final and greatest fight since the beginning of the irrigation movement was made, between those who believed in State reclamation of the arid public lands, and those who believed in national irrigation, wherein the Government should reclaim the arid lands of all States. The fight resulted in the endorsement of the national irrigation policies, and then and

there began the building up of a great empire which has since been consummated, for with the adoption of this policy of national irrigation, the great foundation was laid upon which to build up a great empire in the West.

At the ninth annual session of the National Irrigation Congress, a strong memorial to the Congress of the United States was adopted, and a committee consisting of Governor Prince of New Mexico, Maxson of Nevada; Maxwell of Illinois; Gowdy of Colorado; Ferguson and Wolford of California; Hurtt of Idaho, Lunt of Colorado; Fowler and Murphy of Arizona; Goebel of Washington and Stearns of Oregon, was appointed, all of whom proceeded at once to Washington, D. C., and there met Hon. T. F. Walsh, then president of the Irri-



Kansas Home and Field of Sugar Beets.

gation Congress. They waited upon the President of the United States and also the Secretary of the Interior and the Secretary of Agriculture, where they left copies of the memorial adopted, and urged action upon its lines in the strongest manner possible, and the full report of this committee was made in the proceedings of the Tenth Irrigation Congress, held at Colorado Springs in 1902, shortly after the National Irrigation Act had been passed, and signed by the President.

When the committees from different sessions of this congress began to hammer away at the doors of the National Capitol, the importance of this congress was at once recognized, and after the West had agreed upon the most feasible form of action as they believed, and were united with the national irrigation policies, the attendance became larger, and members of both



A Big Beet Dump, Garden City, Kas.

branches of Congress, together with the governors of many States, began attending our sessions, where a general exchange of ideas was made, and national irrigation began to assume shape and receive consideration from the halls of Congress. The Secretary of the Interior gave this congress very complimentary mention in

his report in 1900, and when the President, in his message to Congress in December, 1901, endorsed national irrigation, general interest was aroused, and when, later, during the session of Congress, a National Irrigation Law was passed by members of all the great political parties, it marked an epoch in the history of our Government second to none, and when that law was signed on June 17, 1902, it laid the foundation for the building up of a mighty empire in the arid West, and the making of homes for millions of people who will come after us.

By following the text of the bill, it will be seen that it is self-operative, that the proceeds from the sale of productive lands will be used to reclaim the non-productive lands of the arid West, without asking a dollar from the National Treasury, and as there are now twenty-seven great projects under way, and nearly thirty millions of dollars in the reclamation fund, it is readily seen that the "landless man" of the congested East, if he has energy, ambition and enterprise, would have no difficulty in making himself a good home in any portion of the arid West, which may now be called the "man-
less land."

The Government provides the land in 40, 80 or 160 acre tracts, and constructs the reservoirs and canals to convey the water upon these lands, and gives the "homesteader" the water to reclaim the same at actual



Garden City, Kas., Sugar Factory.

cost, without interest, and permits the settler to return to the Government, this cost in ten equal instalments during ten years of time, which money reverts to the fund to be used again in the reclamation of other lands.

I desire to call attention at this time to the fact that the great State of Idaho has been an important factor in irrigation matters. One of its citizens, and State officers, Mr. F. J. Mills, was one of the first committee of three to bring the subject before the National Congress in 1897 and 1898, and following along the lines of progress we find another citizen of Idaho, Hon. C. B. Hurtt, who was one of the committee in 1900 to again bring the matter before the President of the United States and his Cabinet.

And now, as we meet here in your beautiful capital city, I can not refrain from personally complimenting the very able manner in which the executive committee of this congress has arranged the business of its session, and furthermore I want to compliment the public-spirited and open-hearted citizens of this city, who have arranged a reception for the members of this congress unequaled in any of its sessions in the past.

In conclusion, I herewith chronicle the meeting places and presidents of the National Irrigation Congress from the first to the present.

First congress held at Salt Lake City, September 15, 1891, C. C. Wright, of California, president.

Second congress held at Los Angeles, September, 1893, J. S. Emory, of Kansas, president.

Third congress held at Denver, September, 1894, Elwood Mead, of Wyoming, president.

Fourth congress held at Albuquerque, September, 1895, J. E. Frost, of Kansas, president.

Fifth congress held at Phoenix, Ariz., November, 1896, C. B. Boothe, of California, president.

Sixth congress held at Lincoln, Neb., July, 1897, John M. Carey, of Wyoming, president.

Seventh congress held at Cheyenne, Wyo., September, 1898, John M. Carey, of Wyoming, president.

Eighth congress held at Missoula, Mont., September, 1899, Elwood Mead, of Wyoming, president.

Ninth congress held at Chicago, November, 1900, Thos. F. Walsh, of Colorado, president.

Tenth congress held at Colorado Springs, October, 1902, Thos. F. Walsh, Colorado, president.

(In spring of 1903, Colonel Holmes resigned and Ex. Com. appointed Senator W. A. Clark, of Montana, president.)

Eleventh congress held at Ogden, Utah, September, 1903, W. A. Clark, of Montana, president.

Twelfth congress held at El Paso, Texas, November, 1904, Gov. G. C. Pardee, of California, president.

Thirteenth congress held at Portland, Ore., August, 1905, Gov. G. C. Pardee, of California, president.

Fourteenth congress held at Boise, Idaho, September, 1906, Geo. E. Chamberlain, president.

Respectfully submitted,

H. B. MAXSON,

Secretary National Irrigation Congress.



An Orchard, Arkansas Valley.

GASOLINE REVERSIBLE EXCAVATOR.

Mr. C. C. Hutchinson of Portland, Ore., has recently patented and is preparing to put on the market, a gasoline reversible excavator, which Mr. Hutchinson claims is the first real improvement in continuous earth moving machinery in twenty-five years.

This machine, designed to excavating, ditching and grading, has among its objects a provision which enables it to discharge excavated material on the same side of the ditch or canal when the machine is traveling in either direction; this it is claimed will enable deeper working of the excavator in relation to the wheel-level than is possible with other machines.

Those who are interested in excavating machinery should correspond with Mr. Hutchinson.

THE NATIONAL DRAINAGE ASSOCIATION.

In October last Governor Franz of Oklahoma territory issued a call for a national drainage conference to be held at Oklahoma City on December 5-6 and invited the several states, cities and public organizations to send delegates. The chamber of commerce at Oklahoma City was active in the movement and assumed the labor and expense of preparing a program and ex-



A Flock of Fifteen Hundred Turkeys, Arkansas Valley.

tending invitations to those known to have special interest in promoting drainage, and to the general public. While a call of this character from our newest state and a locality bordering the irrigated belt was a surprise to some, and thought to be unwarranted by others, it is easily explained when the energy and aggressiveness of the citizens of the commonwealth is understood.

The representation was not as general as could be desired, yet delegates from sixteen states were registered. The United States Department of the Interior was represented by seven engineers from the topographic and reclamation divisions, while the drainage service of the United States Department of Agriculture was represented by only one. Were it asked what central thought or object was uppermost in the minds of the promoters of the conference, the answer will doubtless be found in the inscription upon the neat badge distributed to the delegates by the chamber of



Alfalfa Fed Cattle.

commerce and which was the subject of the address of Mr. George E. Barstow of Texas, namely: "National Irrigation a Fixed Quantity, Why Not National Drainage?" It was developed later in the meeting that drainage was a much better established quantity in our agriculture than many supposed, though not upon a national basis. The trend of the papers presented and the discussions which followed indicated to some ex-

tent at least the far-reaching value of agricultural drainage to sections of the country where it had been practiced. Attention was directed at different times during the session to the large areas of swamp land in the country susceptible to drainage and some quite extravagant statements made upon a subject concerning which there is but little positive information.

The conference organized by choosing Mr. G. E. Barstow of Barstow, Tex., chairman, and J. B. Thoburn of Oklahoma City secretary. In a paper presented by the chairman reference was made to the fact that if the one hundred and sixteen billion of our national wealth was estimated for 1906 fifty-five billion, is represented by landed interests. Notwithstanding the additions which have been constantly made to our arable terri-



tory by the arts of drainage and irrigation, lands have constantly risen in value and the faith of our citizens in the stability of these values is stronger than ever before. He regarded the assistance of the federal government in bringing the arid lands of the west into production as proper and timely and expressed the opinion that federal aid should be rendered along similar lines in reclaiming wet lands which can be made suitable for agriculture.

Mr. A. L. Fellows, state engineer of North Dakota, in a paper "On Drainage Problems," made a strong plea for the execution and control of large



Another Harvest Scene.

drainage projects by the federal government. He referred to the costly, inefficient and dishonest work not infrequently performed under the provisions of the state drainage laws, and the waste attending the unguided efforts of individuals in carrying out important drainage projects. Many of the larger drainage works have more or less do to with streams which are under federal jurisdiction and hence the entire project would be handled more satisfactorily by the national government. It was argued that the many difficulties attend-

ing the administration of state drainage laws would be obviated by placing large drainage projects under the direction of the government. It was claimed that an appropriation of \$10,000,000 per year for ten years, converted into a fund like the reclamation fund, the cost of construction to be reconverted into that fund, would be sufficient to accomplish the drainage of all the wet lands, and in twenty years all the capital advanced would be back in the treasury. Compared with the large sums appropriated for less important objects, this would be an insignificant amount.

Prof. L. E. Ashbaugh of Ames, Iowa, described the conditions in Iowa and said that large and expensive drainage projects were being directed by men of comparatively limited experience. As many as thirty drainage districts were found in one county. The work was proceeding satisfactorily under the present state law, which had been secured after correcting many legal defects. He expressed the view that the continual and aggressive education of landowners on matters relating to drainage practice and the principles of special assessments was necessary to the satisfactory operation of the law.

C. G. Elliott of the office of experiment stations, United States Department of Agriculture, described the plan pursued by the department in promoting the exe-



Seventy-five Bushels of Oats Per Acre not Uncommon in Arkansas Valley.

cution of drainage projects desired by individuals or communities where such work would prove of public or general interest. Surveys and plans were made and advice given when desired. Instances were given and examples cited where such assistance had been rendered and the relation of the department to the state drainage laws was shown.

Mr. Thomas L. Cannon addressed the meeting in support of a proposition to amend the national reclamation act so as to include the reclamation of land by drainage. He argued that the national fund should be available for both objects, and that irrigation and drainage should be coördinate works and be under the direction of the reclamation service of the Department of the Interior. He affirmed that by right the states needing land drainage were as much entitled to the benefits of the fund arising from the sale of public lands in the thirteen States and territories whose land required irrigation and they ought to be entitled to it by law.

The claims of the topographic division of the United States Geological Survey for endorsement because of the value of the contour sheets issued by that service were presented by Mr. H. M. Wilson, geographer of the eastern section, and by Mr. H. H. Hodgeson,

local topographer. The latter attempted to show the usefulness of these surveys in furnishing the data required for the design of drainage plans. His presentation of the plans and estimates for the drainage of the overflowed land bordering on the Deep Fork of the Canadian river indicated quite clearly that a 20-foot contour survey furnished extremely meager data for the design of such important work.

Mr. J. G. Melluish of Illinois, Mr. George A. Ralph and Mr. Arthur Morgan of Minnesota discussed various phases of drainage law and practice in their respective states, in each of which, as is well known, large drainage works have been carried out.

The committee on permanent organization reported a constitution and by-laws, which were adopted, and the organization is to be known as the National Drainage Association. The election of officers resulted in the selection of George E. Barstow, Barstow, Tex., president; J. S. Osbourn, Coffeyville, Kas., first vice-president; A. L. Fellows, Bismarck, N. D., second vice-president. The executive committee consists of A. G. Vernard, Cass Lake, Minn.; F. W. Brockman, St. Louis, Mo.; J. G. Mellinsh, Bloomington, Ill.; H. S. McGowan, Snyder, Okla.; L. E. Ashbaugh, Ames, Iowa; Chas. L. Rushing, Meridian, Miss. The constitution stipulates that the secretary and treasurer shall be ap-



Harvest Time on An Irrigated Farm.

pointed by the executive committee. At the time of adjournment these appointments had not been made.

Not the least important part of the proceedings was the adoption of resolutions. Those which relate directly to drainage were as follows: The endorsement of the bill of Senator Flint of California for the establishment of a drainage fund and the construction of works for the reclamation of swamps and overflowed lands. Opposition to the diversion of any part of the reclamation fund from the purpose authorized in the act. The drainage work and investigations carried on by the United States Department of Agriculture was endorsed and asked to be continued. The new state of Oklahoma was by resolution urged to provide in its constitution for the enactment of adequate drainage laws, and states generally were urged to pass such legislation as would permit cooperation with the federal government in prosecuting drainage work.

The movement inaugurated by this association is significant in several respects. It indicates the importance which our people now attach to the development of idle or unproductive lands which are surrounded by high-priced farms, are traversed by railroads, and are within sight of thriving market towns. It is seen

that western lands are no longer cheap lands, and that certain fertile wet areas can be made productive at a less cost than arid lands. This phase of the matter, however, forms the subject of highly-colored word pictures often indulged in by those who have little more than a general knowledge of work involved in prosecuting these improvements. The making of \$100-an-acre land by expending a dollar or two an acre in drainage is known to be a delusion by those having experience in the work. Not all swamp lands are equally fertile or adapted to agriculture, nor are they drained with equal facility and expense.

There were several different views expressed in private discussions upon the subject of federal aid and supervision of works of drainage. Those who had witnessed the successful prosecution of large and varied drainage operations under state laws saw little advantage in government aid. If the project is a good one they find no difficulty in paying for the work in the manner provided for in the law. While they admit that the work is not always done efficiently or economically, they do not feel assured that it would cost them less were it done by the federal government, which might very easily do more and expensive work than would be required and charge the cost against the land. To some the prospect of obtaining a loan without interest for defraying the expense of the work is attractive, yet in order to secure it under any method yet proposed it will be necessary for landowners desiring drainage to perfect an organization in order to apply for such aid and in the end they must pay all costs upon the terms fixed by the government.

In the opinion of many the use of federal loans should be limited to the large drainage projects where the improvement of inadequate watercourses for outlets is necessarily expensive and affects a large number of landed interests. In performing such work it is difficult to see why the improvement should not be made from direct government appropriations and the work regarded as much a public benefit as if it were done for navigation and commerce. Should not a stream or watercourse wholly unfit for navigation be opened and improved for the uses of agriculture at government expense?

The association just organized may properly consider all of the different phases of land reclamation by drainage which are of general and public interest. It should be closely allied to the agricultural interests of the country and be dominated by those who are conversant with the methods and requirements of agricultural drainage.

MEASUREMENT OF FROZEN STREAMS.

One of the most perplexing problems that has confronted the hydrographers of the United States Geological Survey has been that of the determination of stream flow during the frozen season, and the results of investigations on this subject have just been published in Water Supply Paper No. 187. In the northern and central parts of the United States the streams are generally closed by a more or less permanent ice cover for a considerable portion of the year, varying from nearly five months in the extreme north to a few weeks or less in the Central and Atlantic States. The data collected

by the United States Geological Survey regarding stream flow have been a great benefit in the development of water powers, but to be of conclusive value the estimates must cover the winter periods, when the water is likely to be lower than at any other season. The methods of measuring open streams are fairly well defined, but the laws that govern the flow of rivers that are frozen have been but little investigated. Water Supply Paper No. 187, which may be obtained on application to the Director of the United States Geological Survey, Washington, D. C., contains descriptions of the conditions that exist along frozen streams and of the methods that are necessary to obtain accurate measurements. Special investigations of the flow of water under ice have been made by the Geological Survey for several winters on Kennebec river at North Anson, Maine, on Fish river at Wallagrass, Maine, on Connecticut river at Orford, N. H., on Winooski river at Richmond, Vt., on Catskill creek at South Cambridge, N. Y., on Esopus creek at Kingston, N. Y., on Rondout creek at Rosendale, N. Y., and on Walkill river at Newpaltz, N. Y. The ice conditions at each of these places are described in detail and general methods for this kind of work are formulated.

MAKE AN INVESTMENT IN BOISE, THE BEAUTIFUL.

Boise, the beautiful capital of Idaho, is a city with a great future, and one of the safest places for real estate investments in the world.

The population has increased from 9,000 to 20,000 in the past three years. With the great Boise-Payette irrigation scheme trebling the irrigated land at its doors, and the many other irrigation systems building in southern Idaho, it can not fail to double again in the next five years. This means a tremendous increase in the price of Boise real estate.

We are offering lots in our Londoner, South Boise and Denver additions at prices ranging from \$125 four blocks from car line to \$300 on car line. These lots are being purchased and built on freely by our home people, having increased in value from 25 to 50 per cent in the past year, and we believe they will double in less than five years, probably in three.

The terms on the lots valued at \$175 or less are \$2.50 per month; on those of a higher valuation, \$5 per month; 8 per cent interest on deferred payments. You can pay out as fast as you like, and interest ceases on payments as they are made. Why not buy four of these cheaper lots or two of the higher priced ones? It is the greatest savings bank proposition you ever saw.

You will save up \$10 a month you would otherwise spend, and when your lots are paid for you will find you have a nice little stake.

If you will write to the Capital State Bank or the Idaho Trust & Savings Bank, we think they will tell you you can trust us to make as good a selection for you as you could make for yourself.

Should be glad to write you further.

W. T. BOOTH,

211 N. Eighth street, Boise, Idaho.

UTAH'S SOIL AND CLIMATE.

The Lands Are Fertile, Production Abundant, Crops Sure and Prices Average Liberal.

When farming was first attempted in Utah, more than fifty years ago, the land had been parched for centuries and it seemed that the soil would never stop drinking up the water.

It is told there that when the first canal was made in Salt Lake City it took the stream three days to run half a mile! But, all this has been forgotten except by the pioneers who were present, and now the lands of Salt Lake valley are easily irrigated and are as fertile as those of any section of the West.

The range of crops for all parts of Utah include nearly all products from those of the cool temperate to those of a semi-tropical climate. In southern Utah even cotton may be successfully cultivated.

In central and northern Utah grains, fruits, vegetables, alfalfa and other grasses thrive. One of the richest and most progressive in the State is Salt Lake county, of which Salt Lake City is the county seat; another in Weber, of which Ogden is the chief city. Their average altitude would probably be more than 4,000 feet above the sea, not including mountain elevations, yet their productive power is surprising.

HOW UTAH SOIL WILL YIELD.

The nights are too cool for corn, but alfalfa will produce about seven tons per acre, at three cuttings per season. It has been no unusual experience to realize \$100 an acre from alfalfa, including the seed, in a single season, the price ranging up to \$14 a ton. But that return is unusually large. With good farming and good stock it ought to be an easy matter to average \$75 an acre, gross, from beef, milk, calves and pigs each year.

The fields are constantly fertilized by accretions of silt, lime and decayed vegetation carried down by the rains which are frequent and timely in winter, spring and early summer. For that reason, the soil can never wear out. And from the same cause it is exceedingly rich—the farms yielding almost fabulous crops.

Wheat, oats, barley and rye are staples on Utah farms. Wheat has produced as high as sixty bushels per acre, thirty being about an average. The field price would run close to 75 cents per bushel. The quantity is nearly always No. 1, the weight running 61 to 63 pounds to the measured bushel.

Oats thresh out fifty to eighty bushels, worth 40 cents; two-row barley, forty to sixty bushels, worth in the field about 60 cents; club barley forty-five to sixty-five bushels, selling 55 cents; blue barley the same. Rye goes from fifteen to twenty-five bushels, worth in the field 75 cents.

When it comes to vegetables this soil and climate are great. A yield of 800 bushels of potatoes has been reported, 600 is not uncommon, and 250 would be a moderate average, with 50 cents the field price—\$125 an acre and up to \$300 or even more. Big red and yellow onions have turned out 1,200 bushels from an acre and 800 bushels is said to be an average, selling at from \$250 an acre up to \$350. Tomatoes yield from 450 to 700 bushels per acre, worth \$250 to \$300 an acre.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation

UTAH IS A LAND OF FRUITS.

The quality of all vegetables is fine. Common beets grow to immense sizes. Sugar beets are successfully cultivated in certain parts of the State. Celery grows to perfection in the central counties.

Apples and pears are prolific. Peaches do well. Gooseberries are said to have yielded 1,000 bushels per acre, and 800 is a common record, worth at times \$1.00 a bushel—\$1,000 an acre—say \$500 for common run! Currants turn out 300 cases or over, worth \$200 or more; raspberries 400 to 600 cases, worth on an average \$300 an acre; strawberries from 800 to 1,000 cases, worth \$700 to \$900 an acre. Grapes go about four tons per acre, but spring frosts catch them about one year in three in the central counties.

Plums (blue, red and yellow), apricots, quinces, do well. Cabbage, squashes and almost every garden stuff that succeeds in the upper Mississippi valley, thrives here. And there are two great advantages Utah farms have over those in that valley—here rain is made to order, so to speak, by turning water on the farms when needed; and almost no pests to destroy crops. Once planted, farmers can almost feel sure they will bank the money from their harvests. Large production and irrigation unite to make little farms desirable in Utah, for the net results from careful cultivation will average as much from forty acres as from 160 in Iowa and Illinois.

And the markets are good. Most of the farm surplus is in constant demand in the neighboring mining towns and stock ranches, where large quantities are consumed, at good prices.

Salt Lake City, the State capital, has a population of about 60,000, and Ogden of about 17,000. There are a number of other good towns in the State. Utah now has over 300,000 inhabitants, is constantly growing in wealth and people and will be one of the great States of the Union.

It is exceedingly rich in minerals, including very fine iron deposits. Great Salt Lake is literally a dead sea, having no outlet. Its waters include over 20 per cent of salt, and this is one of the show places of the nation. Tens of thousands of tourists visit its bathing resorts each season. The human body will not sink in it, owing to the weight of salt it contains.

Send \$2.50 for the
Irrigation Age one
year and the Primer
of Irrigation.

RECLAMATION SERVICE NOTES.

Uncompahgre Difficulties.

A message from Montrose, Colo., states that the flow of water in the west end of Gunnison tunnel, Uncompahgre irrigation project, is decreasing very slowly. Blowers were received and the work of forcing out the carbonic acid gas was recently begun. As soon as this work becomes effective the engineers will be able to take steps to control the flow so that the work of excavating the tunnel may proceed.

It is not thought probable that any considerable delay will be occasioned by reason of the unexpected occurrence of water in the tunnel.

Must Be Capable.

The early completion of a number of the great irrigation projects of the Reclamation Service will necessitate the employment of several men of especial qualifications as superintendents. The duties of the positions will be numerous and onerous and only men of broad experience and wide knowledge of irrigation structures and methods of farming and applying water will be considered.

The requirements are so exceedingly varied that one of the Government engineers stated that the man who could fill the bill acceptably must combine the qualities of Napoleon, Richelieu, Erickson and Jeffries. He must be a practical as well as a scientific farmer. He must understand irrigation and the quantity of water the various crops require. He must possess executive ability of a high order, must be a diplomat to keep the farmers satisfied even when they are not, must understand engineering, and must be able to enforce personally the regulations necessary to keep the system going.

Huntley Project Handled by Government.

The Secretary of the Interior has ordered the suspension of the contract with Piper Brothers Company, of Pueblo, Colo., for five schedules of the distributing system, Huntley irrigation project, Montana, and authorized the continuance of the work by the Reclamation Service.

The company abandoned their contract on November 16th and turned it over to the United States. As the continuance of the work was urgent, the Government engineers promptly took possession of the equipment and the work was continued without the loss of an hour's time.

Pueblo Firm Wins.

In response to informal advertising three proposals have been received by the engineer in charge of the Belle Fourche irrigation project, South Dakota, for making the portal cuts of the tunnel to be constructed in Section 3 of the south canal, three bids were received, that of Orman & Crook, of Pueblo, Colo., at \$20,825 being the lowest.

The Secretary of the Interior has authorized a contract to be entered into with this company according to the terms and conditions of their bid. The work involves about 45,000 cubic yards of excavation, and is located about seventeen miles east of Belle Fourche. It is to be complete by April 13, 1907.

Work on the Corbett tunnel, which is an important unit of the Shoshone project in Wyoming progressed satisfactorily during the month of December, being only slightly delayed by reason of cold weather which interfered with the laying of concrete.

The Government is doing this work by force account and in December excavated 791 linear feet of tunnel, drove 801 linear feet of heading and concrete lined 305 feet of arch and side walls.

On January 1 the Corbett tunnel had been driven 9,323 feet, of which 3,502 feet are lined.

On the great Shoshone dam, which is to be the highest in the world, the contractor has not made satisfactory headway. His work during the past month consisted of driving a road tunnel and excavating for temporary flume and spillway.

The engineers report a great improvement in labor conditions.

St. Mary Project, Montana.

Mr. Cyrus C. Babb, engineer in charge of the St. Mary project, Montana, arrived recently in Washington, where he will be in consultation for a few weeks with the department regarding progress of work.

"This project," said Engineer Babb, "in many particulars has given the Department as much trouble as any of the other irrigation projects now in hand. There are not only engineering stumbling blocks, but legal and international ones as well, and they are not all settled yet.

"The area to be reclaimed, from 150,000 to 200,000 acres, is located in the Milk River Valley in northern Montana. The water to irrigate the same will come mostly from the St. Mary River, a stream rising on the eastern slopes of the main range of the Rocky Mountains.

"Construction work on the 25-mile canal connecting the St. Mary River and Milk River was authorized by the Secretary of the Interior just a year ago this month. Specifications were prepared and bids asked for construction, involving the expenditure of over a half a million dollars. July 31, the time appointed for opening bids, only one was received, and as it was considered too high by the engineers it was rejected by the Secretary. At the time of rejection the Secretary authorized the reclamation engineers to proceed with the construction by day labor and by force account, as it is called.

"Machinery for this purpose was immediately ordered and purchased. This included two steam shovels, traction engines, dump wagons, steam rock drills, etc.

"Considerable preliminary work was done during the year—sixty miles of telephone line was built. A saw mill, planer and matcher were installed at the foot of the St. Mary lakes. Logs for the saw mill were obtained along the upper shores of the lakes on the Lewis and Clarke forest reserve and delivered to the mill, where they were sawed into lumber to be used in the construction work. The St. Mary canal is located on the Blackfoot Indian Reservation, and during the fall the experiment was tried of employing the Indians on the construction of a portion of the canal.

"The results were fairly satisfactory. The Indians while working with their horses on the scrapers did reasonably well. Their horses were hardly heavy enough, however, for plough teams. It was also difficult to get them to work as plough and scraper holders. The Reclamation Service was handicapped in not having experienced foremen who had been on extensive canal work before and who at the same time could handle the Indians.

"The Indians are strictly up-to-date people, for in the middle of the day they all went on a strike for higher wages. They were working the regular eight-hour day. The strikers threatened those that wanted to continue the work—that their homes would be torn to pieces, their horses run off, etc. A conference was held between the engineers and the principal chiefs. They were shown that the work was given to them mainly for their benefit; that if they would not go back to work white help from the outside would be obtained. A slight increase in wages was allowed.

"The Indians finally went back to work, but shortly afterward they began to drop off gradually and go home. Cold weather was setting in and they could not be held. Negotiations are now on foot with certain railroad contractors for the construction of the upper fifteen miles of canal by contract.

"Lower Milk River Valley in Montana is well adapted to irrigation if a sufficient supply of water at all times could be obtained.

"In the vicinity of Chinook and Harlem are some small irrigation canals that during certain years net their owners good profits.

"For instance in 1905 a number of the ranchers under the Harlem canal average three tons of hay per acre on 160 acres of land. The hay sold from \$10 to \$15 a ton. The net receipts were from \$4,000 to \$5,000. One rancher there with about 1,000 acres under cultivation netted over \$25,000. These are results that can be obtained in the Milk River Valley in Montana under irrigation. The principal crops now are hay, oats, potatoes and other hardier vegetables. Very extensive grazing areas are located both north and south of the valley. The Great Northern Railroad traverses the entire length of the valley."

The Roosevelt Dam.

"The great gates for the Roosevelt dam, Salt River irrigation project, Arizona, are on the ground and ready to be installed as soon as the water permits," said Mr. Louis C. Hill of the United Reclamation Service this morning. Mr. Hill, who is supervising engineer for Arizona and southern California, is in the Washington office for a few days on business. The Salt River project in Arizona, which is now in course of construction, is already world-famous for its wonderful engineering features and the new and unique devices which have been introduced. The gates, which are to be installed in the tunnel driven around the dam for the purpose of regulating the flow from the reservoir in accordance with the needs of the irrigators in the valley some seventy miles below, were designed by Engineer F. H. Teichmann.

"There are six gates," said Mr. Hill, "arranged in pairs, so that it is necessary for two gates to fall at once in order to prevent the operation of the system. Each gate covers an opening about 5x10 feet and operates under a pressure of about 800,000 pounds. They are the largest gates in the world operating under a head that anywhere near approaches this figure.

"On account of the salt contained in the water it has been necessary to make all faces in contact and the rollers on which the gate operates of special bronze, in order to sustain the enormous pressure. A large number of experiments were made to determine a bronze of suitable composition. After the composition had been selected it was necessary to increase its strength by hammering the face under a heavy steam hammer.

"A unique lifting device for operating the gates was designed by O. H. Ensign, electrical expert. It consists of hydraulic cylinders operating under a pressure of 700 pounds per square inch, the operating mechanism being handled from the power house several hundred feet from the gates by means of electric motors operating the necessary valves. The position of the gates at any time is indicated to the nearest inch by an indicating device at the switchboard in the power house, so that at any time by a glance at the indicator the superintendent in charge can tell the position of the gates and the quantity of water flowing through.

"These gates were manufactured by the Llewellyn Iron Works, Los Angeles, Cal., shipped by rail to Mesa, and then hauled by wagons sixty miles to the dam. A large number of pieces weigh about 16,000 to 20,000 pounds, and special wagons were necessary to transport them. It was necessary to use sixteen to twenty-two animals in order to haul these loads up the heavy grades.

"When the machinery reached the dam it was unloaded by the great cableways used in the construction of the dam, and carried by the cableways to the mouth of the shaft just above the location of the gates in the tunnel. Here derricks handle the machinery, letting it down the shaft to the chamber built to receive it 100 feet below.

"As soon as the present flood is over the tunnel will be closed at each end and the work of erecting the gates will be begun. During the time these gates are being placed in position the entire river will flow over the Roosevelt dam and the contractors will practically have to cease work."

The Secretary of the Interior is asking for proposals for building the Pathfinder dyke situated about forty-five miles southeast of Casper, Wyo., and involving 170,000 cubic yards of earth excavation and 16,000 cubic yards of rip rap.

Sealed bids will be received at the office of the United States Reclamation Service, at Crawford, Neb., until 2 p. m., February 27. The engineer at Crawford will furnish all particulars.

The Secretary of the Interior today awarded a contract to the Expanded Metal and Corrugated Bar Company, of St. Louis, Mo., for furnishing 1,800,000 pounds of steel bars for reinforcing concrete in connection with the Tieton project in Washington.

The bid of the above firm was \$38,315.99.

Our readers are requested to send us in the address of friends to whom you wish sample copies of Irrigation Age mailed.

Savage Talks.

"The scarcity of labor and the difficulty of getting satisfactory proposals is compelling the Reclamation Service engineers to undertake a number of the larger work by direct force account, employing laborers and teams," said Mr. H. N. Savage, supervising engineer of the Reclamation Service for North Dakota, Montana and Wyoming, who is in the city on a brief visit. "While the policy of the Reclamation Service is to advertise all of its work and to award contracts wherever practicable, it is frequently necessary to take over a number of the contracts and carry them out to completion.

"The St. Mary canal is one of the well-known features of the Reclamation Service work. Construction was begun by the engineers last summer, and an additional plant, steam shovels and steam excavating machinery are now being transported to the site of the canal and assembled for carrying on the work as soon as the season opens up in the spring. It is expected that some of the deeper cuts can be excavated during the winter. The canal crosses the Black-foot Indian Reservation, and the engineers employed the local Indians with their teams so far as available during the season of 1906. Two hundred and eighty teams were on the work at one time. It is expected that an equal or larger number will be available for the work during the coming season, 1907.

"The Reclamation Service will consider informal proposals from contractors who desire to take small sections of this work. The nature of the canal is such that there is opportunity for small contractors with steam machinery or with teams to get satisfactory contracts.

"Work on the Huntley project is progressing quite rapidly. It is expected that some water will be available for irrigating the land in the summer of 1907. An effort will be made to open the land to entry next summer, thus enabling the entrymen to get their lands broken up and their houses and barns erected during the summer and fall.

"The work on the three tunnels is being carried on by contractors working three shifts continuous time, and the contractors report that they will finish this work and one section of the main canal on schedule time. The engineers are building the pumping plant for this project by force account, no satisfactory bids having been received. A large force of teams and men are now at work. This is a unique factor in that the water of the main canal is dropped 33 feet and the power thus created is utilized to lift water to a height of 85 feet, covering an additional 3,000 acres of land.

"Arrangements have been made to open a school on January 1st and twenty-five pupils are already waiting to attend. These are children of people employed by contractors who are prospective settlers under the project and who have already moved their families to Huntley. A Sunday school has been in operation for three months with an attendance of from twenty-five to forty. The school house is practically completed. The Sunday school is held at the cottage of the supervising engineer.

"The first unit of the Sun River project, near Great Falls, is approaching the construction stage very rapidly. Drawings and specifications have been completed for the distribution system, and for the structures for the first unit of 17,000 acres, which includes the Fort Shaw military reservation. It is expected that proposals will be received about March 1st for this work. Drawings and specifications have also been completed for the Willow Creek dam, and advertisement will be made the first week in January. This reservoir will store water to supplement the low flow of Sun River.

"On the Lower Yellowstone the contractors are carrying on the work as rapidly as climatic conditions will permit. Work on the big dam across Yellowstone River is being prosecuted by the Pacific Coast Construction Company, and the deep cuts on the main canal are being excavated with clam shell steam excavating machinery of large size."

The Secretary of the Interior has granted an extension of time to May 1, 1907, to the Burke Construction Company of St. Louis, for the completion of their contract to construct a section of the Interstate canal, North Platte irrigation project, Nebraska-Wyoming. According to the terms of the contract the work was to have been completed January 1st, but the contractors found it impossible to obtain laborers, though they shipped in men at their own expense again and again. The work was further delayed by the fact that they were not able to obtain machinery promptly.

Masonry work on the Pathfinder dam, North Platte irrigation project, Wyoming-Nebraska, has been suspended on account of cold weather. The total amount of masonry laid to date is 5,519 cubic yards. A channel has been let at the southerly end of the masonry to take care of water which seeps through the temporary dam, and it is expected that by the time high water appears in the spring the dam will be at sufficient height to force the water through the tunnel, the 36-inch pipes and the channel at the southerly end.

The men who were taken from the masonry work were immediately engaged removing loose rock from the walls of the canyon, and cutting recesses to take the thrust of the dam where the walls do not give suitable bearing. Work on the quarry will be pushed during the winter preparing material for the masonry work.

Operations were greatly hindered during the month both on the dam and on the canal by inclement weather and the scarcity of labor. The winter work will consist mainly of completing such structures and excavating as the weather will permit, and in preparing to push work rapidly in the spring.

The Secretary of the Interior has executed a contract with Jesse W. Crosby, Jr., of Cowley, Wyo., for the construction and completion of the Corbett tunnel, settling basin, dam and spillway, Shoshone irrigation project, Wyoming.

The work is located about ten miles east of Cody, and includes more than 28,000 cubic yards of excavation. Mr. Crosby's bid was \$23,740.50.

The Board of Consulting Engineers of the Reclamation Service, which convened in Chicago on the 20th, to open bids for the manufacture and installation of high pressure gates for the Shoshone and North Platte irrigation projects, Wyoming, received but one proposal, that of the New Jersey Foundry & Machine Company, of New York.

The bid of this company for constructing the gates for the Shoshone reservoir was \$59,166, and the gates for the Pathfinder reservoir was \$78,567. The time required in which to manufacture and ship the gates was two hundred and fifty days, and the time required to complete the installation of the gates was five hundred and fifteen days after the signing of the contract.

The papers will be forwarded to the Secretary of the Interior for action.

THE NORTHERN HOTEL, Billings, Montana



The leading hotel of the Queen City of the Yellowstone Country. Steam heated, electric lighted; headquarters for tourists, irrigation men and all who enjoy good service. A. F. McNABB, Manager.

Send \$2.50 for The Irrigation Age
1 year, and The Primer of Irrigation

EDWARDS' DITCHER.

Taking into consideration its first cost and later its necessary operating expenses, there is probably not another machine made that will show the profit on the money invested, that a good ditching machine will, if properly handled. The capstan can also be used for moving buildings and like work that requires great power. It is now twenty-seven years since the first Edwards' ditcher was put into operation. Many improvements have since been made, making it now a very complete, handy and thoroughly practical up-to-date ditching machine. Its operating principle resembles that of a large plow and is drawn by a capstan and long rope set at any convenient distance from the machine. To successfully operate this ditcher in all soils, except marshes or sloughs, water is required to

known as peat marshes or sloughs are ditched to the best advantage without water. The width of ditch does not change, but remains the same for all depths of ditch. The large knife extending down to the point of the plow divides the earth in the ditch and two short knives cut a few inches into the top of the earth on each side of the ditch. The mold-boards which are of hard plow steel, complete the cutting of the sides of the ditch as the earth is being raised by them, and the wings move the earth away a suitable distance from the edge of the ditch. When the machine is drawn through once the ditch is complete. Different depths of ditch are obtained by turning a screw that stands in a guide on the forward end of the beam. This screw being attached to the knife raises and lowers the point of the plow, giving the depth wanted. The runner shown under the point and hinged thereto is intended to bear most of the weight of the machine when in operation. This runner



Edward's Ditching Machine in Operation.

keep the mold boards thoroughly wet so the earth will scour from them. If water follows in the ditch it is generally enough and if not, it can be taken up with a pail and deposited where needed. Will cut ditches through either swamp or slough, plowed or meadow land and even high and dry lands provided there is water to keep the mold boards wet. And will, with proper management, cut from 100 to 200 rods of ditch per day. and more, under favorable circumstances, much depending upon the track around capstan and time consumed in moving from one setting to another. Regular size of machine cuts a ditch four feet wide on top, one foot wide in the bottom and any depth to twenty-eight inches, according to the nature and various conditions of the ground and the power to draw it. Regarding depth of ditch, the condition of the ground must be taken into consideration. A 16-inch depth of ditch in one place may draw as heavy as twenty-four inches in another, depending upon what the ground is and whether it is wet or dry. Some soils require much more water than others to make the earth scour from the mold-boards. What is

is adjustable up and down at the will of the operator by a screw similar to the one attached to the knife. Being able to put the weight of the machine on the bottom of the ditch, greatly reduces the friction and consequently the draft, as the weight is then on a small lubricated surface and further enables the operator to cut a ditch on ground so soft and rotten that it would not support the weight of the machine on its surface. The bolster to which the forward axle is attached is pivoted so the axle will revolve up over the end of the machine, and the rear wheels on their iron axle raise and lower vertically in their guides. Nothing is removed from the ditcher at any time either in or out of the ground. The wheels change their position only. Has steel wheels with four-inch wide tires, the forward ones being twenty-six and the rear ones thirty-six inches in diameter. None of them are in use while the machine is in operation, but the machine rests and slides along upon its runners on each side of the ditch and the one in the bottom of the ditch. For full particulars address C. D. Edwards, Albert Lea, Minn.

EXAMINATIONS FOR POSITIONS.

Supervising Drainage Examiner, Irrigation Manager, Irrigation Farmer.

We are reproducing below notices for examinations for three very desirable offices. These examinations will be held March 6, 1907. No doubt many of our readers will be interested and all those who are eligible are asked to communicate with the Office of Experiment Stations, United States Department of Agriculture, Washington, D. C.

IRRIGATION MANAGER.

DEPARTMENT OF AGRICULTURE.

March 6, 1907.

The United States Civil Service Commission announces an examination on March 6, 1907, at the places mentioned in the list printed hereon, to secure eligibles from which to make certification to fill five vacancies in the position of irrigation manager in the Office of Experiment Stations, Department of Agriculture, at salaries of \$1,800 to \$2,500 per annum, and similar vacancies as they may occur.

The examination will consist of the subjects mentioned below, weighted as indicated:

<i>Subjects.</i>	<i>Weights.</i>
1. Water supply and ditch management (practical questions relative to water supplies, measurement of water, definition of pumps and pumping machinery, computations of capacity of pumps and reservoirs, and methods of building ditches, laterals, and small reservoirs).....	25
2. Irrigation practice (including methods of preventing seepage losses, of preparing land for the application of water, or irrigating gardens, orchards, and field crops, and keeping records and accounts in irrigation practice).....	25
3. Drawing (including plans for ditches, reservoirs, lettering, and topography).....	10
4. Thesis of not less than 1,000 words on one of two subjects to be assigned.....	10
5. Education and experience.....	30
Total	100

Applicants whose applications show them to be otherwise eligible will be admitted to this examination regardless of the education and experience shown. The education and experience claimed by them will be given consideration before the rating of their examination papers, and if they receive a rating of less than 70 per cent for education and experience their examination papers will not be rated. Persons, therefore, who have not had the required education and experience should not apply for this examination.

Applicants for this position must indicate in their applications that they have had scientific education equivalent to that required for graduation in the agricultural colleges in the United States, and also five years' experience in canal management or irrigation practice.

The duties of irrigation managers will be to direct experiments to determine the best methods of operating canals and applying water to crops, and to give practical advice and direction to farmers about methods of irrigation to be followed.

More than one day may be required for this examination.

Age limit, 21 years or over on the date of examination.

This examination is open to all citizens of the United States who comply with the requirements.

This announcement contains all information which is communicated to applicants regarding the scope of the examination, the vacancy or vacancies to be filled, and the qualifications required.

Applicants should at once apply either to the United States Civil Service Commission, Washington, D. C., or to the secretary of the board of examiners at any place mentioned in the list printed hereon, for application Form 1312. No application will be accepted unless properly executed and filed with the Commission at Washington. In applying for this examination the exact title as given at the head of this

announcement should be used in the application.

As examination papers are shipped direct from the Commission to the places of examination, it is necessary that applications be received in ample time to arrange for the examination desired at the place indicated by the applicant. The Commission will therefore arrange to examine any applicant whose application is received in time to permit the shipment of the necessary papers.

Issued January 26, 1907.

* * * * *

IRRIGATION FARMER.

DEPARTMENT OF AGRICULTURE.

March 6, 1907.

The United States Civil Service Commission announces an examination on March 6, 1907, at the places mentioned in the list printed hereon, to secure eligibles from which to make certification to fill five vacancies in the position of irrigation farmer in the Office of Experiment Stations, Department of Agriculture, at salaries of \$720 to \$1,200 per annum, and similar vacancies as they may occur.

The examination will consist of the subjects mentioned below, weighted as indicated:

<i>Subjects.</i>	<i>Weights.</i>
1. Penmanship (the handwriting of the competitor in the subject of spelling and copying will be considered with special reference to the elements of legibility, rapidity, neatness, general appearance, etc.).....	5
2. Spelling and copying (an exercise of about five lines of ordinary prose containing twenty or more misspelled words).....	5
3. Practical questions in farming (questions relating to the tools and implements used in preparing land, cultivating and harvesting crops, selection of crops for field, garden and orchard, methods of planting, cultivating, and harvesting).....	30
4. Practical questions in irrigation (questions relating to tools and methods used in preparing land for irrigation, building laterals, and applying water to crops).....	30
5. Farm economy and bookkeeping (questions relating to methods of providing a water supply, selection and care of farm implements, appliances, and machinery, and the keeping of farm records and accounts).....	20
6. Experience	10
Total	100

Applicants for this position must indicate in their applications that they have had five years' practice in the operation of ditches or irrigating crops.

Irrigation farmers will take charge of the irrigation of the experimental farms carried on as a part of the irrigation extension work of the Office of Experiment Stations.

More than one day may be required for this examination.

Age limit, 21 years or over on the date of the examination.

This examination is open to all citizens of the United States who comply with the requirements.

This announcement contains all information which is communicated to applicants regarding the scope of the examination, the vacancy or vacancies to be filled, and the qualifications required.

Applicants should at once apply either to the United States Civil Service Commission, Washington, D. C., or to the secretary of the board of examiners at any place mentioned in the list printed hereon, for application Form 1093. No application will be accepted unless properly executed and filed with the Commission at Washington. In applying for this examination the exact title as given at the head of this announcement should be used in the application.

As examination papers are shipped direct from the Commission to the places of examination, it is necessary that applications be received in ample time to arrange for the examination desired at the place indicated by the applicant. The Commission will therefore arrange to examine any applicant whose application is received in time to permit the shipment of the necessary papers.

Issued January 26, 1907.

SUPERVISING DRAINAGE ENGINEER.

IMPORTANCE OF THE KITCHEN GARDEN.

DEPARTMENT OF AGRICULTURE.

March 6, 1907.

The United States Civil Service Commission announces an examination on March 6, 1907, at the places mentioned in the list printed hereon, to secure eligibles from which to make certification to fill three vacancies in the position of supervising drainage engineer in the Office of Experiment Stations, Department of Agriculture, at salaries of \$2,000 to \$2,500 per annum, and similar vacancies as they may occur.

The examination will consist of the subjects mentioned below, weighted as indicated:

<i>Subjects.</i>	<i>Weights.</i>
1. Drainage engineering (including questions relating to steam hydraulics, theory and practice in the construction of surface and underdrains, levees and other structures required in draining lands and for protecting them from overflow)	40
2. Thesis of not less than 1,000 words on one of two subjects to be assigned.	10
3. Drawing (topographic mapping, working plans, and free-hand lettering)	20
4. Training and experience.	30
Total	100

Applicants for this position must indicate in their applications that they have had five years' experience in responsible charge of drainage work, and are able to design and direct the carrying out of important projects in land drainage.

Supervising drainage engineers will be required to supervise surveys and investigations looking to the reclamation of agricultural lands by drainage and to conduct experimental investigations of special problems in farm drainage.

More than one day may be required for this examination.

Age limit, 21 years or over on the date of the examination.

Applicants whose applications show them to be otherwise eligible will be admitted to this examination regardless of the training and experience shown. The training and experience claimed by them will be given consideration before the rating of their examination papers, and if they receive a rating of less than 70 per cent for training and experience their examination papers will not be rated. Persons, therefore, who have not had the required training and experience should not apply for this examination.

This examination is open to all citizens of the United States who comply with the requirements.

This announcement contains all information which is communicated to applicants regarding the scope of the examination, the vacancy or vacancies to be filled, and the qualifications required.

Applicants should at once apply either to the United States Civil Service Commission, Washington, D. C., or to the secretary of the board of examiners at any place mentioned in the list printed hereon, for application Form 1312. No application will be accepted unless properly executed and filed with the Commission at Washington. In applying for this examination the exact title as given at the head of this announcement should be used in the application.

As examination papers are shipped direct from the Commission to the places of examination, it is necessary that applications be received in ample time to arrange for the examination desired at the place indicated by the applicant. The Commission will therefore arrange to examine any applicant whose application is received in time to permit the shipment of the necessary papers.

Issued January 25, 1907.

Every one who has lived in the country for any length of time understands the importance of the kitchen garden. A writer in *Farm and Ranch* says that the kitchen garden is not only a convenience, but a necessity—because it is a saver of money and a saver of health. The old saw about the shoemaker's children going without shoes finds its counterpart in the farmers' children who grow up without an abundance of garden things to eat. If one who lives in the city, having no land on which to plant a garden, economizes on fresh vegetables, there is some excuse, because the price that he pays for them sometimes amounts to \$1,000 or more per acre for the land on which they are grown; but for the farmer to economize by not having a good kitchen garden is not economy at all, but the worst extravagance.

Of course every farmer has a garden of some sort, and usually has turnips, collards and sweet potatoes, but while this is good as far as it goes, it does not go far enough. The renter can not have all the things that an owner can, but he can at least have all the annual vegetables in greatest abundance.

The kitchen garden should be as near the kitchen as circumstances permit. It should contain one-fourth acre, one-half acre or more, according to the size of family. The soil for it should be enriched with manure, ashes and fertilizers most liberally and the drainage should be perfect, even if one has to resort to tile drains. It should be fenced to keep the poultry out, for chickens and a garden in the same place at the same time are incompatible. It should contain everything in season. Something for the early spring, something for the long, hot mid-summer, something for fall and something for winter.

Turnip greens last until spring time, and early radishes come on before one realizes that they have had time to grow. Asparagus is a delicious vegetable, but requires a full year after setting the roots before the tops are eatable, but after that they always appear every spring and must be cut every day or two, else they will get too old.

The asparagus that city folks buy looks beautiful in the bunch, but only the upper third or fourth of each stalk is tender enough to eat, the rest being stringy; but in the garden one may cut it so that practically the entire cut portion is tender. An asparagus bed lives for years and furnishes edible cuttings for a period of a month to six weeks every spring. During the same period rhubarb can be cut for sauce and pies and a dozen hills of it, well manured, will supply the family for many a year.

one may cut it so that practically the entire cut portion is tender. An asparagus bed lives for years and furnishes edible cuttings for a period of a month to six weeks every spring. During the same period rhubarb can be cut for sauce and pies and a dozen hills of it, well manured, will supply the family for many a year.

Lettuce can be had in the early spring if it is started in cold frame in the winter. It stands cold better than any of the vegetables, except those of the cabbage family, and the seed is very cheap. It is one of the easiest vegetables to raise and by means of a succession of plantings may be had throughout the year.

PATENTS

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Onions are one of the vegetables usually found on every farm and are said to be very healthful. There are many varieties and they can be matured either for spring or fall use, and if one likes them, they are negligent not to have them. It was formerly the custom to grow onions in the South from sets, but they are also grown successfully from the seed.

Beets ought to be grown and consumed more than they are. They yield enormously, are cheaply grown and have almost no insect and fungus enemies. A very small garden plot will furnish beets for a family and they are fine eating and easily prepared.

English peas and snap beans of various kinds are leading garden products, and no garden is complete without them. Each should be planted in succession to ripen at different dates.

Tomatoes are in a class all to themselves. They may be had early by starting in hotbed or cold frame, and they may be continued till fall by later planting. The "love apple" of former days, which was thought to be poisonous, has become a leading standby in the garden of today. Whether eaten uncooked, freshly cooked or canned, it is eminently satisfactory.

Cantaloupes and watermelons may be grown in the kitchen garden, or if more convenient, can be grown outside. When the hot weather of midsummer arrives and our appetite for bread, potatoes and meat has vanished, nothing is as satisfactory as members of the melon family. Cantaloupes for breakfast with a little salt on them, and watermelon at any time when resting in the shade, are compensations for the long-continued heat that brings on lassitude.

Summer squashes are excellent for those who like them, and are often a welcome change, but the winter kinds, like the Hubbard, or its southern substitute, the Cashaw pumpkin, are more nutritive.

Cabbage and collards are very substantial food, the former furnishing, perhaps, more nutritive matter for the area on which it is grown than any other vegetable. Cabbage is good fresh, cooked or made into sauer kraut. By all means, let every farmer grow cabbage, or collards if he prefers.

Corn should be the king of the garden, as it is the king of the field. There are many varieties of sweet corn, some of them remaining green a long time, and by planting at successive times one may have sweet corn from June until frost comes again. Corn is the most nutritious of all vegetables, except possibly peas and beans, and is superior to them in ease of production, preparation and cooking. Have all other vegetables, but have corn anyway.

One should have berries on the farm, whether within or without the garden. Several varieties of dewberries and blackberries, and even raspberries, may be grown, while strawberries go without saying.

For ease of working, garden vegetables should be planted in long rows and worked by horse power as much as possible. This will reduce the hand work and keep the garden cleaner than it could be kept if hand work is depended on entirely.

All these things growing within a stone's throw of the kitchen door can be gathered by the children where mamma can have her eye on them or can help them, and they will keep the table full to overflowing with delicious, healthful products and save many dollars' worth of store goods.

NATIONAL DRAINAGE ASSOCIATION.

One of the most important movements of national importance was auspiciously set on foot in the organization of the National Drainage Association at the conference called for that purpose, which sat at Oklahoma City on December 5, 6 and 7 last. There were present at the conference nearly one hundred delegates, representing seventeen States, covering all the way from Georgia to California. The delegates were a most representative lot of men, and fully alive to the importance and the possibilities of the great work involved. The proceedings of the conference were marked by earnest exchange of opinion, and yet resolving themselves with unity of action, which augured happily for the future work of the association. There were twelve or fifteen of our national and state engineers present at the conference—a body of men than whom none are more important or more sincere and earnest in the development of all our national resources on broad and efficient lines. To describe to our readers what a change in sentiment has come to the people along the lines of irrigation, drainage and similar work in the states, we simply contrast this first drainage conference with the first national conference called some eight years since to organize the National Irrigation Congress. At that conference there were twelve delegates present, representing five states.

The drainage association elected as its officers for the first year as follows: George E. Barstow, Barstow, Texas, president; J. S. Osburn, Coffeyville, Kas., first vice-president; A. S. Fellows, Bismarck, N. D., second vice-president.

Executive Committee for three years—A. S. Bernard, Cass Lake, Minn., and F. W. Brockman, St. Louis, Mo.

For two Years—J. J. Melliush, Bloomington, Ill., and A. S. McGowan, Snyder, Okla.

One year—L. E. Ashbaugh, Ames, Iowa, and Charles L. Rushing, Meridan, Miss.

The election of treasurer and secretary was left with the executive committee.

There is something like eighty-five million acres of overflowed lands in the states that can be reclaimed; the products from said lands can hardly be computed. They will add immeasurably to our productive capacity as a nation, and in process of time will be required for our rapidly growing people.

This movement is entirely in harmony with the great work now in progress by the national government, and by private enterprise in reclaiming the great arid regions of the West and Southwest, as well as being in accord with that other most important work of locating the masses of the people upon the lands of the nation. Also emphasizes the vital need of national aid in creating deep water highways out of the Mississippi river and its tributaries.

Senator Flint of California now has an act before the national Congress at Washington, looking toward the establishment of a fund for propagating this great work of national drainage, and which we hope will meet with success.

The first national drainage congress will sit at St. Paul in October next.

BOOKS ON Irrigation and Drainage

THE IRRIGATION AGE has established a **book department** for the benefit of its readers. Any of the following named books on Irrigation and Drainage will be forwarded postpaid on receipt of price:

Irrigation Institutions, Elwood Mead.....	\$1.25
Irrigation in the United States, F. H. Newell	2.00
Irrigation Engineering, Herbert M. Wilson.....	4.00
Irrigation and Drainage, F. H. King.....	1.50
Irrigation for Farm and Garden, Stewart.....	1.00
Irrigating the Farm, Wilcox.....	2.00
The Primer of Irrigation, cloth, 300 pages.....	2.00
Practical Farm Drainage, Charles G. Elliott.....	1.00
Drainage for Profit and Health, Waring.....	1.00
Farm Drainage, French.....	1.00
Land Drainage, Miles.....	1.00
Tile Drainage, Chamberlain40

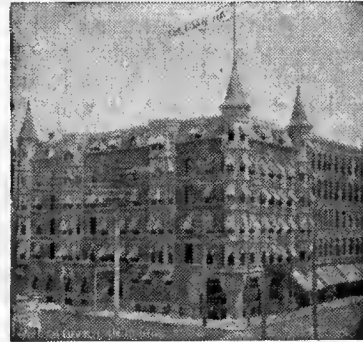
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E. W. Schubert, Manager

THE GULF COAST OF TEXAS

That's the title of a new eighty-page illustrated book just published by Rock Island-Frisco Lines.

We want a copy of it to reach the hands of every investor and homeseeker in the country.

It tells of a region unparalleled in its possibilities for home-getting and fortune making—recently opened up by the St. Louis, Brownsville and Mexico Railway.

You have heard of other sections that are or were favorable for such purposes, but you have never heard of the like of Southern Texas. **MARK THESE WORDS.**

The book will tell you something about it and a trip of inspection is cheaply made. Are you interested?

If you will give me your address I will promptly correspond, sending you the book and full particulars. By special arrangement you will also be personally introduced, if you desire, to **farmers who are now there**—to whom you can talk and of whom you can learn all about that new, marvelous country—the Gulf Coast of Texas.

Very low one-way and round-trip rates on first and third Tuesdays monthly. Write me to-day for full information.]

JOHN SEBASTIAN, Passenger Traffic Manager

ROCK ISLAND-FRISCO LINES

CHICAGO OR ST. LOUIS

[Address me at city nearest you.]

GROW YOUR OWN SEEDS.

The department of agriculture is investigating the quality of seeds being sold in the United States by purchasing sample lots from places scattered over all the country and subjecting them to careful tests. The results are surprising. The actual number of germinable seeds in a bushel of clover seeds costing \$5.50, and in a bushel costing \$3.50 was ascertained. In the former, where the price was apparently higher, the cost of good seed was 9 8-10 cents per pound, while in the latter, where the initial cost was lower, it was 12 6-10 cents per pound. But this is not all. In 56 per cent of waste in a seed of cheaper quality there are innumerable seeds of noxious weeds. In one sample containing in all 1-5 of 1 per cent of spurious seeds the number of weed seeds per pound averaged up to 990. In a bushel of 60 pounds there are, therefore, more than 59,000 weed seeds. A sample containing 4-5 of 1 per cent of spurious seeds has about 3,000 weed seeds to the pound, while in another sample, in which 2 5-10 per cent was spurious seed, there were more than 27,600 weed seeds in every pound. If 15 pounds were sown the farmer would distribute about 144,000 of weed seeds, all of which would have an equal chance with the crop with which they grew. The same holds true to even a greater extent of alfalfa.

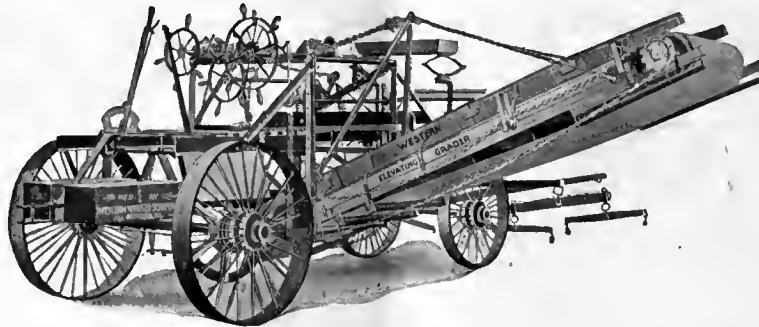
The acreage of alfalfa in this country is increasing rapidly in the well-known area of the arid portion from the Missouri river westward, as well as in the southern humid part of the United States, where its cultivation has been more recently introduced. The larger area sown each year, together with the short crop of the

last two years, has created a demand for seed far in excess of the domestic production. The usual results have followed this scarcity, the price of good seed has advanced, larger importations of foreign seed are being made, a considerable amount of adulterated seed is being offered, and the quality of clover and alfalfa seed is low. During the eighteen months from June 30, 1902, to December 30, 1903, 1,999,335 pounds of alfalfa seed were imported. This seed is mostly of inferior quality.

On the question of imported seed Farmers' Bulletin No. 260, issued by the United States Department of Agriculture, says: "The United States is a large exporter of clover and other seeds, our annual sales ranging from five million to twenty million pounds per annum. At the same time we are importing a relatively smaller quantity of various seeds of lower quality. In most European countries there is some sort of seed control, either voluntary or otherwise, by means of which the people have been educated to the use of seed of good quality. This leaves a large bulk of poor seed that cannot be sold there which, being offered for export at low prices, is sent to the United States and either sold as low grade seed, or, in case it is especially bad, mixed with better seed in the so-called grading down process before being put on the market."

A very stringent seed law has been recently enacted in Canada prohibiting the sale there of seed containing more than a very small number of weed seeds. It contains the following clause: "The provisions contained in this act shall not apply to seed marked, 'Not absolutely clean,' and held or sold for export only."

While the provisions of this law prevent the legal



Western Elevating Grader and Ditcher

Designed especially for the excavation of irrigation ditches and canals. Sold on guarantee that it will move one thousand cubic yards per day of ten hours, using ten to fourteen horses, one operator and two drivers. Also largely used when drawn by traction engine. Ditches up to sixty feet in width can be made with this machine at a fraction of the cost incurred by the use of any other outfit.

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sale of screenings or seeds containing weeds in quantity, it encourages the exportation of such seed from Canada.

"As a result of the effort in Canada and Europe to obtain good seeds in the United States, where we are, is not considered as carefully as it should, and where there are no restrictions on the sale of poor seeds it becomes a ready market for low grade seed."

There is but one remedy. Our American farmer must begin threshing his own seed instead of accepting the dumpings of other countries. This can be done without financial loss. On the contrary, it is very profitable, as the following letters will show:

"Roswell, Idaho, August 30, 1906.

"I, Chas. E. Paine, being first duly sworn, hereby affirm that I am the person who assisted E. H. Brumbach on August 27, 1906, in measuring the entire field on the ranch of Sylvester Hill in Roswell, Idaho, from which Mr. Brumbach was threshing and found it to contain fifteen and two thirds acres by actual measurement.

"(Signed) Chas. E. Paine.

"Subscribed and sworn to before me this 31st day of August, 1906.

"(Seal) J. E. Kerick, Notary Public."

"Now to make this record still more interesting, a few figures will show the financial end of the proposition: Twelve thousand three hundred and forty-one pounds of seed at 12 cents a pound, which said seed would be worth, makes \$1,480.92, and add to this the value of 66 1-2 tons of straw or chaff, which is worth not far from \$250 in actual feeding value, makes \$1,730.92 as the total returns from 15 2-3 acres of

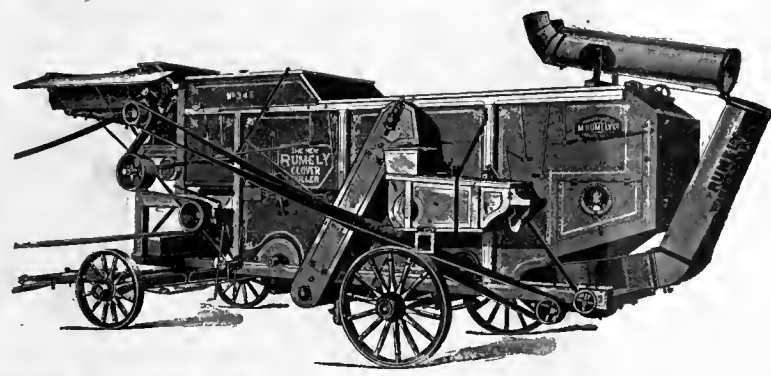
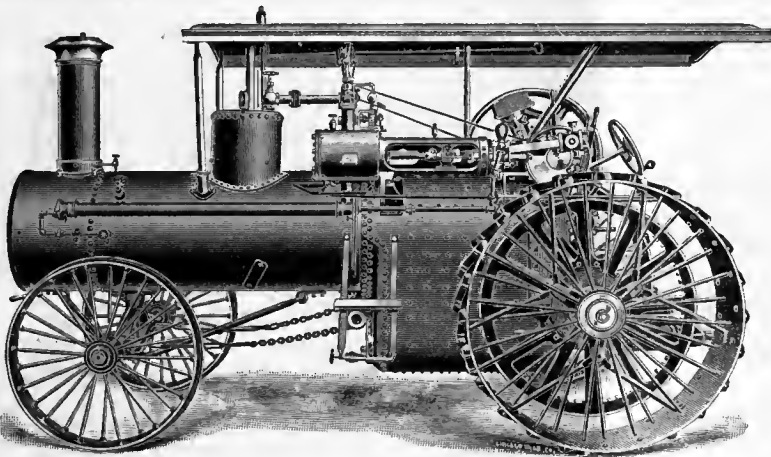
clover. For the actual outlay of time and labor it is doubtful if this result has been equaled in this good year of 1906 in any other instance."

The machinery used was a huller manufactured by the M. Rumely Company of La Porte, Ind., to whom the owner of the seed addressed the following letter:

"I congratulate you on the success of your new huller, sold to Ezra H. Brumbach, Roswell, Idaho. He threshed my 15 2-3 acres of clover in 23 hours actual running time, and could not overtax the separating capacity, although the growth of clover was enormous, as compared with clover grown in the East. Much of it was five feet in length and it was crowded in as fast as the feeder would take it. There was absolutely no waste of seed at the machine. I paid Mr. Brumbach \$12.50 per acre for hulling my seed and am satisfied."

AGENTS \$50. WANTED
Per WEEK
To sell the Dr. Haux famous "Perfect Vision" spectacles—finest on earth. State present occupation. Dr. Haux Spectacle Co., Dept. A. St. Louis.

Send \$2.50 for The Irrigation Age one year and The Primer of Irrigation



"RUMELY" Threshing Machinery

- Single and Double Cylinder Coal and Straw-Burner Traction Engines.
- Rumely "Ideal" Separators, Wind and Attached Stackers.
- Ruth Self Feeders.
- Grain-Handling Attachments.

CLOVER AND ALFALFA HULLERS
PLOWING ENGINES

M. RUMELY CO.
Manufacturers
LAPORTE :: :: INDIANA

Renew your subscription of the IRRIGATION AGE for 1907
 Send us in Post Office or Express money order for \$1.00
 With Primer of Irrigation \$2.50

TWO PIANOS! CASH! BIG PRIZES FREE!



If this chart gets destroyed another printed upon heavy paper will be sent upon receipt of 2c stamp for postage.

Test of Skill—This contest is not to be confused with the guessing or estimating contests. Our contest is a test of skill in counting and planning and the best man wins. It depends upon you. There is no guess or chance about it. Do not hesitate about entering but get your counts in at once.

CONDITIONS—50 cents pays for a year's subscription to SUCCESSFUL FARMING and one count; \$1.00 pays for two years and three counts and makes you eligible for the special \$50.00 prizes given to winners of 1st prizes if they have three counts. See below.

AWARDS will be made as follows—The persons giving correct or nearest correct count will get first prize. Next nearest correct, second, etc.

\$50 PRIZES—We believe everybody should have three counts so they can have one each side of what they think is correct to be more sure to hit it. To encourage this we will give \$50.00 extra to winners of 1st prizes if they have three counts. Remember if you have one count you get 1st prize only, but if you have three counts you get \$50 extra.

TIME PRIZES—\$25.00 Extra. We feel early counters should be rewarded and we will give \$25.00 to the person sending best answers by March 31st.

In case of tie we will write each person so tied asking them to make as few words as possible from the letters of the alphabet, using each letter of the alphabet twice and only twice, and no one word more than once, each letter left over counting as one word. To the one tied in the counting who gives us the fewest words as above will be awarded first prize. This practically eliminates all question of tie, but if there should by any possibility be a tie in this the prize will be divided equally between those so tied.

Subscription without counts is 25 cents per year, additional counts after you have three entered as per our terms in paragraph "condition" above may be entered at 25 cents each.

Publisher SUCCESSFUL FARMING, 235 Tenth St., Des Moines, Iowa.

I enclose \$..... for subscription to SUCCESSFUL FARMING,

and I wish to enter the..... (write ladies' or gents') Contest. If \$1.00 is paid send three counts; if only 50c is paid send ONLY ONE count. The extra \$50.00 go only to those having THREE or more counts entered.

My Count is: (1).....(2).....(3).....

NAME.....

P. O..... State.....

FREE If You Can Tell How Many Dots

IF YOU CAN COUNT AND PLAN YOU CAN WIN!

SUCCESSFUL FARMING will give to those who can count the dots in the piano correctly or nearest correctly, the following list of prizes: CAN YOU DO IT?

- Two Elegant Pianos, one to a lady and one to a gentleman.
- 2nd. Two Hundred Dollars Cash.
- 3rd. One Hundred Dollars Cash.
- 4th. Fifty Dollars Cash.
- 5th. Twenty-five Dollars Cash.
- Next 5. Ten Dollars Each.
- Next 10. Five Dollars Each.
- Next 25. Two Dollars Each.

CONDITIONS: 50 cents pays for one year and one count. \$1.00 pays for two years and three counts. You get \$50 extra if you have three counts. It will pay you to have three. See conditions below.

Don't Delay! If you want a Piano or other Prizes free, send your counts at once.

PRIZE WINNERS IN PAST CONTESTS

A Piano for \$1.00. Surely people may enter your contest knowing that they will receive fair treatment. How glad I was to win a piano for so small an amount and wholly unexpected. The paper alone is worth all I paid.

MRS. L. W. NOTT, Marion, Ia.

He Won a Piano. Refer people to me if they are honest. I got a piano for a prize and never heard of you until I answered your ad. Your paper is worth twice the subscription price.

A PIANO



MRS. L. W. NOTT, Marion, Iowa.

\$100.00 Prize. I got my \$100.00 and it was the easiest I ever earned. The dots are hard to count but I know the prizes go to those who win them fairly.

AMY R. BARNES, Van Horn, Iowa.
 To Whom It May Concern: I won grand prize of \$350.00 Cash in last contest. I was much surprised. I was to watch as to Successful Farming's fairness to any and everybody.

\$100.00 CASH

Do You Want \$100 Cash? I received the \$100 in greenbacks. Thanks to you gentlemen. Your contest must be fair. The judges have been impartial. Refer to me.

A PIANO



W. C. ELLIOTT, Andouin, Ia.



AMY R. BARNES, Van Horn, Ia.

\$50.00 CASH

Win a Piano. I received the elegant piano which I won in your recent contest, and all was perfectly grand. I am recommending you to all my friends and you are at liberty to use my name as reference any time you wish.



NEWTON BARICK, Ligonier, Ind.

Others Who Have Won: \$100—Eva I. Buckner, Fredonia, Kas. \$100—C. S. Wyman, Vinton, Ia. \$50—S. Irving Steyer, 225 E. Ball, Baltimore, Md. \$100—E. M. Ball, Montrose, Mo. \$50—L. P. Stinson, Arcata, Calif. \$50—A. J. Ferdue, Atchona, Ia. \$50—Albert Peterson, Holdrege, Neb. Piano—Mr. Libbie Greulick, St. Paul, Minn. Piano—W. S. Keavor, 817 Freeman St., Cincinnati, O. Piano—J. Gemachlich, Kensington, Kan. These are but a few of many. We could give a list of hundreds if we had space. You might as well be a winner, if you go at it at once.

A Piano for Illinois.

An elegant Piano for a Dollar. That is what I got and anybody that thinks your prizes are not awarded fairly don't know. There can be no favorites or I would not have won.

\$50.00 CASH



EUGENE FOURNIER, Matane, Quebec

Nobody connected with our paper will be allowed to compete. Contest closes June 30, but get your counts in at once. See about time prize above.


Address all letters to SUCCESSFUL FARMING, 235 Tenth, St., Des Moines, Iowa.

**Are You Behind
With Your
Excavating?**

It may mean thousands of dollars to you to have your contract finished on time. The excavating capacity of our steam shovels ranges from 500 to 5,000 cubic yards per day, according to the size of the machine and the character of the material. They are built in sizes from 22 to 110 tons in weight and $\frac{3}{8}$ to 5 cubic yards dipper. The cost of operating is low compared with other methods or similar machines. They are mechanically right in every respect, and thoroughly guaranteed. Give us an outline of your work, and the amount you would want to excavate in a given time, and we will send you specifications and prices on a shovel that would dig to your satisfaction and profit.

..The..

Vulcan Iron Works Co.
130 Vulcan Place
Toledo, Ohio



**Advantages of
NORTHWESTERN IRON HEADGATES**

Advantage No. 3: DURABILITY

The cheapest gate is the one that will last the longest, and the one you don't have to repair. The only way to make a durable headgate is by making it entirely of iron. That is why NORTHWESTERN headgates are so durable, and why they don't need repairing every year.

You can't expect a wooden gate to last long, and you don't want to be bothered fixing it every spring and fall. NORTHWESTERN IRON HEADGATES are made strong enough to last a lifetime, and made properly so as not to need repairing. They are not the cheapest gates in first cost, but are the cheapest in the long run, because one NORTHWESTERN iron headgate will outlast a dozen wooden gates.

Replace your old, worn-out wooden gate with an iron gate that will be a permanent improvement. My booklet will show you how easy it is to put in.

C. D. BUTCHART **Denver, Colo.**

A FARMER, UP-TO-DATE AND A HUSTLER, will work as foreman or manager for one hundred dollars per month. Thorough in general farming, irrigation, vine and deciduous fruit growing. Experienced in all kinds of labor, both tenant and wage system.

Address BOX 286 STOCKTON, CAL.



The Nation's Garden Spot

The vast territories now open for settlement in the States of

OREGON, WASHINGTON and IDAHO

offer to the Homeseeker an unparalleled opportunity. This great region is rapidly developing, and as it becomes more thickly settled land values will correspondingly increase.

LOW HOMESEEKERS' RATES

in effect to these States every first and third Tuesday of February, March and April, 1907, via

UNION PACIFIC

offer an exceptional chance to look at this country for yourself.

Inquire of **E. L. LOMAX, G. P. A., Omaha, Nebraska**

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Apples 4c, Peach 5c, Plums 12c,
Cherries 15c. Best quality
good bearers, grafted
stock, not seedlings.
Concord Grapes 2c.
Forest Tree Seed.
lines \$1.00 per
1,000 up. We
pay the
fr'ght.

GERMAN NURSERIES & SEED HOUSE
CARL SONDEREGGER, Prop.

We
have
a com-
plete line
of Vegetable,
Flower and
Farm Seeds. Our
large illustrated cat-
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GERMAN NURSERIES,
Box 52, BEATRICE, Neb.

Do You Like Apples?

DO YOU WANT TO RAISE

BIG, RED APPLES

Peaches, Prunes, Melons, or Make
Hay when the Sun Shines?

BUY LAND IN THE PAYETTE VALLEY IDAHO

A good investment to be growing along with the boys and turned over to them later.

The best way to place the savings of railroad men, professionals and teachers, especially ladies.

If your savings are small get up a little syndicate and buy 40 acres and divide it into 5 and 10 acre tracts, sending your own man along to care for it. Very cheap way if you get the right man.

We have capable men already here, but we charge for taking responsibility.

Unimproved is worth \$40.00 per acre with good water right.

Any amount of facts and figures to give if you are interested.

Drop us a card and send us the names of your friends. It is good enough to pass along.

Now, if you don't believe all this, write to any one living in the Payette Valley. They will all tell you the same thing, or best of all, come and see for yourself.

Special Rates on Railways. For Further Information
Address

New Plymouth Land & Colonization Co. *Limited*

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Galvanized Steel Irrigation Flumes AND WATER TROUGHS



Galvanized steel is rapidly taking the place of wood for fluming purposes and with The Maginnis Patent splice fluming is made easy Any boy can put the Maginnis Steel Flume together or take it apart. Steel flumes and troughs "Ship Knock down" Third Class freight. Let me figure on your flume. All flumes guaranteed.

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Kimball, Nebraska

Economical **IRRIGATION** Plants

RIFE Automatic Hydraulic RAM

(Pumps Water by Water Power)

Town Water Works
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Elevates water 25 for each foot fall. Operates under 2 to 50 feet fall. 5,000 in Operation. 30 days trial. Catalogue free.

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EFFICIENCY
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"The basis of my business is absolute and unvarying integrity"—Samuel S. Thorpe.

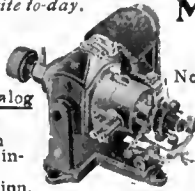
MICHIGAN FARM GRAZING AND FRUIT LAND

FOR SALE CHEAP ON EASY TERMS

I own over 16,000 acres of good unimproved cut-over timber land, lying practically in a solid body adjacent or tributary to the City of Cadillac, the most progressive town in Northwestern Michigan. Price \$5.00 per acre and upwards according to location and amount of purchase. I also own or control several finely improved farms. I have written accurate and comprehensive booklets about this area, its location, soils, climate, markets, transportation facilities and other features which would interest homeseekers and I hold myself personally responsible for each statement therein. My literature is well illustrated with engravings taken from actual photographs on the lands. I send same free. Write today. This is your opportunity, don't miss it. Values are raising rapidly, get settled now and take advantage of the improvements others are making. Address:

SAMUEL S. THORPE, Room 8, Webber-McMullen Bldg., Cadillac, Mich.

Write to-day.



Motsinger Auto Sparker

starts and runs

Gas Engines without Batteries.

No other machine can do it successfully for lack of original patents owned by us. No twist motion in our drive. No belt or switch necessary. No batteries whatever, for make and break or jump-spark. Water and dust-proof. Fully guaranteed.

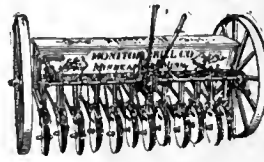
MOTSINGER DEVICE M'FG. CO.,
111 Main Street, Pendleton, Ind., U. S. A.

Catalog free with full information.

BIG PAY FOR NAMES Send us 25 cents and the names and P. O. of 15 good farmers, and we will send you for two years the Farmer's Call, a weekly farm and home paper. Est. 1880. 1200 pages a year. Extra good Household and Children's departments. Address, Farmer's Call, Quincy, Ill.

Monitor Double Disc Drills

Are Especially Adapted For Use in the Arid and Semi-Arid Regions.



STRONG, DURABLE, LIGHT-DRAUGHT

Take less seed and produce greater yield per acre of better grade of grain than any other machine made. Cannot be clogged in mud, gumho, adobe or any other soil. Pretty strong talk—isn't it? We have proof.

Ask For Catalogue No. 19 Free.

MONITOR DRILL CO.

MINNEAPOLIS,

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PEERLESS FENCING—"Without a Rival."

947

A four-foot general purpose fence close spaced enough to turn pigs, high enough to turn all kinds of stock and strong enough for all general purposes—is coming to be recognized as the most desirable style to buy.

Mr. Anderson, editor of this paper, has recently purchased a quantity of this fencing for use on his experimental farm at Cadillac, Mich., and we refer you to him—he will tell you frankly what he thinks of it.

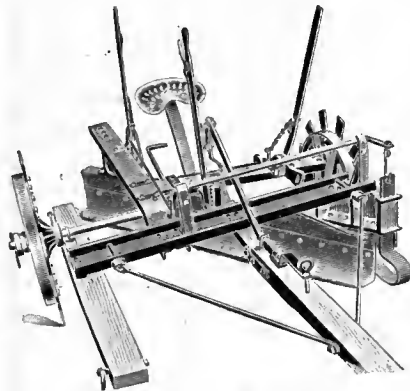
Made with No. 9 top and bottom wires; No. 11 lateral wires and No. 12 crossbars, 12 inches apart. Spaces from bottom up as follows :—3, 3½, 4½, 6, 7, 7, 8, 8.

We make many other styles, from which you may select one especially adapted to your own particular needs, if you wish. We have them all, high and low, close spaced and wide spaced, heavy and light. Our catalog will describe them and is free.

Representation through dealers or agents sought in all new territory.

PEERLESS WIRE FENCE CO., Ltd.

ADRIAN, MICH.



THE EDWARDS

Rural Road Grader and Ditcher

A new model of grader and ditcher that will interest all highway commissioners, builders of ditch and levee work in the rice belt, irrigation work in the West, and the big farmer everywhere to open up ditches with and to build roads needed on the farm.

If you have road grader work to do in any form, then get a Rural Road Grader and Ditcher, thereby saving more than half in cost of machines and working expenses.

Operated by One Man and Two Teams. Sold on Trial.

TESTIMONIAL. SPENCER, IOWA, May 19, 1906

C. D. Edwards, Albert Lea, Minn.

Dear Sir:—You will please find enclosed draft for \$125.00 in payment for one Rural Road Grader and Ditcher, ordered of you April 28, 1906. Would much rather have it than an eight-horse grader. Can do more and better work with it at one-half the expense and can work it where we cannot the larger one, so you can rest assured we are well satisfied with the machine.

Yours respectfully, J. R. FLOYD, R. F. D. No. 1.

Chairman Trustees, Meadow Township, Clay County.

Clearing Land With a Jumbo Stump Puller.

I manufacture the Climax and Chief Pullers also, intended for lighter work. Capstan Ditching Machines, cutting ditches 4, 6 and 8 feet wide and Bog Land Cutters. Send for catalog of the machine you are interested in.

B. L. VINEYARD & CO., Eagle Lake, Texas, General Southern Agents, Manufacturers Machinery Co., New Orleans, Louisiana, Agents for Louisiana and Arkansas, F. E. Widmann, Pueblo, Colorado, General Agent.

C. D. EDWARDS

Albert Lea, Minnesota

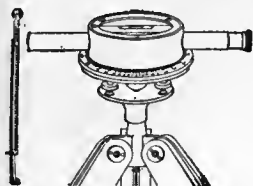
BEFORE YOU BUY A LEVEL

Write for descriptive circulars of the

BOSTROM IMPROVED FARM AND BUILDERS' LEVELS

Practical up-to-date instruments that anyone can use. Recommended by professional men of repute and by the most progressive farmers of the country for irrigation, drainage and building purposes.

Prices: \$12.50 and \$25.00 including Telescope, Tripod and Rod.



BOSTROM-BRADY MFG. CO.

55 W. Alabama St. - - ATLANTA, GA.

The only plow made for digging lateral ditches or trenches.

Canton Ditching Plow

Made especially for the irrigated sections, and no other plow equals it for this class of work. **Large, Massive and Heavy,** and strong enough for 6 or 8 horses. Forc

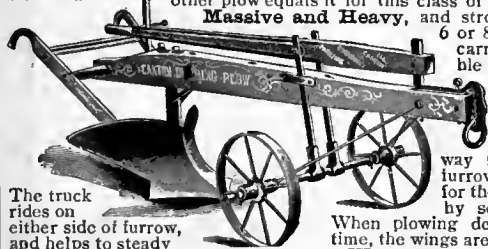
carriage is adjustable both ways. Can be furnished with wings for first plowing, throwing the soil 3 ft. each

way from center of furrow, leaving room for the soil thrown up by second plowing.

When plowing deep the second time, the wings are removed.

Write for prices.

The truck rides on either side of furrow, and helps to steady the plow.



Parlin & Orendorff Co., Canton, Ill.

PORTLAND SPOKANE DENVER

Con. W. & M. Co., Salt Lake City Pacific Impl't. Co., San Francisco

Help.

We want help immediately to aid us in selling the output of three factories just added to our rapidly growing business.

We want energetic and capable men and women in all parts of the union, in either city or country, who are willing to devote all or part of their time, earning an income from \$15 to \$75 per week.

We have a place for you. With or without experience.

Home and neighborhood work for ladies and girls in forming clubs and canvassing. Grocery, drug and general stores and cigar canvassing for men.

Write today for our unequalled offer, give age, experience, if any, and your ideas of work.

We have a large, popular and profitable line to offer you.

THE PEOPLES MERCANTILE CO.,
607 Vine St., Cincinnati, Ohio.

DON'T INCORPORATE

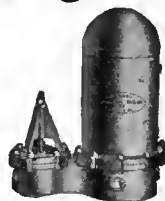
until you have first written us for a copy of the laws of Arizona, now universally conceded to be the most liberal in the United States; private property exempt from corporate debts, no franchise tax, do business anywhere, cost very small, can commence business same day the articles are received. Write for our pamphlet giving copy of the corporation laws of Arizona and detailing the many advantages of organizing thereunder.

ACME INCORPORATING COMPANY

Corporation Agents, Organizers and Promoters
PHOENIX, ARIZONA.

NO MORE BLIND HORSES For Specific Ophthalmia, Moon Blindness, and other sore eyes, BARRY CO., Iowa City, Ia., have a sure cure.

Niagara Hydraulic Engine



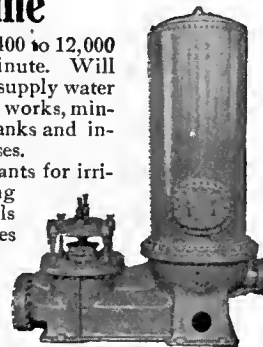
Using from 2 to 350 gallons per minute. Elevating 35 feet for each foot-fall.

Niagara Hydrokinetic Engine

Using from 400 to 12,000 gallons per minute. Will automatically supply water for town water works, mining, railroad tanks and industrial purposes.

Complete plants for irrigation, utilizing as power, falls from 18 inches to 50 feet.

Write for catalogue C and guaranteed estimate.



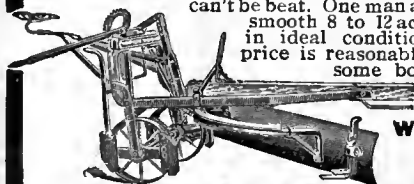
NIAGARA HYDRAULIC ENGINE CO.,
140 Nassau Street, New York

Dig Irrigation Ditches Quicker

Two horses can manage a 20th Century. It weighs only 500 pounds, all steel and malleable iron except pole. It's a "bummer" as a Nebraskan says, for ditches and laterals. Blade is 6 feet long, can be tilted either up or down and turned right or left to any angle up to 50 degrees. Because built all of metal the

20th CENTURY GRADER

is strong, solid, durable; is guaranteed to stand every reasonable shock or strain. For leveling and grading it can't be beat. One man and a team can level and smooth 8 to 12 acres a day leaving land in ideal condition for seeding. The price is reasonable. Write for our hand some booklet that shows the Grader in operation and explains details.



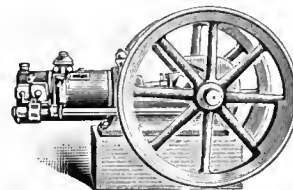
White City Grader Co.
Dept. F
White City, Kansas

Profits may be increased

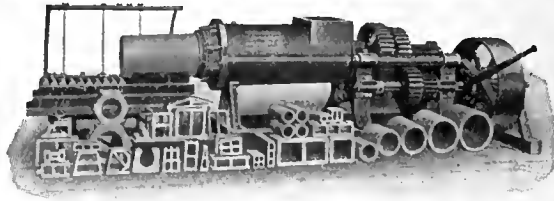
in any manufacturing business by installing the right kind of a power plant. "Otto" Engines, whether Gas, Gasoline or Alcohol, are at once economical and dependable, but the

"Otto" Suction Gas Producer cuts the cost of power down to the minimum. Nearly 100 successful plants as references.

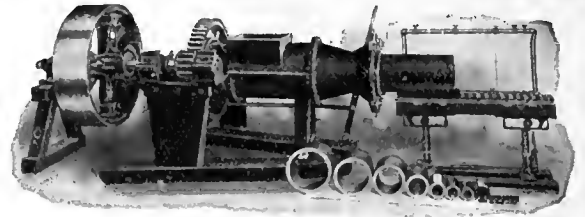
"Otto" Producers Work. "Otto" promises and guarantees are made good.



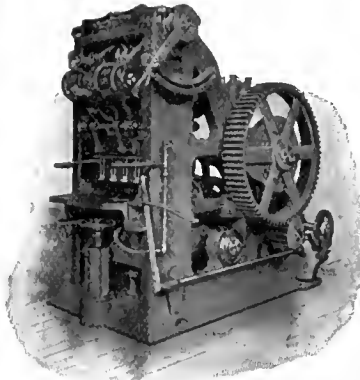
Otto Gas Engine Works, Phila., Pa.



Centennial Auger Machine



Mascot Auger Machine



Dry Press, 5 styles



Wheelbarrows and Trucks



Eagle Repress

Clay Working Machinery

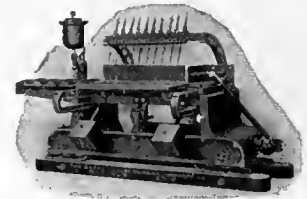
**"BUILT RIGHT—
RUN RIGHT"**

We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

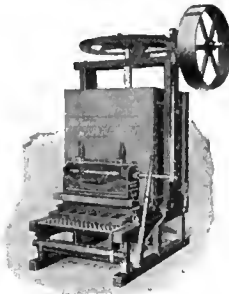
The American Clay Mch. Co...Bucyrus, Ohio



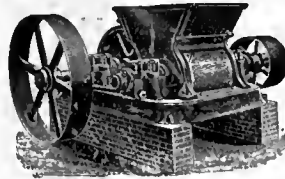
Dry Cars, all kinds



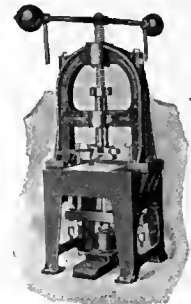
Hand and Power Cutters



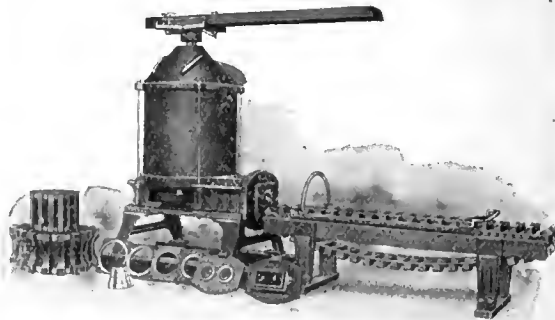
Soft Mud Machines, Horse and Steam Power



Disintegrators



Hand Power Screw Press

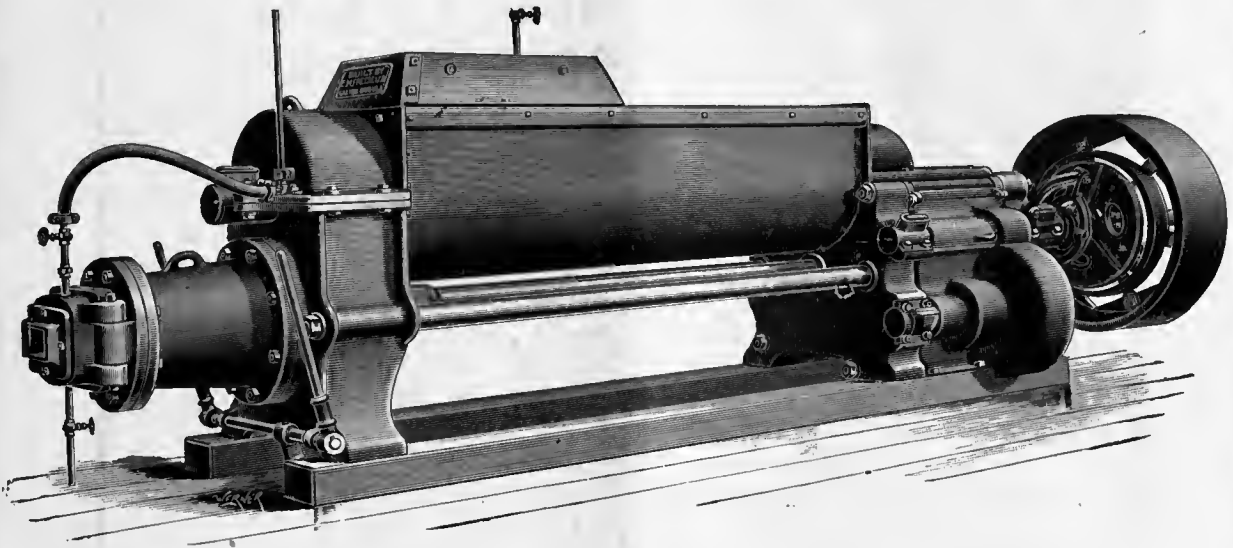


Horse Power Plunger Machine



Products of our Auger Machines

UNION MACHINES WITH PUG MILLS COMBINED



FIVE SIZES . ALL CAPACITIES

Outfits for Drain Tile, Hollow Ware, Building
and Paving Brick and other Clay Products

If interested write us for particulars and estimates.

E. M. FREESE & CO.
GALION, OHIO

Let Me Prove That 10 Acres of this Irrigated Land will earn \$250.00 A Month For You



E. W. SHUTT, President
Rio Grande Land, Water & Power Co.

I Will Sell It To You For \$2.50 a Week

Irrigated, under cultivation, ready to earn at least \$250 a month.

Not in all the world have I ever heard of so good an opportunity for men of small means. In this small space I cannot tell you all the steps that have been taken to safeguard your money in every way. This is investment — not speculation — yet you get returns equal to those from successful speculation. And all the while you are secured against loss by the finest farm land in the world, and your interest in water-rights that no man could buy for a million dollars. There is no question like finding gold or striking oil about this proposition. The land is there for all time. The water is there for all time to nourish and fertilize it. You don't have to dig in the ground deeper than to plant seed. There are no insects that destroy crops in this country.

There is no chance for drought. There is no chance known to man for a single crop failure, ever. And the abundant crops of large and in every other way superior hays, grains, vegetables and fruits are equalled in only a very few favored spots, such as the lucky Ford country. But I am going to prove by case after case that net returns from ten acres of this property rarely are as low as \$3,000 a year and often as high as \$10,000, according to the kind of crops. The difference is not according to location of land or season or anything of that kind.

The land is near a prosperous and growing city — Albuquerque — the largest city in New Mexico. Our main irrigation canal to run through the city. The main line of the Santa Fe Railroad runs through our land from end to end. And our own electric line is to supply additional cheap and convenient transportation to every section of these lands. If you want to see the country for yourself, you can go with the next party I take to look at the property. Or you and your friends can band together and send a representative. Or I will send you names of prominent men who have gone or will go and you can ask them what conditions they find. But this is the merest outline of what I will show you in detail.

There are many features of this Secured Land Contract that make it safe and profitable which I haven't space to touch upon. I am only attempting to make it clear to you that if you can possibly save \$2.50 a week you can have an assured three to ten thousand dollar income in a few years. Don't doubt — I have proof. I have promised to lay it before you. All you have to do is to write for it — that can't cost you a cent more than postage. And as fast as the mails can carry, I will send you proof that as sure as crops grow where climate, soil and water conditions are perfect, you can be financially independent in a few years.

Now, not to hurry your decision in the least, but to protect the price, write me personally at once. For after the first lot of ten-acre tracts is contracted for we will ask more. But I make this promise. Every man or woman who answers this advertisement at once can have at least ten acres on these terms unless, of course, all our land should be already contracted for from this one advertisement. Now, write at once. I can say nothing more in this advertisement except that, if I could, I would not tell you all you can confidently expect from this investment. For you would not believe it without the proof which I cannot put in an advertisement. Address me personally, and believe me sincerely,
E. W. SHUTT, President Rio Grande Land, Water and Power Co.
658 Houser Building, ST. LOUIS, MO.

YOU know, or can easily learn from United States Government Reports, that irrigated lands in the Great Southwest, in selected crops, will net \$300 to \$1,000 a year per acre over and above the entire cost of cultivating them.

Anyone who knows the country will tell you that absolutely the surest, safest way in the world to gain a large and permanent income for a small outlay is to get hold of a few acres of irrigated land in the Great Southwest.

But always before it has required at least a few hundred dollars and it has been necessary for the investor to live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest irrigated land in the world if you can save \$2.50 a week.

You can go and live on it — absolutely assured of an income from it alone of \$3,000 to \$10,000 every year without fail.

Or you can remain in your present position and add that much to what you earn.

For my company will cultivate your property for a small share of the crops.

You don't have to know a thing in the world about farming.

Now, I can and will prove all this from the highest authorities in the land.

All you have to do is — write me and say, "Prove to me that ten acres of your land will net from \$3,000 to \$10,000 a year above all cost of cultivating it."

I have the proof, so read what my company will do for you.

I will deliver to you at once a Secured Land Contract for ten acres of irrigated land in the Rio Grande Valley.

You must pay my company \$2.50 a week or as much more as you like.

Instead of your having to pay interest on deferred payments, I agree, for my company, to pay you 5% per annum on the money you pay to.

I also bind my company to fully irrigate your land and turn it over to you under full cultivation whenever you desire to mature your contract.

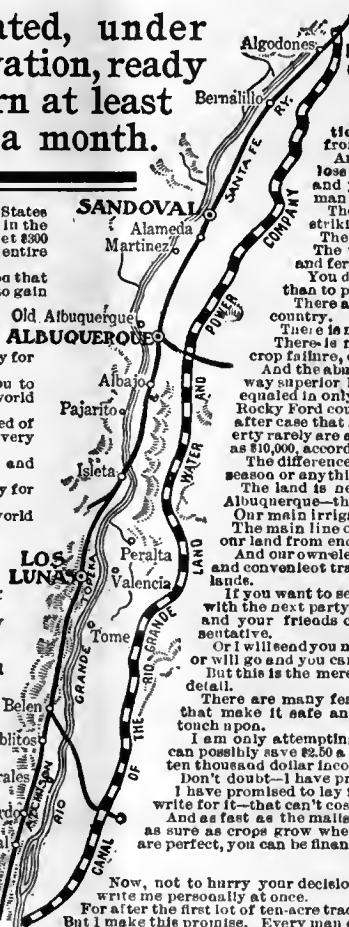
\$2.50 a week will mature your contract in 10 years.

But after you have paid \$2.50 a week for three years, or the same total amount in a shorter time, I agree and bind my company to loan you enough money to make all future payments and mature your contract.

Remember, the land will be fully irrigated and completely under cultivation, so your first year's crop should net you enough over and above the cost of cultivating it to fully pay your loan.

You would then own your land outright and have an assured income of from \$3,000 to \$10,000 a year.

Can you hope in any other way as safe and sure as this to have so large an income in a few years!



THE IRRIGATION AGE

VOL. XXII

CHICAGO, MARCH, 1907.

No. 5

THE IRRIGATION AGE

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

With which is Merged

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

THE D. H. ANDERSON PUBLISHING CO.,
PUBLISHERS,

112 Dearborn Street, - - CHICAGO

Entered at the Postoffice at Chicago, Ill., as Second-Class Matter.

D. H. ANDERSON, Editor
W. J. ANDERSON .. G. L. SHUMWAY
Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

It may interest our readers to know that
Possibilities THE IRRIGATION AGE contemplates pre-
for paring a series of articles which will ap-
Homemaking. pear during the summer of 1907, which
will clearly illustrate the possibilities for home-making
in the territory adjacent to the lines of the new Trans-
Continental Railways, which are building westward to
the Pacific Coast.

The editor of THE IRRIGATION AGE intends to cover
a good part of the territory along the projected lines
of the roads through Montana, Wyoming, Idaho, Wash-
ington and Oregon. The first of this series of articles
will treat of the territory along the line of the Chicago,
Milwaukee & St. Paul Railway, in Montana, in what
is known as the Musselshell Country. This should be
interesting reading for those who contemplate making
a home in the western country, and our aim will be to
give such information as will enable settlers to determine
clearly, before moving, what expense is necessary, the
character of the soil, what crops may be made to pro-
duce best results, and a lot of other information along
a line which will start the prospective settler right.
These articles will be finely illustrated and it is
hoped that they may be of considerable benefit to
home-seekers.

We will be glad to send sample copies containing
these articles to any names which our readers may
choose to send us. We would prefer to send them to
people who contemplate moving into the West, so they
may derive whatever benefit is to be had from informa-
tion of this character. Please send us in names of those
of your friends who are talking of going West, and we
will be glad to mail copies of such issues to them as

SUBSCRIPTION PRICE.

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In forwarding remittances please do not send checks on local banks.
Send either postoffice or express money order or Chicago or New York
draft.

Official organ of the American Irrigation Federation
Office of the Secretary, 309 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that The Irrigation Age is the
only publication in the world having an actual paid in advance
circulation among individual irrigators and large irrigation corpo-
rations. It is read regularly by all interested in this subject and has
readers in all parts of the world. The Irrigation Age is 22 years
old and is the pioneer publication of its class in the world.

contain matter which will assist them in selecting a
location.

We will esteem it a favor if our readers will assist
us in the matter of sending in names of friends who
would be interested in these special issues.

Beginning with our March issue, THE
IRRIGATION AGE will make a general cam-
paign among manufacturers and other ad-
vertisers to induce them to take ad-
vantage of the field offered by its growing circulation
to develop trade throughout the irrigated West, and as
this issue will go forward to many manufacturers and
others who are looking for trade in the West, and who
have not fully understood the situation which exists
throughout that great territory being reclaimed from
desert lands, we take this means of presenting a few
facts, which it will be well for advertisers to bear in
mind when reaching out for this trade:

It is, perhaps, not generally known that work is
underway to reclaim fully ten million acres of land
heretofore valueless sagebrush desert. When the fact is
taken into consideration that all of this land is capable
of producing net for the farmer from \$15 to \$500 an
acre per annum, the producing power of the farmer may
be easily estimated. It is a simple matter to figure what
a profit of \$15 per acre on one million acres means to
people who are supplying goods to the man who works
a given area, and when that is multiplied by ten (our
readers should understand that this is a low estimate
per acre), some fair conception of the purchasing power
of this money may be obtained.

To illustrate more clearly what has and is being accomplished under irrigation, we wish to call attention to the famous Snake River Valley in Idaho. Along this stream were many small irrigation projects, whereby areas of fifty to one hundred acres and upward have been irrigated for many years past. Within the past five or six years great enterprises have been undertaken by the Federal Government, as well as private corporations, and from this list something like three million acres have been reclaimed, and a large portion of that acreage is under cultivation. Thriving towns have sprung up in the centers of these irrigated districts, where may be found all of the requisites of modern civilization.

A fairly good illustration of what has been accomplished, is the Twin Falls Tract in Idaho. Something less than four years ago, the writer drove over this tract, which was then sagebrush plain. Today, 271,000 acres are under cultivation, and we are informed that many of the farmers earned enough from the first year's crop to pay for the full cost of land and water, which amounted to nearly \$35 per acre. Is it then not fair to suppose that a man who can earn from \$25 to \$35 net per acre per annum may be a good purchaser of the wares of the manufacturer of agricultural implements, dairy machinery, wagons, carriages, earth moving machinery, seeds, etc.? Can the manufacturers of any of these goods afford to ignore this field or opportunity?

THE IRRIGATION AGE is a recognized authority on irrigation matters throughout the world. It has a paid circulation around the world, and is read carefully by thousands of people who are looking for the goods mentioned.

It may be well to remember that there are no crop failures in an irrigated section, consequently there are no bad years. The market for products from irrigated sections is always safe and the prices are high, owing to the fact that all irrigated territory lies nearer the great mining districts than other agricultural districts farther east, and it is a well-known fact that mining markets, so far as price is concerned, are the best in the world.

Those of our readers who are producers or manufacturers should consider carefully the subject of reaching into this field for trade. Some one will get it; why not you?

Alone in
Its Field.

Advertisers, who have been receiving the IRRIGATION AGE regularly for the past fifteen or twenty years, need no particular word to attract their attention to the possibilities of space in its columns developing trade throughout the West. For the benefit of those who have not been in touch with it, it may be well to say that this is the only publication which attempts to cover

thoroughly this great field in the arid and semi-arid sections of the United States.

THE IRRIGATION AGE has readers by the score in the lately acquired possessions of the United States, in Africa, Egypt, Australia, Russia and Ceylon. The bulk of its circulation, however, is west of the Missouri River in the United States. It has been producing some wonderful results for advertisers within the past few years. Why would it not pay you to give it a trial? We will gladly send rates on application. Kindly remember that there is only one way of reaching this class of readers and that is through the columns of THE IRRIGATION AGE.

We are informed that the publication known as *Irrigation*, which was issued at Denver, Colorado, for a year or more has gone out of business and that its good will, along with its handful of subscribers, has been taken over by an eastern publication. Thus passeth out a journal which was started under a misrepresentation and, like a parentless child was buffeted hither and yon by capricious and adverse winds.

With frail physical editorial and financial support, its early passing out is not surprising to those who were acquainted with its parentage.

The men who started the paper deliberately used the volume number of *Modern Irrigation*, which had been purchased by and merged with THE IRRIGATION AGE, and launched the first number as No. 7, Volume XVII, which was the number and volume of *Modern Irrigation* when it was purchased by the publisher of THE IRRIGATION AGE. This move was immediately investigated by the postal authorities and the second number was brought out under correct headlines, viz., Volume I, No. 1.

In examining the history and career of this ill-savored venture, the thought occurs that it is always best is launching any business to start with a clear understanding that "honesty is the best policy," and that fairness to one's self as publisher compels a like treatment of those from whom the publication seeks to derive its support.

In conclusion it may not be out of place to say that THE IRRIGATION AGE holds its own in its chosen field as authority on irrigation and kindred subjects as well as in point of circulation.

Send \$2.50 for The Irrigation
Age one year and
The Primer of Irrigation

California. Poultry thrives and is profitable in any of the Pacific coast States. The Old Hen is always a valuable aid to civilization and prosperity.

California's mineral output is about \$30,000,000 annually. Since gold was discovered there in 1848 the value of that metal mined in that State has amounted to the enormous sum of \$1,500,000,000.

California has a high-class educational system, including two great universities, the State and Stanford. The State is at Berkeley, near San Francisco, and Stanford is about an hour's ride south, at Palo Alto. Stanford was severely shaken by the earthquake, but the school work was not suspended.

Owing to the abundance of petroleum in California the crude oil is generally used for fuel by railroads, coastwise steamers, factories and for heating buildings. As California has no coal to speak of, this fuel oil is a very fortunate thing for the State.

It snows worth while on the lofty peaks of the Sierra Nevada mountains, two miles or more in altitude. A record of 697 feet in a season has been made at Summit—a depth of about two city blocks. "The Beautiful" also descends liberally on Mount Shasta and the North Coast range. This snow is wealth, too, for it means an abundant and unfailling supply of water for irrigation and electrical power. Little snow falls in San Joaquin valley or on the low levels of southern California, and what does come soon melts.

When we published the other day the fact that the government had withdrawn 13,500,000 acres of land in Colorado for forest reservations we naturally supposed everybody would be satisfied and were assured that no further drafts would be made. We naturally supposed that with one-fifth of the total area of the State taken in this way that Uncle Sam ought to be content; but it seems not, and the bond has been broken by the further segregation this week of 605,600 acres of unalienated lands in western Colorado from all forms of disposal under the public land laws, as an addition to the Uncompahgre forest reserve. The lands include a part of the Uncompahgre plateau as well as some of the San Miguel valley on which a tree can not be found for stretches of many miles. The land extends from a point south of Montrose westward to the boundary of Utah. The Uncompahgre forest reserve now comprises more than a million acres. As the old Ute Indian reservation which occupied the greater part of the western slope contained something less than eleven million acres, it begins to look as if Uncle Sam was trying to hedge by segregating more than fourteen million acres for the funny purposes of reforestation, which is developing into a good deal of a farce to those who make a study of such things. Fully twenty-five per cent more land than we took away from the poor old Utes has now been taken away from us by our paternal government, all of which means that we of Colorado are not getting a square deal. We certainly will not be counted in the running after Mr. Roosevelt gets his leasing bill through Congress, for then nothing will be left to the unfortunate settlers who would like to come and help us to populate the State.—*Field and Farm.*

PROGRESS IN THE GREAT STATE OF TEXAS.

Every well-informed person knows that Texas is of great territorial area, yet few really grasp its immense scope and vast productive possibilities.

It is nearly thirty-two times the size of Massachusetts, almost equal in area to five such great states as Iowa.

Its governor estimated its population on January 1, 1907, at 3,600,000, a growth since 1900 of 551,290. That increase exceeds the entire population of Florida or Colorado in 1900 and nearly equals that of Maine.

And the state is filling up rapidly, from the North mainly.

The farms, factories and mines of Texas produced for sale last year, at cost prices, an output of fully \$700,000,000, enough to build 14,000 miles of railroad costing \$50,000 per mile, a line about two-thirds around the globe! And it is reasonably certain that the state will double that tremendous yield within ten years.

GREATEST COTTON PRODUCER ON EARTH.

The cotton supply of the world in 1905-6 was placed at 14,072,000 bales of 500 pounds each.

Of that quantity the United States grew 11,319,860 bales—80 per cent. And of the yield of this country, Texas sold 2,525,000 bales, or about 23 per cent of all harvested in this nation, and over 18 per cent of the total supply of the world. In 1904-5 Texas sold 3,235,000 bales, over 20 per cent of the world's output. The crop for 1906 was worth over \$126,250,000 to the grower.

In 1900 the census showed Texas as the second state in the union in value of live stock. It produces corn, wheat, oats and the grasses with great success.

Around the Gulf and in southeast Texas generally truck gardening is growing into a very profitable employment. There all kinds of vegetables are produced in January, February and the spring months for the northern market, and prices are good, of course. Carloads of strawberries were on the market in January and February from those fields.

Excellent literature on this subject can be procured from the Southern Pacific Railway company at Houston, Texas, or any of its northern offices. The Rock Island company also has fine descriptive pamphlets concerning the truck farming in the Gulf coast region.

RICE GROWING IN TEXAS.

One of the comparatively new industries of Texas, and one that promises to be of great importance is the cultivation of rice.

The Southern Pacific company also has excellent books on the methods of production and results realized in rice growth. The details are too lengthy for this article.

But it may be stated in a general way that this promises to be one of the most important branches of irrigation in this country. Rice is grown in water three or four inches deep, kept standing for about three months.

It is estimated that at least 2,000,000 acres of land in the state can be thus irrigated. By "slouch" farming, the shiftless, careless variety, the yield is about nine barrels per acre. By careful, diligent work, fifteen or more barrels can be realized just as well.

Japanese in Texas harvest around twenty barrels, and the record has exceeded thirty-six barrels. The

farm price is about \$3 a barrel, so that good cultivation will produce from \$45 an acre up. The straw is as good for feed as wheat straw.

The future rice crop of Texas may easily be \$75,-000,000 a year and may reach \$100,000,000 annually.

OTHER IRRIGATION INTERESTS.

The rainfall of Texas gradually decreases from 60 inches on the Arkansas line to 9 or 10 inches on the western border.

Even where the rainfall is 30 inches a year it pays to irrigate, and many projects, large and small, are in operation, being planned or considered.

The greatest enterprise of this kind, aside from the rice plants, are on or near the Rio Grande river, where many thousand acres have already been thus reclaimed.

Both for rice and general farming in southeast and western Texas many wells are in use. Some of them flow out and need no power, but most of these wells have to be pumped.

Such wells are successfully employed in the Panhandle and on the highlands of the Staked Plain, where such a scheme would have been considered impossible a few years ago. Irrigation in Texas is just in its infancy and in time will make millions of rich acres in this state fertile and profitable, which are not now under cultivation.

THE GROWING INTEREST IN DRAINAGE.

From the activities of the various drainage associations about the country and the frequency with which drainage bills are being presented before the National and State legislatures it would seem that the idea of the importance of drainage as a means of agricultural improvement is very rapidly gaining ground. This progress is clearly reflected in the operations of the Office of Irrigation and Drainage Investigations of the United States Department of Agriculture. The work of this office in drainage extends over the entire country from Florida to the Dakotas and from Massachusetts to California. Drainage maps are being prepared and the general soil, topographic and hydrographic conditions as related to drainage are being studied in a score of localities. Among the drainage projects recently taken up are the following: A preliminary survey of the Everglades, with a view of securing data upon which to base a plan for the drainage of that district; a survey of the Black Bayou in the Yazoo Delta District of Mississippi; and surveys along the Little Forked Deer River in Tennessee.

To carry on these investigations and other work which will be taken up during the next fiscal year, \$150,000 was included in the general agricultural appropriation bill for the use of the Office of Experiment Stations. This bill has already passed the House of Representatives.

A far-sighted and business-like policy of assisting in the improvement of the agricultural conditions in the territory through which they run is becoming very popular with railroads at present. The Missouri Pacific has recently undertaken a very necessary application of this policy along its line in Arkansas and Louisiana. In this section there are numerous and extensive areas of marsh and swamp land, notably those of the St. Francis and Washita basins and the Cypress Creek district. Throughout this territory drainage and good roads are the two most pressing requirements of

agriculture, and the farmers are in great need of reliable information and instruction as to how best secure the necessary improvement.

Realizing the importance of this need the Missouri Pacific provided a special train and a series of farmers' institutes were held during the latter part of January and the early part of February at various points along the line of the railroad. Mr. J. O. Wright, drainage engineer, represented the Office of Irrigation and Drainage Investigations, giving a series of addresses illustrated with lantern slides, when possible, on the agricultural engineering and legal phases of drainage; while Mr. Z. M. Peirce of the office of Public Roads discussed the good roads problem. The awakening and instruction of farmers in such matters should be followed by far-reaching results, and the railroad company is to be greatly commended for its initiative in the matter.

That the State of Arkansas is becoming greatly interested in the subject of drainage is evidenced by the fact that the Arkansas legislature recently invited Dr. Mead, chief of Irrigation and Drainage Investigations, United States Office of Experiment Stations, to address that body on the subject of drainage, but unfortunately he was unable to accept the invitation.

In South Carolina the question of drainage is being taken up with great energy and thoroughness. Following the example of the Charleston County Sanitary and Drainage Commission, which during the past year has been co-operating with the Department of Agriculture in the preparation of plans for the drainage of swamp lands in the vicinity of Charleston, the South Carolina Legislature recently extended an invitation to the office of Irrigation and Drainage Investigations for a representative to address them on the subject of drainage. Mr. C. G. Elliott, drainage engineer of the department, responded to this call, and on the 6th inst. made an address before the legislature on the general features of drainage, taking up in particular the legal phases of the problem from the standpoint of the experience of other states.

Our Future Orchards.

Ten years from now every farmer who sets out fruit trees this spring will congratulate himself on his wisdom in selection if he listens to and seeks the advice of experienced fruit and nursery men.

A veteran among nursery men is Carl Sonderegger, at Beatrice, Nebraska. Any farmer who contemplates setting out a new orchard, or just a few trees; a new fruit farm, or just a little patch; or is planning to reforest any part of his holdings, or wants just a few shade trees, will get dollars added to his bank account and years of experience added to his knowledge if he would write Mr. Sonderegger for counsel. This is free. But because it is free, don't think for a moment that it is not valuable. Mr. Sonderegger is offering a big line of nursery stock, field, garden and flower seeds, etc. The seeds are all tested before shipping; all fresh, clean and vigorous. His prices are attractively low. For instance, apple trees are 4c, peach 5c, plum 12c, cherry 15c. These trees are not seedlings, but are grafted stock. Concord grapes are 2c. Forest tree seedlings a thousand for a dollar. Mr. Sonderegger gives for this season a packet of a new variety of head lettuce called "May King" to every person who writes for his large, illustrated catalogue and asks for sample packet.

BIGGEST IN THE HISTORY OF CALIFORNIA'S CAPITAL.

Interstate Exposition of Irrigated-Land Products to Accompany State Fair.

National Irrigation Congress to Be Held Immediately Prior to the California State Fair, Accompanying Exposition to Overlap Fair Week.

SACRAMENTO, CAL., February 28, 1907.—It is announced here by the officials of the National Irrigation Congress and of the California State Fair, that the dates of these two events have been fixed to cover the first two weeks of September, and that an Interstate Exposition of irrigated-lands products on a large scale will be held, commencing with the opening of the Irrigation Congress on Monday, September 2, and continuing until the close of the State Fair, Saturday, September 14.

This will have the effect of making the California

other trophies well worthy of interstate competition will be among the prizes offered, and it is expected that competition for these will be open to all other states, but not to California, as a second set of trophies and prizes will be offered for State Fair exhibitors. In the Interstate Exposition this state will act as host to visiting states and visiting exhibitors of irrigated-land products and will hang up prizes for which her guests will compete.

The proposed exposition has been fully discussed between the members of the board of control of the Irrigation Congress and Mr. J. A. Filcher, secretary of the State Agricultural Society, and the plans are practically determined, subject to the approval of the directors of the State Agricultural Society at the next regular meeting, to be held in this city February 24.

Details for the big event are still to be determined, but it is probable that the Interstate Dry Lands Ex-



This cut shows a 10 horse power gasoline engine pumping water for irrigation near Garden City, Kansas. This engine was manufactured and installed by the International Harvester Company of America, whose headquarters are Chicago.

State Fair an Interstate Fair, so far as agricultural products are concerned, and it is altogether probable that the live stock feature, too, will be made to include all the Western States. "The California State Fair, Interstate Irrigated-lands' Products Exposition and Western Stock Show" is the name that has been suggested for the big event, which will eclipse any similar effort ever made in this state, with the single exception of the Midwinter Fair, held in San Francisco several years ago.

Under the plans tentatively agreed upon, the details of the Interstate Exposition will be handled by the State Agricultural Society. The Board of Control of the Irrigation Congress will, of course, take an active interest in it, and will offer handsome prizes for interstate exhibitors, in addition to those offered by the State Agricultural Society. A number of cups and

position will open Monday, September 2, and that an effort will be made to have the agricultural and horticultural exhibits of the California State Fair in place also by that time. The Irrigation Congress will be scheduled to meet on the 2d, but the proceedings of the session will probably be deferred until Tuesday, the 3d. Saturday, the closing day of the Irrigation Congress and the opening day of the State Fair, will be marked by some kind of a grand demonstration, including a parade that will eclipse any previous affair of the kind.

The board of control of the Fifteenth National Irrigation Congress will undertake to expend \$50,000 providing for and entertaining the congress. Two weeks of enjoyment will be provided, and visitors will be given the time of their lives. The days of the session will be quiet, in order that the attention of the delegates may not be distracted from the main purpose.

NORTHWESTERN NOTES.

Spokane, Wash., Feb. 28.—Official announcement is made in the annual report by F. W. Newell, chief of the reclamation service, that the United States government purposes to irrigate 10,000 acres of land in Okanogan county, northwest of Spokane. He adds that the irrigable lands have an elevation between 850 and 1,350 feet above sea level and lie in a series of benches sloping toward Okanogan river. The soil is mainly sand, light loam and volcanic ash. Irrigated lands in this vicinity, when planted to alfalfa, yield a profit on a valuation of \$100 the acre, and lands in fruit or nuts, for which the soil is especially adapted, often yield profits on a much higher valuation. Without irrigation the lands are practically worthless.

if necessary an additional 100,000 acre-feet can be obtained by utilizing the smaller lakes. Five big reservoirs are contemplated—Lake Clealum, Lake Kaches, Lake Keechelus, Bumping Lake and McAllister Meadows. Satisfactory foundation has been found for dams at the outlet of all these reservoirs except McAllister Meadows, but even this site will ultimately be utilized in connection with the Tieton sub-project.

The Yakima project as a whole will add 300,000 acres to the irrigated area of Yakima valley, and with improved economy in the use of water, and with the possibility of some additional storage in the Clealum Basin, it is believed that 400,000 will ultimately be brought under irrigation.

The secretary of the interior allotted \$1,250,000 for the construction of the Tieton sub-project. In March,



Typical Mountain Road Leading to Clearwater County, Idaho.

The government proposes to convert Salmon Lake into a storage reservoir, and build a second reservoir immediately south of the town of Conconnully, the two combined capable of storing ample water to irrigate all the lands embraced in the project. Twenty miles of main canal, and forty miles of smaller canals will be required to distribute the water from these reservoirs.

The Yakima project is by far the most important, as well as the most extensive project yet undertaken in Washington. It involves five sub-projects, the Tieton, Sunnyside, Kittitas, Wepato and Benton, the first two now in course of construction, the Wepato still under investigation, and the Kittitas and Benton temporarily set aside because of the high cost of construction.

Surveys made by the reclamation service show that practically 800,000 acre-feet of water can be economically stored on the headwaters of the Yakima river, and

1906, the Tieton Water Users' Association was formed and four months later 33,000 acres had been subscribed. Much of the land, however, is non-irrigable, and only 24,000 acres can be brought under water.

The Sunnyside project contemplates the irrigation of about 40,000 acres of land included in the old project, which the government has purchased, and an additional 45,000 acres through its extension. The total allotment for the project is \$1,100,000.

Drainage will be an important factor in connection with the Sunnyside project, and some study has been made of the situation. In the vicinity of Sunnyside drainage is an absolute necessity. The community there found it necessary for the protection of lands to organize drainage districts under the state laws, and more than \$30,000 has been expended for the development of drainage systems.

THE YAKIMA VALLEY.

Where Irrigation Has Wrought Miracles.

BY JOHN EDWARD BUCK.

Of all the irrigated sections through which we have traversed thus far, the Yakima valley looks the most prosperous and the most picturesque. In the Yakima country one can see the desert before the ditches are dug, and the fertile fields under irrigation. The whole

The Yakima valley stands pre-eminent in the arid West for the plentitude of its water supply; the watershed of the Yakima river and its tributaries consists of a portion of the eastern slope of the Cascade range; the annual snow fall on the range is heavy, and the higher ranges are covered with it quite late into the summer, while the peaks are perpetually white; compared with such water sheds as that of the Missouri river, for instance, that of the Yakima is very small, but a comparison of the two streams shows the remarkably large volume of water that flows from its relatively



Wild Horse Falls Washington County, Idaho.

Yakima valley is rapidly being transformed into a highly cultivated region.

Small farms are the rule in irrigated districts, because irrigation makes intensive farming necessary. A high type of civilization is also found in irrigated sections, because the denser population made necessary by small farms leads to the introduction of modern improvements and tends toward a distinct uplift in the trend of social influences. Isolated farming communities in older and less populous regions do not, of course, enjoy such advantages.

small watershed. This discharge can be, and will be, largely increased by storage. The larger streams head and are fed in a measure by mountain lakes some of which are of considerable magnitude and all of which are natural storage reservoirs, capable of conserving an immense volume of water, for all of which there will be need, as the area of irrigable land in the Yakima valley is very large.

It may be said that the Yakima valley is in various stages of development. Portions of it are highly developed and equipped with every modern improvement.

What are probably the most valuable farming lands in the United States are to be found in the Yakima valley. Some of the farms there cannot be purchased at any price. During the present year several farms changed hands at values ranging from \$800.00 to \$1,000.00 an acre, these figures including, of course, valuable improvements as well as the land. Just think of it! Twenty years ago this land was part of a desert, and at that time nobody believed anything would grow there—except sage brush; but the land now returns a good rate of interest at an unusually high valuation. Irrigation wrought the miracle, though it is understood, of course, that only intelligent and progressive farmers could do this.

Back from the railroad lands equally as good can be secured for as little as \$50.00 an acre. The investor can find almost every sort of opportunity, ranging from improved lands and new lands under the recent extension of canals to sage-brush lands without water rights.

The Yakima valley, the garden spot of the Pacific Northwest, is about one hundred and forty miles long,

that farming by irrigation is a "sure thing," while farming without it never can be anything but a chapter of accidents, fortunate and unfortunate. The necessity for irrigation in farming is not disadvantageous. The farmer who does not irrigate is at a disadvantage. Without irrigation, scientific farming is impossible, and the best results cannot be obtained. Irrigation is neither difficult nor costly. During the present season the cost of irrigating varied from 50c to \$3.00 an acre—a very small item where land nets the owner a yearly profit ranging from \$25.00 to \$700.00 an acre. Crop failures are unknown, though carelessness may result in short crops. The soil, water and the sunshine are there in abundance, the gods having apparently worked overtime to supply the best they had in stock, and all the farmer has to do is to take the water from the river when he needs it, and put it where he wants it. The result is a combination that no one has been able to beat.

The Yakima valley is pre-eminently a good place to live, and a place to make a good living. It is inviting to the man of the Middle West who is tired of the



Typical Freight Outfit on Way to Irrigation District in Washington County, Idaho.

and extends from the Cascade foot hills to the Columbia river. The width varies from two to forty miles, the reclaimed portion varying from two to twenty miles.

The productiveness, the wealth, the beauty and the hope of the Yakima country are all due to irrigation. There are few great manufacturing industries there. There are no shipping; no mines; no fisheries; few mills; few payrolls. There are farms, gardens, orchards, meadows, livestock knee deep in green pastures, hop-yards, vineyards, groves, well kept lawns and happy homes. These are distinctive features of the Yakima country. They all owe their being to irrigation. The waters of the river are the lifeblood of the land. Until they were spread over the prairies by men, the valley was a desert, and where the canals cannot be extended the desert will be forever.

Eastern farmers, as a rule, suppose that a country where irrigation is necessary is unfortunate. They think that way because nobody ever explained to them that as a practical proposition in farming it is more economical to put water on cultivated lands as it is needed than to depend for crops on the uncertainties and eccentricities of the clouds. Nobody ever told them

strenuous struggle to keep warm in winter and cool in summer, and to escape the cyclone and the blizzard when not otherwise engaged. There are no storms of any kind there. Sometimes the iceman harvests a crop in winter, but it often happens that he doesn't. Usually the winter brings enough snow for a sleighride, but if the man with the sleigh hesitates he is lost. There are three weeks of hot weather in the summer, but the sultriness of the more humid countries is unknown. The summer nights are always cool enough for refreshing sleep.

The valley is distinctive in many ways, not only as a part of the Evergreen State, but as a part of the irrigated domain of the arid region. Nowhere else, except in Southern California and Utah, is irrigation carried on so extensively. Nowhere else has farming by irrigation been carried on with such truly wonderful success. No other irrigated district can match the Yakima for soil, climate, abundance of water supply, markets or variety and excellence of products.

Surveys for the Kittitas project, which contemplates the irrigation of 60,000 acres in the vicinity of

Ellensburg, were never carried beyond a preliminary stage.

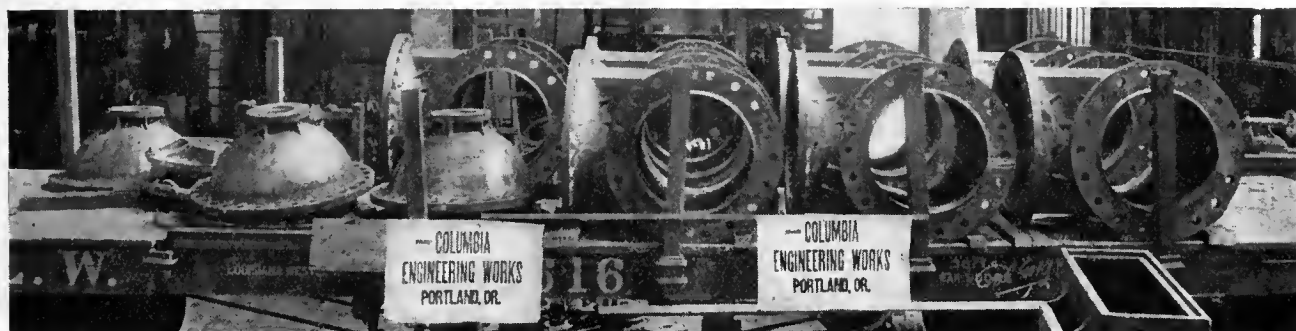
The report indorses the Benton project as one that could economically reclaim about 210,000 acres, of which 40,000 acres could be irrigated by pumping from the Columbia River. The Hanford Irrigation company has already organized for that purpose, and this project will, therefore, be reduced in area by that amount. The large initial outlay, about \$2,000,000, needed to carry the main canal to any considerable area of irrigable land, and the large ultimate cost, about \$7,000,000, makes it certain that the building of this project must be deferred for several years. The project as a whole is feasible and inviting. The land is fertile and transportation facilities are excellent.

Surveys of the Priest Rapids project were made, which indicate that a total of 129,000 acres might be reclaimed, partly by gravity and partly by pumping, but as the development of the projects already approved will leave no funds available for many years for undertaking new projects in Washington, further studies and surveys of secondary projects have been discontinued. Most of the lands withdrawn in connection therewith have since been restored to settlement and entry.

DRAINAGE.*

Drainage laws have proven essential factors in the development and continued prosperity of the middle West. They are contemporary with improved farming, thriving towns, commodious rural dwellings, abundant crops, and general agricultural progress. These laws have been enacted in response to a demand for diversified and high class farming and more healthful surroundings which in many localities can not be obtained without the construction of drains which require co-operative efforts on the part of land owners concerned. No operations of this character can be prosecuted under the rulings of common law. Special legislation is required, as was demonstrated to the cost of many progressive men in the early stages of the drainage improvement.

The writer desires to discuss this subject from the viewpoint of a layman rather than from that of the attorney-at-law or legal expert. It is said with much truth that our drainage laws as found upon the state statute books are not smooth and euphonious in their literary structure, that they are disconnected in their provisions and constitute a mass of specifications lacking legal terseness and logical form. Granting this



LARGE VALVES FOR CALIFORNIA.

The accompanying illustration shows a carload of large valves made by the Columbia Engineering Works, Portland, Ore., for the Edison Electric Co., Kern County, California. Each of these valves weighs 6 300 pounds, and seventeen of them were made for the California plant.

It is not at all surprising that Mr. Pinchot, head of the forest reserve division, should begin to see that his policy is not popular here in the West. People would be perfectly satisfied if Mr. Pinchot would confine his efforts to the object for which forest reserves were created—the planting of trees and the preservation of the lumber, or more properly what little is left. The lumber trust has corralled all the valuable timber it will require for the next fifty years and the taking of the remainder away from the people is exactly what the big timber men desire. How much Mr. Pinchot is co-operating with the lumber trust in his work is of course not known, but he is having a very hard time making the people believe that he has not done everything possible to favor the trust. Ever since his advent into the West on his present trip he has been hung up on the hooks until every utterance is an apology for his undemocratic policy. Here in Colorado after the timber is all gone he runs in and segregates over 14,000,000 acres of nearly one-fifth of the State's total area for primary exclusion of settlers and to perpetuate the grazing privileges of the cattle barons, and the people do not propose to stand for it much longer.—*The Denver Field and Farm.*

to be true, I may add that such a condition of affairs is the natural result of the drainage progress. There are three essentials to a drainage law. It must be legally sound, equitable, and workable. Those familiar with drainage operations know what these terms comprehend.

Some of the most egregious and costly blunders committed in the framing of drainage laws have been those of a legal character. The most common principles of law, not to say of common sense, have been overlooked in the drafting of some of our drainage laws, and it is to be regretted that the history of these laws does not shed a brilliant halo of glory upon our legal fraternity.

Drainage laws as far as the field to be covered is concerned have necessarily been amended and revised to meet growing demands and conditions which could not be easily foreseen. They have become cumbersome by reason of the multitude of provisions it has been found wise to add. In order to obviate some of these objections the states of Indiana, Wisconsin and Minnesota

*An address delivered by C. G. Elliott, engineer in charge of drainage, U. S. Department of Agriculture, before the Drainage League, Fargo, N. D., December 11, 1906.

codified their drainage laws in 1905 in such a way as to make them more concise in form. In doing this, however, it may be that some essential features of the original laws have been omitted in the revised codes.

One fruitful source of trouble found in administering state drainage laws is the lack of clearness upon many points. Our legal advisers suggest leaving certain things indefinite to be subsequently determined by the courts. This is often an excuse for ignorance of the details of the matters to which the proposed law applies. We do not want methods of procedure left so indefinite as to require an interpretation or ruling by the court. Our drainage laws should practically be a set of specifications covering every condition and contingency arising in the initiation and prosecution of a drainage project. The attempt to do this as occasion required in states where drainage work has been longest

watercourses may be cleaned out, straightened, widened, deepened and extended wherever the same shall be conducive to public health, convenience and welfare. Drainage, however, contains an element of individual profit or advantage which frequently dominates the element of public welfare. This fact can not be eliminated. Public welfare is often closely allied with works constructed for individual advantage and gain which without permission by law, would not be attempted. There has been some difficulty in harmonizing this feature of improvements by drainage with the requirements of the state constitutions. It has been difficult to secure an affirmative or drainage laws by the courts. In fact, pressure of popular sentiment has been brought to bear upon the courts with such force as to induce them to waive some technical points that would otherwise have been permitted to control in the matter.



A FEW PEACH ORCHARDS,
UPPER END OF GRAND VALLEY.

Courtesy
Colorado Midland Ry.

carried on has resulted in the limbering up, of their laws by amendments which give them an unattractive appearance to the student of laws relating to economic subjects.

Some serious difficulties have always confronted the enactment and subsequent operation of laws upon this subject. State constitutions restrict legislation to affairs which relate to the "public good and welfare." In theory no legislation which may not apply to all citizens of the state under like conditions is constitutional. Accordingly the laws of all the states except Illinois distinctly state in substance that drains may be located, established, constructed and maintained, and drains and

There is necessarily a marked difference between drainage and other laws in the method of taxation for raising funds for the improvement. Ordinarily property is taxed in proportion to its assessed value, that is the most valuable property pays the highest tax. In assessments for drainage the reverse is true. The property of lowest value is assessed the highest on the ground that it will receive the greatest benefit from the construction of the work. The tax is special as distinguished from equal or general.

The state drainage laws, except those of Illinois, specify that if the work petitioned for be found conducive to public health, convenience or welfare, the

petition may be granted. No other considerations may be taken into account. After the drain asked for has been established on these grounds, the element of public welfare virtually disappears and it is directed that the cost of the work shall be met by a special tax assessed upon individual property in proportion to the benefits it will receive by reason of the execution of the work petitioned for. It does not require a legal mind to discover the illogical gap here exposed which the courts have obligingly closed by ruling that work of this character performed by individuals for private gain and paid for by special tax is conducive to the public welfare. This view of the case is now so well established that it is not considered necessary for legislatures to be empowered by constitutional amendment to enact drainage laws, though it is admitted by jurists that these statutes would be more direct and logical were this done.

by the improvement, apportion the cost of the same to each tract as benefited, submit full specifications for the construction of the work, and superintend and inspect the same during construction.

In Illinois the employment of an engineer is optional with the drainage commissioners. Any competent engineer may be appointed. He shall make preliminary surveys, maps, and estimates for the work called for by the petition if so directed by the commissioners and supervise its construction.

In Indiana the county surveyor is charged with the preparation of plans and specifications and with the superintendence of work during construction. The amount of work he performs is optional with the viewers or commissioners, as the case may be, but he is usually the chief adviser upon matters of constructive detail.



IRRIGATION IN THE
GRAND VALLEY.

Courtesy
Colorado Midland Ry.

A review of the work performed under the provisions of state laws leads to the conclusion that engineers have in many instances received scant courtesy, and their opinions as often given little weight. There may have been good and sufficient reasons for this state of affairs. Be that as it may, the work is assigned to engineers by state drainage laws is important and requires prudent and careful engineering work to which should be added a knowledge of finance and practical agricultural economics.

In Ohio the county surveyor is engineer and is instructed to make surveys, plans and estimates, describe and report to the county commissioners the land affected

In Iowa any engineer may be appointed by the board to make surveys and plans. He must also report the lands affected by the proposed work and the manner in which they will be benefited. By virtue of his appointment he is a member of the commission for making assessments upon the property.

In general it may be said that the engineer of any drainage project is in a position to be more intimately acquainted with the conditions affecting every detail of the work than any other officer under the law. If he chooses to familiarize himself with them and study them with that care which the importance of the undertaking merits, he may practically become the lead-

ing executive in the case as the law of Ohio makes him subject, of course, to the authority exercised by the board.

In this connection it is suggested that the State of North Dakota may profit by taking a step in advance of others by specifying in the law that all plans for drainage shall be submitted to the state engineer for his approval or revision before adoption by the board. The need of a review of the plans by a competent disinterested authority is felt in other states, but as far as I am informed no provision for review of this kind is made. In states where the office of state engineer exists and especially where both irrigation and drainage are agricultural activities, this officer should be charged with the examination and approval of plans for both and also with the inspection of the work when completed.

A revision of the Utah drainage law is contemplated during the next session of the legislature. A provision for the submission of all drainage plans

in the middle West by drainage. We may wisely avoid the mistakes brought to our attention and by so doing secure correspondingly more satisfactory results.

Here is another consideration which should really precede all others. Do the people of North Dakota want to drain their lands? A drainage law does not say you shall or shall not drain, but it says you may if you choose, and provides a way for doing the work necessary to that end.

A case within my personal knowledge well illustrates this phase of the subject. Twenty-five years ago I made a survey and plan for a small drainage district in Illinois. The land amounting to about 800 acres was held by well-to-do farmers and adjoining high priced farm lands in one of the best sections of the State. The work was opposed by a majority of the owners, who succeeded in getting the matter dismissed. Two years since a letter from a young engineer in that locality informed me that the most pronounced opposers of the project had died, and the present holders of the



Salzer Ford Saw Mill, Black Lake, Idaho.

covered by the law to the state engineer for his approval or revision will be incorporated in an amendment. Those charged with the administration of a drainage project affecting numerous landowners can not exercise too great care in perfecting the plans, and should know when the work which they call for has been faithfully executed.

It was suggested at the beginning of this discussion that the law should be workable. This is an expressive though not elegant term. No lawyer lacking an intimate knowledge of practicable drainage operations can draft a good workable law. In this undertaking he needs the assistance of the drainage engineer and landowner to which group may be profitably added the county commissioner and the county auditor. I do not propose to decry drainage laws because there have been difficulties in their enactment, in their confirmation by the courts and in their operation by the people whom they were designed to assist. To them may be attributed the substantial progress so far made in improving lands

lands were taking steps to carry out the long deferred plans which, by the way, he had accidentally unearthed from the township archives.

It is well known that the late Lord Scully, owner of thousands of acres in central Illinois, persistently refused to invest any of his wealth in the drainage of his estate though besought long and often by his tenants to do so, until a few years before his death he suddenly waked up to the importance of this improvement and began to drain his wet lands with great vigor and thoroughness.

It is assumed that the farmers of eastern North Dakota want to improve their lands in this way and to that end desire the best drainage law obtainable. With the precedents afforded by other states in full view, and their experience in drainage covering a quarter of a century as a guide, North Dakota should not fail to secure one of the best if not the best law upon agriculture drainage.

GIVE SETTLERS A FREE HAND.

BY G. L. SHUMWAY, EXECUTIVE CHAIRMAN AMERICAN IRRIGATION FEDERATION.

Upon the subject of irrigation a wide variety of opinion exists, but without a doubt there is a unity of thought regarding a few fundamentals.

In irrigated areas there is greater likelihood of communities retaining distinctive individualities than in sections where the productive lands have not boundaries established by canal lines. Habits, customs, language, religion, or whatever peculiar attributes possessed by people who occupy an irrigated body of land, will likely cling from generation unto generation without material change. Thus a new area if settled by Scandinavians, will have its Swedish or Norwegian schools, churches, dress and language. Another community will forever remain a miniature Germany, or France. Instead of

It is most essential for the glory of our country, that each community shall contain a proportionate percentage of all cosmopolitan elements of our land. We need a mixture of the sterling frugal Teutons, industrious Scandinavians, forceful Anglo-Saxons, and romantic Latin races. We need the dash and constructive abilities of American citizenship, likewise Slavonic and Nippon enterprise. All these combined will make of each developing community, a source of pride to founders of National Irrigation, and will eliminate the danger of a midway plaisance aspect of Inter-Mountain lands.

Without a method of endeavor we will have our mountain valleys filled with "Little Germanys," "Little Tokios," "Little Moscows," and miniature streets of "Cairo," each an isolated world with sympathies as far remote from one another as those communities and tribes of central Asia.

The one central figure which may avert this isola-



Sugar Beet Pile at Grand Junction, Colo., Factory, on Denver & Rio Grande Railway.

absorbing the cosmopolitan ideas of Americanism, they will cling to their traditions and customs.

At best the agricultural mind is bucolic. Comparatively few of us possess the happy quality of adapting ourselves to new environments instantaner. Few of us accustomed to certain methods of agriculture, will alter our ways at the first instruction of science. A farmer from the rainbelt, must have an experimental year or two with irrigation before the full force of different methods penetrates his bucolic mind. It takes a corn grower many years to abandon the child of Teosinta and adapt himself to climatic and soil conditions of his new pastoral environment.

All of which not only emphasizes a difficulty to be met in peopling the several million acres now being reclaimed but how to make the inhabitants real Americans, and what endeavor will be most available toward equipping the new home-makers with attributes necessary for success.

tion of each irrigation area, and its absorption by one class of character, is the pure and typical American, the man of pluck, of energy, of resource, and, if you please, of speculative tendencies. Whenever opportunity presents to make more than a living, he is there. If restricted to a living, he fades away, and herein is where arises criticism of interpretations given by executives, into whose hands has fallen the duty of this vast and mighty enterprise. A living is the heritage of every citizen, and he who can not make a living in these times and anywhere when there is such demand for every kind of labor and its product, is poor indeed. Will a national government ask that men abandon home, and friends, and go into another newer land, and upon a conquest of a virgin prairie, toil for its development for a mere living? Is it the policy of theorizing engineers and experts to limit land units under federal projects to such restricted areas that it takes all enthusiasm out of settlers? Such interpretations eliminates a class of citizens most desirable in new countries. Fathers of families, the children nearly grown and capable of doing a man's work, yet not legal entities, such as these, who has to leave each of these children a small farm are denied fulfillment of such noble aspirations.

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Aside from eliminating attractive features to American enterprise, we hope we may impress upon consulting engineers the potency of the psychological environment in which their endeavor lies. An invisible antithesis of their work is excited by antagonizing interests of settlers already on the ground. However convincing may be the logic and reasoning, it is not a satisfactory way of introduction to assert that the citizen holds erroneous conceptions and at once close the argument. It awakes a spirit of resentment, which later effort must overcome.

Recently, near my home, a private irrigation enterprise of considerable importance undertook certain accomplishments by means that at once aroused antagonism. It undertook by injunction to prevent an appeal to law. When a private enterprise or a federal engineer undertakes to enforce its presumed prerogatives by sheer force, regardless of public opinion, the combative resources of the interests or personalities affected are at once in action. Moral support is obliterated and much

the first settler, the one who breaks the virgin soil, or builds his first rude habitation, profits a little from those subdivisions, which lagging brothers are anxious to acquire. Is the pioneer not entitled to reward for the initiative for risking the experiment, and striking the first blow at taming wild alluvial and untried soils?

This settler is the one who gives evidence of quick perception of active intelligence and hopes by instant action to avert impending dependency in old age. As a reward he is denied this ambition and his dull-witted, or improvident or unfair brother drops in after all initial trials are over and is awarded substantially the same areas and privileges as the one who was "quick to perceive the signs of the times."

This attribute of federal authorities is curtailing energy by limiting possibilities under federal projects, the truly American enterprise and citizenship is not encouraged. Thrifty people—people of conquest, of usefulness, expansiveness of originality, all those things which make up an ideal people—an essential people if



A San Luis Valley, Colo., Potato Field, on Denver & Rio Grande Railway.

time and energy that might be usefully expended, must be diverted and utilized in explanation, or unavailable endeavor. Thus one obtains a diminishing return for his energy.

Because of the strings put upon the public domain, by recent interpretations, the very class of citizenship needed to make the colonies of the intermountain districts American, are not obtained, and I would counsel a more liberal construction of the National Irrigation Act, and that inducements to homeseekers be extended to the maximum area limits in all localities should be made sufficiently attractive to enterprising people.

I have a communication from Professor Huileman, soil expert of the Agricultural Department which in advocating small farm units, says that "settlers are slow to observe the signs of the times, and get in harmony." But our rejoinder is that the settlers are no slower in accepting the verdict of small units, than are consulting boards of the federal government in realizing the set tendencies of human intelligence. No farmer could be more obstinate in his contention for a sufficient area to show his mettle, than are conductors of federal works in their determination that their theories shall prevail.

If small farm units are an inevitable condition in these new areas, the subdivisions will take place without arbitrary limitations, and will be affected without friction and in abundant season to meet the conditions of development, markets, etc. What matters it to the progress of a community, of Americans, or the world, if

you please, if success is to be a necessary adjunct, are not given an opportunity to square their shoulders and buckle into harness. Eliminate all speculative features of western development, and you have neither atmosphere or environment that will yield those sterling qualities, and the great big brainy men that are characteristic among the inextinguishable molders of the West. We have not the inducement which will fill the new farm areas, except with colonists.

It is possible that arrogance of claims, of promoters of private enterprises is responsible for creating in the minds of federal consulting boards an opinion that anyone who criticises their methods or rulings is in some way connected with antagonists of government work. Perhaps some of the criticism of government work has an origin in cunning brains, with sinuous intention to embarrass and perhaps obliterate a national reclamation service, but servants of the U. S. who have in hand an expenditure of your money and mine should hesitate and consider well, before they assume to state that corporate influence is responsible for emanations which differentiate with opinions of consulting boards.

This subject of immigration is upon us. I am advised that the Truckee-Carson region is sparsely settled, owing to the fact, that contiguous mines and environment are more alluring, than that which the government has to offer. Press dispatches state that more than 75 per cent of areas in recently opened reservations is unclaimed. Registration at the Crow and Shoshone

openings was about 20 per cent of anticipations. Why is this falling off of interest in homes upon public domain? Apparent reasons are: a period of prosperity in all communities, restricted inducements to pioneers, and the system of espionage inaugurated by the federal government upon homesteaders. An average American citizen will not endure the insinuation that lies behind visits of special agents, that he must be watched in order to be honest.

Do not understand me to advocate opening flood gates of speculative venture under government projects, but give the old boys a chance, the vanguard of actual settlers' who by main strength and with bare hands, built crude canals, initiated and demonstrated an idea, do not call them sooners, and don't accuse us of fraud because their habitations are rude and crude, and lack luxury of interior and artistic architecture. We know they are not comfortable, why aggregate our worriments? Many of the boys lost everything in that titanic struggle, but with hope anew, rushed into new areas, trusting that our government would acknowledge their services, would give them opportunity to recoup sufficient foundation to prevent impending despondency in old age—not to reduce their holdings, so that they must toil on and on for a mere living. Executives of free America should not permit a tyranny of law to become an executioner of hope.

I am of the opinion that new settlers upon reclaimed areas will make best citizens is subject to a few restrictions as possible. For instance while a water users' association is an essential to get deeded lands subscribed for water and to guarantee compliance with federal law, as it now stands the law itself does not compel or urge upon new homesteaders a membership. If it is necessary for homesteaders to subscribe for water to cover that deficiency in the law which says "a half of the unit area must be reclaimed," permit them to do so as individuals. Associations and community of interest, while absolutely essential to some degree, subordinates, nevertheless, individualism and after all its the individual, the human entity that does things. The great big West, and its large distinctive men, are a result of lack of restraining laws. They are the product which might be expected where mental and moral character are an evolution of self control and not of an enjoining arm of land.

Thus I say give greater inducements, less espionage and give the greatest possible degree of individual liberty compatible with rights of others. It will develop the West better and more rapidly, and the new people of the new West will be whole-souled, splendid specimens of humanity, which the world loves, admires and seeks to emulate; a citizenship, the usefulness and influence of which has no circumscribing boundaries within the realm of man or man's intelligence.

A bill has been introduced in Congress by Senator Heyburn providing for the establishment of district land courts throughout the country and a court of appeals. Should it become a law it will divorce the interior department from this work in the future and will put an end to political interference with decision in land cases. The bill provides for the establishment of additional courts of the United States to be known as district land courts in each state and territory in which

are situated lands subject to entry and sale under the laws of the United States wherever such lands exceed one million acres. When a state or territory has not one million acres of public land the court in the nearest adjoining state is given jurisdiction. These special courts are to be given power to review the decisions of the registers and receivers of the local land offices. The bill further provides for the appointment by the president of a judge for each land district court at \$5,000 per annum. Provision is also made for the appointment of a clerk for each court at a salary of \$2,500 per annum. The usual method of appeal applying in the United States district courts are made applicable to the new courts thus to be created. It seems a very strange thing indeed that we have arrived at that critical period in our civilization when we must load ourselves



Nine-Foot Oats near Buena Vista, Colo., on Denver & Rio Grande Railway.

up with special courts, commissions and other undemocratic paraphernalia destined to concentrate all our doings under one federal power. In other words, we have come to a pretty turn in the road when we have to set a thief to watch a thief and thus pungle up the whole theory of a free and democratic government.—
Denver Field and Farm.

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DRAINAGE OF THE FLORIDA EVERGLADES.

The land known as the Florida Everglades has been of historical interest since the Seven-year Seminole Indian War, which ended in 1842, during which time a meager knowledge of that peculiar area was obtained and later published in various brief reports. Its reclamation for farming purposes has generally been regarded as impossible, or at least so visionary as to merit no attention until recently. The preliminary work for its drainage, inaugurated by the State in 1906, is sharply criticised in many quarters and bitterly opposed in others. There is no question but that this area occupies a most unique position among the various drainage projects now receiving attention in various parts of the country. It is a swamp plain extending from the south shore of Lake Okeechobee to the south boundary of the State, 5,000 square miles in extent and covered with saw grass of extraordinary height relieved by scattered hillocks which are covered with pine, palmetto, and various subtropical bushes. This plain is covered with water to various depths during the entire year.

begun to dredge the channel from the head of New river at Fort Lauerdale on the east coast, northeasterly to the southern border of Lake Okeechobee—the first move made toward the drainage of any considerable portion of the Everglades—these and other undetermined matters essential to the ultimate success of this vast reclamation project still confront the State and other owners of land to be affected. The State Board, appreciating this state of affairs, has, through the Governor, asked that the U. S. Department of Agriculture through Irrigation and Drainage Investigations of the Office of Experiment Stations make the matter a subject of special investigation and report.

A preliminary examination of the Everglades was made by Mr. J. C. Wright, drainage engineer of the Office of Experiment Stations, followed by a conference with the governor and a number of members of Congress of Florida, which resulted in the Office of Experiment Stations undertaking an investigation which includes the running of a line of levels from the west to the east side of the Glades, something never heretofore attempted. This survey was begun at Fort Myers in



A Yard of Potatoes from Rife Creek Valley, Colo.

Whenever the question of the agricultural possibilities of the Everglades is raised, several problems present themselves for solution. One is the removal of the excess of water which makes this the largest swamp area of the country. Not only is there an annual rainfall of 60 inches to be considered, but water is also contributed by the overflow of Lake Okeechobee, which receives the drainage of not less than 5,000 square miles from the northern portion of the State and has only one small relief channel, the Caloosahatchee river, which discharges westerly into the Gulf. This being inadequate, the lake spills over on the glade lands lying at the south.

The depth and structural character of the soil has not been determined nor studied closely. The Disston Sugar Plantation, established several years ago north of Lake Okeechobee but now abandoned, demonstrated that the muck soil in that locality when drained produced sugar cane of superior quality and quantity. The stability of artificial drainage channels in this territory, the control of the water level in soils of a muck or peat character, and the amount of shrinkage likely to take place where drainage is accomplished, are yet subjects of speculation. Those glade lands whose producing properties have been tested, are confined to the little glade openings at the border of the great swamp, which are not muck lands and in this respect are wholly dissimilar to those in the interior as far as examinations have disclosed their character.

While the State Drainage Board of Florida has

January, last. It is in charge of Mr. John T. Stewart assisted by Lawrence Brett, drainage engineers of the Office of Experiment Stations. Those engineers have a corps of assistants equipped for making all the necessary engineering and physical examinations. The line of levels which starts at tide water at Fort Myers, will be carried across the state connecting the surface of Lake Okeechobee and the upper part of the Everglades with tide water at the east coast. Examinations will be made of the physical structure and depths of muck or other material overlying the rock which is said to constitute the substrata of the entire area.

This preliminary examination relating to the agricultural possibilities of the historical Everglades includes not only instrumental engineering but problems in drainage construction and consideration of the subsequent behavior and value of the soil for productive uses. The examinations will be made with a view of determining the most feasible and practicable plan for draining the whole or a part of the Everglades, in which will also be taken into account their probable agricultural value when drained. If the land can be successfully reclaimed, its value will be measured largely by the staple subtropical crops that may be produced and exported. It is expected that the investigations already begun will be continued until some definite conclusions have been reached upon all of the doubtful and undetermined factors pertaining to the drainage of the Florida Everglades.

GOVERNOR FRANK R. GOODING.

Frank R. Gooding, governor of Idaho, was born in England in 1859, came to the United States with his parents in 1867, the family settling in Michigan, where he lived until his seventeenth year. He then moved to northern California, where he was later married. In 1880 he went to the Wood River country in Idaho at the time of the mining excitement there and for a number of years was a contractor for mining and smelting companies in getting out timber, saw-logs and cord wood.

Gradually he worked into the stock business and later into the sheep business, which he has followed during the last fifteen years. At present he is engaged in farming, stock raising, merchandising and banking; he is one of the principal owners of improved land in the State, a large owner of thoroughbred sheep, having the best band of thoroughbred Lincolns in the West.



Gov. Frank R. Gooding of Idaho.

For the last fifteen years he has made his home in Lincoln county, from which county he was sent to the State Senate for the Fifth session. He was chairman of the State central committee of his party for four years, elected governor in 1904, and has just been re-elected to the same position.

Governor Gooding has for a number of years taken an active interest in the subject of irrigation, and he was prominently identified with the work of the Fourteenth National Irrigation Congress held at Boise, Idaho, last September.

Send \$2.50 for The Irrigation Age one year and The Rimer of Irrigation, 300 page book.

RECLAMATION SERVICE NOTES.

About Belle Fourche Project.

Mr. Charles E. Wells, Supervising Engineer for the Belle Fourche irrigation project, South Dakota, and the North Platte project, Nebraska-Wyoming, who is in Washington for a few days on business connected with his work, said recently:

"The diversion dam at Bell Fourche is nearly completed, and it is expected that it will be finished in time to use for irrigation the coming season. Work is being prosecuted on the Belle Fourche dam, which is an earth structure about $1\frac{1}{4}$ miles long and 100 feet in height, and which creates a reservoir covering between eight and ten thousand acres.

"About 17 miles of main canal under construction will probably be finished next season. Specifications have been prepared for the construction of Sections 2 to 8 of the South Canal and appurtenant structures, involving approximately 900,000 cubic yards of canal excavation, 7,200 cubic yards of concrete, and 1,295 lineal feet of tunnel.

"It will not be possible to use the Belle Fourche dam for impounding water the present season, but a temporary canal has been constructed so that it will be possible to irrigate a considerable acreage under the project by means of this canal. It is expected that by the season of 1908 the Belle Fourche dam will be so far advanced in construction that it may be used for impounding water in the reservoir and that water will be distributed through the North and South Canals to the lands under them. Much of the land under the project has been settled upon and a desirable class of settlers is preparing to make homes there."

"We were obliged to close down the masonry work on the Pathfinder dam about the middle of November on account of freezing weather, but the contractors are continuing work through the winter at the quarry and spillway, excavating stone which will be used next season on the masonry work on the dam. A large force of teams is also employed hauling cement from Casper to the dam site, a distance of about 50 miles. At present about 10,000 barrels of cement are stored at the dam site, and it is expected that the work of laying masonry will begin early in the spring and be prosecuted with vigor before the floods occur in May and June, during which time work will have to be suspended.

"The floods usually last until early in July, when the waters in the North Platte River subside. The working season will then last until probably about the middle of November. It is expected that the bulk of the work on the dam will be done the present season and that the dam will be completed by the contractors before November, 1908.

"Advertisements are out containing specifications for the construction of the Pathfinder dike, and bids will be opened for this work February 27th. The dike is an earth structure reinforced with rock on the water side, and is constructed for the purpose of supplementing the Pathfinder dam. On the south side of the dam is a low place which requires to be filled, and the dike is constructed for the purpose of preventing the water running through this place. It will be about a quarter of a mile long and about 35 feet high at the highest point. It is expected that contracts will be let soon after the opening of bids, and that the dike will be completed by 1908.

"The contract for the high pressure gates which are to control the flow of water from the Pathfinder dam has already been awarded, and the gates will be placed in position before March 1, 1908.

"About 150 miles down the river from the Pathfinder dam the Whalen dam will divert the waters into the Interstate Canal. Bids for this dam were received January 9th, and the contract probably will be awarded within a very few days.

"Forty-five miles of the Interstate Canal were completed last season, and considerable land will be placed under irrigation from the finished portion of the canal this season. Fifty miles more are under construction and will probably be finished early the coming summer. One hundred and thirty-five miles of laterals are also under construction and during the season of 1908 a large amount of land under the Interstate Canal will be ready for irrigation."

O. H. Ensign—Electrical Engineer.

Mr. O. H. Ensign has been designated as Chief Electrical Engineer of the United States Reclamation Service in charge of electrical and mechanical matters, with office at 321 Merchants Trust Building, Los Angeles, Cal. It has been found desirable to give Mr. Ensign more specific authority and responsibility in connection with the preparation of designs for electrical and mechanical devices. Mr. Ensign's past record is briefly recited:

Native state, New York; born, July, 1863. Grammar and high school education; two years in Mechanic Arts, Cornell. Ithaca machine shops, 1883; Schenectady Locomotive Works, 1884 to 1886; Edison Electrical Company, New York, 1887 to 1888; General Electric Company, Schenectady, N. Y., 1889 to 1893, in charge of tests, and general inspector. In 1893 moved to California and was made consulting engineer on first three-phase transmission line in America at Redlands, Cal. Electrical and mechanical engineer, Los Angeles & Pasadena Electric Railway, and Los Angeles & Santa Monica Railway. In 1896 to 1904, Electrical and Mechanical Engineer of the companies now known as the Edison Company of Los Angeles, constructing and operating long distance hydro-

Klamath Project.

Proposals are being solicited for the construction of the Keno Canal in connection with the Klamath irrigation project, Oregon-California. The work will involve the excavation of about 80,000 cubic yards of rock and earth. The bids will be opened at Portland, Ore., April 15, 1907. Contractors should address the Supervising Engineer of the Reclamation Service at Portland, Ore., for particulars.

Authority has been granted to the Reclamation Service by the Secretary of the Interior to purchase by informal contract under competitive proposals the necessary equipment consisting of machinery for the generating of electricity and its utilization at the tunnel headings and other points on the Tieton project, Washington. The cost of the machinery is not to exceed \$75,000.

The New Jersey Foundry & Machine Company, of New York City, has been awarded contract for furnishing high pressure gates for the Shoshone and Pathfinder dams, Wyoming, at the price of \$123,500.



View of Black Lake, Washington County, Idaho.

electric plants. Member American Institute of Electrical Engineers. On November 1, 1904, appointed Electrical Expert, United States Reclamation Service.

The Secretary of the Interior recently granted an extension of time to S. H. H. Robinson to June 1, 1907, for the completion of his contract for the work of Schedule 1, main supply canal, Belle Fourche project, South Dakota.

The Secretary of the Interior has authorized the Reclamation Service to purchase power equipment to be utilized in the building of the Cold Springs dam, Umatilla irrigation project, Oregon, now being constructed by force account under the supervision of the Government engineers. The estimated cost of the machinery is \$5,000.

The Secretary of the Interior has granted an extension of time to July 1st to Nohle & Mann of Buford, N. D., for the completion of the work of constructing a unit of the Lower Yellowstone project.

The Reclamation Service has been authorized to purchase informally from the lowest bidder, cost of transportation considered, 5,000 barrels of Portland cement for use on the Interstate Canal, North Platte irrigation project, Nebraska-Wyoming.

North Platte Irrigation Project.

The Secretary of the Interior has awarded contract to the S. R. H. Robinson & Son Contracting Company, of St. Louis, Mo., for the construction of a diversion dam and headworks, North Platte irrigation project, Wyoming-Nebraska, at a total price of \$217,850.

This dam, known as the Whalen dam, is situated about 150 miles down the river from the Pathfinder dam, its purpose being to divert the water into the Interstate Canal. Its construction involves the excavation of about 90,000 cubic yards of earth and rock, the furnishing and placing in structures about 10,000 feet board measure of lumber, and the construction of about 8,000 cubic yards of concrete masonry.

Will Purchase Cement.

The Secretary of the Interior is advertising for proposals to furnish 55,000 barrels of Portland cement f. o. b. cars at mill, for use in connection with the following irrigation projects: Shoshone, Wyoming; Williston and Buford-Trenton, North Dakota; and Huntley, Montana; North Platte, Wyoming-Nebraska.

The bids will be opened at Huntley, Mont., March 12, 1907. Detailed information may be obtained upon application to the Supervising Engineer, Huntley, Mont., or the Supervising Engineer, Crawford, Neb.

Colorado River.

A telegram received recently by the Reclamation Service from the engineers on the Lower Colorado River in Mexico, reports the successful closing of the break in the bank. After a mighty struggle with this unruly stream, in which all the energy of 1,000 men, supplied with the equipment of the Southern Pacific Railroad, has been employed for weeks, the Colorado has been controlled and once more is proceeding on its way to the Gulf of California.

A determined effort is being made to fortify the break by constructing many miles of levees. The problem from now on will be to preserve these levees from destruction during the period of floods.

Strawberry Valley.

Authority has been granted the Supervising Engineer of the Strawberry Valley project, Utah, to obtain proposals from as many firms as may be practicable for the machinery required for the power plant to be used in excavating the Strawberry Tunnel. It is estimated that the machinery required will cost approximately \$100,000. The general plan which has been worked out by the engineers is to erect a power plant at the point where the Strawberry Valley Tunnel water is dropped into the Salem Canal, utilizing a fall of 120 feet, and the minimum amount of water which flows into Spanish Fork about 60 cubic feet per second. This power is to be utilized for furnishing power to the Strawberry Tunnel until it is finished, and in furnishing light and possibly small quantities of power to the towns in the neighborhood of the power plant which are all within a radius of twelve to fifteen miles.

The estimates indicate that there will be an excess of 100 horse power to dispose of for this purpose. The total power generated and available with this quantity of water and fall will be about 500 electrical horse power, of which probably 400 will be required to carry on the construction of the Strawberry Valley Tunnel.

Authority has already been granted for the construction of about three miles of canal which will carry the waters of the Strawberry Tunnel, as well as the waters of Spanish Fork, to the power house.

As the Hondo Reservoir in New Mexico was not completed in time to receive the full flood discharge of Hondo River, the settlers have requested that the project be not declared open this year, but that the members of the Water Users' Association be permitted to buy such water as may be required; precedence in purchasing to be given to those whose lands are already in cultivation. In view of the action taken by the Secretary of the Interior in the Carlsbad project, which in many respects involves similar conditions, the Supervising Engineer has been directed to provide for the sale of water to the settlers on the Hondo project for the season of 1907.

Northwestern contractors are offered an excellent opportunity to bid on government work by the Reclamation Service which is now soliciting proposals for the construction of an earth-filled dam and accessory structures located on Willow Creek, about five miles northwest of Augusta, Mont. This work is in connection with the Sun River project for the irrigation of lands near Great Falls. It involves about 7,500 cubic yards of open cut excavation; 170,000 cubic yards of embankment; 620 linear feet of lined outlet tunnel, and 130 cubic yards of reinforced concrete. Bids will be received until March 15, 1907, at the office of the United States Reclamation Service, Great Falls, Mont., and particulars may be obtained by addressing the engineer at that place.

The Secretary of the Interior has granted an extension of time to Orman & Crook, of Pueblo, Colo., for completing the work of Schedule 3, South Canal, Belle Fourche irrigation project, South Dakota, to June 1, 1907.

The delay in the work which made this extension necessary was caused by the severity of the weather.

In connection with the construction of the Keno Canal, Klamath irrigation project, the Secretary of the Interior has authorized a portion of the work to be done by force account. The estimated cost of this part of the work is about \$19,000, and it is proposed by the Reclamation Service to divide it into small schedules so that local contractors can bid on the work. This has been deemed advisable owing to the necessity for delivering water by October 1, 1907.

Contractors are asked to bid on the work of excavating the Keno Canal, near Klamath Falls, Klamath irrigation project, Oregon, involving about 80,000 cubic yards of rock and earth excavation.

The plans, specifications and forms of proposal may be obtained by application to the Supervising Engineer, United States Reclamation Service, Portland, Ore., or the Project Engineer, Klamath Falls, Ore.

The Secretary of the Interior is soliciting proposals for the construction of twelve miles of main canal, sixty-seven miles of laterals, seventeen miles of waste water ditches and appurtenant structures in connection with the Sun River irrigation project, near Great Falls, Mont.

The work involves approximately 481,000 cubic yards of excavation, 1,200 cubic yards of concrete, 900 cubic yards of paving and riprap, 290,000 feet board measure of lumber, the placing of 182,000 pounds of steel, and the furnishing of such other material and the performance of such other work as may be necessary for the completion of the work.

The bids will be opened at Great Falls, Mont., on April 3, 1907. Detailed information may be obtained at the office of the Reclamation Service, Washington, D. C., or from the Project Engineer at Great Falls, Mont.

The Secretary of the Interior has executed a contract on behalf of the United States with the Expanded Metal and Corrugated Bar Company, of St. Louis, Mo., for furnishing 1,800,000 pounds of structural steel for the Tieton irrigation project, Washington. The contracting company agrees to furnish this material for the sum of \$38,315.99.

Northwestern contractors are offered an excellent opportunity to bid on government work by the Reclamation Service, which is now soliciting proposals for the construction of an earth-filled dam and accessory structures located on Willow Creek, about five miles northwest of Augusta, Mont. This work is in connection with the Sun River project for the irrigation of lands near Great Falls. It involves about 7,500 cubic yards of open cut excavation; 170,000 cubic yards of embankment; 620 linear feet of lined outlet tunnel, and 130 cubic yards of reinforced concrete. Bids will be received until March 15, 1907, at the office of the United States Reclamation Service, Great Falls, Mont., and particulars may be obtained by addressing the Engineer at that place.

Corbett Tunnel.

Work on the Corbett Tunnel, which is an important unit of the Shoshone project in Wyoming, progressed satisfactorily during the month of December, being only slightly delayed by reason of cold weather, which interfered with the laying of concrete.

The Government is doing this work by force account and in December excavated 791 linear feet of tunnel, drove 801 linear feet of heading and concrete-lined 305 feet of arch and side walls.

On January 1st the Corbett Tunnel had been driven 9,323 feet, of which 3,502 feet are lined.

On the great Shoshone dam, which is to be the highest in the world, the contractor has not made satisfactory headway. His work during the past month consisted of driving a road tunnel and excavating for temporary flume and spillway.

The engineers report a great improvement in labor conditions.

The Secretary of the Interior on behalf of the United States has executed a contract with the New Jersey Foundry & Machine Company of New York city for furnishing and installing high pressure gates at the Shoshone and Pathfinder dams, Shoshone and North Platte irrigation projects, Wyoming, for the sum of \$123,000.

Send \$2.50 for The Irrigation Age
1 year, and The Primer of Irrigation

Placing the Cart Before the Horse.

Since the break in the west bank of the Colorado River in Mexico began to attract attention there have been almost innumerable communications sent to the President and prominent officials in Washington from persons with more or less vague knowledge of the subject, and from genuine cranks. Many of these suggest that the Salton Sea should be allowed to fill up because of its supposed effect upon the rainfall, and point out the fact that during the last year or two there has been a notable increase in precipitation throughout the arid regions and even farther east.

Their reasoning, however, is defective in that they attribute to the Salton Sea an effect on precipitation whereas as a matter of fact it is the temporary increase in rainfall upon watersheds in Arizona and New Mexico, hundreds of miles away from the Salton Basin which has given rise, in large part, to the flow of water into this basin. The large and somewhat unusual floods of the past few years have caused the river to maintain the break through its west bank, and to this fact is due the difficulty of closing the break. Under ordinary conditions the break might have been closed with relative ease.

The temporary increase in rainfall throughout the central part of the United States is by no means unusual, and a study of rainfall records, extending through several years will show that there is a more or less swinging of the pendulum in this connection, some years being of excessive moisture and others of excessive dryness. It is to be inferred that the present years of moisture above the average will be succeeded in due course of time by other years with rainfall below the average.

The effect of the Salton Sea on the climate is almost infinitesimal. As shown on map of the United States it is merely a dot. When we compare this with the Gulf of California or with the Pacific Ocean, or even with Great Salt Lake, we see the incongruity of the assumption that this little puddle of water can have anything to do with the climate. If the lands along the Gulf of California are arid and those around Great Salt Lake are equally dry, it is hardly to be supposed that the Salton Sea will change the climate of the country.

Lowest Bid Too High.

Authority has been granted the Reclamation Service to prosecute the work involved in the construction of structures for Division 1, main canal, Shoshone irrigation project, Wyoming, by force account. About 180,000 cubic yards of grading will be required, 1,800 cubic yards of concrete, and 127,000 pounds of steel reinforcing bars and other incidental work.

Proposals for this work were opened August 23, 1906, and the lowest bid received was considered too high and rejected. Further effort was made to secure proposals and circular letters were sent out announcing that bids would be received up to February 1, 1907, but no response was made.

It is necessary to complete this work during the coming field season, and the Secretary of the Interior has accordingly authorized the Reclamation Service to proceed with the work, the estimated cost of which is \$56,000.

Steel Bars—North Platte.

The Secretary of the Interior has awarded contracts for furnishing about 125,000 pounds of steel bars for reinforcement of concrete, about 16,000 pounds of structural steel, and about 50,000 pounds of cast iron gates, guides, stands, etc., for the North Platte irrigation project, Nebraska-Wyoming, as follows:

Schedule 1, structural and reinforcing steel, to the Minneapolis Steel & Machinery Company at \$4,880.88, f. o. b. cars at Whalen, Wyo., and

Schedule 2, cast iron gates, guides, stands, etc., to the Vulcan Iron Works, Chicago, Ill., at \$4,161.37.

Proposals are being solicited for the construction of sections 2 to 8 of the South Canal with appurtenant structures, in connection with the Belle Fourche irrigation project, South Dakota.

The work involves approximately 900,000 cubic yards of canal excavation, 7,200 cubic yards of concrete, and 1,295 linear feet of tunnel. The bids will be opened at Belle Fourche, S. D., April 10, 1907. Plans, specifications, etc., may be obtained from the supervising engineer of the Reclamation Service at Crawford, Neb.

The Secretary of the Interior has executed a contract on behalf of the United States with the S. R. H. Robinson & Son Contracting Company, of St. Louis, Mo., for the construction and completion of diversion dam and headworks in connection with the North Platte irrigation project, Nebraska-Wyoming, for \$217,850.

The work involves the excavation of about 90,000 cubic yards of earth and rock, furnishing and placing in structures about 10,000 feet B. M. of lumber, and the construction of about 8,000 cubic yards of concrete masonry. The dam will be used to divert the waters which flow down North Platte river from the Pathfinder reservoir into the Interstate canal.

The Reclamation Service has been authorized to construct the levees on the California side of the Colorado river, Yuma irrigation project, by force account. This action was necessary by reason of the fact that if advertisement was made for bids and contracts awarded in the usual way the work would be delayed until after the spring floods. The estimated cost of building the levees is \$115,000.

ELSEWHERE in this issue will be found an article entitled "The Reclamation of Our Arid Lands." This article was written by an Elgin (Ill.) school girl, and shows that the subject of irrigation is one that appeals to all classes of people, and one that is being discussed in our homes. The urgent need of reclaiming our arid lands is now apparent to the American people.

Gifford Pinchot of the forestry bureau is likely to be made Secretary of Agriculture on the retirement of James Wilson, whose skidoo is expected along about the 4th of March. As a politician he will look like a pinshow to a great circus as compared with old man Wilson and he will have to take lessons in the manly art of boxing to hold his own when it comes to striking Congress for a lot of fancy appropriations. Pinchot is to be in Denver next week and will probably deny all association with his aspirations to sit at the President's official board. He is an active young man, with a good deal of personal magnetism, but we never admired some of his public policies nor his snobbish ways.—*Denver Field and Farm.*

Send \$2.50 for the
Irrigation Age one
year and the Primer
of Irrigation.

THE RECLAMATION OF OUR ARID LANDS.

BY MISS MAY ROGERS, ELGIN, ILL.

In this vast country of ours, with an area of more than three million square miles, and a population of almost seventy-seven million people, there are one million three hundred thousand square miles of land unfit for use, a territory which is over twice as large as the areas of Great Britain, Germany and France combined. A very large part of this land it is possible to reclaim, if

pieced! The little state of Rhode Island has 343 people to every square mile, while the large Nevada, out in the West, has only one person to every two square miles.

Now the question arises, How is this land to be made productive? There are many answers to this. The first and perhaps most important is irrigation. This land is not absolutely devoid of water. There are rivers here just the same as in other parts, and there is some rainfall. If only the water would be forced through ditches into reservoirs and dammed, it could be spread over the parts farther distant from the rivers.



Five-Year-Old Lombard Plum Tree near Finita, Colo., on Denver & Rio Grande Railway.

only the right means can be used. How many more people could live in this country if only this land could be made available! President Roosevelt said in his first message to Congress: "The western half of the United States would sustain a population greater than that of our whole country today if the waters that now run to waste were saved and used for irrigation."

How much less crowded our eastern states would have to be if only this land in the West could be occu-

The one hundredth meridian divides the United States from north to south into two equal parts. The eastern half is humid; the western is made up of vast plains, deserts and mountains. Nearly all except along the rivers or on the seacoast is either arid or semi-arid. Yet this despised section is rapidly gaining the title of "The Better Half of the United States." With irrigation it can be made from twenty-five to one hundred per cent more fertile than the East. Seven millions five

hundred thousand acres are already under irrigation. The Mormons were the first to irrigate in the West. They were obliged to do this in order to keep themselves from starving. The land around Salt Lake, which before their arrival was a desert, is now the "garden spot" of the West.

When the present plans are carried out, the one-half million acres of fertile land along the Colorado River will be increased to one million two hundred thousand acres. This river has already justified its name, "The American Nile." Here barley and wheat ripen in sight of Egyptian cotton. Here dates, olives, oranges, grape fruit, apples and pears, all of superior quality, may grow in the one orchard. Sweet potatoes, Irish potatoes, cabbages, peanuts and strawberries may grow in the same garden.

In Colorado in 1904 over \$3,000,000 were paid to farmers for their sugar beets, and \$100,000 were paid to factory labor for converting these beets into sugar. The total value of all products grown under irrigation in Colorado in 1904 was \$40,000,000. Irrigated land between Denver and the foothills is worth \$200 or \$300 an acre.

In Wyoming 907,916 acres of land will be reclaimed. In Idaho there will be 1,672,132 acres reclaimed. This state has 300 days of sunshine per year. Potatoes yield from three hundred to four hundred bushels per acre.

In California much has been done in the way of irrigation. In parts of the state irrigated land is sold for fruit raising at \$1,800 an acre. Riverside, Cal., in the irrigated country, is the wealthiest city in the United States in proportion to its population.

In Oregon there are 3,000,000 acres of land cultivated with only very little rainfall. Steps are being taken to provide this land with a sufficient amount of water. Already an irrigation canal has been completed which will water 150,000 acres.

Montana has not as much irrigated land as Utah, yet there is much more land susceptible of irrigation in Montana than in Utah.

In Texas, Kansas, western Nebraska and the western half of the Dakotas, as well as much of Montana, men are settling where success must depend upon dry farming and irrigation. Dry farming is the raising of crops that require little water, such as macaroni wheat, kaffir and Egyptian corn and alfalfa. Macaroni wheat came originally from Russia. In spite of its name, it can be used for all purposes for which the other wheat is used. It yields from thirty to forty bushels an acre on soil that had been producing ten or twelve bushels of the ordinary variety. Alfalfa is a kind of clover. It is to the farmer of the semi-arid West what the camel is to the wandering tribes of the desert—it supplies all the necessities of life. Its roots will go twenty feet to water, and under ordinary conditions it will produce four crops a year.

These lands in the West, especially Arizona and New Mexico, are very desirable because several crops can be raised in one year when they are not dependent upon rainfall, and because of the warm climate many more kinds of things can be raised than farther north.

When the desired end in irrigation has been attained, and agriculture in the West is farther advanced and more people are moving west, more cattle will be raised, more mines will be worked, and more manufactures will be located there. Even now the cities of Phoenix, Reno, Boise, Salt Lake and Denver are almost

as much the creation of irrigation as the farms and orchards which surround them.

Another way to improve this land is to adapt plants to grow on the desert. Mr. Luther Burbank, the "wizard botanist," who has done so much in plant creation, has carried on extensive work in this line. He has combined trees that grow on fertile lands with those that are wild, and the result is beautiful trees that will grow in either kind of soil. He has done especially wonderful work in the case of the plum. He has cultivated the American beach plum, a small, dull-colored, bitter, wild fruit, into a large, deep-purple plum. This wild fruit was unfit to eat unless cooked. It was little larger than a cherry and contained a very large pit. But it was hardy; it grew in sandy soil and heavy clay, in desert-like places and in soil sometimes submerged by sea. It grew in drought as well as in rainy seasons. It withstood the frost and some of it ripened early and some late. The plum which he has made from this will grow in the same climate and soil, but it is very much larger, about three inches in circumference, and grows in great abundance upon the trees. This is of value to our country because of the amount of fruit there is and because of the good shipping qualities which it possesses. It has a thick, tough skin, which will preserve it through long journeys.

A third way of reclaiming this desert land is by the cultivation of plants that already grow there, and making them edible. One of the few plants which will grow everywhere, where there is any rainfall at all, is the cactus. This grows very abundantly on desert land, and needs no irrigation. It is a very fleshy plant, having large, thick leaves, and would furnish ample food for man and beast were it not for the long thorns on the leaves and the woody substance, or spicules, contained within them. Mr. Burbank began to work upon this plant, and after ten years of crossing and breeding he produced a plant, a giant cactus, eight feet high, with leaves from ten to twelve inches long and five to eight inches wide and nearly one inch thick. This plant was thornless and spiculeless, and in three years one plant produced six hundred pounds of food. It will grow from seeds, cuttings or from leaves. The fruit is two and one-fourth inches in diameter and three and one-half inches long, and the juice, which is sometimes red and sometimes yellow, is used as a coloring for painting and for confectionery.

The western half of our country, of which I have been speaking, is equal to the combined areas of Japan, New Zealand, Italy, Spain, Germany, Norway, Sweden, Austria-Hungary, Holland, Belgium, France, Portugal, Great Britain, Ireland, Denmark and Switzerland. The population of all these countries is 228,000,000, while the population of our western states is only 10,000,000. An irrigation expert says: "Having in mind the great difference in population, we can not fail to be impressed with the opportunities for increase of population and industries, especially as the resources of these western states are of greater extent and have hardly yet been exploited. There is apparently no reason why our western states should not, in the distant future, be capable of furnishing homes and profitable occupation for as large a population as some of the countries whose names have been given."

A recent work on irrigation says: "The confines of the great American desert are narrowing rapidly. Do but reflect that a quarter of a century back the journey which you now make in perfect comfort was a

matter of wild adventure, at a cost of months of arduous travel and at a hazard of life, not only because of the human foes, but for scarcity of food and water. One never appreciates the full stride of American progress until he has traversed in a Pullman car such a territory as this, where "Valley of Death" and "Journey of the Dead" are names still borne by waterless tracts, and justified by bleached bones of cattle and lonely mounds of scattered graves.

"Rescued from centuries of horror and planted in the front rank of young rising states by the genius of our generation, the desert parts of the West is a land of broad ranges, where hundreds of thousands of sleek cattle and countless flocks of sheep browse upon the nutritious grasses, where fields of grain wave in healthful breeze, where orchard trees bend under their weight of luscious fruits, and where the rocks lay bare inexhaustible veins of precious metals.

"Here may be found today as profitable large ranches as any in the country, and innumerable small aggregations of cultivated acres, whose owners sit comfortable upon shaded verandas, while their servants till the field."

"If you own ten acres of irrigated land here, you are that much-vaunted, but seldom encountered, independent farmer."

For instance, a man went out West, took up a government claim and borrowed the money to pay for it. Here he put up two tents, in which he and his wife and two children lived. From the first year's crop on this land he made enough money to pay for his farm and a perpetual water right, to build a house and a barn, to

buy a team and all of his farming tools.

There is plenty more government land waiting to be taken. This is an excellent opportunity for poor men to become independently rich. To the ambitious young man, whether he intends to be a farmer, a ranchman, a mine operator or an engineer, we can repeat the famous advice given by Horace Greeley, forty years ago, "Go West, young man; go West."

Renew your subscription for the IRRIGATION AGE for 1907. Send us Post Office or Express money order for \$1.00.

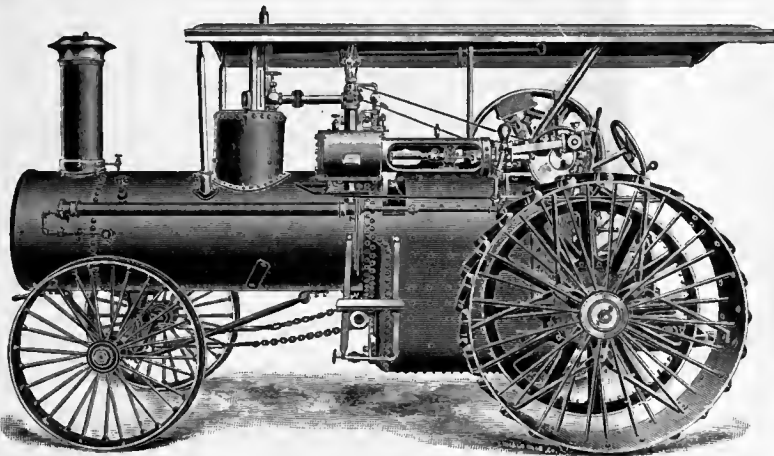
PATENTS

Send sketch or model for free examination and report as to patentability. Patents promptly secured. Advice free; terms low; highest references and best service. Address

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"RUMELY" Threshing Machinery

Single and Double Cylinder Coal and Straw-Burner Traction Engines.

Rumely "Ideal" Separators, Wind and Attached Stackers.

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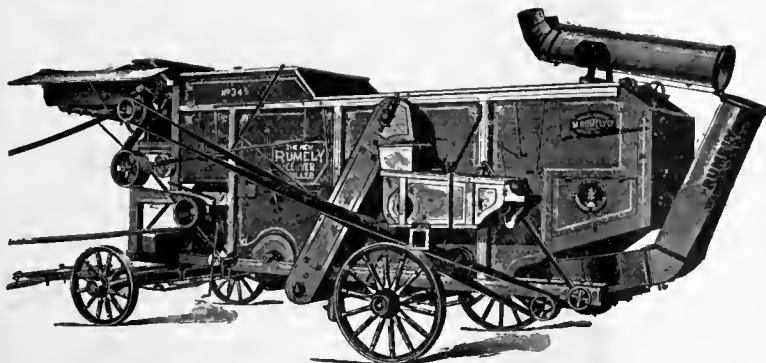
Grain-Handling Attachments.

CLOVER AND ALFALFA HULLERS

PLOWING ENGINES

M. RUMELY CO.
Manufacturers

LA PORTE :: :: INDIANA



CORRESPONDENCE.

SEATTLE, WASH., January 3, 1907.

EDITOR IRRIGATION AGE, Chicago.

DEAR SIR: I am expecting to go on irrigated land next spring where the water supply will be quite alkali for drinking purposes and where the ditch water will be warm and liable to contamination. I have been looking through the back numbers of the IRRIGATION AGE for information and advice on the methods I will have to use to secure good drinking water for the family. I could not find anything on the subject in the numbers of your paper I have on hand. Will you please direct me to where I can get information on the subject? Does not someone manufacture a still to put on the back of the stove? Could you give me their name and address? Would not distilled water be healthy to drink? Thanking you in advance for any information you can give me on the subject.

Respectfully yours,

M. M. GRISWOLD.

[Will some of our readers kindly give Mr. Griswold such information as he desires? Those who have encountered similar difficulty will no doubt be glad to assist him with their advice.]

DEADWOOD, S. D., January 23, 1907.

EDITOR IRRIGATION AGE, Chicago, Ill.

DEAR SIR: I have just read the January number of IRRIGATION AGE and wish to say that it is the best I ever read. Thank you ever so much. You speak to "Teddy" in a way that makes you *distinctly* an American citizen. If every paper of every kind were as honest and bold to speak the truth as you are, things would not have the cancer spots on them that we see today. How deep may they eat before they are checked is the great question today. Give my thanks to Walter H. Graves the first time you see him and a big hand shake. His article shows the *broadest and clearest* understanding of the nature of water, land and home as related to the state. His statement that a settler would need \$5,000 to make himself secure in taking a home under Government irrigation projects will, I am sure, apply to the Belle Fourche scheme, as

I have had some pretty good chances to know something about it. The statement in the AGE that oats, wheat, rye and barley, with apples, pears, plums, cherries and small fruit can be raised on this land is at least problematical, no one has ever seen them yet. I refer to the "Gumbo" belt. The Black Hills do not stand in need of any more vegetables.

Yours for home,

ELIS G. ARNOLD.

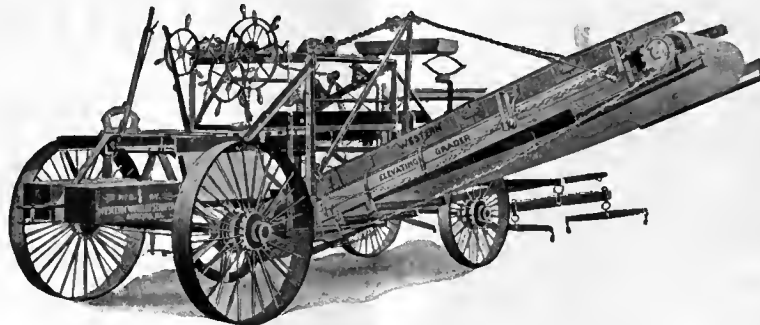
GOOD AND CHEAP FARM LEVEL.

Every farmer who has any ditching or terracing to do should equip himself with one of the Farm Levels manufactured by the Bostrom-Brady Company of Atlanta, Ga.

This level is delivered at the customer's station for \$12.50. It is well made, light and strong. The writer having purchased and had in use one of them, knows them to be efficient and satisfactory instruments.

The Bostrom-Brady Company is reliable and honorable in all its dealings and will make no misrepresentations upon any point. They sold several thousand of these levels in 1906, all of which are giving satisfaction. They donated one to the Southern Cotton Association at Birmingham and in addition to that will during 1907 give the association one dollar for every level bought by members of the S. C. A. provided the fact is made known at the time of purchase.—*Exchange*.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation



Western Elevating Grader and Ditcher

Designed especially for the excavation of irrigation ditches and canals. Sold on guarantee that it will move one thousand cubic yards per day of ten hours, using ten to fourteen horses, one operator and two drivers. Also largely used when drawn by traction engine. Ditches up to sixty feet in width can be made with this machine at a fraction of the cost incurred by the use of any other outfit.

Wheeled Scrapers, Drag Scrapers, Buck Scrapers, Road Graders, Dump Wagons, Dump Cars, Rock Crushers, etc.

Western Wheeled Scraper Co.

Send for Catalog

AURORA, ILL.

BONANZA TALES.

The old fable of the farmer who was told of hidden treasure just under the surface of his farm, and who dug over every acre apparently in vain, only to find that the treasure came with the increase in his crop, has been paralleled in Colorado, where bonanza tales of profits in sugar beets and alfalfa, peaches and canteloupes are replacing the exciting finds in the mining camps. True, the production of the mines of the State for 1906, as shown in the recently tabulated records of the State's progress, was one of the greatest in its history, but it was so far eclipsed by the records of the farms as to seem of little importance.

According to the published figures, the farms of Colorado produced in 1906 the enormous total of \$101,000,000, while all the mines together—gold, silver, zinc, lead, copper, tungsten and radium—could roll up only \$50,000,000. Although the coal production has almost doubled in the last ten years, it has not caught up with the combined output of fruit and sugar to sweeten it, as the orchards of Colorado and the beet fields together produced \$20,000,000 worth of salable products, while the coal mined in the State brought only \$18,000,000.

The record of the farms becomes of still greater importance when it is remembered that a ton of coal or an ounce of gold or silver taken from the ground leaves it that much the poorer, while under irrigation, a farm that produces well this year may be expected to do even better next year.

Cash Profits Pile Quickly Get Started NOW

Let me tell you the name of this man and many others who are making these **Miracle Concrete Sewer Pipe** on my **Miracle Bell End Sewer Pipe Molds**. Write me today, I'll answer you personally and make you a special proposition if you **START NOW** where you live. No experience is necessary. It won't cost you a cent to investigate. My **Free Book Explains Miracle Concrete Bell End Sewer Pipe** and how easily you, as an Individual or Contractor, can make money faster with this than with any other Concrete Proposition. **Miracle Molds** quickly pay for themselves. Lowest prices and best terms. First 50 feet of pipe you make pays for your outfit. 24-inch size sells at \$12.50 per foot or more. Don't miss this. Write today. Sewer Pipe Book Free or my Large 114-Page Concrete Book covering the entire concrete industry sent for 24c in stamps. Address me:

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AGENTS \$50. WANTED Per.WEEK

To sell the Dr. Haux famous "Perfect Vision" spectacles—finest on earth. State present occupation. Dr. Haux Spectacle Co., Dept. 123 St. Louis.

TREES THAT GROW

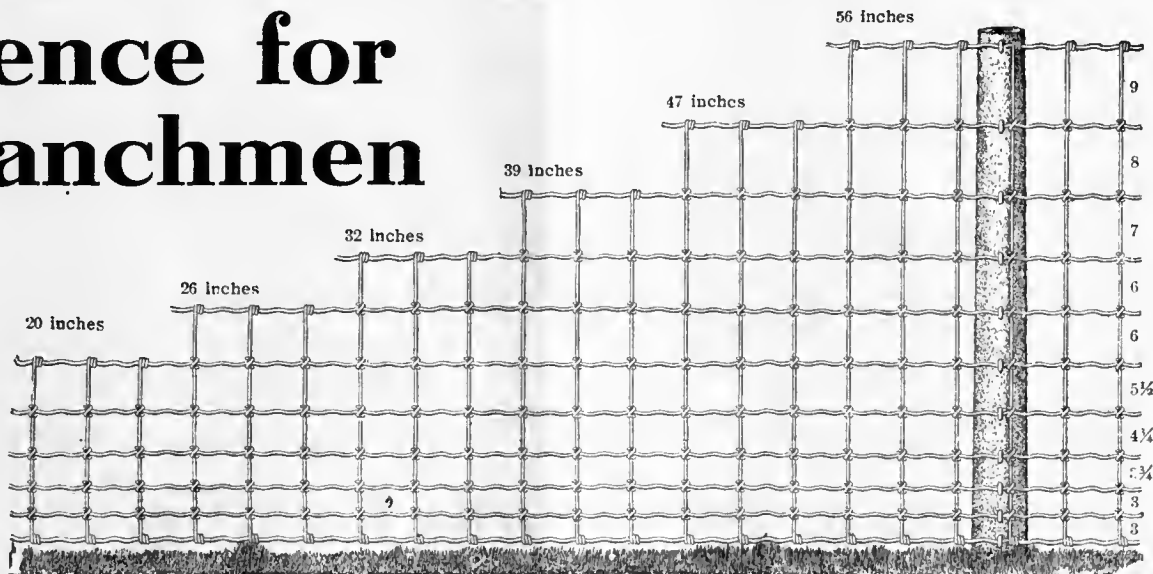
Apples 4c, Peach 5c, Plums 12c, Cherries 15c. Best quality, good bearers, grafted stock, not seedlings. Concord Grapes 2c. Forest Tree Seedlings \$1.00 per 1,000 up. We pay the freight.

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CARL SONDERREGGER, Prop.

We have a complete line of Vegetable, Flower and Farm Seeds. Our large illustrated catalog free.

GERMAN NURSERIES,
Box 52, BEATRICE, Neb.

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You will not long content yourself with barbed wire fence after we prove to you that a hog-tight woven wire fence costs nothing—that is, it more than pays for itself the first year and is clear profit every year thereafter.

Our catalog will show you where you lose money—hard cash—every season you neglect to fence your field hog-tight.

Let us make you a proposition on a hog-tight woven wire fence for your ranch. If you will give us the number of rods required we will make you a proposition on the whole business, delivered, freight paid at your nearest railroad station.

Our Square Deal Fence is the highest type of fence on the market today. The one piece stay feature alone puts it into a separate class from cut stay fences.

OUR LOCK IS PRACTICALLY IMMOVABLE and indestructible. Our wavy line strand wire furnishes a flexibility which enables Square Deal Fence to withstand and recover completely from excessive strains which would cause permanent injury to a less elastic fence.

Get our catalog with full description and prices.

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Peaches, Prunes, Melons, or Make
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We have capable men already here, but we charge for taking responsibility.

Unimproved is worth \$40.00 per acre with good water right.

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Drop us a card and send us the names of your friends. It is good enough to pass along.

Now, if you don't believe all this, write to any one living in the Payette Valley. They will all tell you the same thing, or best of all, come and see for yourself.

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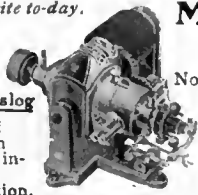
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FOR SALE CHEAP ON EASY TERMS

I own over 16,000 acres of good unimproved cut-over timber land, lying practically in a solid body adjacent or tributary to the City of Cadillac, the most progressive town in Northwestern Michigan. Price \$5.00 per acre and upwards according to location and amount of purchase. I also own or control several finely improved farms. I have written accurate and comprehensive booklets about this area, its location, soils, climate, markets, transportation facilities and other features which would interest homeseekers and I hold myself personally responsible for each statement therein. My literature is well illustrated with engravings taken from actual photographs on the lands. I send same free. Write today. This is your opportunity, don't miss it. Values are raising rapidly, get settled now and take advantage of the improvements others are making. Address:

SAMUEL S. THORPE, Room 8, Webber-McMullen Bldg., Cadillac, Mich.

Write to-day.



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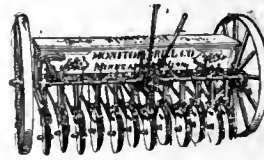
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Gas Engines without Batteries.
 No other machine can do it successfully for lack of original patents owned by us. No twist motion in our drive. No belt or switch necessary. No batteries whatever, for make and break of jump-spark. Water and dust-proof. Fully guaranteed.
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Are Especially Adapted For Use in the Arid and Semi-Arid Regions.



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Take less seed and produce greater yield per acre of better grade of grain than any other machine made. Cannot be clogged in mud, gumbo, adobe or any other soil. Pretty strong talk—isn't it? We have proof.

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MINNEAPOLIS,

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Better get our prices on steam shovels first, so that you can bid intelligently. These machines are money savers. You can't possibly do excavating so cheap by any other method, or machine. The material used in their construction is of the best, and the design is the result of thirty years experience in steam shovel building.

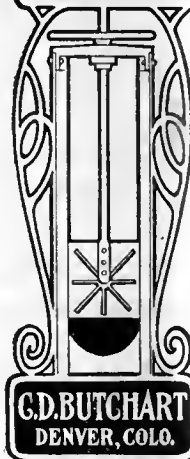
Owing to the increased capacity of our shops—we've almost doubled them in the past year—we are able to make very prompt shipments. 10 standard sizes. Ask for our catalog.

..The..

Vulcan Iron Works Co.

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Advantage No. 4:

EASY OPERATION-CONVENIENCE

A headgate that is hard to operate causes loss of time. You know what trouble it is and what a long time it often takes to open or close a wooden gate. The slide sticks, and you sometimes pull or pry it out altogether. In trying to partly close it you probably shut off the water completely. By the time you have properly adjusted the slide you have lost valuable water and valuable time. Why be bothered with a clumsy and unhandy wooden slide?

The slide on a Northwestern iron headgate cannot stick, because it is operated by a wheel and screw—one of the most powerful mechanisms known. Any one can operate a NORTHWESTERN headgate easily, quickly and safely, and regulate it exactly.

You would be surprised how much time and trouble a NORTHWESTERN iron headgate would save you. Better investigate.



O. L. Chase
 St. Louis, Mo.

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2 Full Gallons Free to Try—6 Months Time to Pay
I Guarantee Freight Charges.

I AM the paint man. I have a new way of manufacturing and selling paints. It's unique—it's better. It revolutionized the paint business of this country last year.

Before my paint was invented paint was sold in two ways—either ready-mixed or the ingredients were bought and mixed by the painter. Ready-mixed paint settles on the shelves, forming a sediment at the bottom of the can. The chemical action in ready-mixed paint, when standing in oil, eats the life out of the oil. The oil is the very life of all paints.

Paint made by the painter cannot be properly made on account of lack of the heavy mixing machine.

My paint is unlike any other paint in the world. It is ready to use, but not ready-mixed.

My paint is made to order after each order is received, packed in hermetically sealed cans with the very day it is made stamped on each can by my factory inspector.

I ship my thick pigment, which is double strength, freshly ground, in separate cans, and in another can, I ship the pure, old process Linseed Oil—the kind you used to buy years ago. Any child can stir them together.

I sell my paint direct from my factory to user—you pay no dealer or middleman profits.

My \$100.00 Cash Guarantee

I guarantee, under \$100 Cash Forfeit, that the paint I am offering you does not contain water, benzine, whitening, or barytes—and that my Oil is pure, old-fashioned linseed oil and contains absolutely no foreign substance whatever.

I guarantee the freight on six gallons or over. My paint is so good that I make this wonderful fair test offer:

When you receive your shipment of paint, you can use two full gallons—that will cover 600 square feet of wall—two coats.

If, after you have used that much of my paint, you are not perfectly satisfied with it in

every detail, you can return the remainder of your order and the two gallons will not cost you one penny.

No other paint manufacturer ever made such a liberal offer.

It is because I manufacture the finest paint, put up in the best way, that I can make this offer.

I go even further. I sell all of my paint on six months' time, if desired.

This gives you an opportunity to paint your buildings when they need it, and pay for the paint at your convenience.

Back of my paint stands my Eight-Year officially signed, iron-clad Guarantee.

For further particulars regarding my plan of selling, and complete color card of all colors, send a postal to O. L. Chase, St. Louis, Mo. I will send my paint book—the most complete book of its kind ever published—absolutely free. Also my instruction book entitled "This Little Book Tells How to Paint" and copy of my 8-year guarantee.

O. L. CHASE, The Paint Man.
 Dept. 520 St. Louis, Mo.

NOTE—My 8 Year Guarantee Backed by \$50,000 Bond.

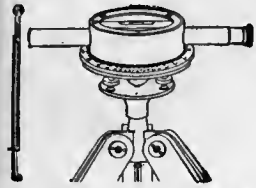
BEFORE YOU BUY A LEVEL

Write for descriptive circulars of the

BOSTROM IMPROVED FARM AND BUILDERS' LEVELS

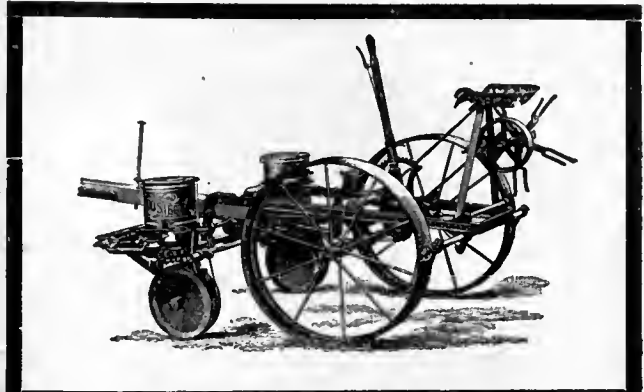
Practical up-to-date instruments that anyone can use. Recommended by professional men of repute and by the most progressive farmers of the country for irrigation, drainage and building purposes.

Prices: \$12.50 and \$26.00 including Telescope, Tripod and Rod.



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If you want a good stand of corn buy the BEST PLANTER on the market.

Three Grains to a Hill.

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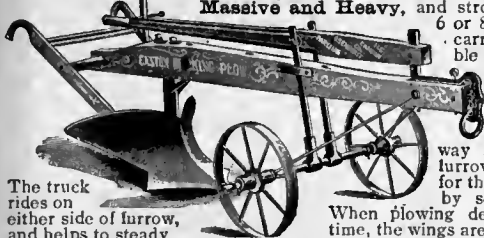
HOOSIER DRILL COMPANY

Division The American Seeding Machine Co., Inc.
RICHMOND, INDIANA.

The only plow made for digging lateral ditches or trenches.

Canton Ditching Plow

Made especially for the irrigated sections, and no other plow equals it for this class of work. **Large, Massive and Heavy,** and strong enough for 6 or 8 horses. Fore-carriage is adjustable both ways. Can be furnished with wings for first plowing, throwing the soil 3 ft. each way from center of furrow, leaving room for the soil thrown up by second plowing. When plowing deep the second time, the wings are removed. Write for prices.

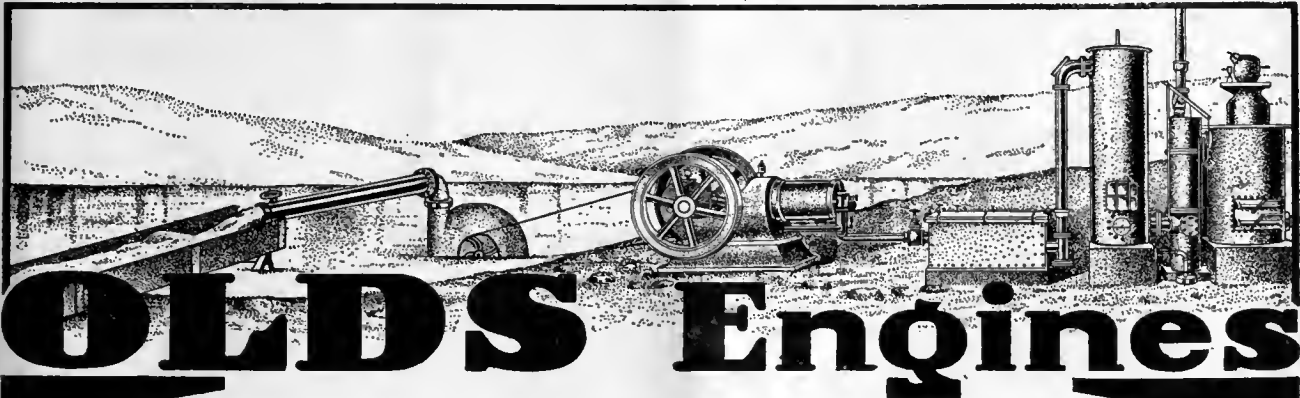


The truck rides on either side of furrow, and helps to steady the plow.

Parlin & Orendorff Co., Canton, Ill.

PORTLAND SPOKANE DENVER

Con. W. & M. Co., Salt Lake City Pacific Impl't. Co., San Francisco



OLDS Engines

"BEST BY EVERY TEST."

U. S. GOV'T REPORT.

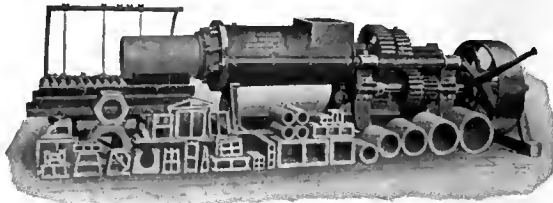
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For 25 years the standard, up to date, designed by engineers and built by mechanics who have had years of experience in the business, built throughout in the most complete modern factory. Every part inspected and tested. Every complete engine is run and tested three times by different men, so we know they are perfect before they leave the shop.

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Tell us your requirements and we will help you figure out what you need. Send for Catalog.

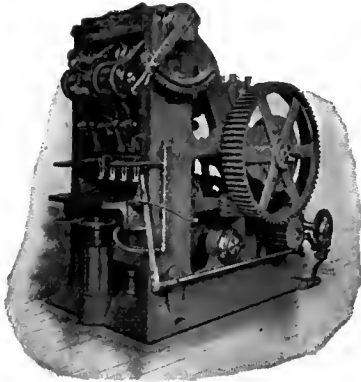
Olds Gas Power Co., 957 Chestnut Street, Lansing, Mich.



Centennial Auger Machine



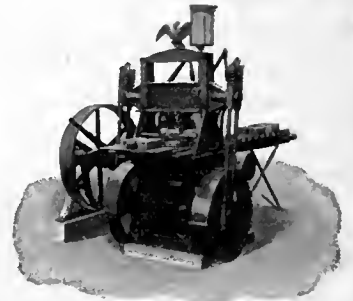
Meacot Auger Machine



Dry Press, 5 styles



Wheelbarrows and Trucks



Eagle Repress

Clay Working Machinery

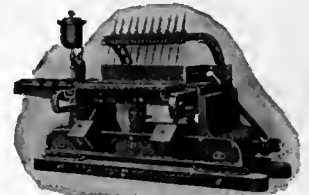
"BUILT RIGHT—
RUN RIGHT"

We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

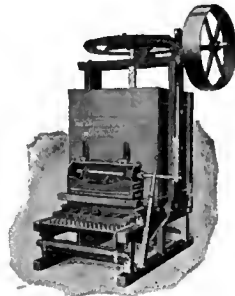
The American Clay Mch. Co...Bucyrus, Ohio



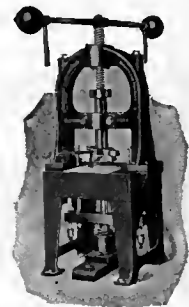
Dry Cars, all kinds



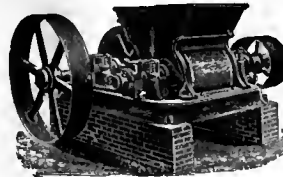
Hand and Power Cutters



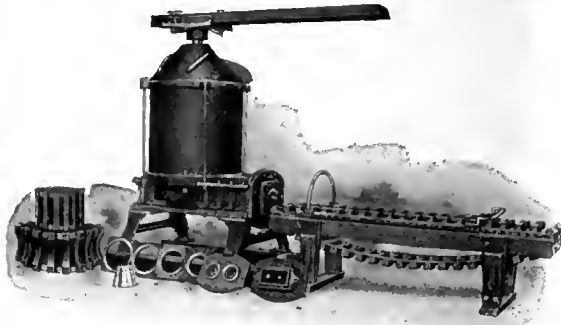
Soft Mud Machines, Horse and Steam Power



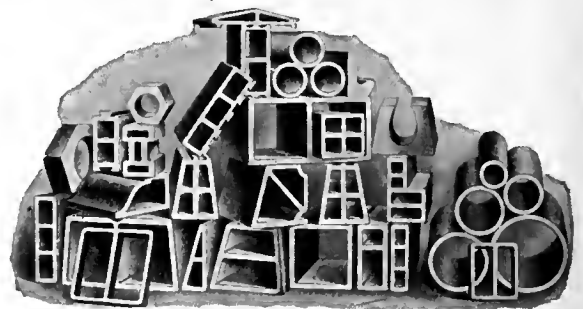
Hand Power Screw Press



Disintegrators

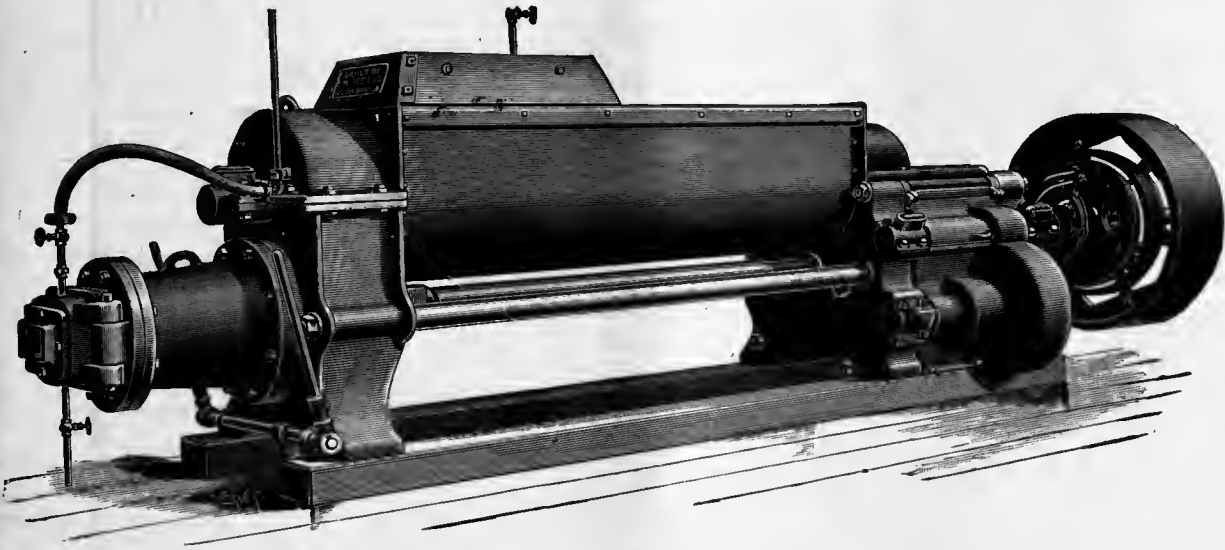


Horse Power Plunger Machine



Products of our Auger Machines

UNION MACHINES WITH PUG MILLS COMBINED



FIVE SIZES ALL CAPACITIES

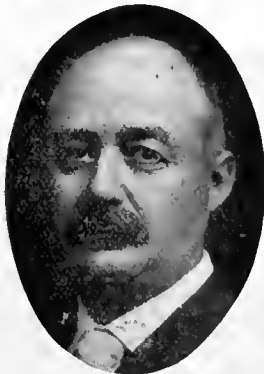
Outfits for Drain Tile, Hollow Ware, Building
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If interested write us for particulars and estimates.

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GALION, OHIO

Let Me Prove That 10 Acres of this Irrigated Land

Will earn \$250.00 A Month For You



E. W. SHUTT, President
Rio Grande Land, Water & Power Co.

I Will Sell It To You For \$2.50 a Week

Irrigated, under cultivation, ready to earn at least \$250 a month.

Not in all the world have I ever heard of so good an opportunity for men of small means. In this small space I cannot tell you all the steps that have been taken to safeguard your money in every way.

This is investment — not speculation — yet you get returns equal to those from successful speculation.

And all the while you are secured against loss by the finest farm land in the world, and your interest in water-rights that no man could buy for a million dollars.

There is no question like finding gold or striking oil about this proposition. The land is there for all time.

The water is there for all time to nourish and fertilize it.

You don't have to dig in the ground deeper than to plant seed.

There are no insects that destroy crops in this country.

There is no chance for drought.

There is no chance known to man for a single crop failure, ever.

And the abundant crops of large and in every other way superior hays, grains, vegetables and fruits are equalled in only a very few favored spots, such as the Rocky Ford country. But I am going to prove by case after case that net returns from ten acres of this property rarely are as low as \$3,000 a year and often as high as \$10,000, according to the kind of crops.

The difference is not according to location of land or season or anything of that kind.

The land is near a prosperous and growing city — Albuquerque — the largest city in New Mexico.

Our main irrigation canal to run through the city.

The main line of the Santa Fe Railroad runs through our land from end to end.

And our own electric line to supply additional cheap and convenient transportation to every section of these lands.

If you want to see the country for yourself, you can go with the next party I take to look at the property. Or you and your friends can band together and send a representative.

Or I will send you names of prominent men who have gone or will go and you can ask them what conditions they find.

But this is the merest outline of what I will show you in detail.

There are many features of this Secured Land Contract that make it safe and profitable which I haven't space to touch upon.

I am only attempting to make it clear to you that if you can possibly save \$2.50 a week you can have an assured three to ten thousand dollar income in a few years.

Don't doubt — I have proof.

I have promised to lay it before you. All you have to do is to write for it — that can't cost you a cent more than postage.

And as fast as the mails can carry, I will send you proof that as sure as crops grow where climate, soil and water conditions are perfect, you can be financially independent in a few years.

Now, not to hurry your decision in the least, but to protect the price, write me personally at once.

For after the first lot of ten-acre tracts is contracted for we will ask more. But I make this promise. Every man or woman who answers this advertisement at once can have at least ten acres on these terms unless, of course, all our land should be already contracted for from this one advertisement.

Now, write at once. I can say nothing more in this advertisement except that, if I could, I would not tell you all you can confidently expect from this investment. For you would not believe it without the proof which I cannot put in an advertisement. Address me personally, and believe me sincerely,

E. W. SHUTT, President Rio Grande Land, Water and Power Co.

658 Houser Building, ST. LOUIS, MO.

YOU know, or can easily learn from United States Government Reports, that irrigated lands in the Great Southwest, in selected crops, will net \$300 to \$1,000 a year per acre over and above the entire cost of cultivating them.

Anyone who knows the country will tell you that absolutely the surest, safest way in the world to gain a large and permanent income for a small outlay is to get hold of a few acres of irrigated land in the Great Southwest.

But always before it has required at least a few hundred dollars and it has been necessary for the investor to live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest irrigated land in the world if you can save \$2.50 a week.

You can go and live on it — absolutely assured of an income from it alone of \$3,000 to \$10,000 every year without fail.

Or you can remain in your present position and add that much to what you earn.

For my company will cultivate your property for a small share of the crops.

You don't have to know a thing in the world about farming.

Now, I can and will prove all this from the highest authorities in the land.

All you have to do is — write me and say, "Prove to me that ten acres of your land will net from \$3,000 to \$10,000 a year above all cost of cultivating it."

I have the proof, so read what my company will do for you.

I will deliver to you at once a Secured Land Contract for ten acres of irrigated land in the Rio Grande Valley.

You must pay my company \$2.50 a week or as much more as you like.

Instead of your having to pay interest on deferred payments, I agree, for my company, to pay you 6% per annum on the money you pay in.

I also bind my company to fully irrigate your land and turn it over to you under full cultivation whenever you desire to mature your contract.

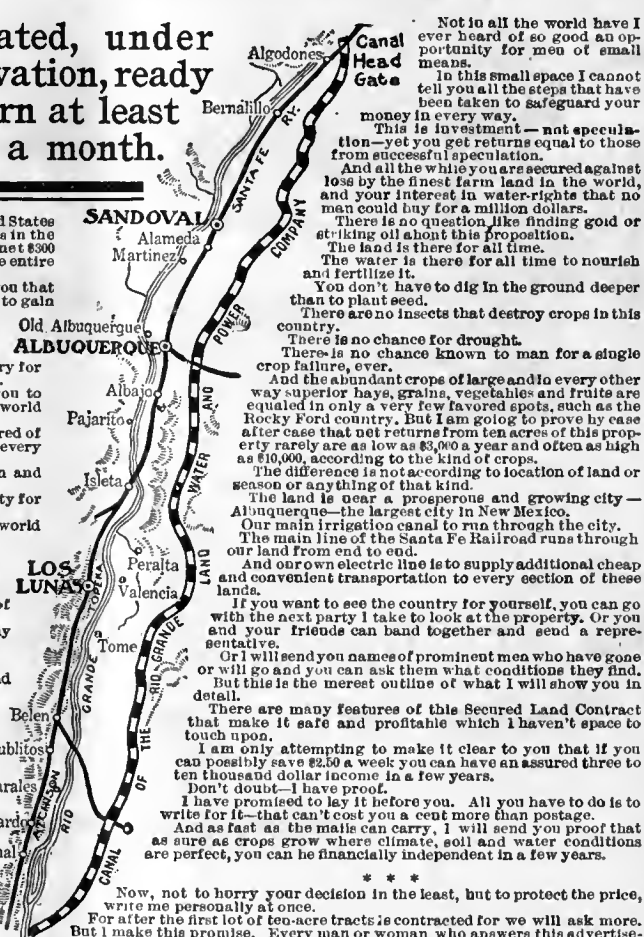
\$2.50 a week will mature your contract in 10 years.

But after you have paid \$2.50 a week for three years, or the same total amount in a shorter time, I agree and bind my company to loan you enough money to make all future payments and mature your contract.

Remember, the land will be fully irrigated and completely under cultivation, so your first year's crop should net you enough over and above the cost of cultivating it to fully pay your loan.

You would then own your land outright and have an assured income of from \$3,000 to \$10,000 a year.

Can you hope in any other way as safe and sure as this to have so large an income in a few years!



THE IRRIGATION AGE

VOL. XXII

CHICAGO, APRIL, 1907.

No. 6

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,

112 Dearborn Street, CHICAGO

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D. H. ANDERSON, Editor
W. J. ANDERSON .. G. L. SHUMWAY
Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

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To Canada and Mexico, 1.00
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Official organ of the American Irrigation Federation.
Office of the Secretary, 309 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that *The Irrigation Age* is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. *The Irrigation Age* is 22 years old and is the pioneer publication of its class in the world.

The Warren Bill. On January 7, 1907, Senator Warren of Wyoming introduced a bill, the object of which as stated in the preamble is to aid in the settlement and irrigation of the lands included in the national reclamation projects. Under the provisions of this bill the Secretary of the Interior is authorized and directed to set aside a tract of 40 acres of land within the limits of each project, which is to be placed at the disposal of the Secretary of Agriculture for experiments in irrigation and drainage. These experiments are to consist of investigations "to determine the best and most economical methods of preparing land for irrigation and for applying water to crops, and for preventing or removing by drainage, injuries caused by seepage water and alkali, and to furnish advice and direction to the settlers included in each reclamation project." The necessary water for the experiments upon such farms is to be furnished free of cost and the expenses necessary are to be covered by an appropriation of \$50,000. This bill is evidently prepared in response to the gradually widening idea that the successful carrying out of the reclamation act consists not alone in the construction of immense dams, reservoirs, and main and distributing canals, but in the actual occupation and successful tillage of the reclaimed land by the settler. Some of our reclamation projects are nearly finished and finished with a thoroughness and skill which speaks well for the efficiency of the government engineers. Now, however, comes the crucial test of the Reclamation Act, which may be expressed by the question: Will the settlers be able to meet their annual payments? It is useless to reply to this

question (or attempt to evade it) by impressive figures showing the cost and value of irrigated crops, the general benefits of irrigation, etc., for the question is too real and pressing a one to be answered by generalities and verbiage. The immensity of the reclamation works, the salubrity of the climate, the variety of products which can be grown, and the comparative cheapness of the land have been well advertised in papers throughout the United States, and it is probable, therefore, that a considerable proportion of the settlers who take up land under these projects will come from the humid sections of the country. Even though many of them may have been well acquainted with practical farming as it is carried on in the East, they will find their knowledge of but small assistance on these arid lands, for it is well known that irrigated agriculture if carried on successfully requires greater cultural skill and more intimate knowledge of soil and soil moisture conditions than does farming in a humid climate. To acquire such skill and such knowledge requires years of practice and study, and it is probable therefore that the first few years for many settlers upon the government project will be years full of struggles and disappointments. Since these projects are government enterprises, it clearly should be the duty of the government to minimize these difficulties as far as possible, and in order to do this information should be made available to the settler as to the best and most effective methods of preparing the land and applying the water, the kinds of tools to be used, the time when land should be irrigated, the quantity of water to use and the character of the cultivation which should follow this use. Such information cannot

be given adequately by means of bulletins or other reading matter; an ocular demonstration is what is needed. Hence the necessity for the demonstration farm. From these farms, if properly conducted, the settler should gain an idea of correct irrigation practice and of the possibilities of the soil and climate of the locality where he proposes to live. Incidentally, such farms might serve a very useful purpose in showing how to make the irrigated farm attractive in looks as well as profitable.

As a means of promoting the success of the government irrigation scheme, the Warren bill seems the most important measure proposed since the passage of the original act.

This bill was side tracked, being referred to the committee on irrigation, where it is to sleep until Congress meets again. It is sincerely hoped that early action may be secured when the committee gets together at an other session.

Irrigation Bonds.

Within the last few years a new class of bonds have come before the public that combine all and more of the safety features of the farm loan, meeting the requirements of the larger money loaners as to size and length of loan. We refer to the bond issues based on lands and water rights in the new irrigated districts of the West. For many years, even in irrigated districts, only those lands were taken up and improved where the waters could be controlled with little expense; usually the work of the farmer himself in building small dams and reservoirs and suitable ditches. Large areas of the West, however, could not be irrigated without the outlay of great sums of money for the building of immense reservoirs and the construction of great systems of canals often involving millions of dollars. With the increased value of farm lands many of these large propositions have been undertaken by wealthy individuals or by corporations and sometimes by Uncle Sam. Thousands of acres of land, sometimes hundreds of thousands of acres, are acquired by a company at a nominal cost, then millions are expended in irrigation works and the land is accordingly sought after by the farmer and is soon transformed from a desert to the most productive of farms. Large sums of money are required for the original purchase of the lands and for the construction of ditches, reservoirs, flumes, etc., and the most available way of securing this is by a bond issue, thus binding under one mortgage a thousand or more farms.

What shall be done with our money to insure safety and a reasonable rate of interest is the question thousands are asking. In the past, large blocks of railroad bonds have been readily taken by bond buyers and by them resold to small investors. At the present time,

and owing largely to recent investigation into the methods of some of the railroad magnates, these bonds have in a measure come to be looked upon with suspicion. Municipal bonds are readily sold, usually at a premium, but in these a great amount of care has to be exercised to see that the issue is in every way regular and within the limits allowed by law. Often cities or towns exceed the amount of bonded indebtedness contemplated by the law makers.

It should be borne in mind when contemplating the purchase of bonds that a loan in the form of a bond amounting to say \$25 or \$40 per acre on an irrigated tract of land is much better security than a straight-loan on farm land valued at \$80 or \$100 per acre. This is true from the fact that an acre of irrigated land will earn double that of an acre watered by the clouds which are beyond control.

Investors, generally, should study the matter more thoroughly. There is no better nor safer investment today than bonds issued on an irrigation project which has been properly handled from the beginning.

Drainage and Irrigation Legislation.

The legislature of South Carolina enacted at its last session, its first general drainage law, entitled, "An act to improve the sanitary and other conditions of the State of South Carolina by proper drainage, and to provide for the same." It is framed along quite different lines from the drainage laws of other States. Upon request of the senator and representatives of any county, the governor shall appoint five residents who shall be known as the Sanitary Drainage Commission of that county. The commission is given control of all sanitary, agricultural, and road drainage outside the limits of incorporated towns and may require the owners of lands which are in an unsanitary condition, to drain them.

An estimate of the amount of money which will be required for drainage work for any ensuing year, as estimated by the commission, must be filed with the State comptroller in January of each year and be submitted to the general assembly by that officer. The general assembly is given power to levy a tax upon the lands of the county for the construction of drains, which shall be collected and paid to the county treasurer and be expended by the commission under the regulations controlling the acts of that body. The commission may apply to the general assembly if necessary, for an issue of county or township bonds in order to prosecute drainage construction in county or township.

The great value of drainage as a sanitary measure has been quite well demonstrated in Charleston County, where for three years land drainage has been prosecuted under the provisions of a special act of the legislature by which a commission was empowered to construct

necessary ditches. The sanitary feature of drainage takes precedence of all others because the coast lands cannot be successfully cultivated by white laborers on account of their unhealthfulness. The fact is now recognized that these lands must be drained before they will be made attractive to the better class of immigrant farmers, or produce paying crops. It is a matter that concerns the prosperity of the State, especially since an effort has been made to induce foreign immigration. Until these fertile lands are made healthful as well as productive, there is little encouragement for the farming class to settle upon them, nor will they remain when once located unless both of these conditions are assured.

The drainage laws of Utah and of North Dakota have been amended to remedy defects in their operation which experience has shown to exist. In the former State, where the drainage of irrigated fields is becoming imperative, the amendment makes it possible for a few landowners to effect an organization for the cooperative construction of needed outlet ditches. The counties bordering the Red River Valley in the latter State now have maps, plans, and estimates for comprehensive drainage systems suited to the needs of those level lands, which have been prepared by the Office of Experiment Stations of the United States Department of Agriculture and which at a convention held last winter, were indorsed and recommended for use in the prosecution of future drainage operations.

The State of Mississippi enacted a drainage law which was approved in April 1906. This law makes it possible for landowners to organize in the prosecution of work necessary to reclaim the large areas of fertile land which are now attracting attention, in the western part of the State. Preliminary steps are now being taken in accordance with the law, to effect drainage organizations for the reclamation of several bodies of land in the northern part of the State. The Drainage Division of the United States Department of Agriculture has reported upon the feasibility of improving the Black Bayou in Washington County, which is the natural outlet for the drainage of 157,000 acres of valuable land. The channel to be improved is 58 miles long and has a fall of only 6 inches per mile.

No national legislation on drainage was passed by the last Congress, though several bills relating to that subject were read and referred to committees. The Flint Drainage Bill, introduced during the first part of the session, was not reported out of the committee to which it was referred, until the day before the close of the session. This bill is drawn so as to provide for the reclamation of swamp lands by the government in much the same manner that arid lands are reclaimed under the provisions of the irrigation act of 1902. The cost of construction is to be paid from a fund arising from the sale of public lands, and to be charged against

the land which is drained, and later collected from the owners of the land in installments without interest. The Warren Bill providing that 40 acres of land be set aside in each project constructed under the National Irrigation Act for experiments in irrigation and drainage to be conducted under the direction of the Secretary of Agriculture, for the purpose of aiding settlers in starting their farms properly, was referred to the committee on irrigation, where it now remains.

The legislature of California has appropriated \$15,000 for irrigation and drainage investigations in that State for 1907-08, \$5,000 to be especially used for drainage, the amount to be expended under the joint direction of the State Agricultural College and the Office of Experiment Stations of the Department of Agriculture on condition that the same amount be added to the fund by the latter office. The legislature of Utah has appropriated \$5,000 for irrigation and drainage investigations for the next two years, upon the same general conditions, and Wyoming appropriated \$500 for special drainage investigations in the Grey Bull Valley of that State.

Irrigation Congress.

The Hon. Fred J. Kiesel of Ogden, Utah, to whom is largely due the credit of the splendid success of the irrigation congress held in his city three years ago, and who was instrumental in the success of the congresses held at Portland, Ore., in 1905, and at Boise, Idaho, in 1906, has again become prominent in connection with the congress to be held during the first week of September of this year at Sacramento, Cal.

Through the efforts of Senator Kiesel, a bill was recently passed by the Utah legislature appropriating \$4,000 to be used as prize money for the best fruit and grain exhibits from Utah at the Sacramento congress and exhibition. We are informed that this appropriation would not have been made had it not been for the splendid efforts of Senator Kiesel in its behalf, and the people of California owe a debt of gratitude to not only Governor Cutler of Utah, but Mr. Kiesel as well.

This money will be used to collect, ship and install at Sacramento a splendid exhibit of Utah's products on the occasion of the interstate exhibition to be held in connection with the Fifteenth National Irrigation Congress.

The Utah State Agricultural Society will have charge of the exhibition and account for the expenditure of the money. A splendid showing of the products of the irrigated lands of Utah will be made.

We are informed by the board of control of the National Irrigation Congress that the Southern Pacific Company has made a one-way rate for round trip for materials intended for the exhibition at the Interstate Irrigated Lands Products and Forestry Exhibition.

This special rate will apply to all material shipped to points on the Southern Pacific lines, traversing Pacific coast states and territories, provided the exhibits are returned to the original shipper at the original point of shipment.

Mr. W. A. Beard, chairman of the executive committee of the congress, informs us that money is being contributed by the citizens of Sacramento in a very satisfactory manner, and a fund of \$75,000 will easily be raised to defray the expenses of the congress. The citizens of Sacramento are noted for their liberality and it is reasonable to suppose that the congress at Sacramento will be the greatest ever held, in point of attendance and attractions for visitors.

EDITORIAL NOTES.

BY G. L. SHUMWAY.

Most of the great land steals of America have been brought about by legislation, in which well-meaning but hysterical men have over-riden the protests of the statesmen whose location and environment gave a thorough understanding. Sentimentalists are preyed upon by designers. Theorists possess a positiveness born of ignorance, and the preponderance of our population having little direct knowledge of local conditions, are likely to cause injustice and force upon communities restrictions and conditions not conducive to their best welfare.

The remarkable editorials that appeared in some of our eastern contemporaries commending the late executive action of thwarting the will of congress, is an example. So long as writers carp in ignorance of imagined things, so long as publications of the prairies attempt to mold the policies of the mountains and the forests, there is liable to be a confusion of tongues, and radical mistakes of legislation occur. The government could better cede to the various states the public lands within their borders and permit each to work out its own destiny.

But few people question the honesty and sincerity of the President, but if he does not shut his ears to some of his present advisers he will work intolerable hardship upon the West. His appended reasons for creating those thirty new forest reserves show evident reluctance and indicate doubt of their necessity or desirability. We are led to the hope that a sort of consciousness of the intense earnestness and sincerity of the builders of the West is beginning to percolate through that bureaucratic barrier built by the bigots of the Pinchot type, and that it will eventually reach the central heart and intelligence of our chief executive.

The whole object of all our land laws is ultimately to make homes for the homeless. This original purpose is being perverted, and Mr. Bishpan, an attorney of the government, confided recently that in his opinion a strict interpretation of the law would prove this an erroneous conception, and that only under the most favorable circumstances could a poor man hold a homestead and comply with the law. Now if that is the condition according to the standpoint of the government, it is better that we get along with fewer lawyers in the service, and more of the old-fashioned common sense.

Settlers may be driven from their homesteads by these new ideas and persecution of spies, but we need them in the West. We need their industry and enterprise. American citizens are departing daily for the Canadian Northwest and the Old Mexico Southwest. Thousands and thousands are going—two to each one that settles upon our own domain. Mr. President, is it not time to call a halt? Nine-tenths of this noise about land frauds in the West is bombast; it is calculated to deceive the public and to deceive you. Your order revoking the order to inspect before patents shall issue indicates that you personally do not wish to injure actual home-makers, but that you have an impression that considerable more fraud exists among the people of the West than is apparent to us, who have no interests at stake save the welfare and reputation of the communities in which we dwell.

Why this vigilance, this spying, this nauseous espionage, that begets a furtive citizenship, when the government records themselves show only a fraction of one per cent of homestead proofs that have ever been attempted have been fraudulent? Why not go, Mr. President, into that little office in St. Paul, where that vast forestry fraud was conceived? Why not try to discover the origin of the "lieu lands" clause? It would be well to have the public understand why our chief forester was not alive to the interests of the people when that clause was attached to an appropriation for the forestry service.

It would require 25,000 claimants to accomplish as much toward plundering the public as that one little insignificant provision. Mr. President, we of the West are accused, and now in turn request, nay, it is our privilege to insist that you turn the searchlight of investigation upon those near to you who have pointed accusing fingers at us.

The trial of Benger Hermann brings out the fact that government attorneys Heney and Burns have attempted to coerce witnesses to testify to things which the witnesses say were not true, the penalty being a threat of a severe jail sentence if they refused, Mr.

Meldrum, former surveyor general of Oregon, being a Tartar whom they ran against. We have mentioned Mr. Heney heretofore as a man whose zeal and ambition for success subordinates his sense of justice to the citizen.

Further evidence in the case seems to indicate that advance information was in Mr. Hermann's possession, as to the limitations of a contemplated forest reserve. How he obtained the information is not explained, but it was brought out that he possessed it, and that he advised "friends who understood" that to acquire leases upon worthless lands to be included would enable them to make an exchange, after the reserve was created, for valuable "lieu lands" outside. Advance information, leaking from the forestry department, apparently proved a most valuable factor in aiding in the pillage of our American forests.

A news item of March 21 says: "Five carloads of land seekers left Lincoln, Neb., last night for the Northwest Territory (Canada) and Burlington officials state they can hardly secure cars for the crowds going thence." Yet in the sand hill area of Nebraska 97 per cent of the claimants have abandoned their section homesteads because of unreasonable restrictions and spies, and the famous North Platte Valley—only fourteen hours from Denver and eighteen hours from Omaha—is calling for settlers and paying unheard of wages for men to aid in the construction of her immense irrigation works.

And here in the West is a territory, as large approximately as all the United States east of the Mississippi, upon which settlement is denied. Mr. Pinchot has felt called upon to make a defense of this segregation, and a supply of his photographs with his explanations that do not explain, have been published broadcast, especially in those parts of the United States least affected. The inconsistencies are too apparent to those who have an acquaintance with local conditions.

"Only those lands chiefly valuable for the production of timber, or the protection of waterflow are included in national forests," is an illustration, for in the West it is known that millions upon millions of acres included in forest reserves are as barren of timber and timber possibilities as the peaks of the Hymalayas. We also know that the act of June 11, 1906, to which he refers, is a joke as a home-maker, for red tape and humiliation imposed are beyond that which most of us will probably endure.

And the carefully fostered opinion molding, that the men who attacked the land and forestry policies, as they have been recently administered, are inspired by any except the purest motives, is a new and rare function of government. Assassination of charac-

ter, spies, suspicion—they are fitting companions. One who is under the shadow of the great gambling institution, the Stock Exchange, sees sinister things in all the world, but Carters, Heyburns, Mondells, Rosses, Goudys and their kind possess intelligence nurtured in fairer climes. The balsam laden atmosphere of the West makes statesmen; and attacks of penny-a-liners or bureaucratic two-by-fours alike will prove unavailing.

GOVERNMENT BUYING CANALS.

Phoenix, Ariz., March 29.—It is now understood that the Grand, Maricopa and Salt River Valley canals, on the northern side of the Salt River Valley, will pass into the control of the reclamation service on May 15. The Arizona canal will be joined under the same management at a later date. The larger part of the money paid by the government for the north side canals has gone to the Arizona Water Company, which held a large majority of the stock of the several corporations. The minority stockholders, nearly all farmers, will receive \$78,000. This sum is now on hand in the local offices of the reclamation service, in the shape of individual checks, and will be turned over by Engineer in Charge Hill.

In a way the reclamation service already is in control on the Arizona Canal, as Engineer Hill has started work with about 100 men on an enlargement of the waterway to a capacity for at least 80,000 miners' inches. At the present time it is doubtful if it would carry half of its rated capacity of 40,000 inches. The work now being done is above the Granite Reef diversion dam site, with the expectation that the great canal will be utilized to carry the flow of the river at low and medium stages around the construction works in the river bed. Real estate prices have jumped with the prospect of assured irrigating water, and farming lands are now rated at twice the prices asked last year.

A NEW SPRAYING CALENDAR.

The experiment station of the Iowa State College has just issued Bulletin No. 89, which is a spraying calendar dealing with orchard and farm crops' enemies. It treats of the various fungus diseases and insect pests of the orchard and smuts of barley, wheat and oats. The various formulae have all been tried and can be safely used. Some of these are for the use of bordeaux mixture, paris green, the various arsenical poisons, kerosene emulsions and the formalin treatment of wheat and oats. In every case they have been tried and therefore can be safely used with benefit.

This bulletin may be obtained by applying to C. F. Curtiss, director of experiment station, Ames, Iowa.

Send \$2.50 for The Irrigation

Age one year and

The Primer of Irrigation

MILLIONS RUNNING TO WASTE.

BY G. L. SHUMWAY.

In the southwest country of our United States lies hundreds of thousands of acres of as fertile soil as may be found anywhere. Above it smiles the glorious sun, radiating vitalizing energy. Meandering for miles and miles across it is a river which annually carries to the sea a million acre feet of water—and the great volume runs during the summer months.

Land—sunshine—water: the emperial triumvirate, which separate are non-producers, but combined by the modern alchemist, the irrigator, create magic gardens and bowers and supplies a hungry world with food.

This land whereof I speak is in San Juan County, New Mexico, and the river is the San Juan and its tributaries. One railroad only has found it—the D. & R. G.—which is a pioneer in railroading. Anyone who rides upon it and whisks around its curves, wanders



Foot Bridge, Farmington, N. M. Imperial millions running to waste underneath it.

through fertile valleys and canyons deep and gorges, climbs perilous cliffs or over mountain tops, must marvel at its engineering feats.

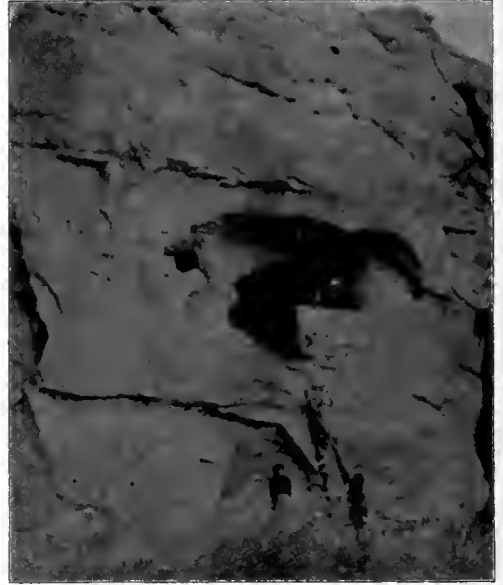
At Durango, Ouray and Silverton, or other places, one is inclined to wonder how they ever found the hidden nooks wherein to build those teeming, bustling cities.

"Beyond the Alps lies Italy," and the sunny San Juan is over the continental divide, beyond several hundred miles of intermountain railroad.

Along the rivers the San Juan, Animas and La Plata, which converge and unite near Farmington, are many small private and community canals, and considerable areas are planted to orchards. Happy communities dwell under spreading Alamos and weeping willows, but a large percentage of them are hardly conscious of that ideal climate, their splendid environment, or the country's possibilities.

Plans are being formulated for canals covering higher mesas. Blair Burwell and George Gray Anderson, engineers of indomitable energy, have accomplished

much preliminary work in connection with the proposed Eden Canal, which means the reclamation of a beautiful mesa lying east of the Animas River. Mr. Spath is hard at work developing the Citizens Canal, but the most gigantic of undertakings is by Jay Turley, who proposes to reclaim over 100,000 acres of the higher mesas south of the San Juan.



A Cliff Dwelling near Farmington, N. M.

Mr. Turley was outlining his plans and showing me over some of his proposed work, and the stupendousness of the undertaking induced me to remark: "Mr. Turley, you have before you more than the work of a few years; it is a life endeavor."

His answer: "Can you imagine a better service to which I can devote my life?" illustrates more than anything I have ever heard, the spirit that actuates the living, breathing West. He is a prototype. He and his wife have left behind them the dress suit and the drawing room, for which they have ample endowments, and the glory of the builder shall be theirs.



A Show Window, *Farmington Times Hustler*, Farmington, N. M.

Send \$2.50 for *The Irrigation Age*
1 year, and *The Primer of Irrigation*

BOND VALUES.

An Interesting Study for Investors.

Among conservative, careful money loaners there is no class of investments that are more sought after than farm loans. It is only where large amounts of money are to be placed that the bond mortgage comes into competition, to save annoyance of a great number of transactions. The farm loan issue ranging from \$500 to \$15,000 necessitates much bookkeeping and many changes. Where the sum to be loaned is from \$50,000 up into the millions the desire is to concentrate these loans into as large ones as possible, hence the desire for a bond issue. Notwithstanding this no class of security is safer than the farm loan. With the building of large irrigation ditches under corporate management and covering large tracts of land to be irrigated thereby, a new class of bonds have come into the

the East or Middle West. It is a bugbear and the ordinary Eastern man looks at it with suspicion simply because in his egotistical way he declares that anything he does not understand must be looked upon with suspicion. This is a day of research and enlightenment and it is so easy to prove the value of irrigation that it seems strange that an ordinary business man should show such dense ignorance regarding such an important question. The people of the West look upon the question of irrigation as the cheapest kind of an insurance of large crops. It is seldom that the irrigating expense reaches 5 per cent of the value of the profit, more often it does not exceed 1 per cent.

Now let us look at the benefits. First, it insures against draught; second, it gives to the growing crops the needed moisture at the opportune time; third, your harvest time is dry and loss and damage by storms almost unknown; fourth, in the cultivation of the crops no time is lost by storms but while the irrigating is



Cornfield, Pinon County, Colo.

market, combining all of the safety features of the farm loan with the advantage of loaning in a single large sum as with other bonds and having several features of safety not offered by the ordinary farm loan.

With the ordinary bond placed on manufacturing plants several items have to be taken into consideration. First, the plant may be destroyed by fire; the farm never. Second, machinery and manufacturing appliances are ever changing. Third, no manufacturing plant can be successful without careful management and this may change at any time; not so with the farm. It requires no skilled and talented man to run the farm and bring forth the fruit thereof. This is usually the result of brawn, muscle and hard work. As in every class of security, it is necessary to investigate. First, the quality of land. Second, the source and sufficiency of the water supply for irrigating purposes. Third, the means employed to conduct the water to the desired lands. If the land is good and the water supply ample, there is no safer loan in the world than a conservative irrigation bond issue secured by both land and water.

Irrigation is a subject which is little understood in

being done the sun is shining, the crops are growing and farm help fully employed; five, by giving to the growing crops the moisture when needed and withholding it when not needed insures the highest quality of vegetables, grain, hay and fruits.

Now let us make some comparisons. The general average of wheat grown in the United States, to the acre, is 12.3 bushels.

- In Montana under irrigation wheat yields.....28.2
 - In Colorado under irrigation wheat yields.....26.6
 - In Utah under irrigation wheat yields.....26.2
 - In Nebraska without irrigation wheat yields.....15.7
 - In Minnesota without irrigation wheat yields....13.1
 - In South Dakota without irrigation wheat yields..13.8
 - In North Dakota without irrigation wheat yields..12.7
- and hay in like proportions Sugar beets under irrigation in Colorado give an average of 17 per cent saccharine.

- Montana under irrigation.....17%
- Utah under irrigation.....17%
- Wisconsin, Michigan and Nebraska without irrigation, rather under.....12%

Poatoes, onions, cabbage and crops of nearly every kind showing corresponding increase in irrigated districts over non-irrigated. While irrigation is going on the sun shines and growth is continuous.

Long ago the United States Government set the pace and formed the popular conception of the proper size of a farm as being 160 acres. This unit remains today over nearly the entire Union, the popular view of the amount of land one farmer ought to own and use. The coming of irrigation has changed this view. In irrigated districts of the West, except where grain or hay is raised exclusively, the small farms are becoming more popular and profitable, 40 acres being ample for one man and his family, while large areas especially near the large cities are being divided into 5 and 10-acre tracts, and on the small tracts where cultivation has become intense and the best results realized from the ground can be found a more prosperous class of farmers than where the large farm is the standard, and in but few locations in the West where other conditions are favorable can good lands with water rights be obtained for less than \$50 per acre, \$100 being more nearly the average, while for the small tracts of 5 and 10 acres the price will vary from \$100 to \$1,500 per

years or it would run out. Thus it will be seen that the irrigation bugaboo is a fallacy.

Within recent years enterprising individuals, corporations and even Uncle Sam have undertaken extensive and expensive irrigation projects for the re-claiming of large tracts of fertile lands which when once placed under the magic touch of the life giving mountain streams, become the most fertile and productive of lands. Many of these enterprises involve the expenditure of hundreds of thousands or even millions of dollars in extensive reservoirs or expensive system of canals, often twenty, fifty or even one hundred miles in length. With a good supply of water and the means of applying it to the lands, an issue of bonds based on the lands or at a price of from \$15 to \$30 per acre can be classed as among the very safest and best securities and that would be the least affected, by periods of repression, of any securities offered.

NORTHWESTERN NOTES.

Spokane, Wash., March 30.—Private irrigation plants are in building and projected in various parts of the Inland Empire, embracing 125,000 miles in east-



Durango, Colo., a Gem of the Mountains.

acre according to location and surroundings. In Colorado alone last year there was raised 128,613 acres of sugar beets, an industry only in its infancy. Most of these beets were raised on small farms of from 5 to 40 acres. The average price realized per acre for these beets was \$68. Potatoes yielded an average of 160 sacks per acre. Returns from such a crop would yield from \$75 to \$150 per acre. Strawberries and small fruits yield from \$200 to \$800 per acre. Another important matter to be taken into consideration is the question of fertilizers. In an irrigated country the use of fertilizers is almost unknown. Irrigation seems naturally to enrich and renew the soil from year to year. Again it is no uncommon thing to see timothy fields yielding from 1½ to 5 tons per acre that have been seeded for a long term of years, the writer having personally seen large meadows that have not been re-seeded for twenty years but producing as large crops as when first seeded. In a non-irrigated section it would be necessary to re-seed this at least once in three

ern Washington, northern Idaho and northeastern Oregon, and thousands of acres of land are being put under water. The latest concern to be organized will be called the Valleyford Water Company. It has a stated capital of \$40,000 which will be expended in building the irrigation system for all of the land lying within the town-site of Valleyford, south of Spokane. The officers are Arthur D. Jones, president; B. F. Kizer, vice-president; W. E. Goodspeed, secretary and treasurer, all of Spokane. Water will be taken from California creek, which runs through the tract, also from a number of artesian wells to be bored. Two of these have already been sunk, and an inexhaustible supply of water having been struck at the depth of 50 feet.

The Fairview Heights Irrigation Company will irrigate a tract of nearly 1,000 acres, six miles west of Spokane. This project is somewhat different from other irrigation enterprises, in that water is to be taken from wells, one to be sunk on each tract, which contains five acres. An inexhaustible supply of water is

to be had at a depth of from 12 to 21 feet. The company had ordered 25 windmills and tank outfits. There will also be a number of gasoline engine experiments made on the tracts, and if these are found more satisfactory than the windmills, they will be used exclusively. The company is capitalized for \$50,000. The officers are: C. M. Crego, president; Maxon Chase, vice-president; W. C. Morgan, secretary, and A. M. Tate, treasurer, of Spokane.

The Spokane Canal Company, of which L. MacLean is president, has purchased 250 acres of land at Otis Orchards and adjoins the present German settlement on the west. It is directly crossed by the Spokane & International Railroad. This land will be platted in 5 and 10-acre tracts and water will be placed on it. The cost was \$20,000. Otis Orchards now comprises about 4,000 acres of land, all of which is or will be irrigated. The company will continue to buy land in the neighborhood of Otis Orchards and add to its holdings until 9,000 acres are secured, this amount of land being the limit which can be irrigated with the water owned by the company.

Nine hundred acres of land east of Spokane, and adjoining property will be put under irrigation this summer by the owners of the property. Twenty owners of land have organized a company under the state irrigation laws, to be called the East Spokane Irrigation Company. The company is a co-operative concern, having no capitalization. Those concerned in the project are George Mudgett, H. D. Kay, H. W. Kinne, L. Quigley, James Merager, J. Henry Thierman, Sparks brothers, and J. A. Yungreen. It is the plan to sink wells to supply water, an abundance of which is available within 50 feet of the surface. A pumping plant will be built, costing about \$18,000, and equipped with a pump having a capacity of 1,600 gallons per minute. This will supply water not only for irrigation purposes, but for domestic use.

John S. Malloy of Spokane has taken 1,000 acres of land near Coeur d'Alene, Idaho, 34 miles east of Spokane, where he will install an irrigation plant. The contracts specify that water will be on the tract by June 1.

Advices received in Spokane from North Yakima are that it is likely the Tieton canal project (government), to reclaim 25,000 acres of land in the Yakima Valley, will be somewhat delayed because of the scarcity of labor and inadequate service of the railroad in carrying supplies. It was intended to have the ditch completed by 1908. Work on the opening of the portals of the three long tunnels has progressed as far as possible until more machinery arrives and the power house is completed. Joseph Jacobs, engineer in charge, finds it impossible to secure sufficient laborers, although he is offering \$2.25 for a day of eight hours. Sixty men are now at work on the portal of the long tunnel, about 10 miles from Naches City. It is the intention to place 700 men at work as soon as drilling machinery arrives. The government is doing the work itself as the bids for construction are rejected because they are excessive. Mr. Jacobs says he may ask a number of contractors to take contracts for small portions of the work and handle a few stations. Commodious bunkhouses and dining rooms have been built and the workmen have more comforts than usual in camp life.

THE EVOLUTION OF IRRIGATION INSTITUTIONS.

BY ELWOOD MEAD, CHIEF OF IRRIGATION AND DRAINAGE INVESTIGATIONS, UNITED STATES DEPARTMENT OF AGRICULTURE. READ BEFORE THE FOURTEENTH NATIONAL IRRIGATION CONGRESS.

Your program committee has assigned me a congenial subject. It so happened that the first fifteen years after I came to the arid region were spent in the states which have exercised a potential influence in shaping the principles and rules which govern the con-



DR. ELWOOD MEAD,

Chief of Irrigation and Drainage Investigations, Office of Experiment Stations, U. S. Department of Agriculture, Washington, D. C.

trol of water in irrigation. During nearly all of this time I was connected with the state engineers' offices of Colorado and Wyoming. They were the years in which the rights of those streams were being acquired and the laws and customs under which rivers are controlled were wrought out.

What I shall say of the evolution of irrigation institutions will have something to do with the attitude of the irrigator; how he has thought, talked and acted in the pregnant years when institutions were being formed, as well as the growth of those principles which regulate human conduct in irrigation.

Colorado was the first state to pass a law requiring a measurement of the flow of ditches as a guide to the division of streams. I helped measure the first ditch

under that law. Wyoming was the first state to require intending appropriators to submit their plans to state officers and secure their approval before making the diversion. To men who had always looked upon water as something to be taken and used with the same freedom as air, a law which required them to ask the consent of the State to make such diversion seemed like impertinence and I had a number of busy years in convincing them that, while this policy imposed some present hardships, it was essential to their future security and to the ultimate peace and progress of the whole region.

The first trip of the water commissioner on any stream is a trying experience. He is usually met by the dog and threatened with the shotgun, but as irrigation extends and the older rights are threatened by later comers the water commissioner in time comes to be regarded as the most essential factor in agricultural success.

I think the early attitude of the irrigators of Colorado and of Wyoming is the attitude of irrigators in every state when public control is first exercised. It is illustrated by a conversation which I had recently with one of the best men in California. I told him of the peace and security which the public control of streams have brought to the Rocky Mountain states which had adopted it. He answered that this might do for the people of Colorado, but it wouldn't do in California. He said: "We are a high spirited people and the first time a water commissioner undertook to fool with our head-gates we would fill him so full of holes that he wouldn't make a shadow." One by one, however, the states have departed from the primitive idea. Some have gone farther than others, but in all the progress has been made slower and more difficult by the prejudices brought by immigrants from their former homes. The early irrigators of Colorado only accepted public control when private regulations had failed. So long as the ditch owners of Greeley could tear out the dams of the ditch owners farther up the stream they were content with private control, but when the irrigators above dropped their shovels and took to the shotgun the voluntary regulators began to cast about for aid in the regulation of human conduct.

The foundation of those distinctive features of western civilization, which we call irrigation institutions, grew out of the overshadowing importance of streams. During the past year an area larger than the state of New York, which otherwise would have been barren and arid, was made fertile and productive by irrigation. To do this every acre had to be watered from one to six times. To reach this land the water had to be carried through tens of thousands of miles of main canals and through a still longer mileage of laterals. The division of this water between these thousands of irrigators involved the adjustment of the diverse and conflicting interests of individuals, communities and states. The snows of the mountains had to be divided in thousands of canals. This meant that head-gates had to be closed, and the water let run past fields that were parched with drought at the time in order that the rights of the earlier users of the water might be protected, and their work saved from ruin by the encroachments of later settlers. Everywhere the value of land, the results of the farmer's labor, depends on the right to use the stream and securing the water which

this right gives. Farmers under irrigation must learn to associate together and must learn to submit to regulations, of which farmers in humid lands know nothing. Irrigated agriculture is an organized industry. Until this fact is accepted every farmer's work is distressed by anxiety and every community divided by quarrels. But with titles to water established so that each user is secure in his supply, irrigated agriculture becomes the most orderly, the most satisfactory, and the most certain way of growing crops known. And it is the working out of the principles and the methods of enforcement of those principles which constitutes the evolution of irri-



Three-Year-Old Apple Tree near Clifton, Colo., on Denver & Rio Grande

gation institutions. The first step in this was the abrogation or practical disregard of the old common law doctrine of riparian rights, the purpose of which is to maintain the integrity of streams. Under the riparian rights doctrine only such diversions are allowed as will not impair the flow. The needs of arid land is to provide for the diversion of all the water that can be taken out without injury to prior rights, or supplying those higher needs of communities, like water for drinking purposes and other domestic uses. These rights being essential to the very existence of civilized life, should be always maintained, and whenever the diversion of streams threatens them it should be stopped.

The principles which govern the diversion of streams for irrigation are these: That the first user of

water has the better right; that the extent of the appropriation is measured by the actual beneficial use of water, and that when the use ceases the right ceases. There is in some states a modified riparian doctrine, but it is a wide departure from the old common law and only differs from the doctrine of appropriations in making riparian land owners preferred appropriators. These principles are a satisfactory basis for an irrigation code, but a working principle is not enough. To divide a river among thousands of users requires more than a principle, just as the enforcement of laws requires courts and sheriffs. We have in this to deal with human nature, and solve the question of an irrigator who said: "What shall we do? There are eight owners of our ditch, seven of them are men and one of them is a hog."

We have to have state engineers and water commissioners to manage the hog. In doing this we began with makeshift devices. There were objections to laws which created new offices and we tried to get along with offices already created. Rights were recorded with the county clerk and the amount of appropriations settled by lawsuits. The seeming economy of this was not real.

are concerned, corrected this mistake by uniting all the separated water districts into divisions, each of which takes in an entire watershed. We have now before us the question of how to adjust the rights across state lines and protect the earlier rights in the state below from the encroachment of the state above.

This principle of court adjudications of rights has been adopted by the majority of the arid states, but it has been greatly improved by coupling with the judicial act an important administrative act which is the preliminary measurement of the land irrigated by the state engineer. In time the practice of establishing water titles by lawsuits will be abandoned throughout the arid region. The beginning of this was made in the adoption of the Wyoming law which incorporates two new features in the irrigation codes of this country. The first of these was the establishment of the existing titles by an administrative board rather than by court. I think the importance of this administrative board has been exaggerated in discussion, because this board deals only with the settling of the older claims. It has little to do in the establishment of future rights. In the establishment of existing rights its merit was not in sub-



Uncompahgre Valley, Colo., Wheat.

The mistakes, the extravagant rights and the uncertainty as to water titles has cost a thousand times more than the establishment of an adequate administrative system at the outset. This country should have begun as Canada did. In Canada water is considered a public property and titles are established under a proceeding analogous to that followed in this country in the establishment of titles to public land. Every water right filing in Canada is recorded not only in the province where the diversion is made, but also at the dominion capitol, just as we record land filings in this country.

Another mistake was in not making the administrative unit all the drainage of the stream. Recording claims in the different counties led to the establishment of different sets of rights in each county; the creation of water districts which did not take in all the drainage of the stream led to the cutting up of the stream in sections, and to conflicts between districts as to their respective shares of the flow. We have, so far as states

stituting an administrative board for the court, but in making any title depend on the facts gathered by a measurement of the ditch, a measurement of the land irrigated, a determination of the quantity of water which could be appropriated and a determination of the quantity of water which had been appropriated, rather than by the interested testimony of the claimant. If this testimony had been gathered and submitted to a court instead of to an irrigation board, I have no doubt the results would have been much the same. The important feature of the Wyoming law, however, was not the settlement of old rights, but the method of establishing future rights. This was the requirement of every intending settler to secure a permit, of watching by the state officials of every step in the diversion of water and the granting by the state of a title when the applicant had done all the law requires. In this way every right is established on its merits exactly as homestead and desert titles are established to land, i. e., on the merits of each

case. The bitterness of failure, the expense and uncertainty inseparable from litigation, is all avoided in this way. No irrigator is brought into conflict with his neighbor in the protection of his legitimate rights.

The improvement of our water rights and the betterment of the condition of the irrigator has been aided more by the work of the state engineer than by any other single influence. No one, except those who have held this position, can understand the amount of time, courage and patience required to make the beginners in irrigation understand the need of regulations which are new to them, and to submit to the acts of officials when it often means the loss of their year's work. Even if this distribution of water is not affected by this human problem it can only be carried out successfully by men having administrative ability of a high order. To divide the water of hundreds of streams in the state so that the share of each irrigator shall go to him with the same certainty that a shipment of freight goes over a railroad to the man to whom it is consigned, requires as much ability as it does to manage a railway. To the state engineer and water commissioner belongs the chief credit for the fact that our improved laws are being successfully put in operation.



Minidoka Dam and Regulating Devices. View from north end. August 29, 1906. Minidoka Project, Idaho. Photo by F. C. Horn.

In the last five years a number of states have enacted enlightened codes which have been framed in whole or in part by the officers of the National Reclamation Service. These men have been in the position to deal with this question from a broad standpoint rather than from that of the individual, community or state. The vital interest of the federal government in this question warrants such study and influence, and it must in time be an increasingly potent factor in shaping the principles which are to govern streams. The passage of the reclamation act is to have, I believe, one very beneficial effect upon this region. It is to compel the consideration of problems which we must sooner or later face and which demand an immediate solution. The criticism of our irrigation system is that we have never made sufficient provision for future requirements. All we have done has been of an emergency character, made to meet present needs. We began by treating the country as a unit and then we divided streams in a half dozen sections in a state and attempted to treat each section as a unit. We have had to abandon that

and we now treat the drainage basin within a state as a unit. We must soon go one step farther and treat an entire stream regardless of state lines as a unit, and we should begin at an early date to work out a method by which the priorities across state lines are to be established and protected. We cannot avoid this problem by refusing to consider as vital the welfare of individuals when property rights are concerned in its just solutions.

Within the past quarter of a century the value of water rights in the older irrigated districts has doubled, trebled and quadrupled. This is for irrigation alone. Within this period there has been such a noticeable increase in the importance of water as an agent for the acquirement of power for industrial uses that the protection of rights for power is complicating the rights for water for irrigation. The demand for water for domestic uses in cities and towns is in some cases practically absorbing the entire flow of streams once used entirely for irrigation, and with the growth of population there must be a growth in these demands. All these are creating new problems in legal matters. That which was sufficient yesterday does not suffice for the advanced conditions of today. The security and contentment of the people of this region requires that we should not only solve the problems of today but anticipate, if we can, the problems of the next generation. What we leave undone will only be regained by heavy loss. With a nation as with an individual, it is important that we recognize what should be done and do it without hesitation, and not leave to an uncertain future that which is necessary to our most rapid and satisfactory progress.

In this connection I have a suggestion to make to this congress. It is that it appoint a committee to serve during the coming year, and to take up and report its conclusions as to the principles which should govern the establishment of water titles and administrative measures necessary for the protection of those rights both within the boundaries of states and across the boundaries of state lines. Such action by this congress has abundant precedent and justification in that of similar bodies. The National Bar Association has from time to time appointed committees to consider and report its conclusions as to legislation of special importance and difficulty. A committee was appointed to report on a uniform divorce law. A few years ago a similar committee was appointed to report on a uniform bankruptcy law. The appointment of such a committee by this congress would serve to call attention to these questions and to crystallize public sentiment both as to the necessity for adequate limitations of rights and for an adequate protection of rights throughout the entire drainage of a stream.

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MILLIONS FOR MOISTURE.

"Millions for Moisture" was the subject of an address delivered to the National Geographic Society in the National Rifles Armory, Washington, D. C., recently, by Mr. C. J. Blanchard, statistician of the reclamation service. The lecture was profusely illustrated with colored views of the work of the government in the West.

"The policy of national irrigation is broadly paternal," said Mr. Blanchard, "yet it is so thoroughly common sense and business like that the wonder is it was not adopted long ago. With the examples of other nations in similar works constantly before us for years, it is well nigh inexplicable that our nation, the most progressive in the world, should have been so tardy in initiating the work upon which it finally engaged less than five years ago.

"National reclamation plans to break down the barriers which the Great American Desert has so long interposed to western progress and development. It plans the subjugation of the nation's waste places, the fructification of the land that 'God forgot.'

"The full importance of national reclamation is obtainable only by comparison. Twenty-five projects upon which the government is now engaged, when developed to their full extent, will add 3,198,000 acres to the crop producing area of the United States. Add to these thirteen other projects which are held in abeyance, pending the completion of the first mentioned, and which will reclaim 3,270,000 acres, and we have a grand total of 6,468,000 acres. This enormous area today is practically worthless. It returns revenues neither to the states in which it is located, nor to the nation to which it largely belongs. It is utilized only a short period in each year for grazing nomadic herds that are driven over it. Potentially it is the richest, the most fertile and productive land in the world, and is capable of supporting in comfort an agricultural population as dense as can be found in any of the older settled parts of our country. By expending \$60,000,000 on the twenty-five engineering works now in process of construction the reclamation service will reclaim 3,198,000 acres, or a cultivated area equal to the total acreage in crops in four states of Connecticut, Massachusetts, New Hampshire and Florida. The diversified crops, enormous yields from irrigated lands, and the excellent prices for all farm products in the West warrants the assumption that this land will return annually an income larger than the farmers receive in the four states named. For comparison, let us say that the revenues per acre will be the same. It is apparent then that this area reclaimed will each year increase the value of farm crops by \$60,000,000. It will add \$232,000,000 to the taxable property of the people. It will furnish homes for 80,000 families on farms and in villages and towns.

On several of the projects the work has reached the point where the human interests involved overshadow in importance the engineering features. The most intensely interesting period in the work of reclamation is at hand—the landless man has been brought to the manless land. It has been well said that he who helps establish the security of the irrigable home will also help to establish that greater, that composite home, the United States of America. Our nation is indeed affected by this problem which the reclamation service is

on the eve of solving, for on the success of the irrigable home rests today the prosperity and stability of more than one western state.

"Our desert region is the only section of our imperial country wherein there is an equality of opportunity. In no other part of the nation are the rewards for individual effort more constant and certain. When these facts are more fully realized the wisdom of the President's policy in safeguarding and conserving this vast estate for the people will be appreciated. America



One Limb of Pears, grown near Clifton, Colo., on Denver & Rio Grande Railroad.

has furnished a safety valve against the overcrowding of the great centers of population in the old world for fifty years. Is it not about time to look to our problem and prepare against the day when there will be a glut of population in our own cities?

"President Roosevelt has called attention to the fact that the nation is giving away public utilities of priceless value to greedy promoters who are monopolizing power sites, large areas of agricultural lands, immense tracts of coal lands, and miles and miles of forests without compensation to the people to whom these

utilities belong. Thoughtful men are predicting a population of 200,000,000 in 1950 and 400,000,000 at the close of the century. How shall we take care of this vast increase?

"A summation of the work of the reclamation service to January 1 shows that it had dug 1,267 miles of canals, or nearly the distance from Washington to Omaha. Some of these canals carry whole rivers, like the Truckee River in Nevada and the North Platte in Wyoming. The tunnels excavated are forty-seven in number and have an aggregate length of nine and one-half miles. The service has erected ninety-four large structures, including two great dams in Nevada and the Minidoka dam in Idaho, 80 feet high and 650 feet long. It has completed 670 headworks, flumes, etc. It has built 376 miles of wagon road in mountainous country and into heretofore inaccessible regions. It has erected and in operation 1,373 miles of telephones. Its own cement mill has manufactured 70,000 barrels of cement, and the purchased amount is 312,000 barrels. Its own

Potato Culture

BY L. A. ASPINWALL, JACKSON, MICH.

THE POTATO.

Potato (from Spanish patata), *solanum tuberosum* (name adopted by Linnaeus, the Swedish botanist), is of the nightshade family. It is indigeous to the plateaus adjoining the mountainous range known as the Andes, in Chile, Peru, Bolivia, Ecuador and Colombia, also the mountains of Costa Rica, Mexico, and the United States as far north as western Colorado. According to Humboldt (the German naturalist), when America was



Prize-Winning Steers, from Carbondale, Colo.

saw mills have cut 3,036,000 feet B. M. of lumber, and 6,540,000 feet have been purchased. The surveying parties of the service have completed topographic surveys covering 10,970 square miles, an area greater than the combined areas of Massachusetts and Rhode Island. The transit lines had a length of 18,900 linear miles, while the level lines run amount to 24,218 miles, or nearly sufficient to go around the earth.

"The diamond drillings for dam sites and canals amount to 47,515 feet or more than nine miles. Today the service owns and has at work 1,154 horses and mules. It operates nine locomotives, 223 cars and 23 miles of railroad, 39 stationary engines and 27 steam engines. It has constructed and is operating five electric light plants. This work has been carried on with the following force: Classified service, 380, including the Washington office; laborers employed directly by the government, 3,500; laborers employed by contractors, 6,100, or a total of all forces of 10,000. The expenditures now total about \$1,000,000 per month. The excavations of earth and rock amount to 33,000,000 cubic yards, or about one-fourth the estimated yardage of the Panama Canal. As a result of the operations of the reclamation service eight new towns have been constructed and 10,000 people have taken up their residence in the desert."

discovered it was cultivated by the natives in the temperate zone from Chile to New Grenada, but not in tropical Mexico.

It was first found by the Spaniards under cultivation by the natives in the neighborhood of Quito, and probably carried to Spain early in the sixteenth century. It was introduced into Virginia by the Spanish explorers, and into Great Britain by Sir John Hawkins in 1563 (*Garten Zeitung*, 1805, page 346). According to Sir Joseph Banks the potatoes brought by Hawkins were of the sweet variety. The credit is generally assigned to Sir Walter Rawleigh, as herewith given. In 1585 or 1586 potatoes were brought from North Carolina and Virginia to Ireland by Sir Walter Rawleigh and cultivated on his estate near Cork. Although cultivated in Italy and Spain for some years previous to that time, the earliest representation of the plant is to be found in Gerard's *Herbal*, published in 1597, and in the first edition of *Catalogus* by the same author, published in 1596, also in the second edition which was dedicated to Sir Walter Rawleigh in 1599. In the *Herbal* we find the first description accompanied by a wood cut (page 781) called the "Potatoes of Virginia." As seen from the above, potatoes have been cultivated in England more than 300 years, though not generally for more than a century, which is also true in our country.

AS AN ARTICLE OF FOOD.

The subject deserves notice. Standing alone in the vegetable world as containing the starch element in common with cereals, has placed it beside wheat as one of the standard articles of diet. In all probability the potato will never be adulterated, its nature being such that no process of manufacture is required to prepare it for food. In its purity there can be nothing more healthful. The various methods of cooking them recommend the valuable product to more extended use.



L. A. ASPINWALL
President Aspinwall Mfg. Co., Jackson, Mich.

The element of value contained in the potato is starch. Although from 70 to 80 per cent of the potato is water, there is about 18 per cent of starch. The elements being variable in different varieties of potatoes, the following table from Encyclopedia Americana may be considered a fair approximate:

Water	78
Starch	18
Protein	2.2
Ash	1
Fat	0.1

99.3

Starch being a carbohydrate, naturally includes a trace of sugar (which is more abundant as they become soft in the late spring), also a fraction per cent of fiber, which with a little undetermined matter go to make the 100 per cent. The starch is contained in small cells, and with the protein (albuminous matter), through the action of heat when boiling the tubers, unite with the water contained therein. These, including the water, constitute the food elements of the potato. Unlike the starch in rice, which unites with the water it is boiled in, the starch of the potato unites with the water contained in the tuber, thus bringing about a similar result in each.

Figure 1 represents a transverse section of a potato. The inner portion or medullary layer contains the faintly visible channels through which the sap

flows, and are more prominent at the stem end or source of supply. These channels are variable in shape throughout the potato, and are visible where the cells which contain the starch grains are apparently lengthened by the flow of sap. This layer is rich in starch except at the center. Surrounding this is the cortical layer which is also rich in starch. It also contains rather more fiber.

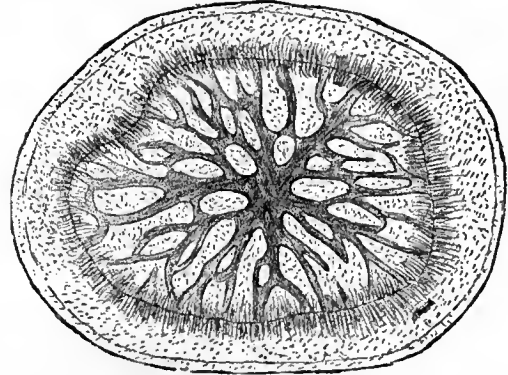


Figure 1.

The thin external layer just underneath the skin contains the least starch. By reference to Figure 2, which represents the starch cells magnified about 100 diameters, we will notice they are flattened or imperfectly developed near the skin, and contain comparatively smaller grain of starch. As we penetrate the cortical layer larger cells are found which abound with correspondingly larger grains of starch, as shown at the center of the figure. It is interesting to note that the cells are mostly hexagon or pentagon in shape, although many are found which are four-sided. These layers are formed upon each other like a well-built wall, which they also resemble. The cells are composed of fiber and are alike found in all vegetables, although devoid of starch. Just how the liquid flowing between these cells percolates between the walls, or by a process of osmose produces the starch grains within them I am unable to explain.

Figure 3 represents the starch grains magnified about 400 diameters. In appearance they are much like potatoes, both as to shape and variation in size.

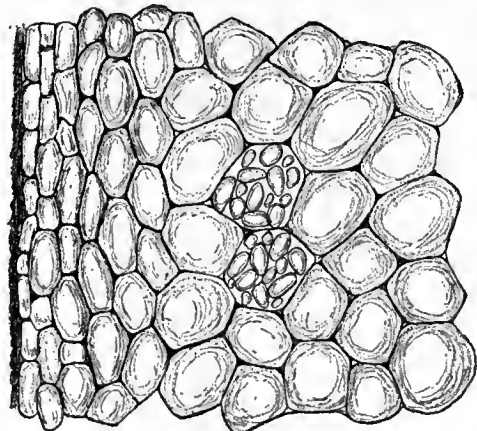


Figure 2.

The outer layer or skin is exceedingly glossy and beautiful when viewed by the aid of a microscope.

The future of the potato must be exceedingly great if we take into consideration the possibilities of increasing the product by a further introduction of improved

machinery for planting, cultivating and harvesting the crop, which will further lessen the cost of production. Aside from the increased consumption as an article of food, great starch factories in various parts of the country will open fields for more extended culture. The potato crop of 1883 was over two hundred million bushels; it has increased to more than three hundred million bushels, showing a greater ratio of increase than the population of the United States. In 1883 the average yield per acre was about 84 bushels. In 1904 the average showed 110 bushels per acre, with an average price of over 45 cents per bushel, being about \$49 per acre. From the above it will be seen that potato growing is far more profitable than wheat with an average of about twenty bushels to the acre. Furthermore, with the tax now removed from denatured alcohol, the potato crop must eventually figure largely in its production, which, in the near future, may prove to be the most economical fuel both for motive and heating purposes.

The Colorado potato beetle has undoubtedly increased the cost of production, still a compensation may be found in the tendency to maintain better average prices, until a general introduction of improved machinery, together with advanced methods of coping with insect pests and diseases, reduce the cost of production.

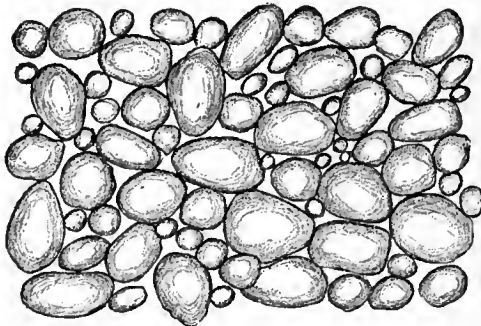


Figure 3.

It is highly probable that the potato bug has existed for ages in the locality where the potato had its origin. The extended and increased cultivation of the plant westward toward their native habitat furnished fields of food which resulted in their rapid increase spreading eastward. Their appearance in the State of New York was in the early sixties. The writer well remembers how invariably their direction of travel was toward the East, as if guided by a supernatural power. Although varying considerably from a direct line, scores of bugs could be seen pursuing the same general course. Seldom could a bug be found traveling in another direction.

Numerous contributors to our agricultural journals have added much to the knowledge of successful potato culture, while a few have furnished valuable information in treatises on the subject. The writer, having had large experience in different parts of the country, also having spent upward of six years in Europe, the greater portion being in England, which time was devoted mostly to the study of potato culture in connection with inventing machinery for planting and digging the tubers, therefore may be able to furnish some information advantageous at least to those who are beginners in the business.

Who shall engage in the business, what localities and kinds of soil are best? In considering the first

question the latter two should be included with it. Of course the question of soil is most important, but where the markets are exceptionally good (as in the instance of large cities), and the land productive, potatoes may be profitably grown. Although the product from heavy land may be inferior to that grown on sandy soil, a compensation lies in the advantage of easy marketing. Again, localities with facilities for transportation to the large markets are desirable, and those who are not familiar with shipping can soon acquaint themselves with the best methods by making a beautiful beginning, perhaps by planting five to ten acres. A nearness to market is often sufficient to waive a soil condition. On the contrary, those who possess land exceptionally adapted to potato growing, can afford to haul them a long distance to market, the increased yield together with fineness of quality making it an object of consideration.

The soil best adapted to produce a fine quality of potatoes is undoubtedly the sandy or gravelly kind having good drainage. Light land is sought by all experienced growers. The potato partakes largely of the soil upon which it is grown, those from heavy land being heavy and sticky in their texture, especially in wet seasons. However, much depends upon the mode of culture, as shall be shown hereinafter; but, all things taken into consideration, light soils are preferable.

What varieties of potatoes shall we raise? is a question which is perhaps equally important as either of the preceding ones. Change and decay are stamped upon every order of creation. Varieties of potatoes that were grown successfully twenty years ago have degenerated and are supplanted by new kinds; hence, the importance of keeping pace with the times. The newer sorts are usually more prolific and better able to withstand disease. To obtain a few potatoes of the most promising varieties when first brought to notice in order to test their quality and productiveness, a fair quantity of seed can be produced by the time a demand for them is made. By such tests with numerous new varieties, a judicious selection of the best can be made with comparatively little outlay. It has been found that certain varieties succeed best on certain soils and in different sections of the country, while it is equally true that other kinds succeed well in most soils and localities.

Mr. E. E. Parkhurst of Presque Isle, Maine, the largest grower of potatoes in the state, gives the following for the East: For early and late planting, the Green Mountain leads all others for table use. For the early market, the Irish Cobbler, Early Ohio, Bovee, Early Rose, White Ohio, and Gem of Aroostook. As in the Northwest, potatoes are largely grown in the state of Maine and shipped to the south for seed. The Red Triumph leads for this purpose. The next leading seed variety is the Early Rose, then follows the Early Norther, Early Harvest, Ohio, Irish Cobbler, and Bovee. The late seed varieties are Parkhurst Prize, Carman Nos. 1 and 3, Sir Walter Raleigh, Rural New Yorker and Green Mountain.

Mr. L. L. Olds, of Clinton, Wis., the most extensive seed potato grower in the northwest, and authority on the subject, has furnished the following list which includes the best varieties. The Rural New Yorker stands first as a market variety all through the Northwestern states. Burbanks do not yield as well as formerly, hence not so much grown now. Rurals can be relied upon for

a good yield, and their fine appearance makes them a good seller. Carman No. 3, Sir Walter Raleigh and Banner are newer varieties of the rural type which in some respects are improvements over the original Rural. Kings are quite commonly grown in some sections of Wisconsin, but are objectionable on account of color. Early Ohio is still the most popular of all early varieties. It is not a large yielder in Wisconsin and Illinois, but does better in Minnesota. It is largely grown in the Red River Valley. The White Ohio is a sport from the old Early Ohio, and much more desirable because of its color. Acme is another of the Ohio family which usually outyields the Old Ohio. Triumph is grown quite extensively for seed to go south. Early Rose and Beauty of Hebron are not much grown, having seen their best days. Of newer varieties, Early Roser, similar in type to the old Early Rose, is a splendid one, also Early Eureka and Noroton Beauty promise well. These last two are extra early.

J. H. Palm & Sons, of Lexington, Ohio, who are also extensive seed potato growers, name the following varieties as adapted to the State of Ohio and adjoining territory: For late varieties, the Washington and Vermont Gold Coin are most popular, being large yielders, strong growers and of good quality. The Gold

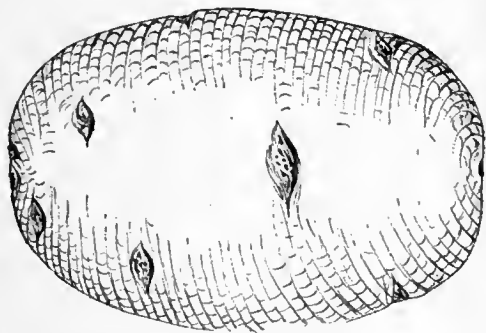


Figure 4. AN IDEAL SHAPED POTATO.

Coin especially is a vigorous grower and the quality first-class. Although the Carman No. 3 is a good yielder, Whitman's White Mammoth is much better in quality, also a fine yielder. Sir Walter Raleigh in some localities is grown with good results. The most popular early variety is the Early May. It is a strong grower, and fine quality.

Preparation of the soil is a matter of vast importance if large returns are expected. In considering this part of our subject, it will be well to include both plowing and manuring. To plow and pulverize the land most perfectly—without the application of something which will increase its fertility or at least maintain a good average condition of strength—will result in little or no profit. Success in this age of the world depends upon intelligent and energetic work. Imperfect or half-finished work will not receive the highest wages. In reference to plowing, it may be well to state that deep plowing is advisable in most cases. The potato plant usually has a large top, hence a corresponding root, which naturally requires depth and room to spread.

(Concluded in May issue.)

TILE SUB-IRRIGATION.

BY B. W. RICE, CALDWELL, IDAHO.

A hundred years hence the old men will be saying: "We can remember when we used to run the water on top of the ground." All over the arid West fifty gallons of water is now being used to put one gallon in actual contact with growing vegetation. Fifty times the quantity of water is being used that is necessary to accomplish the purpose. All this will have to be changed in the future and the sooner we get at it the more sensible it will be for the coming generations. Only one-twentieth of the soil of the West will ever be utilized under the present system of waste.

That water is now being wasted in immense quantities under the present gigantic irrigation propositions is too obvious for any contradiction, but just how the change is going to be brought about is a subject not so clearly defined. Whether mechanical means shall be resorted to to move the water about over the earth, or to go on permitting it to move by the law of gravitation and thus consume much valuable time, remains yet to be decided. That one inch of water shall remain the standard for one acre of land has already been disputed with a vim that is going to be felt in the near future. That the present generation will not make the needed changes in all this is a self-evident fact, but that the changes must be made is also a truth that stares us in the face. Just how to bring about the result is what we now want to know.

In Idaho one acre of land is about 210 feet square. To wet this acre one time it requires 44,100 gallons of water. This wetting must be done every ten days for fifty days, which means five waterings. Of course some soils must be watered more frequently and some soils will stand it with less water. Some crops will assist in holding the moisture and some will do very little toward shading the surface, but as a rule five waterings will mature the average Idaho crop. When this 44,100 gallons of water is spread out over the surface of the ground it immediately begins to disappear into the dry atmosphere and the dry atmosphere can only succeed in taking one gallon of every hundred, thus wasting ninety-nine gallons of what one day will be mighty precious material in the economy of the world. This ninety-nine gallons disappears into the air and drifts away to fall at some season of the year when it is not needed for growing crops. To reserve half of this wasted water means that fifty times the present surface of the earth may be wet with the present supply of the needful. The question arises then, how can this be done on an economical basis, and even the economical feature may be eliminated, for we will some day be driven to the extremity where water must be saved at the expense of human labor and the toil of animals generally. Let us pipe our land. Run no water on the surface for any crop. Put it all in tiles or pipes under the surface. This Idaho acre named above can be tiled for \$60 and is thereafter in far better condition than our present system will ever put it. Seven thousand feet of two-inch pipe will put a tile every six feet and one gallon of water inserted into the soil through a tiling is worth fifty spread out on the surface. Of course the tile or pipe business will have to be improved and en-

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larged under the present elevated profit and price can be annihilated and the product only represent labor and material. But all things must come to that basis sooner or later and the quicker the land of the earth is given its place in the great economy of human life the better it will be for us.

To institute this tiling there will be an expense of \$10 per acre for labor. At the present it is no uncommon thing for twice this sum to be expended on "leveling" the ground. At the present we are aware that the producing power of land is often reduced many times by the removal of the present surface down to a formation that will not grow vegetation and by putting a part of this poor soil on top of the good soil in the "low" place for which it has been removed. We "kill two birds of good with one stone of evil" with this sort of work. With the tiling system in vogue we will not annihilate the present good preparation of the surface of the field. We will let it remain as it is and usually there is a foot of splendid soil on top. The tiling machine will pass through the soil at regular distances and plant the tiling, allowing the soil to fall back where it was originally. Rolling fields can more readily be brought under cultivation, for the tiling will carry water up and down as the surface changes. Twelve hundred gallons of water will fill the tiling for an acre of land and this quantity of water thus inserted will equal three waterings on the surface, to say nothing of the expedition it will create over the present plan of "ruining" the present capillary work of the soil. With the tiling at work we can keep the four-inch top soil as a mulch and thus once more make a saving over the present crude system of reserving moisture.

When we are depending on surface wetting or gravity ditches it is very natural for us to reclaim the lower lands first. It is a well known fact that Idaho river bottom lands are not as good as the higher levels. With "flooding" or surface watering we will some day destroy every quality of the lower land, as has now already been shown by the few years' experience. With the tiling system this will never occur. With tile and the corresponding decrease in quantity of water necessary for growing crops, it will bring it within the region of the economical to lift water by power for irrigation. It is evident everywhere here in the semi-arid region that immense tracts of the very richest soil lay high above any possible gravity canal. Tile system, as outlined above, would make it business to lift water three hundred feet for all kinds of crops that the climate will produce. Twenty-five foot elevation from present rivers and waterways, including the present canals, will bring into cultivation five times the land of today that is producing. Two hundred and fifty feet of an elevation will create an inland empire where now worthless land remains unused excepting for rough grazing during short seasons of the year. A man "just above" the present ditch could use one old horse for pumping purposes, raise the water forty or fifty feet and have eighty acres of as fine crops as his neighbor below the ditch. One horse working ten hours a day would keep eighty acres of land well watered and his feed will cost 25 cents per day when raised on a farm of that kind. Of course, it is going to take labor to install the tile system, but labor will some day be about all the stock in trade that a large portion of the human race possesses. Any system that produces or creates legitimate labor at fair wages is good and should be encouraged. With some

new way of making tiling it could be manufactured in the region of its utilization and the farm could be credited with furnishing abundance of labor of this sort. Any labor that soil is made to produce goes to the credit of that soil and thus the tiling of the arid West will create a generation of legitimate labor. An acre of Idaho well-leveled and well-watered soil is worth a hundred dollars at the present prices and demands. We have many millions of acres that are now worth only \$1.25 per acre. With a hundred dollars in labor expended on this land it will be worth twice the present price of surface irrigated land. Thus the actual tiling becomes a legitimate proposition that will pay from the beginning.

The labor of wetting a farm under tiles will not be one-tenth of that of the surface ditch business of today. With the tiling well instituted one of the little girls before breakfast could turn half a dozen gates and the job would be complete.

The natural surface of the soil with its thousands of years of preparation for producing will not be buried beneath a lot of soil of material that nature has not intended shall produce. Little knolls will not be dug off and thrown in low places so water will run across. The surface will remain as it is.

When the wetting of the surface has been discontinued the insects that blight crops and kill fruit and breed diseases will find it uncomfortable living in that region and they will quietly fold their tents and hike out for other regions. The weeds and other useless growths that are spread and nurtured by the present system will find that they no longer have an abiding place. The cultivating of orchards and vineyards will be reduced largely, sugar beets and other similar crops will produce better and labor will produce more days' food than at the present. Some will say: "God wets the surface and that's our way, too." I want to call attention to the fact that God wets the surface very little in arid regions during that season of the year when crops will grow best. Another thing in connection with the tile system. Along the river bottoms of the middle West where irrigation is not practiced on account of the soil not "standing" the surface wetting, the tiling will bring it within reach of actual use and make failure a thing of the past. To wet the soil from the bottom annihilates many of the bad features.

The tile system will intensify farming. The world is going to need more to eat from year to year hereafter. The farm lad who wants to go to town and carry drinks up stairs in the hotels because he can smell perfume that evening should be shown that the producer of something to eat and wear and of something that does the human race good, is the only legitimate sphere for man. The young woman who is looking beyond the young man with brown face and hardened hands to the white-handed worthless fellow who only consumes that he may take a bath in the "swim" or keep creases in his trouser legs, will have to be told clearly that the human race must retain its backbone and that labor of the legitimate kind never shriveled the human heart nor parented a child with desire to get something for nothing. We do want a little more gingerbread on our farm houses and clothing, however. A telephone and an ice-cream freezer and a place to hang a good suit of wearing apparel are mighty legitimate attractions for the farm. A colored glass in two of the windows of the farm house will not cost much more than the plain sort

and it makes the sons and daughter prick up their ears and "clean their finger nails." It will create a desire for the tooth brush and the garter. It is not the raising of radishes that discourages a human being, either young or old, but it is the fact that other people always raise better radishes than you do and that you always sell your best ones to somebody else, that crushes the heart and makes you want to change to something you think is better, but which is four times as bad.

I wouldn't marry a girl whose father always kept his barnyard gate off its hinges or who kept his wagon brake tied on with wires. That's in the blood of the family every time. Neither would I marry in a family where the girls always wondered what their mother saw in their father to make her marry him. It isn't good policy, either, to marry in a family where the young women say they will never bear children if it's going to make them look like their mother and have big, red looking hands. The earth is not nearly full of people yet. I can see how we can take care of ten times the present population. The scientists tell us that in ten million years it will be so cold here that we cannot live, but this is not materially affecting the price of land and things in Idaho at the present. Do right and do the best work and the best thinking you can possibly turn out. Get to thinking about something. Express some opinion about the affairs of the world today and make your opinion stick.

GREAT STATE OF CALIFORNIA.

General Sketch of Its Topography, Climate, Productions and Possibilities.

There is but one California in the Union. It is the largest state except Texas, having nearly four times the area of Ohio and more than twenty times that of New Jersey! Massachusetts has 8,315 square miles, California 158,360.

One of the most striking as well as important of California's many features of interest is the San Joaquin valley. This is what the geologists call a "sea trough," and occupies the center of the northern two-thirds of the state. It is an inter-mountain basin, approximately 450 miles long and averages about 60 miles wide. Its mountain rim is shaped like a long letter "C," with the opening of 75 miles or more running northwesterly from near the town of Berkeley.

The Sierra Nevada chain of mountains tower along the east side, rising to an average altitude of about two miles. This elevation closes around the south end of the valley and connects with the Coast range, which bends eastward to complete the union. The Coast mountains parallel the shores of the Pacific ocean from the lower end of the San Joaquin valley to Oregon, except at the opening of the letter "C" already explained. The lower range is not as lofty as the Sierras, but they and the upper horn of the "C" are, like Jove, "cloud compellers."

Mount Shasta "butts in" at the north end of the state, and the summit as well as those of the upper Coast range and Sierras are so lofty that the mean annual temperature ranges according to various altitudes and circumstances, from 30 to 44 degrees above zero. All around the Sierras, Shasta and the upper Coast

range is a lower zone on the mountain slopes having a mean range of temperature of 44 to 52 degrees. This belt surrounds the letter "C" except at the opening and caps the lower Coast range.

Within that second zone is a third still warmer, having a range of 52 to 60 degrees. This belt surrounds the "C" and runs along the ocean from Oregon to a point just below the San Joaquin valley, a little north of Santa Barbara, where it bends eastward, inland, and crosses Santa Barbara, Ventura and Los Angeles counties. A branch runs around northward over Owens lake and into Nevada. The other branch turns south at Mt. San Bernardino and continues, widening, to the Mexican line.

Then there is the lowest zone of all, the land of the orange, lemon, raisin grape, the fig and the olive. This takes in the southern portions of Santa Barbara, Ventura and Los Angeles counties, all of Orange county and the west end of San Diego and Riverside counties and the southwest corner of San Bernardino county.

This area ranges from 10 to 80 miles wide and has a mean range of temperature of from 60 to 68 degrees. The floor of the San Joaquin valley is also of this temperature.

SAN JOAQUIN VALLEY PRODUCTS.

The area of the San Joaquin valley comprises about 17,280,000 acres, and it is a very conservative estimate to place the average annual net productive power, under high-class cultivation, at \$50 per acre. So that when this valley is fully reclaimed, as it will be in the future, an annual aggregate yield from its soil of \$864,000,000 will be possible. Allowing \$2,000 to a family of six, the valley may be made to support 432,000 families, or a total agricultural population of 2,592,000. As a matter of fact the land will yield a net profit of \$100 an acre or more under thorough tillage and may support 5,184,000. Allowing fifty per cent more for manufacturing, mercantile and professional population and the magnificent total of 7,776,000 people may in time live comfortably in this valley. This is intended merely as a suggestion of its productive greatness.

It will grow a wide range of products, the soils of different sections favoring a great diversity of crops. Wheat, oats and barley are grown successfully. Corn does well in spots. Alfalfa and dairying are highly profitable. Poultry business prospers.

There are places where one can see potato fields of 20,000 acres, which yield from 300 to 600 bushels per acre, representing in money from \$225 to \$450 an acre. There are also hundreds of acres of asparagus in places, grown for the canneries. This work is mostly done by Chinamen, but the lands are owned by Americans. The yield increases from the second year, the plants lasting from year to year and will produce good crops for as much as a dozen years. At the best the harvest is 5,000 pounds or more per acre each season, for which the packers pay from 2 to 4 cents a pound, depending on the quality, thus showing a selling value of from \$100 to \$200 an acre.

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ALSO FAMOUS FRUIT COUNTRY.

Again, you will meet with great vineyards of Muscat and Thompson's Seedless grapes, out of which very fine raisins are made by drying them in the sun in the fields. Train loads of these grapes are sold fresh, called "table grapes," those elegant specimens seen in the eastern markets. Out of the inferior grades or the unsold surplus millions of gallons of the famous California wine are made every year. A net return of \$250 an acre and even higher sums are common.

Very fine lemons, oranges, peaches (yellows, Muirs and clings), apricots, figs and olives grow in the valley soil. In places unsurpassed blackberries are successfully cultivated. Certain soils favor English walnuts and prunes. In the counties south of this valley are also great orange and lemon orchards and walnuts grow well in Orange and other counties. West San Diego county produces raisins and olives unsurpassed in the United States.

In Fresno, Kern, Los Angeles and other counties immense quantities of crude petroleum, mainly of an asphaltum base, are annually taken, the output for the state amounting to from 36,000,000 to 40,000,000 barrels each year.

In the San Joaquin valley and the counties south of it are found large areas of the best sugar beet soil in America, and the manufacture of beet sugar has already attained extensive proportions. These beets yield from 2,500 to 3,000 pounds of sugar per acre. In this same region hundreds of acres of lima beans may be seen growing in a single field. Down in San Diego county a net return of \$300 an acre from strawberries is a common matter, and yet tons of strawberries are shipped in for local consumption. This is but an outline sketch, and does not tell all that California lands and favoring climate will do for cultivators of the soil, by any means.

Above San Francisco about 60 miles is Santa Rosa, near which the famous Luther Burbank is working out his experiments in plant evolution. Along the Sierra and North Coast mountain sides are grand forests of pine and other timber. Many of the most magnificent trees in the world are found in this state, some of them measuring over 36 feet in diameter and towering 300 feet toward heaven.

Reclamation Service News

FREDERICK H. NEWELL,
Director of the Reclamation Service.

[CONTRIBUTED.]

Frederick Haynes Newell was born in Bradford, Pa., March 5, 1862. He graduated from the engineering course of the Massachusetts Institute of Technology in 1885, and later took a post graduate course in hydraulic work. The graduates of this college, owing to its high standards and excellent facilities, are found in the front rank of the technical professions.

Immediately after completing his course, Mr. Newell took up his professional work in Colorado. Here he came

into direct contact with practical irrigation on a large scale. His stay in Colorado left a deep and lasting impression which was responsible in no small degree for his accepting a minor position as hydraulic engineer in the irrigation survey in 1888. During the formative stage of this survey its rather chaotic conditions afforded an excellent field for the exercise and development of young Newell's capacity for organization. Through all the vicissitudes which the new bureau passed he never wavered in his purpose of doing well and thoroughly everything assigned to him. The irrigation survey proper was short lived, as Congress failed to provide for it after 1890. Authority, however, was granted to continue the measurement of streams and to select survey, and segregate reservoir sites. All of this work was placed directly under the charge of Mr. Newell.

His star was national reclamation of the Great American Desert, and for eighteen years he has devoted all of his skill and energy to the work of acquiring information concerning the resources and needs of the arid West. It is said that he has first hand knowledge of every important stream in the West. The extensive and valuable results obtained through this work attracted wide attention, and the demand for data led Congress to increase the appropriation gradually until in 1902 they amounted to \$200,000 annually.

The early work was mainly in a vast wilderness full of obstacles to civilized occupation, and the results were largely responsible for the subjugation of many desolate valleys and the development of large areas for agriculture. His work opened new channels for industry, new employment for many thousands, and continues to afford opportunities for the home-seeker.

The reclamation act of June 17, 1902, was the logical development of the investigations of the previous twelve years under Mr. Newell. Naturally its administration was placed in his hands as chief engineer by the director of the Geological Survey. His appointment to the position of director of the Reclamation Service, now an independent bureau of the Interior Department, is a proper recognition of the invaluable services he has rendered the Government. It furnishes also an inspiration to those who are devoting the best years of their lives to Government work.

Mr. Newell's fitness for great responsibilities lies chiefly in his all-round perfect balance, supplemented by good common sense and a judicial attitude of mind by which he can at any time patiently hear and give due weight to the suggestions of others. Thus to a remarkable degree he is able to bring to his work the combined wisdom of many minds, avoiding the errors of the cock-sure egotist on the one hand and of the pliant tool or weakling on the other.

If Mr. Newell has anything that may be called a hobby it is his insistence on a close personal acquaintance with the work of which he has charge. He spends a large share of his time in camp discussing details on the ground with those who are designing or building works, thus equipping himself for quick and wise decision on the many points of importance that constantly demand executive action. He is an incessant worker, and has the capacity for an immense amount of business, yet never appears to be hurried nor overwhelmed with the duties of his office.

An invaluable element of his extraordinary success in organization, the Reclamation Service entered upon actual con- needed for responsible positions, and in maintaining an esprit de corps among them that has challenged the admiration of all who have come in contact with the Reclamation Service.

As a result of his foresightedness and his ability in organization, the Reclamation Service entered upon actual construction within a year after the passage of the act, and two years later a great project in Nevada was formally opened to settlement. At the present time construction work is going forward on twenty-five projects in twelve states and two territories, involving the ultimate expenditure of \$40,000,000 and the reclamation of 1,200,000 acres. In less than five years the service has practically completed four projects and will supply water this year to 282,000 acres of desert.

It has dug 1,267 miles of canal, several of which carry whole rivers; its tunnels are more than nine miles long and the excavations of earth and rock amount to 33,000,000 cubic yards, or about one-fourth the estimated yardage of the Panama canal. It has constructed ninety-four large structures, including two great dams, one in Nevada and one in Idaho. It has built 376 miles of road in mountainous country and through heretofore inaccessible regions. It has erected and

in operation 1,373 miles of telephone lines. It has 1,154 horses and mules on hand and at work, is operating nine locomotives, 223 cars, 23 miles of railway, 39 stationary engines, and 27 pumps and five electric light plants. The work is giving employment to 10,000 people, and involves the expenditure of approximately \$1,000,000 a month.

As a result of the operations of the Reclamation Service eight new towns have been established, 100 miles of branch railways have been constructed, and 10,000 people have taken up their residences in the desert. The work has given a decided impetus to every line of industry in the West.

Rejected Bids.

The Secretary of the Interior has rejected as excessive all bids which were recently received for the construction and completion of the Pathfinder dike, North Platte irrigation project, Nebraska-Wyoming, and directed the readvertisement of the work.



Concrete Flume across Pecos river. Main view, December 18, 1905. Carlsbad, N. M., Project.

The Reclamation Service received some rather disquieting telegraphic reports from the lower Colorado river country recently, indicating that the river was rising at the rate of six inches an hour.

This is the period of the annual flood of the Colorado, which occurs with remarkable regularity every year on nearly the same date. The rise of 1905 came on March 15.

High water measurements taken late in the afternoon of March 1 showed a maximum flood flow of 63,500 cubic feet per second, with the river stationary. Advices received from the lower Colorado heading, near where the recent break in the river banks occurred, show that the new levees are holding well, and unless the flood reaches abnormal stage no serious damage will occur.

Want Too Much Money.

The engineers of the Reclamation Service who have charge of the construction of the Pathfinder dam, North Platte irrigation project, Nebraska-Wyoming, are experiencing some difficulty in obtaining reasonable proposals for building the dike.

This dike is an earth structure reinforced with rock on the water side, and its purpose is to supplement the Pathfinder dam. On the south side of the dam is a depression which will require a dike about a quarter of a mile long and thirty-five feet high at the highest point. Bids for its construction were opened February 27, but as the lowest bid was considerably in excess of the engineer's estimates, all were rejected by the Secretary of the Interior, and contractors are again invited to submit proposals.

The work is located about forty-five miles southwest of Casper, Wyo., and involves about 170,000 cubic yards of earth excavation and about 16,000 cubic yards of rip rap. Bids will be received at Crawford, Neb., up to June 5 by the engineer in charge.

North Platte Project.

The Secretary of the Interior has executed a contract with the Vulcan Iron Works, of Chicago, Ill., for furnishing

cast iron gates, guides, stands, etc., for use in connection with the North Platte irrigation project, Nebraska-Wyoming, the price named being \$4,051.37.

The Secretary of the Interior has executed a contract on behalf of the United States with the S. R. H. Robinson & Son Contracting Company, of St. Louis, Mo., for the construction and completion of diversion dam and headworks in connection with the North Platte irrigation project, Nebraska-Wyoming, for \$217,850.

The work involves the excavation of about 90,000 cubic yards of earth and rock, furnishing and placing in structures about 10,000 feet B. M. of lumber, and the construction of about 8,000 cubic yards of concrete masonry. The dam will be used to divert the waters which flow down the North Platte river from the Pathfinder reservoir into the Interstate canal.

Extension of Time.

The Secretary of the Interior has granted an extension of time to the D'Olier Engineering Company, of Philadelphia, Pa., for the completion of their contract for furnishing an electric power plant for the Garden City irrigation project, Kansas. The date now fixed for the completion of the work under this contract is three months from the receipt by the contracting company of notification from the engineer in charge of the work that the building in which the plant is to be installed is completed.

The delay in furnishing the power plant was necessitated by the fact that the building could not be completed on time, owing to the failure of the railroads to deliver the material.

The Board of Consulting Engineers of the Reclamation Service which met recently at Crawford, Neb., received three bids for the construction of the Pathfinder dike, North Platte irrigation project, Wyoming-Nebraska, as follows:

Hubbard & Carlson, Boise, Idaho.....	\$293,935
Geddes & Seerie, Denver, Colo.....	244,875
James O'Connor, Mitchell, Neb.....	244,460

This dike, which is to be constructed in connection with the Pathfinder dam, is situated about forty-five miles southwest of Casper, Wyo., and involves about 170,000 cubic yards of earth excavation, and about 16,000 cubic yards of rip rap.

These bids are under consideration, and the recommendations of the board will be announced later.



Hondo Reservoir, looking north from outlet tower, January 31, 1907. Hondo Project, New Mexico. Photo by W. J. Lubken.

Mr. James W. Martin, of Mesa, Ariz., has received an appointment as engineer in the Reclamation Service and assigned to the Salt River irrigation project, Arizona, where he will have charge of the construction of the diversion dam. This dam will divert the waters stored behind Roosevelt dam when they are allowed to flow down the river, and turn them into the distributing canals at a point about forty miles down stream from Roosevelt.

Mr. Martin is a graduate of the University of Maine, and has had a varied experience in the West in his profession.

Cement.

The Reclamation Service wants 30,000 barrels of Portland cement for the Uncompahgre irrigation project, Colorado, and is asking the cement mills to submit proposals, which will be opened April 15 at Montrose.

This cement will be used in lining the great Gunnison tunnel, which is now considerably over half completed. The engineers have encountered all sorts of difficulties in this construction, but are working away with the same degree of enthusiasm which they displayed when the work was taken over from the contractors in May, 1905. During several months past the drilling in the east end has been exceedingly hard rock, and the difficulty of material and scarcity of labor have retarded the progress considerably. In the west end the laborers have encountered floods and deadly gases. In February an air shaft about 700 feet in length was sunk to increase the circulation of air and aid in carrying off the gases, and the floor of the tunnel has been concreted for 14,000 feet. The tunnel is now in good shape for any large flow of water which may be encountered when the seam which has been giving so much trouble is opened. This seam was closed two months ago and all efforts concentrated on sloping the sides and paving the floor of the tunnel so that the water can be easily handled.

The Civil Service examination for junior clerk, U. S. Reclamation Service, which was scheduled to take place at Garden City, Kas., March 13, has been postponed to April 10, and will be held at Deerfield, Kas.

This examination is for the purpose of filling vacancies as they occur in the position of junior clerk, at salaries of \$60 to \$75 per month, depending upon conditions of service and location.

Two contracts in connection with the lower Yellowstone irrigation project, North Dakota-Montana, have been awarded the Pittsburg Manufacturing Company, of Pittsburg, Pa. One of these contracts calls for the furnishing of forty small gates for lateral turnouts, the other for furnishing six gates for sluiceways. The company agrees to furnish the former for \$4,895.06 and the latter for \$449.75.

The Secretary of the Interior has awarded contracts for canals and structures, Buford-Trenton irrigation project, North Dakota, as follows:

James Burton, Delhi, Iowa, furnishing and installing pressure pipe, \$13,282.50; Penson & King, Williston, N. D., thirteen miles of canal and ditch excavation, and the construction of bridges, flumes, culverts, etc., \$20,867.75; John S. Penson, Williston, N. D., installing pumping station, \$3,333.

Force Contract.

The Secretary of the Interior has authorized the Reclamation Service to prosecute the work of constructing the laterals and structures required in the distribution system of the Okanogan irrigation project, Washington, by force account.

The work will be divided into small schedules so as to enable local contractors to submit bids. The estimated cost is \$50,000.

This project is somewhat remote from transportation facilities, and the work does not attract large contractors.

The Secretary of the Interior has accepted the bid of the General Electric Company, of Schenectady, N. Y., for the installation of a plant for the generation of electricity for lighting and power purposes in connection with the Strawberry Valley irrigation project, Spanish Fork, Utah.

The total amount of power generated at this point will be about 500 electrical horsepower.

A recent report from Mr. J. H. Quinton, supervising engineer, states that notwithstanding labor troubles the total excavation of 153 feet was made during the month of February on the Strawberry Valley tunnel in Utah.

The work has been greatly retarded by reason of heavy snowfalls, rendering it impossible to reach the far side of the tunnel in any way except on snowshoes. The snow is now from five to eight feet deep on the summit, and the roads are impassable.

The party in charge of the survey of the power canal has completed the preliminary work and the final location of the canal from Spanish Fork to the power plant will be completed on the ground this month. The work of construction will be started immediately thereafter.

Buford-Trenton.

The Board of Consulting Engineers of the Reclamation Service recently convened at Williston, N. D., to open bids for the construction of canals and structures in connection with the Buford-Trenton irrigation projects, reports that one proposal each was received for divisions A, C and D, none having been received for division B.

The work involves the excavation of about 420,000 cubic yards of earth and furnishing labor and material for a pumping station and various structures requiring about 120,000 feet B. M. of lumber, about 1,300 cubic yards of concrete, and 10,000 pounds of structural steel.

Division A consists of thirteen miles of canal and ditch excavation and the construction of bridges, flumes, culverts, etc. The proposal submitted was that of John S. Penson and E. F. King, of Williston, for \$20,867.75.

The bid of James Burton, of Delhi, Iowa, was submitted for division C, which consists of furnishing and installing pressure pipe. Mr. Burton's bid was \$13,282.50.

John S. Penson, of Williston, N. D., submitted a proposal for installing pumping station as provided for in division D, for the sum of \$3,333.

The papers have been forwarded to the Secretary of the Interior for consideration.

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A summary of the work of the Reclamation Service to January 1 shows that it has dug 1,267 miles of canals, or nearly the distance from Washington to Omaha. Some of these canals carry whole rivers, like the Truckee river in Nevada and the North Platte in Wyoming. The tunnels excavated are forty-seven in number, and have an aggregate length of 9½ miles. The service has erected 94 large structures, including the great dams in Nevada and the Minidoka dam in Idaho 80 feet high and 650 feet long. It has completed 670 headworks, flumes, etc. It has built 376 miles of wagon road in mountainous country and into heretofore inaccessible regions. It has erected and in operation 727 miles of telephones. Its own cement mill has manufactured 70,000 barrels of cement, and the purchased amount is 312,000 barrels. Its own sawmills have cut 3,036,000 feet B. M. of lumber, and 6,540,000 feet have been purchased. The surveying parties of the service have completed topographic surveys covering 10,970 square miles, an area greater than the combined areas of Massachusetts and Rhode Island. The transit lines had a length of 18,900 linear miles, while the level lines run amount to 24,218 miles, or nearly sufficient to go around the earth.

The diamond drillings for dam sites and canals amount to 47,515 feet, or more than nine miles. Today the service owns and has at work 1,154 horses and mules. It operates 9 locomotives, 223 cars and 23 miles of railroad, 39 stationary and 27 steam engines. It has constructed and is operating five electric light plants. This work has been carried on with the following force: Classified service, 380, including Washington office; laborers employed directly by the Government, 3,500; laborers employed by contractors, 6,100, or a total of all forces of 10,000. The expenditures now total nearly \$1,000,000 per month. As a result of the operations of the Reclamation Service eight new towns have been established, 100 miles of branch railroads have been constructed, and 10,000 people have taken up their residence in the desert.

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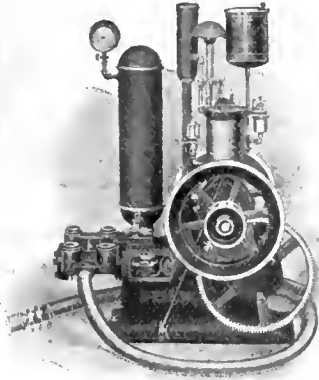
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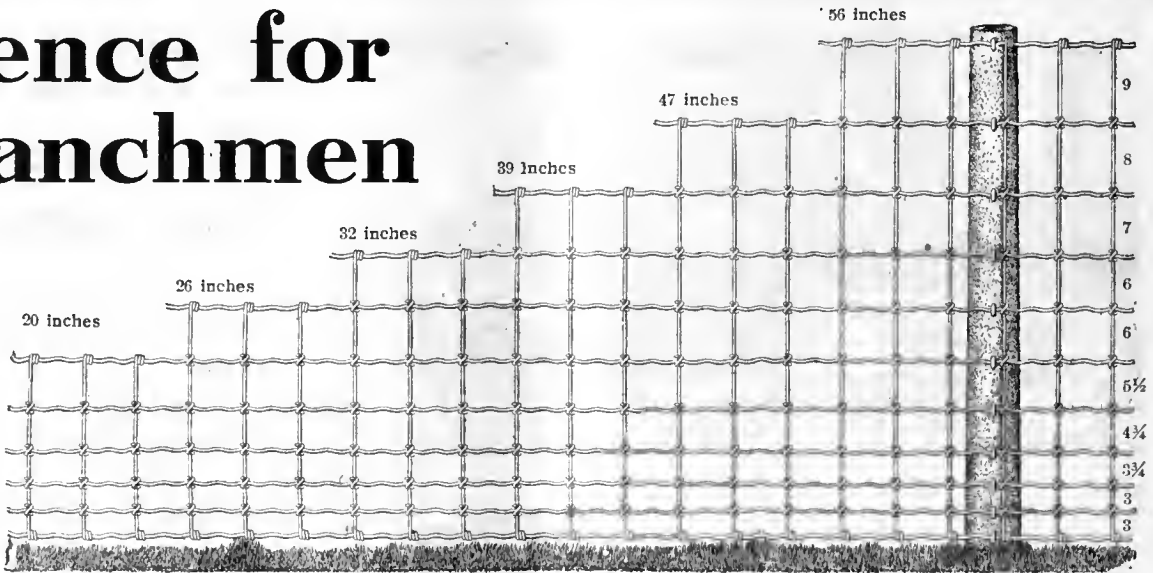
have attained among growers who have given them a severe test, proves conclusively that the efforts of the manufacturers have not failed.

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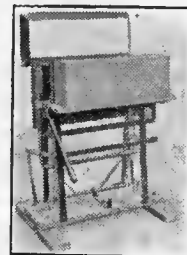
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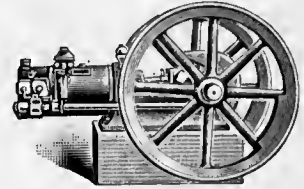
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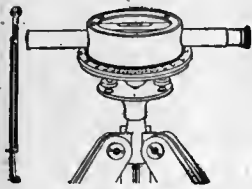
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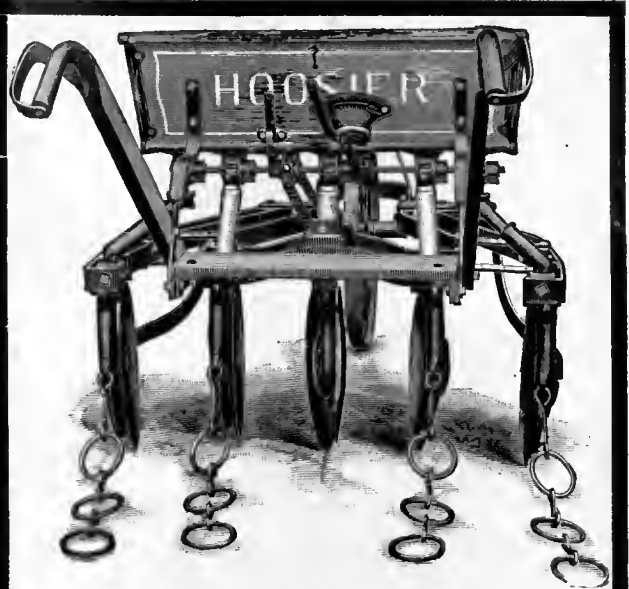


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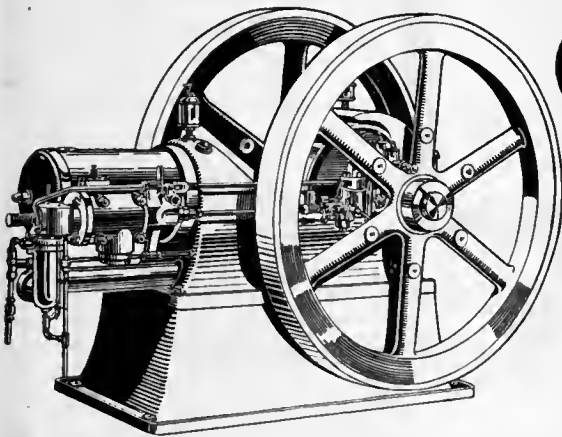
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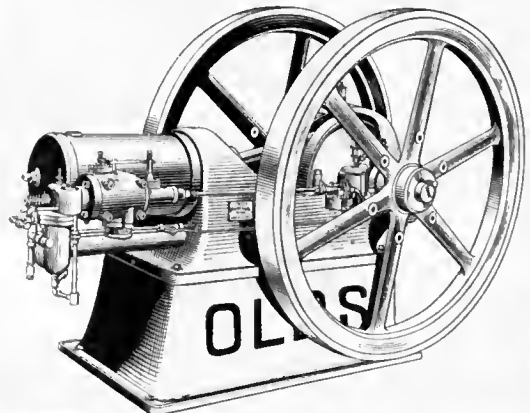
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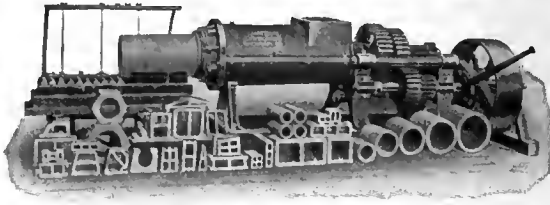
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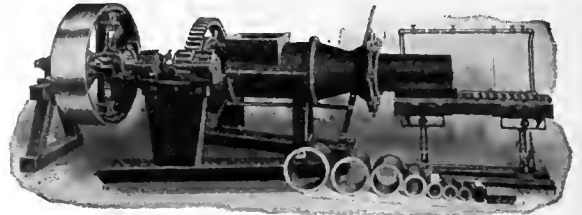


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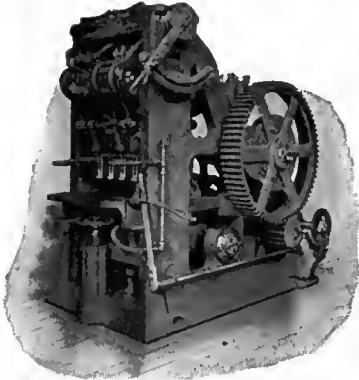
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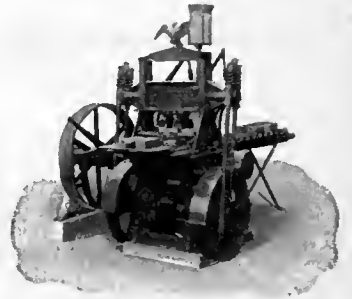
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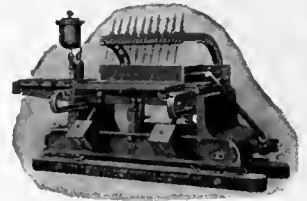
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RUN RIGHT"**

We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kiln Irons, Cutting Wire and all supplies. Send for information or catalogue.

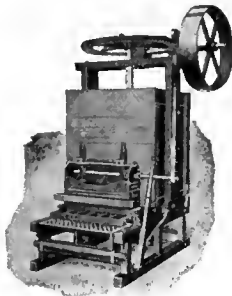
The American Clay Mch. Co...Bucyrus, Ohio



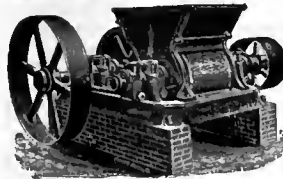
Dry Cars, all kinds



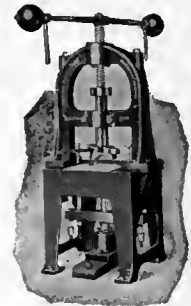
Hand and Power Cutters



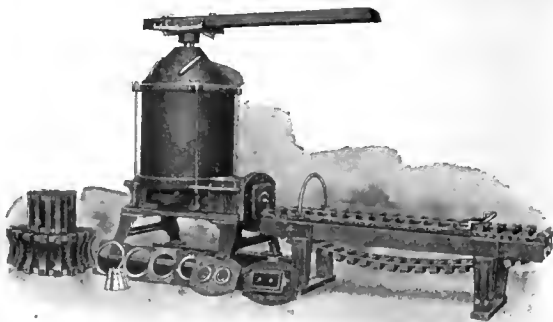
Soft Mud Machines, Horse and Steam Power



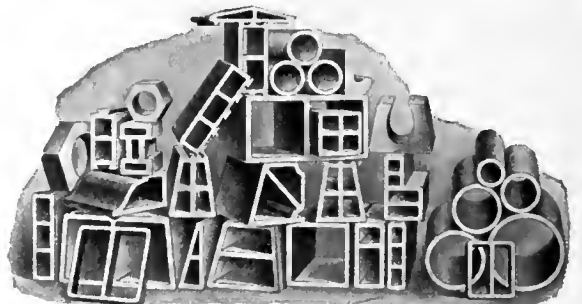
Disintegrators



Hand Power Screw Press

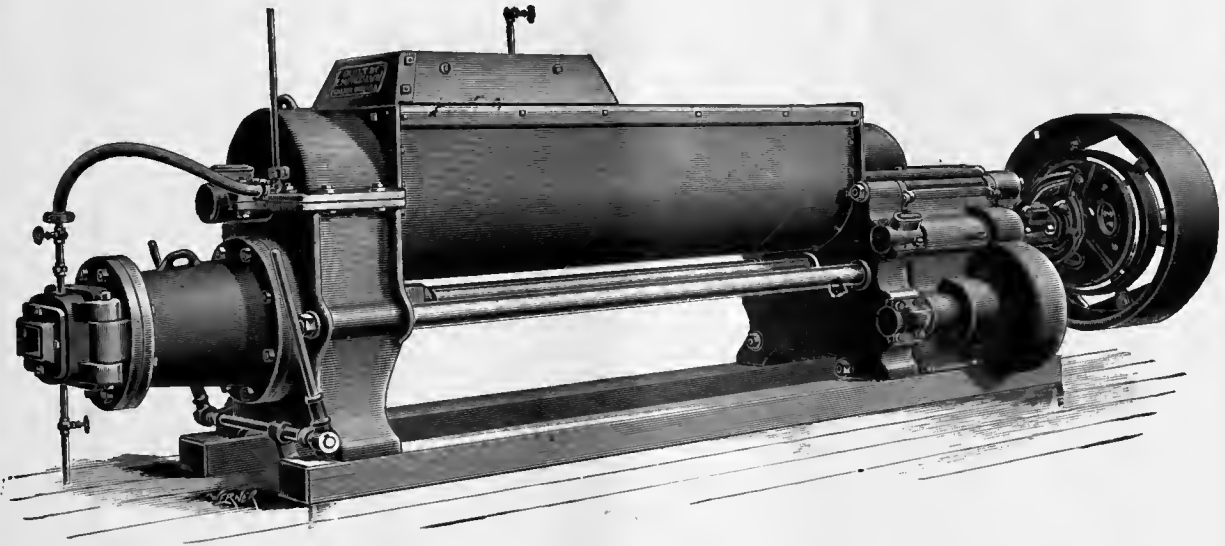


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UNION MACHINES WITH PUG MILLS COMBINED



FIVE SIZES ALL CAPACITIES

Outfits for Drain Tile, Hollow Ware, Building
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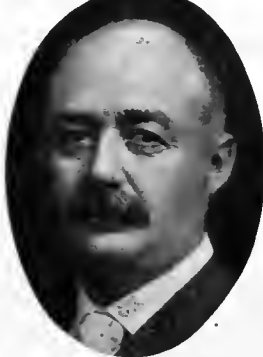
If interested write us for particulars and estimates.

E. M. FREESE & CO.

GALION, OHIO

Let Me Prove That 10 Acres of this Irrigated Land

Will earn **\$250.00** A Month For You



E. W. SHUTT, President
Rio Grande Land, Water & Power Co.

I Will Sell It To You For \$2.50 a Week

Irrigated, under cultivation, ready to earn at least **\$250 a month.**

Not in all the world have I ever heard of so good an opportunity for men of small means.

In this small space I cannot tell you all the steps that have been taken to safeguard your money in every way.

This is investment — not speculation — yet you get returns equal to those from successful speculation.

And all the while you are secured against loss by the finest farm land in the world, and your interest in water rights that no man could buy for a million dollars.

There is no question like finding gold or striking oil about this proposition. The land is there for all time.

The water is there for all time to nourish and fertilize it.

You don't have to dig in the ground deeper than to plant seed.

There are no insects that destroy crops in this country.

There is no chance for drought.

There is no chance known to man for a single crop failure, ever.

And the abundant crops of large and in every other way superior hays, grains, vegetables and fruits are equalled in only a very few favored spots, such as the Rocky Ford country. But I am going to prove by case after case that net returns from ten acres of this property rarely are as low as \$3,000 a year and often as high as \$10,000, according to the kind of crops.

The difference is not according to location of land or season or anything of that kind.

The land is near a prosperous and growing city — Albuquerque — the largest city in New Mexico.

Our main irrigation canal runs through the city.

The main line of the Santa Fe Railroad runs through our land from end to end.

And our own electric line is to supply additional cheap and convenient transportation to every section of these lands.

If you want to see the country for yourself, you can go with the next party I take to look at the property. Or you and your friends can band together and send a representative.

Or I will send you names of prominent men who have gone or will go and you can ask them what conditions they find. But this is the merest outline of what I will show you in detail.

There are many features of this Secured Land Contract that make it safe and profitable which I haven't space to touch upon.

I am only attempting to make it clear to you that if you can possibly save \$2.50 a week you can have an assured three to ten thousand dollar income in a few years.

Don't doubt — I have proof.

I have promised to lay it before you. All you have to do is to write for it — that can't cost you a cent more than postage.

And as fast as the mails can carry, I will send you proof that as sure as crops grow where climate, soil and water conditions are perfect, you can be financially independent in a few years.

Now, not to hurry your decision in the least, but to protect the price, write me personally at once.

For after the first lot of ten-acre tracts is contracted for we will ask more. But I make this promise. Every man or woman who answers this advertisement at once can have at least ten acres on these terms unless, of course, all our land should be already contracted for from this one advertisement.

Now, write at once. I can say nothing more in this advertisement except that, if I could, I would not tell you all you can confidently expect from this investment. For you would not believe it without the proof which I cannot put in an advertisement. Address me personally, and believe me sincerely,

E. W. SHUTT, President Rio Grande Land, Water and Power Co.
658 Houser Building, ST. LOUIS, MO.

YOU know, or can easily learn from United States Government Reports, that irrigated lands in the Great Southwest, in selected crops, will net \$300 to \$1,000 a year per acre over and above the entire cost of cultivating them.

Anyone who knows the country will tell you that absolutely the surest, safest way in the world to gain a large and permanent income for a small outlay is to get hold of a few acres of irrigated land in the Great Southwest.

But always before it has required at least a few hundred dollars and it has been necessary for the investor to live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest irrigated land in the world if you can save \$2.50 a week.

You can go and live on it — absolutely assured of an income from it alone of \$3,000 to \$10,000 every year without fail.

Or you can remain in your present position and add that much to what you earn.

For my company will cultivate your property for a small share of the crops.

You don't have to know a thing in the world about farming.

Now, I can and will prove all this from the highest authorities in the land.

All you have to do is — write me and say "Prove to me that ten acres of your land will net from \$3,000 to \$10,000 a year above all cost of cultivating it."

I have the proof, so read what my company will do for you.

I will deliver to you at once a Secured Land Contract for ten acres of irrigated land in the Rio Grande Valley.

You must pay my company \$2.50 a week or as much more as you like.

Instead of your having to pay interest on deferred payments, I agree, for my company, to pay you 5% per annum on the money you pay in.

I also bind my company to fully irrigate your land and turn it over to you under full cultivation whenever you desire to mature your contract.

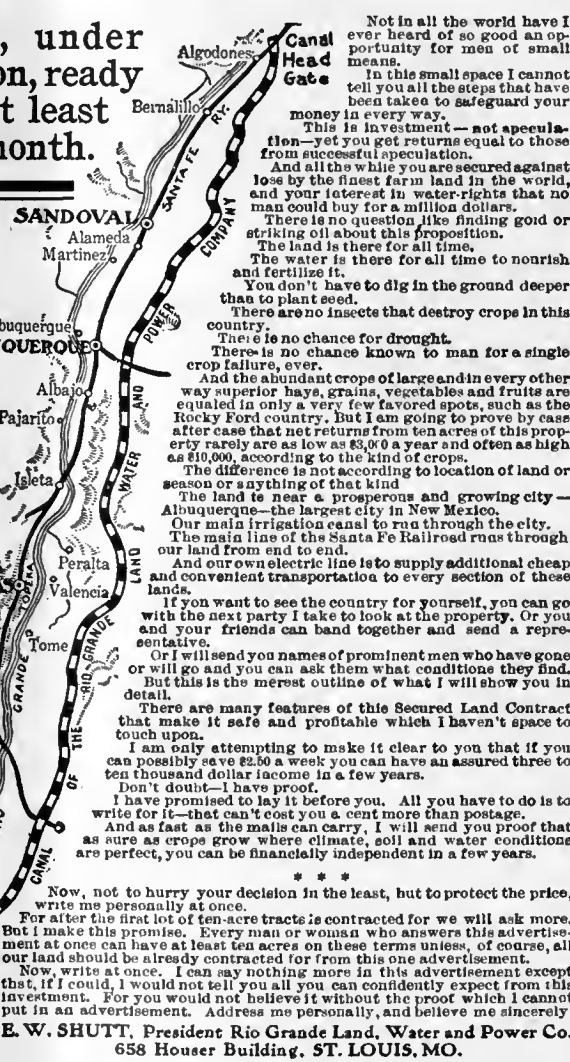
\$2.50 a week will mature your contract in 10 years.

But after you have paid \$2.50 a week for three years, or the same total amount in a shorter time, I agree and bind my company to loan you enough money to make all future payments and mature your contract.

Remember, the land will be fully irrigated and completely under cultivation, so your first year's crop should net you enough over and above the cost of cultivating it to fully pay your loan.

You would then own your land outright and have an assured income of from \$3,000 to \$10,000 a year.

Can you hope in any other way as safe and sure as this to have so large an income in a few years?



THE IRRIGATION AGE

VOL. XXII

CHICAGO, MAY, 1907.

No. 7

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,

112 Dearborn Street, - - CHICAGO

Entered at the Postoffice at Chicago, Ill., as Second-Class Matter.

D. H. ANDERSON, Editor
W. J. ANDERSON . G. L. SHUMWAY
Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

Irrigation Congress.

The editor of IRRIGATION AGE returned recently from an extended visit at Sacramento, Cal., and other points in that delightful state, where a study was made of some of the features of exploiting the Fifteenth National Irrigation Congress, to be held in the Queen City of the Sacramento Valley during the week beginning September 2.

During his stay in Sacramento, and under the guidance of Mr. W. A. Beard, he had the pleasure of meeting all of the members of the Local Board of Control, and attended a meeting in that city on April 25, which was called by that board. There were in the attendance of this meeting seventy-two representative men of the state of California, and speeches were made by Governor Gillett, J. A. Filcher, Hon. George A. Peltier, chairman of the Board of Control; Congressman J. C. Needham, Dr. Elwood Mead of the Office of Experiment Stations, Washington, D. C., and Mr. W. A. Beard executive officer of the Local Board of Control, and chairman of the executive committee of the National Irrigation Congress.

The meeting was a success in every way, and a fund of \$50,000 was guaranteed by those present, who represented the various sections of California, which is to be used in advertising the congress and in the entertainment of those who attend as delegates.

In this connection it may not be out place to say that Messrs. Peltier and W. A. Beard are doing splendid work in the interests of the congress, and it is the opinion of those who are acquainted with the situation

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All Other Foreign Countries, 1.50

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Official organ of the American Irrigation Federation.
Office of the Secretary, 309 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 22 years old and is the pioneer publication of its class in the world.

that at least three thousand delegates will be in attendance at the Fifteenth Congress, and that nearly ten thousand visitors will be attracted to Sacramento and California, as a result of the thorough system of advertising which is contemplated and is being carried out by the Board of Control.

Mr. George A. Peltier, chairman of the Local Board, is a wonderfully active man and is taking a deep interest in this work—he is one of the prominent men of the state of California and is a leader in the Sacramento Valley, and it is safe to say that through the efforts of himself and Mr. Beard the Sacramento Valley and California generally will be better advertised through the medium of this congress than ever before.

We are publishing elsewhere in this issue an article on the congress prepared by Mr. W. A. Beard.

"Pinchoff" Pinchot.

One of our western readers who has been perusing Mr. Shumway's notes is prompted to communicate with us and furnish a bit of information as to a custom in his neck of the woods apropos to the subject of Shumway's observations. He states that they dub the "Secretary of State of the Kitchen Cabinet" "Pinchoff," in view of his propensity for incessantly pinching off portions of the public domain.

Our correspondent states "forest reserve discussions are of common occurrence in his section of the country, and that "Dr. Pinchoff" is our bete noir. That is the name used to frighten children with by thoughtless parents, and is synonymous with any old sort of evil thing, pest or plague." Continuing, our correspondent states:

"Whenever 'Dr. Pinchoff's' advent is heralded by his press bureau it is generally regarded by the citizens of the Northwest about the same as the approach of the smallpox or any similar dreaded thing," and concludes by saying "Long live Pinchoff!—if he could only be dethroned and forced to remain forever in Washington, D. C."

The effusion of our western friend indicates in a way the general feeling toward Mr. Pinchot throughout the west. The impression seems to prevail in that territory that this gentleman has some unknown influence over the President of the United States, and the western people are making an effort to learn what that influence is.

Exorbitant Prices. Reports indicate that the Reclamation Service is experiencing considerable difficulty in securing what they consider fair offers for construction work in connection with various projects. Contractors consider government jobs "fat picking," but the careful surveillance of Reclamation Service officials, where they are honest, as the majority of them are, will preclude the possibility of any overcharge by contractors in this work.

Mr. Newell, whose honesty and integrity are unquestioned, has general supervision of all of this work, and where bids are passed through him to the Secretary of the Interior it is safe to conclude that he or his assistants, being well acquainted with conditions, are fully as capable of determining values for work to be performed as the contractors themselves.

The exorbitant prices asked by some contractors for construction work on main canals and laterals in Montana has compelled the Secretary of the Interior to authorize a call for informal proposals, either in small divisions, or as a whole, and it is stated that even under these conditions only one bid was made, which would indicate at least an understanding between all large contractors who are capable of taking care of work of this character, which may prove too burdensome for the Reclamation Service and compel the carrying out of some of the larger projects by forced contract directly under the control of the engineers in charge of specific work.

The new Secretary of the Interior has not been in office long enough to fully grasp the situation in its entirety, but recent reports of his rulings would indicate a desire to protect the government in every way possible, and at the same time treat fairly the contractors who are equipped for work of this magnitude.

The IRRIGATION AGE will publish an article soon by Hon. Arthur R. Briggs, secretary of the State Board of Trade of California, on "How to Attract New-comers to the Newly Developing Areas Under Government Canals Throughout the West."

Mr. Briggs is fully competent to handle this subject and we anticipate an article which will be very interesting to our readers.

Recent developments under the reclamation law tend to show that a grave error was made in omitting from that law some provision which would assist in colonizing the areas under different government works throughout the West. It is a well-known fact that the Truckee-Carson Project, which was completed last year, and was extensively advertised as the first project opened up under the reclamation law, is not receiving the attention of homeseekers which its soil, climatic conditions and water supply warrant. This work was well advertised through the magazines of the country all of which gave it unusual prominence owing to the fact that it was the first project completed under this law, and it was reasonable to suppose that no difficulty would be encountered in colonizing the area under the canal. Varying conditions have, however, left this project with few settlers and a serious problem confronts the government in the matter of a return of the money expended on this work, which under the law was to be used for other works, as it was paid in by the settlers, at the rate of 10 per cent annually on the cost of each acre reclaimed.

It is very evident that where there are no settlers and where money is not turned back to the government as was anticipated under the law, serious criticism may be brought out against the law itself, and unless some provision is made whereby this money is returned to the Reclamation Service for use on new projects, the whole enterprise is liable to be discredited by a scrutinizing public. It is the impression of those who have given the matter serious attention that the law should be so amended as to allow a given sum per acre for colonization purposes, as carried on by large land and railway corporations throughout the West.

To more clearly illustrate the disadvantages under which the government is operating, it may be stated that the large railway corporations of the West and Southwest, who are marketing immense areas, of in many cases inferior lands, pay colonization agents as high as \$5 per acre for securing purchasers, who will settle on the land, and it is very easy to understand that a colonization agent, who is working at the rate of \$5 per acre for securing settlers, will put in better work than is possible by any government system, where the officials are not permitted to offer any inducement to either a settler or an agent.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation

The IRRIGATION AGE is not in a position to offer suggestions other than to say that it would be perhaps better to allow a prospective settler the amount represented by his first, second or third year's payment on his water right, thereby giving him the benefit of the money which would otherwise go to the pockets of colonization agents. On the other hand, it is possible that this plan would not work, as it would permit of no expenditure to bring facts concerning the cost of settlement upon land, and the expense encountered up to the time the first money crop is produced, clearly before the eyes of the man of the East, who has saved up a given sum and who will not move West without knowing definitely how far this money will reach in establishing a home in a new country. Another solution of this problem would be to allow colonization agents from \$3 to \$5 per acre with the understanding that they were to fully exploit the attractions and possibilities of a given tract under a reclamation project.

It is very clear that this matter must be taken up soon and presented to Congress at its next session, otherwise untold values in water will be running to waste through government canals by allowing the settlers who could utilize it advantageously, to remain in ignorance of the facts, and as stated above, these facts should be clearly put before the public by the right system of advertising.

Mr. Briggs will make this matter clear to our readers in his forthcoming article, and state some definite plan whereby this change in the law may be secured at an early date. If any of our readers are in a position to offer suggestions along this line we will be very glad to publish same in future issues of IRRIGATION AGE.

EDITORIAL NOTES.

BY G. L. SHUMWAY.

Congressman Mondell of Wyoming has the sleuths of the land department on his trail. Mr. Mondell was so inconsiderate that he opposed the pet scheme of the Forest King of levying tribute upon the beefsteak that reaches the table of the workingman and others.

The Forestry Department controls the price of building materials to us common laymen by compelling with its restrictions, all custom mills to close and forcing all builders to pay tribute to F. W. Weyerhouser. By its restrictions coal barons are given opportunity to advance prices of fuel. It seeks by establishment of lease reserves to advance the price of roasts and steaks that get to the consumer's table.

Governor Buchtel of Colorado has called a convention of representatives of public land states to see if

a united effort cannot be made for remedial legislation. This meeting should be well attended. The governor has shown a strange temerity in these days, however, by assuming that anything might be the right thing that has not for its original conception the fertile brain of some bureaucratic specialist at Washington. Look out for federal sleuths, Governor Buchtel.

It is devoutly hoped that our executive government will have representatives at the meeting—not to dictate or even participate—but to learn. Not to tell the West what they will give us, for we do not believe in coercive government, but to obey the will of the people who know of what is best. At the last meeting of the irrigation congress Forester Pinchot took the rostrum, and throughout his discourse ran the discordant note of dictation. We will give you this or that. "We" (the usurper) taking away our lawful heritage of free land, and then with condescending mannerism, will give it back to those who will be good.

Now this coming Denver meeting should be free from such offense. Representatives of our executive government should be there, should offer suggestions if requested, but should offer no intimation of what would be or would not be acceptable to the administration.

From a distance the press reports of the Binger Hermann trial seem to indicate complicity and perhaps crime, but press reports of the Nebraska trials are so perverted, we would prefer not to pass judgment upon the ex-commissioner. It would seem that men engaged in the dissemination of news would rise above the lot of common slanderers. That even if a federal employe gives out an item of presumed news, reporters would subject it to the same sifting process that another's information must endure.

Convictions at Omaha are monstrosities of justice, and the fault lies with the administration. Mr. Roosevelt, with his inherent impulsiveness, accepted as fact such misinformation garnered by fly-by-night irresponsibles. Upon it he discharged a United States marshall of unimpeachable integrity and a United States attorney of equally high standing, and practically rebuked a federal judge, and thereby exonerated a maudlin secret service agent who did not even need to substantiate his reports with an affidavit.

Arthur Wallace Dunn, a staff reporter of the *Woman's National Daily* of St. Louis stated a condition very concisely, when he said "the trials of these presumed offenders are made in the press." Recently all the western papers have contained scare headlines

announcing a sensation about to be disclosed. Men high in the walks of life, political, social, financial, are presumed to be implicated in a gigantic land swindle.

Just who the men are, or what the specific crime, the statements do not include, but they are so constructed that they are intended to leave no doubt in the mind of the reader that the unnamed accused ones are guilty. The public mind is poisoned—already convinced that crime exists, and that federal sleuths have conclusive evidence. The papers are aiding and abetting these abortions of justice by publishing such inferences.

Attorney Bush thinks he has convicted some of these so-called conspirators. Perhaps he has, but it was the press agent of the government who did the actual work. Irresponsible special and secret service agents with unsworn reports, together with a slop-over hysterical press, will convict any man, and there is little use to protest. Trials can just as well be eliminated, for victims will be railroaded to the penitentiary just the same.

Once again I repeat that a square deal demands that special and secret service agents should be compelled to swear to their reports, and be under bonds for damages if they fail to tell the truth.

The bureaucrats are worried, but have a momentary respite, for they have succeeded in directing the President's virility to fighting windmills. That \$5,000,000 conspiracy was concocted for no other purpose than diverting attention from the evident bureaucratic manipulation which is assisting the plunderbund lumber and coal men to profit upon the people's needs. Fifty million or five hundred million could not stem the tide of popular approval and assure the President a logical successor if Mr. Roosevelt would weed out his own executive garden.

When the President set aside those 18,000,000 acres for forest reserves on March 4 the lumber trust advanced the price of lumber \$2 a thousand feet. We had then hoped that this was the last executive act that would boost prices on the builders. However, it is discovered that Mr. Pinchot does not need law to govern his actions. In spite of express statute he has segregated a million acres more in Nevada and New Mexico, and we can expect another tilt in the price of lumber.

It is understood that a few custom mills were operating under the pinions and scrub pine, cutting timbers for mines, etc., hence the unlawful federal in-

terference. "Whom the gods would destroy they first make mad."

There has been much said of the agricultural home-stead bill, and the prodigal liberality of the forestry service in granting free permits to use timber from reserves. From that area which, if compact, would be over a thousand miles across in any direction, they have "permitted" settlers to use \$75,000 worth of timber. The munificence of this gift to us, goods that belong to us, is emphasized—it strikes home and makes our hearts overflow with gratitude—when we comprehend that it costs the nation millions a year to maintain the service, and has cost the builders of the nation billions during the last few years in excessive prices of lumber made possible by closing custom mills.

We can give Land Commissioner Ballinger a tip on how to increase the irrigation fund and at the same time reduce the cost of irrigation construction in the West. Put back some of the old liberal construction on our land laws and the people of the United States will quit going to Canada and begin filling up our own domain. Call off the sleuths of the land department and throw open to entry a few million acres that are now denied to settlers, and the irrigation fund will begin to pile up as of yore, and the west will fill with people who will be ready to assist in building the needed canals.

Secretary of Interior Garfield and the honorable commissioner have begun well, by eliminating useless bureaus and simplifying departmental work. Glory be! It looks like some real live ones are at the helm. Their predecessors were a decade behind the times, albeit they might have been of sterling integrity.

"Practical Irrigation," a 36-page pamphlet, has just been issued by Fairbanks, Morse & Co., Chicago, Ill. It deals very thoroughly with the mechanical irrigation problem and contains much interesting and valuable information with reference to the many different types of pumping machinery used for this purpose.

There are many fine half-tone illustrations showing irrigation plants in actual operation, these installations covering a wide range of service, including pumps operated by gasoline engines, steam pumping machinery, electrically driven pumps, and pumps operated by windmills, and the advantages of each clearly defined.

This is probably the most original and complete treatise ever issued on the subject. A copy of this pamphlet, No. 650 PI, will be mailed free of charge to interested parties.

**Send \$2.50 for The Irrigation Age
1 year, and The Primer of Irrigation**

The Fifteenth National Irrigation Congress.

To Be Held at Sacramento California, During the Week Beginning Sept 2, 1907.

BY W. A. BEARD, CHAIRMAN EXECUTIVE COMMITTEE AND EXECUTIVE OFFICER OF BOARD OF CONTROL.

The Fifteenth National Irrigation Congress promises to be a very large and enthusiastic meeting. The people of Sacramento, where the sessions will be held, began early to make plans and preparations for the comfort and entertainment of delegates. Work was already begun when the California delegation to the Boise Congress reached home and its scope has increased accordingly. Shortly after the political campaign closed last Fall a Board of Control, consisting of prominent citizens of Sacramento and of California, was appointed by the Chamber of Commerce and forthwith we began the work of creating and preparing for the Fifteenth Congress. The members of the Board of Control are

States in the great problems of forest conservation and irrigation development. As public interest in these problems and in their solution has grown, interest in the Congress has necessarily increased from year to year. The last Congress held at Boise, Idaho, was much larger in point of attendance than its predecessors held at Portland and at El Paso, and it is reasonable to expect that the Fifteenth Congress held in Sacramento this year will be very much larger than the fourteenth session—in fact, to be a success it must be larger, and it will be a success because the interest of the people of the United States is aroused.

The movement, of which the Irrigation Congress



HON. JAS. N. GILLETTE,
Governor of California.



HON. W. A. BEARD,
Chairman Executive Committee, Fifteenth National Irrigation Congress.

Geo. W. Peltier, manager of the California National Bank, chairman; Jas. N. Gillett, governor of California; M. R. Beard, mayor of Sacramento; W. H. Devlin, Col. E. A. Forbes, M. Diggs, Col. H. I. Seymour, J. M. Henderson, Jr. and C. F. Dillman.

Sacramento is preparing to entertain visitors on a very large scale, and we have reason to believe that the ample facilities which, we propose to provide for the comfort and entertainment of delegates will all or nearly all be required, for we understand from correspondence with people in various portions of the United States that the Fifteenth Congress is already attracting very widespread attention and interest.

The history of the National Irrigation Congress shows it to have been a manifestation of the interest of the people of the West and later of the whole United

is a part and which its annual and biennial sessions in years gone by have done so much to initiate and further, has for its object the conservatism and development of great natural resources of the country. These resources belong not to one state or one section but to the people of all the states. Their development means an increase in the commonwealth and is therefore of interest alike to the people of all states and to those engaged in all the various industries known to this country.

In the beginning the Irrigation Congress was an expression of a demand on the part of the West and many people, no doubt, still regard it as largely a Western movement. But it is not and it should not be a Western movement alone. The irrigation work in progress in the Western States, while perhaps more directly associated with the progress of those states

than of others, is, however, of interest to the people of Eastern States as well, because the irrigation of these Western lands means opportunities for the creation of homes. The people who build these homes are not in the West today; they must come from the East.

The development of the West by irrigation is of interest not alone to those who would make homes on lands so reclaimed, but to the manufacturers and merchants and all the great commercial interests of the country and of the East, for the reason that the people who settle upon these lands and make them by their labor productive must become purchasers and consumers as well as producers whose products will swell the sum total of the business of the country.

The Irrigation Congress deals not alone with Irrigation but with Forestry. Within the last few years an entirely new forest policy has been developed in this

its initiative and with the aid of the public sentiment aroused by the discussions which have comprised the proceedings year after year.

The National Reclamation Service now has at its command a fund of nearly \$40,000,000 with which works of great magnitude are being constructed in not less than fifteen states and territories. The Forest Service, also largely the result of the Irrigation Congress, has been entrusted with the control of many millions of acres of the public domain, the administration of which by executive action is deemed necessary to the preservation and conservation of streams.

Those who favor and those who approve, for there are some who oppose, must alike appreciate the importance of a meeting where the officials charged with the administration of these important branches of the Government Service meet face to face representatives of



Home office of Maywood Colony at Corning (Sacramento Valley), California. This elegant and substantial building symbolizes the permanency and stability of the Maywood Colony and is in plain view of all passing trains on San Francisco-Portland division of the Southern Pacific system.

country, a policy that is of interest to every citizen no matter where he lives for it seeks to protect the watersheds of the country, not alone in order that water may be conserved for Irrigation but to the end that destructive floods may be averted and prevented. The forest policy of the National Government is discussed at the annual meetings of the Irrigation Congress by men who favor and by men who oppose and in these debates lies the opportunity for the people of the United States to acquaint themselves with the underlying principles of this policy and to register their individual preferences regarding its administration.

The importance of the Irrigation Congress as a factor in our national life impresses itself upon us when we consider the tremendous character of the national enterprises which have been developed through

the various portions of the United States and through them make their reports direct.

Sacramento, where the Fifteenth National Irrigation Congress will be held, is the capital of California, the commercial and railway center of The Great Interior Valley of the state. The city has a population of nearly 50,000 people and boasts numerous advantages and attractions. Chief interest from an irrigation standpoint attaches to the great valley of which this city is the heart and center. This valley stretches lengthwise through the state of California more than 400 miles, a great level plane bordered on the east by the Sierra Nevada Mountains, on the west by the Coast Range, and presents probably the greatest irrigation opportunity on the Western Hemisphere.

This Great Valley with more than 10,000,000 acres

of fertile land lying beneath the California sun, with a growing season that is practically continuous, has a water supply that is believed to be ample for the irrigation of every acre and plans for the development of great impounding reservoirs, diverting dams and canal systems are now being made by the engineers of the National Reclamation Service. The carrying out of such colossal plans as have been outlined for this valley is an enterprise far beyond the capacity of the National Reclamation fund as at present provided, especially in view of the fact that justice must be done to other states having an interest therein. A beginning has been made in a small way, however, by the allotment of funds for a small unit of this great project which will soon be

an attendance of several thousand people and we are making preparations to take care of them.

We anticipate the fullest co-operation on the part of the railway companies of the country. We have asked for special rates, and assurances of interest in the events from railway managers all over the United States is our assurance that very favorable rates will be made.

THE NORTHWESTERN EMPIRE.

J. J. ALLISON.

In a recent visit through the northwestern states and northern California I was impressed with the



Eight year-old Almond Grove at Maywood Colony, California—Well Cultivated, but Never Irrigated.

undertaken at Orland in Glenn County.

Plans for the entertainment of delegates include a low-rate thousand-mile excursion completely encircling This Great Valley of California.

The chief feature of entertainment, perhaps, will be an Interstate Exposition of Irrigated-land Products which will open simultaneously with the Irrigation Congress and extending over the period of the California State Fair which will be held one week later than the Congress. The holding together of these three events, the National Irrigation Congress, the Interstate Exposition of Irrigated-Land Products and the California State Fair, offers an opportunity to study the irrigation policies and irrigated agriculture such as has been offered seldom if ever before. We confidently anticipate

progress that has been made and thrilled with the immense possibilities of future development.

It may be well to state that I have lived in the west, have made irrigation and agriculture a special subject of investigation for years, and that during much of the past two years I have traveled for the purpose of becoming familiar with the great "Northwestern Empire."

In this the first number of a series of articles for THE IRRIGATION AGE I shall give a general statement of the advantages of living on the irrigated lands of the west.

To western people the processes and effects of irrigation are so simple and ordinary that writing about them is superfluous. The majority of people who will

take part in the development of irrigated lands are the youths of the eastern states who are now seeking knowledge of the processes by which the products of the soil of irrigated lands in certainty, in quality and in quantity exceed the products of sections in which they now live. To these youths and to men and women of worth whose opportunity for obtaining a comfortable home and a competency is limited, I address these letters.

On every hand I met the same request—send us men and women who will work and send us money to develop our country. We have the opportunity and you back east have the people and the capital. Our people have made a living so easily they do not care to work.

To attain the highest success on irrigated lands intelligence and attention to business count for more than they do in the country of plentiful rainfall. Intensive cultivation is both possible and profitable when you have an abundant supply of sunshine, water just when you need it, and the finest soil that can be made. Forty acres of land with all the essentials for producing a full and certain crop is worth more, if measured by net cash returns, than a quarter section under ordinary conditions. When fruit is planted the value of the product is many times multiplied. At the present time irrigated lands are as cheap as the best lands of the east. Dr. N. D. Hillis said recently in an address at Caldwell, Idaho, that the farm lands of that region would, within a short time, be worth \$500 an acre. Lands there now, in alfalfa and sugar beets, net more than ten per cent on that amount.

The irrigated country will be densely populated, bringing all the comforts of the city with the added pleasures of country life. This is possible because the delightful climate permits outdoor work and outdoor pastimes during the greater part of the year.

It is often remarked that if the production is so abundant the market will be overstocked. The history of the country and the natural conditions prove the opposite to be true. Only a small portion of the land can be irrigated, on account of the surface formations and the supply of water. The greater interests of mining, stock raising and manufacturing will consume more than the irrigable lands can possibly furnish. In one year food products to the amount of \$6,000,000 were shipped into Montana alone. Other states have the same conditions to meet. The demand for agricultural products increases more rapidly than the supply, and must do so for many years.

The federal government is spending from ten to fifteen millions a year in building irrigation systems, and private enterprise more than that amount, and yet the demand for unimproved land is so great that at the opening of the Twin Falls tract, in April, 1907, thirty thousand acres were sold, with a great number of buyers unsupplied. It might surprise our readers to know that the most eager buyers are from the irrigated regions.

We are now in a most remarkable period of settlement. The opportunities of fifty years ago in Illinois and Iowa are not to be compared with the advantages now offered in our western states. The settlement will be largely completed and the settlers will be enjoying luxuries superior to those of the older communities within a very few years.

In selecting a state or a section for a home, one must be guided by his tastes, the amount of his cap-

ital, and the kind of business he will choose. In intensive farming specialization should be practiced. Some will choose fruit culture; others the dairy; others hay farming; many sugar beets; and still others stock raising. In all sections garden marketing and poultry raising will be very profitable.

In the main, the reports of great crops are true. Only those who have made investigations can believe what is told. In all the good is there nothing disagreeable? Yes, the country is full of failure, and always will be. Men will not work. They squander their money and their energy. The privations common to any new country discourage the faint-hearted, but there is compensation for those who conquer! Home with all the comforts and luxuries that money can buy is sure to come to the faithful. Worthy is the man and woman who build such a monument. It is not best for all to be dissatisfied with the old home. But to youth and ambition without a home there is a field in our great and growing west that will amply repay them for their labor. There is no room for the idler, the trickster, the pessimist.

In the June issue of THE IRRIGATION AGE I shall write about my observations in "The Great Valley of California"—the Sacramento-San Joaquin—with illustrated articles. The National Irrigation Congress has chosen wisely in selecting Sacramento for the place of its next meeting.

TO STOP SEEPAGE LOSSES.

The following letter comes to us from the University of California:

BERKELEY, CAL., March 31, 1907.

Dear Sir: The irrigation department of the Experiment Station of the University of California is investigating canal linings to stop seepage losses. This work was begun last year and is to be continued this summer. What is wanted is to find the cheapest material and simplest process; something which can be used on laterals as well as large canals, something which will check if not stop the percolation of water, prevent the growth of vegetation in canals and obstruct burrowing animals. Cement is effective but costly. Clay for puddling is not to be had in many valleys where water is valuable. There are, however, an unusual number of raw materials in this state which promise well, crude oil and asphaltum being the most abundant, and the special purpose of this year's investigation is to test the native materials.

The results of last year's tests will soon be published as a station bulletin. They showed cement concrete to be most effective, but it cost six times as much as a lining of crude oil, which cut down the loss more than half, stopped all vegetable growth, and ended the work of gophers.

We wish the interest and co-operation of the canal managers and irrigators of the state. We are especially desirous of securing two things:

1. From every irrigator or canal manager who has a lined ditch or reservoir a description of how the work was done, what it cost, and what the result has been.

2. Suggestions as to the experiments you would like to have us make, especially of material or methods of applying linings you would like to have us test.

You can be of great help to us in the planning of these experiments and we shall appreciate this interest and co-operation by giving careful attention to all suggestions and keeping you informed as to results. Sincerely yours,

ELWOOD MEAD.

Will pay for the IRRIGATION AGE
\$2.50 one year and the PRIMER OF
IRRIGATION.

MAYWOOD COLONY.

An Ideal Home-Building Settlement in California in which Good People, From All Over the World, Are Making Homes.

As you go, by the Southern Pacific Railway, from Portland to San Francisco, you pass through this well-known colony settlement. On either side of the railway, for a distance of eight miles, you will see orchards of oranges, lemons, olives, figs, almonds, grapes, peaches, pears, prunes and apricots. Scattered here and there among these orchards you will observe well-kept, thrifty-looking home—homes that look like real homes. You can't help but note the difference in the appearance of these colony homes and those which you will see both before reaching and after passing through the colony. Outside of this colony settlement you will see, as a rule, little houses and big barns, and that most of the houses are total strangers to paint. But when you strike Maywood Colony you'll see a different class of architecture, and you'll note that all of the houses are well painted and well kept up. These colony houses are the homes of people from the East who have settled here during the past ten years. At the present time there are just about 3,000 people here, and every day some new arrival gets off at the colony depot to look the country over. There is yet lots of land in the colony for sale, and there is plenty of opportunity for those who know how to take advantage of it.

That you may know the exact location of this colony you should be told that it is just 20 miles south of Red Bluff, and just across the Sacramento River from the celebrated Stanford ranch and vineyard. Tehama is the county in which this colony is located, and Tehama County is the most northerly county in the Sacramento Valley. Tehama County is noted for its variety of resources. Its geographical location gives it mountain, foothill and valley conditions. The mountains afford endless water power which is being converted into electric power, and conducted to points all over the Sacramento Valley. In the mountains in this country are immense sawmills. These mountains afford summer range for hundreds of thousands of sheep. This county, by the way, is the largest sheep county in California.

In the foothills are many delightful homes. The climate is such as to produce the best of apples, beans, potatoes, etc.

In the valley we have the rich bottom land along either side of the Sacramento River. Here is the home of the sugar beet, of hops, alfalfa, corn potatoes, vegetables, fruits of all varieties, as well as cereals of all kinds.

The Maywood Colony is located on the upper end of the Sacramento Valley, just where the valley land begins to undulate in its approach toward the surrounding mountains. Its setting is an ideal one, being encircled on the north, east and west by nearby mountains from six to fourteen thousand feet in height. While there is practically continuous summer in this valley, perpetual snow rests on the round-about mountains. To the eye this contrast is a source of constant admiration.

Corning is the name of the railway station for the colony. You arrive here in about thirty minutes

after leaving Red Bluff. You can't help but know, as soon as you see it, that it is an Eastern town in a Western country. The first object, out of the car window, is the home office of the Maywood Colony—a striking structure of Spanish architecture, with an observatory or tower one hundred feet high. Stately palms border the office grounds—the whole forming an effect most pleasing to the eye that sees beauty in beautiful things. Just across the street from the office you will see the Hotel Maywood, a big, comfortable hotel, surrounded by ample grounds, in which you will see growing oranges, lemons, pomelos and palms, and other ornamental plants. Right here you have a positive demonstration that delicate citrus fruits and plants will thrive in the open air in this climate. Back of and beyond the colony office and hotel stretches out the colony village of about 2,000 population. Corning is an unusually ambitious and progressive place—in fact, Corning is a city, for it was recently incorporated as a city, with an area of 1,170 acres within the corporate limits.

And the first important move that the citizens took was to vote the town a dry town—so that saloons might be kept out. The people who are settling here are of a moral, home-building kind, and the sentiment is strong against saloons.

Corning has five general merchandise stores, one of which is a co-operative store, with some 180 members. There are two good hotels, two newspapers, two telegraph offices, two lumber yards, two livery stables, an express office, telephone office, bank, a cannery and fruit packing house, an up-to-date creamery and a lot of other business houses usually found in thrifty towns.

Corning is especially proud of her six churches, three of which would be counted as good church structures in a city of 10,000 people. By this you'll see that Corning is looking well to the spiritual side of life.

To her schools, Corning has also given unusual thought and support. In the grammar school nine teachers are employed, while in the high school six teachers are provided. In the colony, and outside of the town of Corning, there are three additional grammar schools.

That you may understand the exact relation sustained between the City of Corning and Maywood Colony, let me explain: Maywood Colony contains 39,000 acres of land, divided into blocks of 80 acres each, with 40-foot avenues bordering each and every block. Each of these 10-acre blocks is subdivided into eight 10-acre lots. The colonists buy and own from one-half a lot to four lots. Most of them own two lots, or 20 acres. Now, right out of the center of this 39,000-acre tract 1,170 acres have been cut out and cut up into business, residential and villa lots. By this you'll see that Corning and Maywood Colony are one, but that the railway station and postoffice go by the name of Corning, while the adjoining land is legally known as Maywood Colony. The cause of the two names for the same place is that the railway station and postoffice were established long before the colony was started. Prior to the coming of Maywood Colony this same land was used

for wheat and barley culture, and Corning was the shipping point.

The industry to which most of the colonists turn their attention is that of fruit growing. In the colony some 12,000 acres are now set to trees, and additional orchards are being planted each year. The place is a natural fruit country. Nowhere in California does fruit culture meet with less resistance. The weather is never cold enough to hurt the trees. The trees are practically free from all tree pests. Fumigating and spraying, which is so necessary in many sections of California, is not needed here. The climate is just right for open air, or sun drying. Water is sufficiently near the surface to mature big crops of fruit without irrigation. Of course, in the absence of irrigation, cultivation must be thorough. At convenient points in the colony there are five different drying plants at which the peach, pear, prune and apricot crops of the colony are cured. These drying plants offer to the fruit grower a variety of propositions, of which he can take his choice. They will either buy your fruit, fresh, for so much per ton, on your trees, or so much per ton delivered at the dryer. Or, they will cure your fruit for you for so much per ton, and deliver it to you, you selling or holding it, just as you see fit. Or, you can buy stock, or a membership, in one of these concerns, have your fruit cured and sold by it and participate in the annual dividends. No trouble to market fruit at Maywood.

In Corning, and on the railway, is located the big fruit packing house where the dried fruit of the colony is processed, and packed for Eastern shipment. During the packing season this plant affords pleasant and paying employment for every available man, woman and girl on the colony. Practically all of the colony fruit crop is sold in dried form. In this form there can be no loss. The fruit is paid for as soon as it is loaded into cars. Fresh fruit consignments are always risky, and the Maywood Colony fruit growers do not sell their fruit that way. A market has already been developed which calls for the entire Maywood brand of fruit. The excellence of the fruit commands top prices.

The olive crop of the colony, which is a big one, finds ready sale. Many carloads of olives are shipped from Maywood to Los Angeles, at which place a big demand has been created for ripe pickled olives. Some of the colonists pickle their olive crop and find a ready market locally.

The almond crop of the colony is usually engaged, or contracted for, two months before it is time to harvest the almonds. This statement is made to show that the market for the Maywood Colony product is already established, and that a prospective settler need not bother his head about what he is going to do with his fruit when he has produced it.

Close to the fruit business as a money maker comes the hen—the White Leghorn hen. She is a money maker here. This is the hen's heaven. The climate just suits her. She knows but little, if any, disease here. Here she lays an average of 13 dozen eggs a year, and the average selling price of these eggs is 22 cents per dozen. This is a gross annual earning per hen of \$2.86. Poultry people here allow \$1.86 a year for the keep of a hen, and give her credit for earning a net profit of \$1 a year. Many of the colonists carry from 250 to 500 hens, and some as many as 1,000. The hens find plenty of natural green grass here for seven months

in the year. Alfalfa patches supply green food during the other five months. The most successful poultry growers cut their wheat with a binder and feed the wheat in the bundle. This plan saves the cost of sacks and threshing, and it gives the hen necessary exercise. Colonists who keep hens always have a rattle in their pockets.

Corning enjoys the distinction of being the biggest turkey shipping station in the State of California.

As a third source of regular income many of the colonists keep a few cows, the product of which is sold to a creamery located at Corning. This is an exceptionally good grass country. Alfalfa yields from three to five cuttings a season. One acre of good alfalfa keeps two cows.

Many of the colony orchards are owned by absentees, and the care of these orchards, including harvesting the fruit crops, affords a vast amount of work for those who are on the ground. An effort is made by the colony management to distribute this work in an equitable manner among those colonists who are equipped to perform this class of work.

One of the valuable assets of the colony, and one which costs the colonists not a cent, is the Sacramento River, which forms the eastern boundary of the colony for a distance of seven miles. In other words, the colony has a river frontage of seven miles, and the colony land is above danger from overflow. This river is full of salmon, sturgeon, carp, pike, bass and catfish. Thousands of pounds of salmon are seined at this point and shipped to the salmon canneries. The river affords a great hunting place for quail, dove, geese and duck. Of course, the boys and girls have their boating and swimming clubs.

Located on the colony side of the river are the immense freight houses of the Sacramento Transportation Company, from which large amounts of grain are shipped. Most of the merchandise freight for the City of Corning comes by boat. A transfer line hauls the freight from the river to the city. This river freight line is a great equalizer of freight rates.

Most of the wood consumed in Corning and on the colony comes from the river. The bank is heavily wooded with oak, cottonwood and sycamore for a width of from one to two miles. Much of this land will cut 200 cords of wood to the acre. Oak wood at the stump sells at \$3.50 per cord, and for \$5 per cord delivered in town or the colony.

No section in the United States gives its settlers better drinking water than this. It is soft as rain water, and exceptionally pure. The whole valley in which Maywood Colony is located is underlaid with a sheet of this water, which runs from 8 to 15 feet from the surface. The supply is inexhaustible. No place in California can water be pumped at a smaller cost than right here.

One thing that we brag about is the character of the people who have made their homes here. There are no Japs, Chinese, Italians, negroes or other objectionable foreign element mixed up with us. They are not here because they are given no encouragement. They are not employed. They prefer to hold all work for colonists.

An interurban railway has just completed its location through the colony, and secured its depot site in Corning. The management states that this road will be in operation before 12 months from date.

All know how demand for property follows the construction of these lines. An electric road of this kind does much more to populate a country than does a steam road. With the electric road, every man's farm is a depot, but not so with the steam road, which stops at towns only.

There can be no question but that there is now at work a combination of conditions which will make of this colony settlement an important place. The indications are that it will soon become a fancy residential place, for nowhere for miles on either side of the colony is there a place which presents so many natural advantages for home-building as this. Thousands of Eastern people have their eyes on Maywood, and just as fast as they can wind up their Eastern affairs they are moving here. While there are now 3,000 people there, it is safe to say that not more than 25 per cent of the land owners in the colony are now living here. They are getting their land while prices are within reach. Some of them are having their places planted and otherwise developed prior to their coming here. Here is a settlement in which good fruit and alfalfa land can be bought for \$50 an acre. A ten-acre lot costs \$500. Many people are acquiring one of these lots by paying \$50 down, then \$12.50 per month for 36 months. No interest is charged on the deferred payments, and the seller pays taxes on the land until the payments are completed. This is a mighty easy way to become the owner of ten acres of good land, in a good community, and in a good country. The same kind of land is being sold in many places at from \$100 to \$250 per acre, and in time will sell at these advanced prices in Maywood Colony.

W. N. Woodson, of Corning, California, is the proprietor of this colony. He has been at its head since 1893. He is a heavy fruit grower at the colony, and has much to do with the general policy of the colony management. If you would care to look into all of the details of a place like Maywood Colony, write to Mr. Woodson, and he will send you printed matter in which there are maps of the colony, prices and terms for the purchase of the land, views of the business houses in Corning and colony residences, views of orchards of different varieties, and much other matter of interest to one looking about for a home, or an investment. All this printed matter is absolutely free.

Lewiston, Idaho, April 30.—Eight hundred cars of fruit will be shipped out of the Lewiston valley this season, a yield of unprecedented size in this section. Seven hundred cars of this amount will be peaches, while the remaining hundred cars will be divided among the famous Vineland cherries, apricots, apples and a few other fruits in small quantities. Much of the fruit has already been sold in advance by the growers, and the only difficulty now confronting them, the danger of frost having passed, lies in the fact that pickers are scarce.

**Send \$2.50 for The Irrigation
Age one year and
The Primer of Irrigation**

ARTHUR P. DAVIS.

On the recommendation of Director Newell, the Secretary of the Interior has promoted Mr. A. P. Davis to the position of chief engineer from that of assistant chief engineer of the Reclamation Service.

Arthur Powell Davis was born in Illinois, February 9, 1861. He was educated in the public schools of Junction City and Emporia, Kas., and later completed an engineering course in the George Washington University. At the age of 23 he entered the United States Geological Survey as a member of the topographic branch and since then has been closely identified with the topographic, hydrographic and engineering work of the Government. His early work was in the west, where he spent several years in surveying reservoir sites in the high mountains and in measuring the streams of the Great American desert. His name is attached to many of the original maps of Arizona, New Mexico and California. The reports of his investigations are valuable contributions to our knowledge of the arid country and its possibilities,



A. P. DAVIS,
Chief Engineer United States Reclamation Service.

and have been of especial value in the preliminary work of the Reclamation Service.

In 1898-1900 Mr. Davis had charge of the hydrographic work of the Nicaragua and Panama canal routes and his reports furnished much needed and important information concerning both plans.

He joined the Reclamation Service immediately after the passage of the Reclamation Act and since that time has been closely identified with all of the engineering work connected therewith.

Mr. Davis is a man of indefatigable industry and is earnestly enthusiastic in developing efficient and business-like methods in the conduct of the operations of the service. His strong characteristics are clear judgment and sound common sense, and these combined with a thorough understanding of the principles of engineering design admirably fit him for the responsible position to which he has attained. His promotion meets with the unqualified approval of all the engineers of the service and is regarded by them as a just reward for faithful and efficient service.

The bureau of which he has become chief engineer is now expending more than \$1,000,000 per month in the construction of twenty-five large irrigation projects, which will reclaim 3,000,000 acres of land. The work gives employment to more than 10,000 people and has already reclaimed nearly 300,000 acres of desert.

Potato Culture

BY L. A. ASPINWALL, JACKSON, MICH.

[Continued]

The time to plow should be carefully considered, especially in localities where the land is heavy and the climate variable in the extreme. Light soils may be advantageously worked at any time when the weather is not extremely dry. Plowing during the late autumn and even in the open winter of some states, when time is abundant and the team unemployed, is great economy; however, to invert some soils at that season would be objectionable. Light soils do not require the action of frost to crumble and pulverize them that heavy soils do. Sod land inverted during the autumn, or even in early spring, will sometimes remain undecomposed through the entire summer, especially if plowed during dry weather and followed by a dry season. *Sod should not be plowed when the weather is dry.* Clover should be allowed to grow from ten to twelve inches high before plowing, and, if possible, when there is abundant moisture in the soil. Under such circumstances rapid decay is certain. Let us note that the plowing in of green clover can only be for the planting of late potatoes. Should the land be fairly good when so plowed, the best results are certain to follow, provided the requisite precautions are taken to destroy the potato bugs and prevent the blight, as we shall hereinafter show. Even in dry seasons the product of such fields will be far above the average. In plowing stubble land we should observe the same rule, corn stubble not excepted. A damp surface is the best to turn under, and it is an important step in the direction of successful potato culture.

Harrowing the land. An ordinary harrow for most soils will answer the purpose; still such implements as the Acme and several of the best disk harrows are to be preferred for sod land. These harrows do not tear up the sod, but leave the surface beautifully pulverized. The field should be traversed somewhat obliquely. This will aid in following the marks made when using a planter, as the driver will not be confused by marks of the harrow.

Manures and fertilizers. The question of fertility is one which demands the attention of farmers not only in the older settled portions of the country, but in districts which were once considered exhaustless. Natural vegetable decay is undoubtedly conducive to the finest and healthiest growth. Sod land or green clover plowed under is certainly the most natural method of enriching the soil. However, the impossibility of producing sufficient clover for this purpose necessarily demands the use of manures from the farm yard or stables, together with commercial fertilizers. In the vicinity of large cities where land is cropped continually, a liberal dressing of stable manure becomes necessary, also the application of commercial fertilizers. Stable manure should be well decomposed; green manure increases the tendency to disease where the soil is heavy and damp, while in dry seasons it will remain undecomposed and the full

benefit cannot be obtained. Clover sod should not be less than ten inches high previous to plowing, which, as previously shown, should be done during a time when the ground is moist. By the addition of eight or ten loads of manure to the acre, plowed in with the clover, a fine yield may be expected. Let us note that one acre well cultivated is more profitable than two poorly cared for. In the absence of heavy manuring, a rotation of crops should be practiced. The rule is to seed the land with clover or mixed grasses, with a crop of wheat, rye or oats. The following season cut one crop of hay, leaving the second growth to enrich the soil, and to be plowed under with the young growth the following spring for corn. There will still be enough substance left for a fair crop of potatoes. With the addition of eight or ten loads of manure to the acre, still better results may be obtained. The following season the land may again be seeded with grain. Where potatoes are more profitable than corn, they may be substituted for it, with a much larger yield, as greater benefit from the sod is afforded. When stable manure is depended upon alone, fifteen or twenty loads per acre, according to the fertility of the soil, is none too much.

Commercial fertilizers have proved a great boon to potato growers in many sections, especially in the eastern states. They are made according to carefully prepared formulas, and contain the elements requisite to potato growth. When drilled in and mixed with soil by the fertilizer attachment of a potato plant, the plant food is placed within easy reach of the young plants, which they stimulate and hasten in growth. However, it is always best to use compost or stable manure in addition thereto, which will maintain a vigorous growth throughout the season. Although from five hundred to one thousand pounds per acre is considered a liberal amount for land of average fertility, many growers use fully a ton per acre. Where the land is exceptionally fertile, two or three hundred pounds per acre will greatly stimulate the plant growth. The Bowker Company, of Boston, Mass., are reliable manufacturers of special fertilizers for potatoes. These contain the elements requisite for potato growth. As already shown, the fertilizer should be drilled in. When sown broadcast the fullest benefit cannot be obtained. Where a clover sod can, with the addition of compost or stable manure, be plowed in and commercial fertilizers drilled in, large returns may be expected in favorable seasons. To overcome the effects of dry weather, liberal manuring is essential. Plant food is rendered serviceable principally through the channel of moisture, which, if insufficient, must be supplied by an increased quantity of manure *well decomposed*. As plants also receive much from the air, liberal manuring will increase the growth of foliage through which they receive oxygen and nitrogen, and, more effectually covering the ground, will aid in retaining the moisture.

How to apply manure; certainly by means of a spreader. They are not only great savers of labor, but also of clothing, and have greatly eliminated this disagreeable drudgery of farming.

Manure should not be left on the surface. Exposed to action of the sun and air, constant waste is the result. Experience has proved that *manure should be plowed in*. It is then within convenient reach of the plant roots, and slight dry spells will not prevent the plants from receiving the necessary benefit. The same

rule will apply to commercial fertilizers, which, as already shown, should be distributed in the drills underneath the seed, and thoroughly mixed with the earth, thus preventing injury by contact with the seed. In the north of England, where potatoes are grown extensively, deep furrows are made, into which well rotted compost or stable manure is put. The seed is placed upon the manure and covered with a large double mold-board plow, which is run between the rows. It will be seen that the manure is where a full benefit can be derived.

The time to plant should certainly be governed largely by the seasons. In locations where extended droughts occur at periods usually the same each year, the planting should be done at a time which would enable a growth sufficient to withstand such dry time, or at a period far enough in advance of such weather to secure the largest growth possible towards maturing an early variety. In localities where the month of July is generally dry, the writer would not recommend very early planting for late varieties, inasmuch as the largest growth and consequent demand for moisture would occur about that period. To plant about the middle of June would be likely to secure a good crop, as the maturing growth would occur later in the season, during the month of August or September. Where droughts occur annually as late as August, early planting should be the practice. Where no relation exists as to condition of soil and moisture, early or late planting may be practiced, and should be decided upon by the demand or profit to be derived. For early planting the best time cannot always be determined, however it may be regarded as safe when the leaf buds of trees have swollen to a considerable size. Even under the most favorable circumstances, a cold spell may follow which would prove disastrous. By careful observation we can soon learn the earliest time it is safe to plant. Late varieties may follow the early planting to suit convenience and weather. An early variety planted as late as the first of July is often very valuable, and can be tested on a small scale before entering into the practice largely. Very slow growers and those which are slow to mature should be planted early; however, in relation to planting, the foregoing suggestions as to conditions of moisture and soil should be taken into consideration.

The selection of seed. It is a law in nature that like produces like. An inherent tendency, however, to degenerate is found where the standard of excellence has been raised by careful selection and cultivation. Bearing this fact in mind, the greatest care should be exercised to maintain such a standard. The planting of small potatoes year after year will bring about rapid deterioration. To plant the largest will favor an upward tendency. However, to plant large potatoes is expensive, hence the necessity of cutting to a size which will utilize most of the eyes. Although most farmers are not particular as to the number of eyes, the majority prefer two or three to a piece.

The one eye system requires more skill in cutting and planting. Many of the pieces being small are likely to become dry if not planted soon after cutting, and for lack of vitality are not certain to germinate, or come up, if planted in open furrows and covered with dry earth. Taking into consideration that more skill is required in cutting, together with the possible chances of failure as shown, it is highly probable.

The two eye system will prevail. The average man

can soon become an expert in cutting and but little care need be exercised in planting, unless it be exceptionally dry, during which time cut seed should invariably be covered with moist earth, otherwise the liability to fail in coming up. As a matter of economy, small potatoes may be planted one season. Where a large acreage is grown, the item of seed is quite an outlay. While the writer would recommend that the stock be maintained from fields planted with large potatoes cut, a great saving can be made by planting the second sorting from the product of cut seed each year, being careful to avoid the selection of any seed from such planting. Usually little or no difference can be seen in the crop from small seed the first season. By cutting off the seed end, a less number of sprouts will appear, hence a larger number of marketable



Figure 5. POTATO CUTTER.

potatoes. Some growers believe in a change of seed. Large potatoes procured from a distance of several hundred miles has proved highly satisfactory. Growers in South Carolina and Florida purchase much of their seed from Aroonstook County, Maine, while seed from the Red River Valley of Minnesota and North Dakota is purchased largely by growers in Colorado and Kansas. The increased yield usually pays well for the investment, including freight and cartage. A change of seed is undoubtedly good, certainly so where no care has been exercised as to selection and improvement. Taking into consideration the importance of obtaining pure seed from vigorous stock, it is best to purchase from reliable sources. Referring again to the selection of large potatoes for seed, and the reason for cutting them, it may be well to state that a further object is the distribution of seed. A large potato contains but few more eyes than a small one—it is simply a small potato more fully grown. As a rule but few eyes in a whole potato will sprout if planted; and four or five large sprouts which become rooted in a single hill are too many for the amount of nourishment and moisture in most soils. But, to divide the potato into pieces containing two or three eyes each, planting them 13 or 15 inches apart, a sprout from each will make the distribution such as to receive the greatest benefit from the soil, resulting in a yield of mostly large potatoes.

Cutting by machinery is fast superseding hand work. Although doubts have been entertained as to the possibility of making a correct division of the eyes, the wonderful success of the Aspinwall Potato Cutter has

brought forth the hearty endorsement of thousands now using them. Although at first thought seemingly impossible, the division of eyes is fully equal to hand work. The eyes of all potatoes are spirally arranged, and at a distance apart increasing in geometrical progression from the seed end toward the stem. The Aspinwall Cutter is constructed on this very principle, and consists of a bed of knives arranged in like progression, by which it is adapted to cut potatoes of various sizes, making the division of eyes equal to the average hand work.

The amount of seed per acre depends upon the size of seed and distance of planting. Whole potatoes will not go as far as cut seed. The one eye system is probably the most economical and should be adopted to increase new varieties. When the distance between the rows is thirty inches and thirteen inches in the drill, about six or seven bushels (according to size of the potatoes being cut) are required per acre. If three feet between the rows and 13 inches in the drill, about one-fifth less seed will be required. Let us note that a bushel of seed cut to one eye will plant nearly double the area that if cut to two eyes. The seed end, which contains eyes closely grouped, cannot be divided, hence should be cut off. When seed is cut to two eyes or thereabouts, and planted 13 inches in the drills, which are thirty inches apart, eight or nine bushels are required per acre. When the rows are three feet apart, about one-fifth less seed will be required. In measurement, it is to be understood as having reference to seed after being cut. When planting small potatoes whole, thirty inches between the rows and fifteen in the drills (which is close enough), from ten to twelve bushels must be allowed to the acre, according to size of the seed. Owing to the great variation in size of both whole and cut seed, allowance should be made from the above which is given approximately.

How deep to plant is a question the answer of which must be governed by the variety of potatoes to be planted, kind and condition of soil, and climate. The practice of ridge or hill culture some years ago gave place to what is known as level culture, which is simply deep planting, and, consequently, less hilling. In localities which for a series of years suffered from severe droughts, the method of planting was gradually increased until a depth of ten inches was reached. With the return of normal conditions, the depth of planting was again lessened. There must certainly be a limit to the depth of planting, both as to certainty



Figure 6. BED OF KNIVES IN POTATO CUTTER.

of the seed coming up and the labor required in digging. The object of deep or level culture is to enable the plants to withstand dry seasons, which were prevalent during the last decade (1890 to 1897). Although level culture still has some adherents, *the depth of planting should be based upon a condition of climate and soil.* Level culture should not be practiced where the climate and soil is damp. In the humid climate of England the practice is exclusively ridge culture. Experience in that country has proved that excess of moisture and the

tendency to decay must be avoided by shallow planting, and the plants sufficiently earthed up to carry off the moisture. Ridges or hills present a large surface to the air and sunlight, hence a rapid evaporation. In Germany, where the climate is less humid, the practice is to plant deeper. From the foregoing, it is obvious that the depth of planting should also be governed by the *condition of the particular field to be planted, in connection with climatic influence.* If inclined to be wet, shallow planting with ridge or hill culture should be the rule; if dry, level culture will produce the best results. Those varieties having a tendency to protrude from the soil should be planted deep enough to prevent exposure of the tubers. A safe range for average varieties is from three to six inches, according to soil and conditions, three inches in damp soil and deeper in dry localities. Let us also note the difference between whole and cut seed in reference to planting. The one eye system leaves but little nourishment in each piece compared with the whole potato. With comparatively little vitality, the sprouts cannot well force their way through more than three inches of earth. With deeper planting much irregularity will result, both as to coming up and vigor of the plants. The feeble growth attendant upon planting cut seed too deep has many times been charged to the seed rather than the depth of planting. Considering the vigorous growth from the whole seed, even when planted six or seven inches deep, let us remember the limitation of depth when planting small pieces. We plant cut seed for two reasons, to economize in the use of seed and to produce a greater proportion of marketable potatoes. We can produce more large potatoes from cut seed in average soils than from whole potatoes, provided we comply with the requirements essential to their growth.

The distance apart to plant depends upon the variety of potatoes and fertility of the soil. The heavy growing sorts require more space than those having small vines. Rich soil will admit of close planting in proportion to its fertility. When planting in drills, the usual distance for average varieties is about thirteen inches, and fifteen for the stronger sorts, when the seed is cut to two eyes. If cut to one eye, the distance may be lessened between the rows. Where the land is very fertile, the distance between the rows should be about twenty-seven inches. By close planting in rich soil, the vines will cover the entire ground, and serve to prevent a growth of weeds, also aid in retaining the moisture. In the neighborhood of large cities in the older settled portions of the country, close planting is the rule, some growers making the distance between the rows less than twenty-four inches. In England and Germany the distance between the rows is not above twenty-seven inches, and frequently as close as twenty-two. The high price of land has necessitated the greatest production possible, hence close planting. The writer has induced some few to adopt the English standard of width, which is twenty-seven inches. Although the change was made with hesitancy, the results were highly satisfactory. Why not profit by this experience and bring a smaller acreage to a higher state of cultivation which will require less time to plow, harrow, plant, cultivate and harvest? The object of all culture should be to obtain the largest yield from the smallest acreage with the least outlay. Land which has been cultivated fifty or one hundred years has the tendency to produce smaller tops, while in new land

the converse is true, necessitating a distance of three feet to give room for the luxuriant growth. The difference in soil has much bearing upon this part of our subject. Heavy land has a tendency to produce a small growth of tops, while sandy land is usually productive of a more vigorous growth. Where potatoes are planted in hills or checks, the distance is usually from thirty to thirty-six inches each way. The great difficulty of planting in checks by machinery will gradually displace the practice for drill culture.

When planting by hand a double mould-board plow is best for opening the furrow. Baskets or sacks strapped over the shoulder render the work as easy as possible. For covering, a plow will answer in absence of a Victor Coverer or Planet Jr. Horse Hoe, both of which are good tools.

Hand planters are used to some extent. The land is prepared by marking the field both ways. As with hand corn planters, they are pressed into the ground at the intersection of the marks. Although a load of potatoes has still to be carried, the work of covering is done away with.

Planting by machinery. In modern potato culture the Aspinwall Planter is regarded as indispensable.

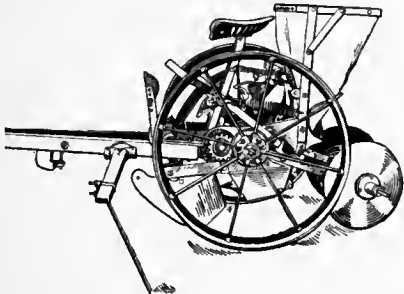


Figure 7. POTATO PLANTER.

The scarcity and high price of labor has made it a necessity. It enables planting the seed at any depth required, which is also uniform. This is scarcely possible with hand methods. Another important feature is, covering the seed with moist earth. Cut seed unless so covered will often fail to come up when the weather is dry. Unlike whole seed, the pieces contain proportionally less nutriment for supporting the sprouts, which in dry soil receive nothing through the young rootlets. With very small pieces (such as contain but one eye) the nutriment frequently becomes exhausted before sufficient moisture is supplied by rain. In any event, many of the plants from small and withered pieces are feeble as compared with those of larger seed. When one can ride and plant five acres per day in rows beautifully straight, the seed deposited at a uniform depth, and distribute fertilizer if desired, it is an appeal to every intelligent potato grower, especially when a large saving in expense is presented, besides personal comfort and ability to accomplish the work when desired. Cultivation of the crop is rendered much easier where the seed is planted straight, also the driving where machinery is employed to harvest the crop. Although the Aspinwall Planter has given almost universal satisfaction for twenty-five years, the change in planting from small to large seed has necessitated greater capacity of the pickers in the handling of large seed. The Aspinwall Planter No. 3 fulfills this requirement perfectly, and, withal, will drop ninety-nine per cent good. In this age of technicalities, potato

growers everywhere are demanding better machinery, as well as methods of culture.

The cultivation of the crop has materially changed within twenty-five years, hand work being almost superseded. Under present methods, the first operation is to harrow the field about one week before the potatoes come up, using a light harrow or weeder. If, when planting, the planter coverers have been set to ridge the rows, the harrowing will destroy all weeds and level the ground. The best plan is to traverse the field lengthways, keeping the horses between the rows so as to avoid treading on the potatoes, which are soon to emerge from the soil. If possible, the work should be done in pleasant weather, when a few hours of sunshine will destroy most of the young weeds.

In about a week the plants will appear in clean rows, when the cultivators should be brought into use. With machine work, the potatoes are planted in a perfect line, which enables setting the cultivators much closer than for hand methods. Close cultivation not only destroys weeds but admits air and light near the plant roots. It is the practice of some growers to harrow once or twice after the potatoes are up. By using a light slanting tooth harrow or weeder, and traversing the field crossways, but few plants will be injured. The complete destruction of young weeds will more than compensate for the slight injury. Between each harrowing, deep cultivation is necessary, though less close to the young plants each time. Keeping the soil loose, not only admits air and moisture, but allows the earth to expand for potato growth. Among the many valuable wheel cultivators it is difficult to decide which is best. Where level culture is the practice, the last cultivating should be substantially as the first, except to set the cultivator so as to hill the row sufficiently to cover any weeds which begin to appear. A moderate quantity of earth is also necessary to protect those potatoes nearest the surface from becoming sunburnt or green. For hill culture the cultivator should be set to draw the earth toward the rows. By hilling potatoes, the late growth of weeds is more effectually destroyed than with level culture. Ordinarily the last cultivating should not be later than when the field is in bloom, however it is advisable whenever young weeds are numerous, or the ground hard. Clean and deep cultivation should be the motto of every potato grower. Clover sod is generally productive of fewer weeds and less likely to become hard than land which is heavily manured from year to year.

DESTRUCTION OF THE POTATO BUG AND TREATMENT OF THE BLIGHT.

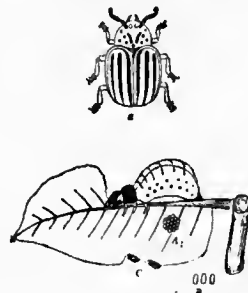


Figure 8. BUG AND LARVAE NATURAL SIZE.
A. EGGS. B. EGGS MAGNIFIED.

Spraying potato foliage with Paris Green or London Purple to prevent its destruction by bugs, and with

Bordeaux Mixture to arrest the progress of blight, is absolutely necessary to success in potato culture. Ordinarily less difficulty is experienced in coping with bugs than with blight. In combating them, it is really the larvae we have to contend with. The parent bugs pass the winter underground, emerging about the period of early potato growth. The eggs, which are orange in color, may be found deposited on the under side of the tender leaves, in groups varying from four or five to fifteen or twenty in number. In five or six days, according to the temperature, the young larvae appear, and, being voracious feeders, rapidly consume the plant foliage, unless the necessary precautions are taken.

[Concluded in June issue.]

Reclamation Service News

Pleasing to Service.

There was jubilation in the Reclamation Service recently when the secretary announced after personal investigation of the charges of graft in Idaho that they were entirely without foundation, and further that the two principal engineers involved deserved recognition for efficient and faithful services rendered in safeguarding the interests of the Government.

Director Newell, in reply to questions, stated that he was particularly pleased at the outcome of the investigation, as it strengthened his hope and belief that the Service is not only a strong organization, but is composed of men upon whose integrity he can rely.

"The publication in several newspaper of vague charges affecting the integrity of engineers in Idaho was naturally a source of deep chagrin," said Mr. Newell. "While at no time has there existed in my mind the slightest doubt as to absolute honesty of the engineers against whom charges of graft were leveled, the complete exoneration by Secretary Garfield of every member of the Service in Idaho is very gratifying.

"We have understood perfectly that the charges were attributable to parties financially interested in discrediting the engineers. The recent attacks were made in the endeavor to intimidate the engineers and to coerce them into taking a less positive position in protecting the Government's interests. These men have boasted that they could bring sufficient influence to compel the removal of engineers who stood between them and the payment of doubtful claims against the Government.

"While proof is lacking of the existence of an actual conspiracy to injure these engineers, all the elements of collusion in this regard are found in the statements which have been made in unison by a number of men. Taken singly none of these statements would be considered as worthy of much consideration, but when combined they had an appearance of plausibility.

"Careful analysis of the papers on file in the department show that this collusion probably stopped just short of being within the reach of the law on the score of libel. The communications are of a character which, while undoubtedly libelous in the ordinary use of the word, may not be quite covered by the law, so that the engineers and others who have been the subject of attack may be unable to obtain legal redress. Public opinion, however, in the long run will render full justice to the men who have been so unjustly accused.

"Some of the yellow journals have taken the opportunity afforded by the attack to intimate that the entire Service was involved. The papers on file do not contain any basis for such broad charges, and I am convinced that the Reclamation Service as a whole stands on the highest plane of personal integrity and devotion to the public interest."

Interview With Arthur P. Davis, Chief Engineer, United States Reclamation Service.

I am exceedingly glad but in no way surprised at the decisive vindication Mr. Ross and Mr. Horn have received at the hands of the Secretary of the Interior after very fully and carefully considering the facts in the case.

No one who is well acquainted with Mr. Ross has ever doubted for a moment that falsity of the charges of dishonesty, nor that he would be promptly and triumphantly exonerated. Mr. Ross was for several years state engineer of Idaho and in this capacity it became his duty to protect the interests of the State in many ways, a duty which he never shirked for an instant regardless of its consequences to himself.

In this way and in similar defense of the interests of the Reclamation Service, Mr. Ross has made many enemies, some of whom are quite influential so that one knowing the history of past struggles is not surprised that occasionally attacks are made upon him as they are bound to be upon every public servant who is aggressively faithful to his trusts.

A stranger going into the state and happening to fall in with a number of disappointed victims of Mr. Ross' fidelity might readily get the impression that he was an easy mark for any one interested in discrediting him. His record, however, is so well known both in Boise and in Washington that it does not take long to fathom the motives behind these attacks and to vindicate his fidelity to duty.

That charges of dishonesty were at the same time and by the same people made against Mr. Horn simply added to the absurdity of the whole affair in the minds of those knowing Mr. Horn, for his record for probity and fidelity is as long and as clean as that of Mr. Ross, although he has not been thrown in a position of making as many enemies.

All honest men who knows the facts are delighted with the outcome of the investigation and with the prompt and decisive action taken by the Secretary of the Interior.

By a simple stroke of the pen Secretary Garfield has effected an annual saving of several thousand dollars in the Interior Department. He has signed a formal order which makes it no longer necessary for the employes of the department to have their signatures to traveling expense accounts acknowledged before a notary or other official empowered to administer oaths.

The jurat fees of the employes alone amount to several thousand dollars each year, and the inconvenience and loss of time entailed upon them probably costs the Government as much more.

The order is in line with the new policy of the department for economy and efficiency in administration, and eliminates a form of red tape which the secretary regards as unnecessary, although sanctioned by long observance in the past.

The interests of the government will not be jeopardized as the penalties of the federal statutes of fine and imprisonment for presenting a false account will be equally applicable to the new method.

The secretary's action is particularly gratifying to the departmental officials, as it places them in the "on honor class" which heretofore included only the officials of the army and navy. It is exceedingly probable that this order will be followed by similar action in other departments, and will result in the saving of tens of thousands of dollars annually to the Government.

Secretary of State Robert Lansing has transmitted to the Secretary of the Interior a joint memorial of the State Legislature of Idaho, urging that a pumping system be installed on the Minidoka project for the irrigation of a large area of land on the south side of Snake River.

In acknowledging the memorial Secretary Garfield stated that it is the purpose of the Reclamation Service to inaugurate a pumping system, but it is not practicable at this time to fix a date for beginning the work.

This season 65,000 acres on the north side will be supplied with water by means of a gravity system which has just been completed. The project is therefore on trial, and it is not deemed advisable to extend the work of construction or to largely increase the expenditures of the reclamation fund on this project until the success of the first unit is fully demonstrated.

Moved to Chicago.

Arrangements have been made for the removal of the cement testing laboratory of the Reclamation Service at Denver, Colo., to Chicago, Ill., where it will be installed in quarters provided through the courtesy of the Armour Institute of Technology.

The work carried on by the laboratory consists principally of acceptance tests of the cement purchased for use on the construction work of various projects of the Reclamation Service and of the supervision of the shipment of this cement from the factories after the tests for acceptance have been made.

The field covered by this work includes all of the projects of the Service, with the exception of those situated in the Pacific Coast States, for which the supply of cement is obtained from plants in California and tests of which are made at the laboratory of the engineer of Soils at Berkeley, Cal., and also of the Salt River project in Arizona, at which point the Service has a cement plant of its own for making the cement required on the project.

The specifications under which the cement is purchased conform in general to the standard specifications of the American Society for Testing Materials and the methods employed in the laboratory for making the tests are in general those recommended by the Committee on Uniform Tests of Cement of the American Society of Civil Engineers which rules are included as a part of the above named standard specifications.

In addition to the regular tests for the acceptance of material which constitutes the routine work of the laboratory, such experimental work has been carried on, such as tests of sand-cement and tests of sand and stone for concrete materials on various projects. The laboratory is also equipped with an outfit for making tests of the permeability of cement mortar under water pressure. It may be noted also that, in addition to the regular tests for tensile strength made in the laboratory, occasional sets of long time tests are made on each branch of cement tested, these sets being for various periods running up to ten years, and there are now over 3,000 briquettes in storage for these long time tests.

The headquarters of this laboratory have been at Denver, Colo., since its establishment in 1904, but as a large portion of the cement is now being obtained from the plant of the Illinois Steel Company at Chicago, its removal to Chicago has been found desirable and acceptance has been of quarters which the Armour Institute of Technology has offered to provide for it. As has just been mentioned, the plant at Chicago is now supplying a large portion of the cement being used by the Service, but other plants from which cement is being obtained, or has been obtained during the past year, are those located at Salt Lake City, Utah; Portland, Colo.; Yankton, S. D.; and Iola and Independence, Kas.; and, in this connection, it may be of interest to note that the laboratory contains a collection of samples from these various plants showing the raw material used and also the same in the various stages of manufacture down to the finished product.

ORLAND PROJECT.

The Secretary of the Interior some time ago made a conditional allotment of \$650,000 for the Orland irrigation project in the Sacramento Valley, and it now rests with the land owners in the vicinity of Orland as to whether the Reclamation Service will have an opportunity to prove to the people of the Sacramento Valley what Government irrigation is capable of doing for that valley. Everyone knows that a large number of the land owners in that valley consider wheat raising good enough, and that means that it takes from one section of land up to maintain a family.

With the examples of the success of irrigation in many parts of the valley before them the people are gradually awakening to the fact that the cultivation of large areas in wheat is not calculated to bring financial returns commensurate with the labor and capital invested. The big ranchman more than any one factor has retarded the proper development of the state of California, and progress will continue to be slow until the large land owner can be brought to see the possibilities of intensive cultivation under irrigation.

The people in the vicinity of Orland have shown a remarkable spirit of progressiveness in organizing a water users' association entirely upon their own initiative, and in urging upon the Government through their Washington rep-

resentatives the consideration of a reclamation project in the vicinity of their town. By energetic action they have succeeded in proving to the Reclamation Service the possibility that land owners might consent to the necessary subdivision of their land; that the owners of present small canals are likely to agree to an amicable settlement of water disputes by the disposal of their properties at a reasonable price, and that lands that may be required for reservoir purposes will be obtainable at fair figures. The Orland people have been able to induce the Secretary of the Interior to make an allotment from the reclamation fund for the construction of an Orland project, conditioned upon the above matters being actually done, and it is gratifying to everyone in the valley to observe the intelligent and ambitious manner in which the people are going about these things.

When the conditions imposed by the Secretary of the Interior shall have been complied with, and when the conditional allotment shall have been made definite, the final plans of the necessary work will be promptly prepared by the Reclamation Service, after which construction can commence.

The area of the project probably will be slightly in excess of 10,000 acres. As compared with the irrigable area of the Sacramento Valley it represents less than one per cent. It cannot therefore seriously affect the physical conditions throughout the valley. When, however, these ten thousand acres now producing a small amount of wheat shall become highly productive, when oranges and lemons and walnuts and almonds are being shipped from this small area by the hundreds of car loads, when the land shall have increased in value from less than \$10 to many hundreds of dollars per acre, then it is hoped that other parts of the valley will desire to be similarly improved, and that the large land owners will consider it to their benefit to encourage similar work elsewhere.

The immense possibilities of the valley will then become more and more apparent, and the various interests will come to realize that the success of one will assist the success of the other. If it can then be shown that the difficulties in protecting the low lands on the Sacramento River may be helped by the construction of reservoirs for the irrigation of the high lands; that navigation can be better provided for than at present with a less wasteful use of the summer flow of the Sacramento River, and that there are ways in which the mining industry can be carried on without detriment to agriculture. With a better understanding of these facts the people of the valley will insist upon attacking the problems of general improvement on the vast and far-reaching scale which it deserves, and henceforth progress will follow in broad lines and with constantly accumulating results.

With the progressiveness and ambition of the Western people it need not be more than a generation to see a marvelous change in conditions, and the work in connection with the Orland project will derive its highest importance and value from having given impetus to the full development of the potentialities of this great valley.

ENGINEER D. C. HENNY TALKS.

Mr. D. C. Henny of the Reclamation Service, supervising engineer for Washington, Oregon, and the major portion of California, who has been in the Washington office a few days, said last night:

"Construction on the Okanogan irrigation project, Washington, is proceeding at a very favorable rate. Storage for the project will be obtained by rebuilding and raising the outlet works on the Salmon Lake reservoir during the late spring of the current year. The inlet canal has already been constructed. The principal storage will be obtained in Conconnully basin reservoir by the construction of an earth dam 82 feet high. No satisfactory bids have been obtained on this work, and for that reason the Government has purchased and shipped in all the equipment necessary to build this dam by forces directly engaged by it, and preparatory work has already been commenced.

"The work is interesting not only in that the dam is a very high one, but also in that it must be constructed between two flood periods, and it is hoped that it will be practically finished before the end of this year.

"The water from the two reservoirs, both lying close to the town of Conconnully, will be released when needed for irrigation, and will flow down the natural bed of Salmon

River for about ten miles, to a point where last year a concrete diversion dam and headgate were constructed. From this point it is but a short distance to the irrigable lands of the project.

"Most of the work of the main canal was accomplished during the past year, and the remainder will be completed during the current year. All the minor canals, laterals, and structures have been staked out and will be finished during the summer and fall.

"The Government engineers have been gratified in being able to have this work under construction by local people at reasonable price. If the plans can be successfully carried out the project may be considered finished and ready to do business in the spring of 1908, when the entire tract of nearly 11,000 acres, inclusive, however, of about 1,700 acres privately irrigated, will be put under irrigation.

"The climatic conditions under this project are in a certain sense ideal. The latitude is relatively high, and yet the elevation is comparatively low, most of the project being below an elevation of 1,300 above sea level. The summers are not excessively hot, nor are the winters very cold, and as a rule the climate can be considered as attractive and healthful as any to be found in the United States. The lands are adapted to the raising of hardy fruits which, by reason of numerous mining camps surrounding the project, and the scarcity of irrigated lands in the vicinity, should command a high price.

"The land will be divided up in forty-acre farms, and a great influx of the best class of farming people has already taken place during the last year, so that the full settlement and immediate cultivation of the soil are practically insured.

"The readiest way to get to the project is to proceed to Wenatchee by rail on the Great Northern Railroad, and there take a steamer on the Columbia River to Brewster, which is about a twelve-hour trip up stream and about four hours down stream. During a few months in the spring a steamer plies from Brewster to the small towns of Alma and Riverside, on the Okanogan River, both very near to the irrigable lands under the project. A stage runs from Brewster to the above named points throughout the year, and the trip to Alma requiring about eight or nine hours.

"The usual water users' association has been formed, and by addressing the secretary of the same at North Alma, Wash., further information regarding the lands can be obtained."

TIETON PROJECT.

"The Tieton project, Washington, will irrigate about 24,000 acres lying due west from the city of North Yakima," said Supervising Engineer D. C. Henny, who has been in Washington for a few days. "Some of the land lies within five miles of the city, and none of it is over fifteen miles distant. The water will be taken from the Tieton River, and in order to get water to the land it is necessary to build a twelve-mile canal along the steep sides of the beautiful Tieton canyon.

"This work will be both slow and expensive, as it involves the construction of numerous tunnels aggregating over two miles in length, and practically all of the open canal requiring lining with concrete. The land itself is also very rolling in character, which renders the construction of a distribution system unusually expensive, so that the entire acre-cost of this project will be relatively high. On the other hand the lands themselves will be immensely productive, as is best illustrated by the present value of the lands immediately surrounding, which range from \$300 to more than \$1,000 per acre. Land owners consider the lands under the project as even more valuable for fruit raising than those now under irrigation, and they believe that though the cost of irrigation works be high, there is a very much larger margin between it and the value of the lands actually irrigated than on any other project under construction by the Reclamation Service.

"In addition to the main canal and distribution works referred to it will also be necessary to build storage works in order to replace in the main Natches River and in the Yakima River the waters taken from the Tieton River, so as not to interfere with prior water appropriations. To this end an earth dam 40 feet high will be built at the outlet of Bumping Lake, on the Bumping River, which flows into the Natches River, and a part of the storage will be derived from dams at the outlets of the upper Clealum lakes at the headwaters of the main Yakima River. A temporary dam at the outlet

of Keechelus Lake has already been completed. A crib dam at the outlet of Lake Kachess, originally built by private parties, has passed into the control of the Government, and will be strengthened and raised, and construction has been commenced on a smaller dam at the outlet of Lake Clealum. All these dams will ultimately serve as temporary diverting works for the construction of high earth dams by which the actual storage in said lakes will be very largely increased, but this work will not be done until further lands in connection with other projects in the valley require storage water.

"In connection with the Bumping Lake dam a road has been constructed by the Government in co-operation with the state and county to the dam which, it is expected, will be completed during the summer. This work was advertised, but as no bids were received new proposals will be asked for during the coming summer. The intention is to have all preparatory work done during the present year, and to have the dam itself completed during next year, when it is also expected that the main canal in the Tieton canyon will be completed and much of the distribution system will have been built.

"A portion of the project will probably be under irrigation during the year 1909, and it is hoped that the entire project will be under irrigation in 1910."

Truckee-Carson Flood.

Reports from the engineer on the flood of March 20th, which passed down the Truckee and Carson rivers in western Nevada indicate that it was the most serious flood which has ever been experienced in that part of the West. The maximum flood ever recorded in the Truckee River was about 9,000 cubic feet per second, but the flood of March 20 probably carried over 20,000 cubic feet per second. The maximum flood ever reported in the Carson River was about 6,200 cubic feet per second, but the flood of March 20 carried over 20,000 cubic feet per second.

This tremendous volume of water thoroughly tested the irrigation works built by the Reclamation Service for the reclamation of the lands lying in the Carson Sink Valley, known as the Truckee-Carson project. So far as can be learned at this writing the only change sustained by these works is the breaking of earth banks in the canal lines. No concrete structures have been injured. Districts Nos. 2 and 7, aggregating 80,000 acres of irrigable land, had practically no damage done to them, and water can be delivered to the irrigable lands of these districts within ten days. The irrigable lands of district No. 1, aggregating 26,000 acres, a large part of which had already been settled, will probably not be irrigated before May 1. Every possible effort will be made to deliver water to this district at that time, and no serious damage will result to farms in this district.

Settlers entering the country this spring will find many excellent farms awaiting settlement in districts 2 and 7, and those who come in at this time will find the water ready for their use in the remainder of the districts before they are able to prepare any amount of land for irrigation.

Floods of this character are almost unknown in this part of the world. According to the memory of the oldest settler there has never been a flood like this in western Nevada. The nearest approach to a flood of this height was that of the early sixties, at a time when there were almost no white people there and few to give accurate reports. As soon as the storage reservoirs are built in the mountains there will be no further floods of any character which can damage the farms of the valley, for in these will be stored the flood waters which will be let down during the latter part of the summer for the irrigation of the lands. There are ten such reservoirs planned, and construction will commence at an early date.

Instructions to Service.

The Secretary of the Interior has issued the following general instructions to the director of the Reclamation Service:

1. Concentrate on and give preference to the works upon which construction is nearly completed and where the projects will soon be producing revenue.
2. Discontinue further expenditures for general investigations.
3. Arrange wherever practicable for the reduction or suspension of work on projects which are so located that favorable bids for construction have not been secured.

4. Recommend for resoration to entry all lands now reserved under the terms of the Reclamation Act, the reclamation of which can not be undertaken in the near future, withholding, however, all reservoir sites or lands which may be required for rights of way for future works whose practicability has been determined.

In explanation of these instructions the secretary said: "The notably increased cost of materials and construction, the uncertainties encountered in transportation and the scarcity and high price of labor are deterring contractors from bidding for the Government work.

"Conditions have altered so materially since the first estimates of cost of construction were made and the allotments of the fund approved that I have deemed it advisable to direct that a reduction of the work in some instances and a suspension in others be considered. It would be most unwise to continue work where circumstances are so disadvantageous or to incur expenses which in the future may be considered as unduly large.

"By concentrating on those work now nearing completion new revenues will be coming into the fund and when the labor conditions and transportation facilities become normal the work on other subjects can go forward more economically and with greater rapidity. The expenditures during the past quarter have averaged about \$1,500,000 a month. At this rate the funds available for new construction will be exhausted before the end of the calendar year."

An area of approximately 28,320 acres embraced in the Truckee-Carson irrigation project, and formerly allotted to the Piute Indians, has been restored to the public domain by Secretary Garfield, who canceled today the Indian allotments. This land, which comprises some of the most fertile and valuable in the great irrigation project, and are subject to entry in farms of not more than 80 acres each under the terms of the Reclamation Act. The present canal systems and proposed extensions cover the entire area, and everything is in readiness for prospective homeseekers to make their filings at once.

A very desirable class of farmers is now taking up claims on this project, and the outlook is extremely favorable for the early development of all the irrigable lands in Carson Sink Valley. The transformation already apparent in this desert valley so long regarded as one of the most desolate spots on our continent is little less than marvelous. A new railroad has been built through the center of the valley, towns are springing up, and the sage brush plain is dotted with the homes of the new settlers. The town of Fallon, in the center of the project, which one year ago had only sixteen inhabitants, has today a population of more than a thousand and is growing rapidly. There is great activity in the nearby mining camps and rich strikes are frequent, confirming the prediction that the agricultural lands will soon be surrounded by prosperous and permanent mining camps which will afford markets for all the valley's products.

The Government still reserves about seven sections of land under the canals, which will be allotted to the members of the Piute tribe in farms of ten acres each as soon as Congress provides funds for paying for the necessary water rights.

PIONEERS WANTED.

Uncle Sam is seeking 500 hardy farmers, mountaineers preferred, to turn over to them for a merely nominal rental 75,000 acres of irrigable land located in the Uintah Indian Reservation. More than 15,000 acres of these lands are now irrigated by ditches constructed by the Government. Other canals are being built rapidly to cover the balance and the new settlers will be given employment at good wages on this work.

These lands are the allotments made to the Ute Indians, the band which recently left the reservation and wandered northward into Wyoming and South Dakota. As these Utes don't care particularly for farming the Government is offering the white farmers an opportunity to acquire a home and a competence by cultivating these farms.

Location of Farms.

The Uintah Indian Reservation is located in Northeastern Utah, in the drainage basin of the Duchesne River and its tributaries. The lands are in the valleys of these streams. The altitude is from 5,000 to 6,000 feet above sea level, giv-

ing this section a delightful climate. The summer temperature is rarely above 80 degrees and the winters are extremely mild. Wheat, oats and alfalfa are the principal crops grown, although in the lower and more sheltered valleys apples, pears, apricots, peaches and plums do quite well. All of the fruit is of excellent flavor.

Surrounding the irrigated lands is a vast area of grazing lands which sustain enormous flocks of sheep and herds of cattle. Extensive deposits of minerals have been found in the reservation of the development of this resource will provide a splendid market for all farm products.

At the present time the demand for stock food exceeds the supply and prices are very high. Last fall oats sold at the thresher for two cents a pound and in the winter for three and one-half cents. Alfalfa early in the fall sold at \$14 per ton and in the winter for \$30 per ton. As the yield of alfalfa runs from three to five tons per acre, it affords a very profitable crop for the farmers.

How to Get There.

Take the Denver & Rio Grande Railroad to Mack, eighteen miles west of Grand Junction, Colo., and there transfer to the Uintah Railroad to Dragon, Utah, where a stage meets the train and carries the passenger to the Indian agency at White Rock, Utah, in the center of the farming area. The Indian agent there will show the homeseeker the lands and arrange the terms for acquiring a home thereon.

Uncle Sam will lease these lands for a term of five years at an annual rental of twenty-five cents per acre, payable semi-annually. The settler is not required to live upon his farm, but must cultivate it. On the expiration of his lease he will be permitted to renew it, and in the event of the death of the Indian allottee he may acquire the property in fee simple by purchase. The particulars regarding terms, location of the farms ready for occupancy, climate, crops, etc., may be obtained from Capt. Hall, Indian Agent, White Rocks, Utah, or from the Commissioner of Indian Affairs, Washington, D. C.

The reservation is in a region of wonderful scenic beauty surrounded by lofty mountains rising 13,000 feet above sea level, their slopes heavily forested. Beautiful lakes abound throughout the reservation. The streams are well stocked with gamey trout and in the mountains are many kinds of big game.

The vigorous, hardy mountain farmer will find this section ideal for a home.

The following described lands, which were withdrawn from entry on January 20, 1905, for use in connection with the Bismarck irrigation project, North Dakota, have been restored to entry and settlement under the public land laws:

Fifth Principal Meridian.

Ts. 139, 140, 141 and 142 N., R. 78 W., all.

T. 138 N., R. 79 W., all secs. 1 to 5, 8 to 17, 20 to 29 and 32 to 36, inclusive.

T. 139 N., R. 79 W., all secs. 1, 2, 11, 12, 13, 14, 23, 24, 25, 26, 35 and 36.

Ts. 140, 141, 142 N., R. 79 W., all.

T. 137 N., R. 80 W., all secs. 2 to 11, and 14 to 24 incl.

T. 138 N., R. 80 W., lot 5 of sec. 7, lots 6 and 7 of sec. 19; lots 7, 8 and 9 of sec. 29; lots 1, 2, 3, 4 and 5, e $\frac{1}{2}$ nw $\frac{1}{4}$, e $\frac{1}{2}$ sw $\frac{1}{4}$, s $\frac{1}{2}$ ne $\frac{1}{4}$ and se $\frac{1}{4}$ sec. 30; all of sec. 31, lots 5, 6, 7 and 8 of sec. 32.

T. 139 N., R. 80 W., all secs. 1 to 24 and 27 to 30 incl.; and lots 1, 2 and 3 of sec. 31.

Ts. 140, 141, 142 N., R. 80 W., all.

T. 137 N., R. 81 W., all secs. 1, 2, 11, 12, 13, 14, 23 and 24.

Ts. 138, 139, 140, 141 and 142 N., R. 81 W., all.

These lands shall not be subject to entry, filing of settlement, however, until ninety days after notice by such publication as may be prescribed by the department.

The Secretary of the Interior has executed contract and approved the bond of W. D. Lovell, of Minneapolis, Minn., for the construction and completion of the structures on Division 1, Garland canal, Shoshone irrigation project, Wyoming.

The work consists of headgates, culverts, crossings, bridge abutments, etc. Mr. Lovell's bid was \$50,544.50.

UNIQUE CELEBRATION.

New Mexico is preparing for a unique celebration to take place July 3d, 4th, and 5th, at Carlsbad. This celebration was authorized by the legislature, and the expenses will be borne by the territorial treasury, its purpose being to commemorate the beginning of Government irrigation in the territory.

In authorizing the celebration the New Mexico legislature passed resolutions carrying a vote of thanks to F. H. Newell, the director of the Reclamation Service, to the supervising engineer whose faithful and efficient services have been an important factor in bringing about the desired results, and to other officials of the service in the territory. It is expected that the Secretary of the Interior, the governor of the territory, the director of the Reclamation Service and other prominent officials and citizens will be present at the celebration.

The Territory of New Mexico has been especially fortunate in the amount of work and attention devoted to it under the terms of the Reclamation Act, three projects having been approved, and two practically completed in the past three years.

The Rio Hondo project, near the city of Roswell, has been completed at a cost of about \$350,000, and water is available for the irrigation of 12,000 acres of fertile land during the present season.

The Carlsbad project, in the southeastern part of the territory, is now nearing completion, and a telegram received in the Washington office this morning stated that the first water was turned into the main canal yesterday at 1 o'clock. This project was primarily undertaken by the Government at the urgent request of the settlers to save their property and homes, which were threatened with destruction by drought, as the result of a flood which washed away a portion of the Avalon dam, upon which their canal system depended for its supply. Acting upon the advice of eminent consulting engineers, a core wall of reinforced concrete was built from bedrock to the crest of the dam. There is no possibility of any flood ever washing away this structure. On the lower side of the dam is a rock fill which would prevent erosion in case

This work when completed will cost more than \$600,000 and will supply 25,000 acres with water.

Over in the Mesilla Valley work is being rushed on a six hundred foot diversion dam for the purpose of supplying water to one unit of the Rio Grande project, the Leasburg diversion. The headworks will be connected with the old Las Cruces system by a canal six miles long. Before this project is finished a gigantic dam will be constructed across the Rio Grande near Engle, forming a lake 40 miles long and storing water for the irrigation of 180,000 acres of land lying in New Mexico, Texas and old Mexico. It will cost \$7,200,000.

The Reclamation Service is experiencing great difficulty in securing reasonable bids for the construction of works in Montana. The contract for the construction of structures on the main canal and laterals, Lower Yellowstone irrigation project, has been advertised twice without securing a fair bid. In order to make the contract more attractive the Secretary authorized the obtainment of informal proposals for the construction of the works, either in small divisions or as a whole, but only one bid was received, and this in the opinion of the board of engineers was regarded as entirely too high and was rejected. The Secretary of the Interior today authorized the Reclamation Service to do the work by force account.

THE CANTON DITCHING PLOW.

This plow, made by the Parlin & Orendorff Company, Canton, Ill., is the only plow of this kind made, and is a fine implement for digging lateral trenches in the irrigation section. It is very heavy and strong, in order to withstand the strain to which it is put when digging deep, but can be easily controlled, as it is carried on a fore-carriage which is adjustable in height, with the lever always in easy reach of the driver.

The plow is provided with a pair of wings, which



Canton Ditching Plow.

flood waters should sweep over the dam. The reinforced concrete conduit which was constructed across the Pecos River by the former owners of the system has been strengthened and the foundations carried to bedrock. Across Dark canyon is a syphon, circular in form, and of sufficient size for a six-foot man to walk through standing upright. The canal has been widened and deepened and built on scientific principles, so as to carry the greatest amount of water with the least excavation. The thoroughness of construction is a subject of congratulation among the settlers of the valley, and they feel that their lands and orchards are assured to them forever, and that dry seasons are now relegated to the past.

are used when plowing the first time, for the purpose of throwing the soil well out on each side of the furrow, leaving plenty of room for the fore-carriage and for the soil which is thrown up in the second plowing. It is strong enough so that six or eight horses can be used. The beam is about 20 inches high, and the plowing capacity each time is from ten to twenty inches deep.

More details regarding this plow can be found in the advertisement of the Parlin & Orendorff Company, on another page.

THE DEMING SPRAYERS.

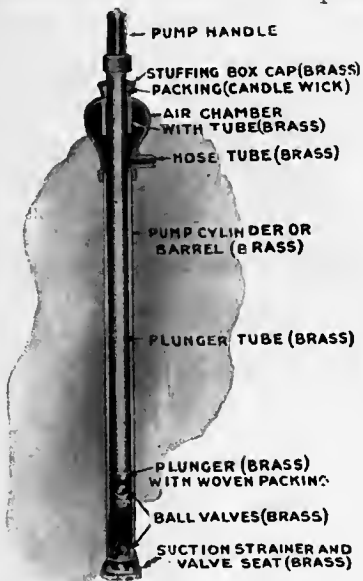
With respect to the services which they perform, Deming sprayers stand in a class by themselves. In spray pumps, as in other lines, prices vary considerably, and at first glance it appears useless to pay more for an article which is apparently no better than one selling for less money. But under close examination a discrepancy often appears between the "workings" of the two. The



Deming Outfit Useful for Many Purposes.

inside—the side least available for inspection—is the vital side of a sprayer, and herein frequently lies the secret of difference in price between this pump and that pump.

The engraving shows a sectional view of the "Success," one of the Deming Company's leading bucket sprayers, which is also illustrated complete. Where a



Sectional View of Deming Bucket Sprayer.

cheaper pump might be furnished with iron working parts, subject to chemical corrosion, Deming outfits are made with all brass parts. Where sprayers less expensive are fitted with rubber valves that are soon destroyed, rendering the pumps valueless because of failure to main-

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Today the great opportunities in farming, in cattle-raising, in timber and in commercial lines are in the country and in the towns along the Pacific Coast extension of the

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tain pressure, Deming outfits are provided with brass ball valves, insuring free and easy passage of the solution. As is well known, spraying preparations have no chemical action on this metal, and while much more expensive than formerly, brass cannot be replaced by cheaper materials which are sensitive to the action of spraying chemicals.

As suggested by the illustrations, Deming sprayers are useful for washing vehicles, windows and the like, and are invaluable in case of fire. Poultrymen, stock growers and property owners in general find these outfits convenient for the application of whitewash, disinfectant, etc.

The literature which the Deming Company is is-

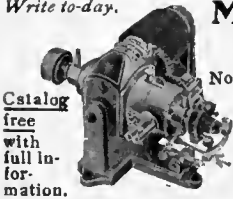
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Deming Company's advertisement, which will be found in another portion of this issue of THE IRRIGATION AGE.



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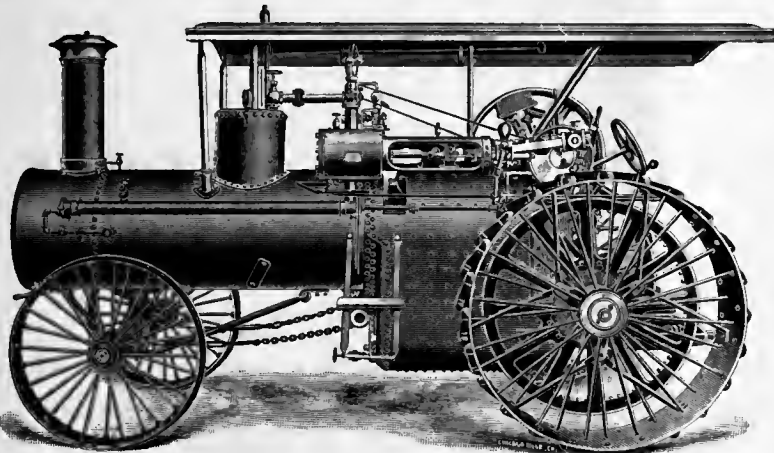
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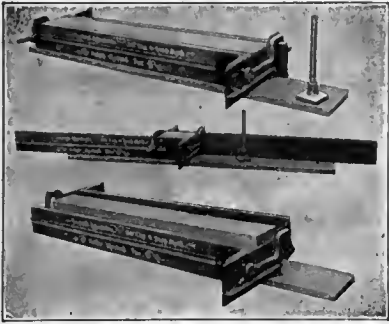
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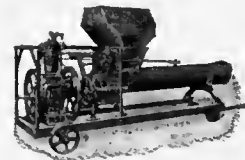
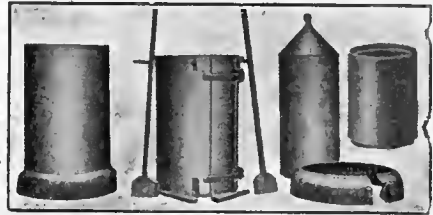
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New Plymouth Land & Colonization Co. *Limited*

C. E. BRAINARD, President

PAYETTE - - - IDAHO

Galvanized Steel Irrigation Flumes AND WATER TROUGHS



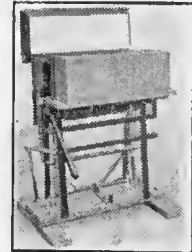
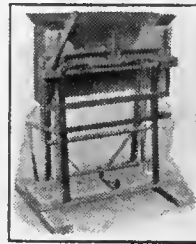
Galvanized steel is rapidly taking the place of wood for fluming purposes and with The Maginnis Patent splice fluming is made easy. Any boy can put the Maginnis Steel Flume together or take it apart. Steel flumes and troughs "Ship Knock down" Third Class freight. Let me figure on your flume. All flumes guaranteed.

Write for Testimonials and Particulars to

P. Maginnis, Mfr.
Kimball, Nebraska

Dry Cement Buildings

ABSOLUTELY MOISTURE AND FROST PROOF



This is what you get when you build your buildings from blocks made on **THE SIMPLEX MACHINE**.

It makes a two piece or hollow wall, any thickness desired for cottage, church or factory building.

All blocks made with face down, and length to 24 inches. Will also make hollow blocks if so desired. **THE SIMPLEX** can be operated by one man or more.

It is light, strong and the most rapid machine on the market. **THE PRICE IS RIGHT.** Send for Catalogue D.

SIMPLEX MANUFACTURING CO.
124 W. Cortland Street, JACKSON MICH.



"The basis of my business is absolute and unvarying integrity"—Samuel S. Thorpe.

MICHIGAN FARM GRAZING AND FRUIT LAND

FOR SALE CHEAP ON EASY TERMS

I own over 16,000 acres of good unimproved cut-over timber land, lying practically in a solid body adjacent or tributary to the City of Cadillac, the most progressive town in Northwestern Michigan. Price \$5.00 per acre and upwards according to location and amount of purchase. I also own or control several finely improved farms. I have written accurate and comprehensive booklets about this area, its location, soils, climate, markets, transportation facilities and other features which would interest homeseekers and I hold myself personally responsible for each statement therein. My literature is well illustrated with engravings taken from actual photographs on the lands. I send same free. Write today. This is your opportunity, don't miss it. Values are raising rapidly, get settled now and take advantage of the improvements others are making. Address:

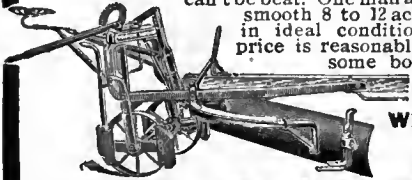
SAMUEL S. THORPE, Room 8, Webber-McMullen Bldg., Cadillac, Mich.

DIG IRRIGATION DITCHES QUICKER

Two horses can manage a 20th Century. It weighs only 500 pounds, all steel and malleable iron except pole. It's a "hammer" as a Nebraskan says, for ditches and laterals. Blade is 6 feet long, can be tilted either up or down and turned right or left to any angle up to 50 degrees. Because built all of metal the

20th CENTURY GRADER

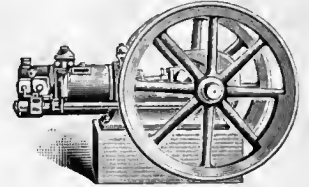
is strong, solid, durable; is guaranteed to stand every reasonable shock or strain. For levelling and grading it can't be beat. One man and a team can level and smooth 8 to 12 acres a day leaving land in ideal condition for seeding. The price is reasonable. Write for our hand some booklet that shows the Grader in operation and explains details.



White City Grader Co.
Dept. F
White City, Kansas

Profits may be increased

in any manufacturing business by installing the right kind of a power plant. "Otto" Engines, whether Gas, Gasoline or Alcohol, are at once economical and dependable, but the "Otto" Suction Gas Producer cuts the cost of power down to the minimum. Nearly 100 successful plants as references. "Otto" Producers Work. "Otto" promises and guarantees are made good.



Otto Gas Engine Works, Phila., Pa.

You can increase the value of your property

and at the same time save money by digging your irrigating ditches with a Vulcan Steam Shovel. It's a mighty small piece of work where a Vulcan Shovel will not save the price of itself. We don't ask you to take our word for it, but we do ask you to let us send you the proof.

Vulcan Steam Shovels are built in 10 standard sizes from 22 to 110 tons in weight, and 1/2 to 5 cubic yard dipper.

When writing, give full description of your work.

.. The ..

Vulcan Iron Works Co.
130 Vulcan Place
Toledo, Ohio



Advantages of NORTHWESTERN IRON HEADGATES

Advantage No. 6: COST-ECONOMY

The cheapest gate is the one that lasts the longest. If there were no difference between the cost of a wooden gate and the cost of a NORTHWESTERN iron gate, you wouldn't think of putting in a wood gate. The first cost of a NORTHWESTERN iron headgate is your only expense, while to the first cost of a wooden gate you must add the cost of repairing and replacing it.

NORTHWESTERN HEADGATES are really the cheapest and most economical, because one iron gate will outlast a dozen wooden gates. A NORTHWESTERN iron headgate is worth more to you than a wooden gate because it will save you water, time and trouble.

You want a gate that is strong, durable, water-tight, easily operated and absolutely reliable, and a gate possessing these advantages is worth more to you than the difference in cost between it and a wooden gate.

C. D. BUTCHART

Denver, Colo.



O. L. Chase
St. Louis, Mo.

I Am the Paint Man

2 Full Gallons Free to Try—6 Months Time to Pay

I Guarantee Freight Charges.

I AM the paint man. I have a new way of manufacturing and selling paints. It's unique—*it's better*. It revolutionized the paint business of this country last year.

Before my plan was invented paint was sold in two ways—either ready-mixed or the ingredients were bought and mixed by the painter. Ready-mixed paint settles on the shelves, forming a sediment at the bottom of the can. The chemical action in ready-mixed paint, when standing in oil, eats the life out of the oil. The oil is the very life of all paints.

Paint made by the painter cannot be properly made on account of lack of the heavy mixing machine.

My paint is *unlike* any other paint in the world. It is ready to use, but not ready-mixed.

My paint is made to order after each order is received, packed in hermetically sealed cans with the very day it is made stamped on each can by my factory inspector.

I ship my thick pigment, which has double strength, freshly ground, in separate cans, and in another can, I ship the pure, old process Linseed Oil—the kind you used to buy years ago. Any child can stir them together.

I sell my paint direct from my factory to user—you pay no dealer or middleman profits.

My \$100.00 Cash Guarantee

I guarantee, under \$100 Cash Forfeit, that the paint I am offering you does not contain water, benzine, whiting, or barytes—and that my Oil is pure, old-fashioned linseed oil and contains absolutely no foreign substance whatever.

I guarantee the freight on six gallons or over. My paint is so good that I make this wonderfully fair test offer:

When you receive your shipment of paint, you can use *two full gallons*—that will cover 600 square feet of wall—two coats.

If, after you have used that much of my paint, you are not perfectly satisfied with it in

every detail, you can return the remainder of your order and the two gallons will not cost you one penny.

No other paint manufacturer ever made such a liberal offer.

It is because I manufacture the finest paint, put up in the best way, that I can make this offer.

I go even further. I sell all of my paint on *six months' time*, if desired.

This gives you an opportunity to paint your buildings when they need it, and pay for the paint at your convenience.

Back of my paint stands my Eight-Year officially signed, iron-clad Guarantee.

For further particulars regarding my plan of selling, and complete color card of all colors, send a postal to O. L. Chase, St. Louis, Mo. I will send my paint book—the most complete book of its kind ever published—absolutely free. Also my instruction book entitled "This Little Book Tells How to Paint" and copy of my 8-year guarantee.

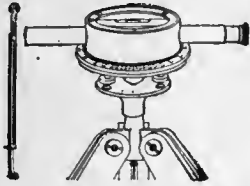
O. L. CHASE, The Paint Man.
Dept. 520 St. Louis, Mo.

NOTE—My 8 Year Guarantee Backed by \$50,000 Bond.

BEFORE YOU BUY A LEVEL

Write for descriptive circulars of the

BOSTROM IMPROVED FARM AND BUILDERS' LEVELS



Practical up-to-date instruments that anyone can use. Recommended by professional men of repute and by the most progressive farmers of the country for irrigation, drainage and building purposes. Prices: \$12.50 and \$25.00 including Telescope, Tripod and Rod.

BOSTROM-BRADY MFG. CO.

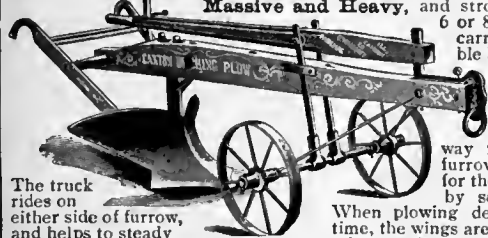
55 W. Alabama St. - - - ATLANTA, GA.

The only plow made for digging lateral ditches or trenches.

Canton Ditching Plow

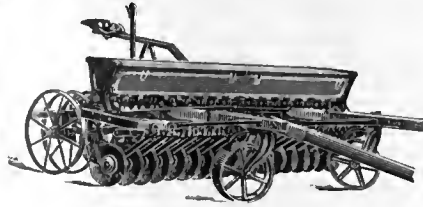
Made especially for the irrigated sections, and no other plow equals it for this class of work. **Large. Massive and Heavy,** and strong enough for 6 or 8 horses. Fore-carriage is adjustable both ways. Can be furnished with wings for first plowing, throwing the soil 3 ft. each way from center of furrow, leaving room for the soil thrown up by second plowing. When plowing deep the second time, the wings are removed. Write for prices.

The truck rides on either side of furrow, and helps to steady the plow.



Parlin & Orendorff Co., Canton, Ill.

PORTLAND SPOKANE DENVER
Con. W. & M. Co., Salt Lake City Pacific Impl't. Co., San Francisco



Press Drill With Caster Wheel

The Name Tells The Tale

"HOME OF GOOD GOODS"

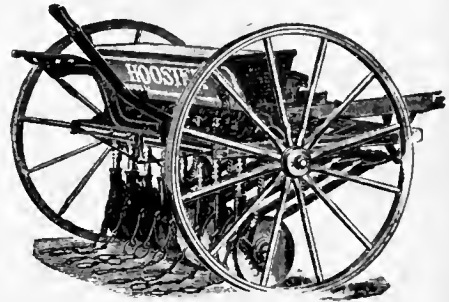
MADE BY

HOOSIER DRILL COMPANY

Division The American Seeding-Machine Co., Inc.

RICHMOND, INDIANA

We Supply The World



Plain Disk Drill (Single or Double Drag Bar)

OLDS ENGINES

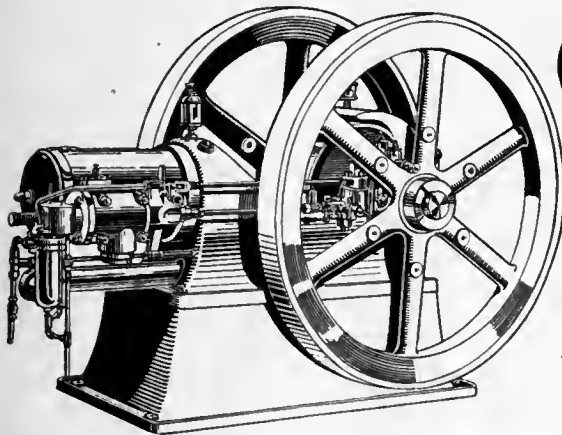
"Our salvation here is the individual pumping plant." This statement was made by L. L. Diesem, member of Kansas Board of Agriculture to the Garden City, Kansas, Industrial Club.

He wanted to emphasize the fact that every land owner, no matter how well fixed his farm might be as to irrigation ditch facilities, ought to take advantage of the wonderful ample under-flow waters.

The way to have the best pumping facilities on your own farm is to get an Olds Engine, which is the ideal engine for this purpose.

It is built in sizes from 8 to 50 H. P.

For 25 years it has been the standard.

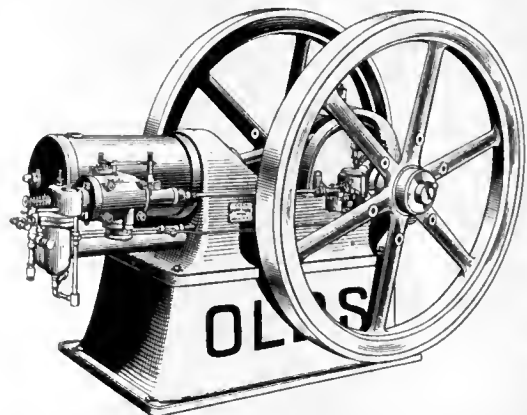


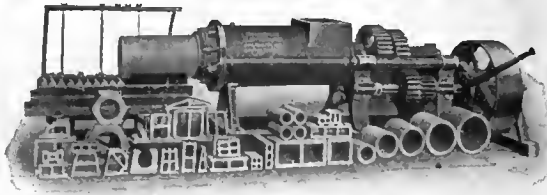
It is up to date, designed by engineers and built by mechanics who have had years of experience in the business. Every part inspected and tested. Every complete engine is run and tested three times by different men, so we know they are perfect before they leave the shop.

Send for catalog and tell us your requirements.

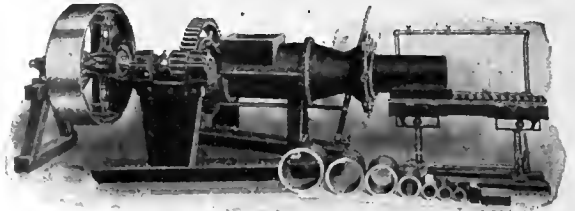
OLDS Gas Power Co.

957 Chestnut Street, LANSING, MICHIGAN

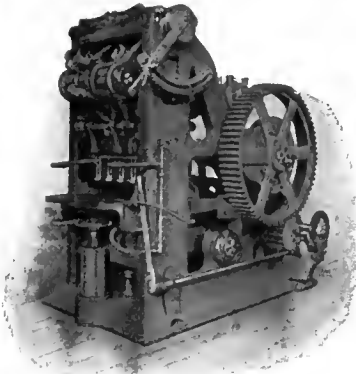




Centennial Auger Machine



Mascot Auger Machine



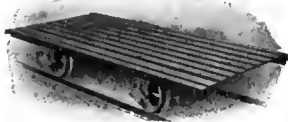
Dry Press, 5 styles



Wheelbarrows and Trucks



Eagle Repress



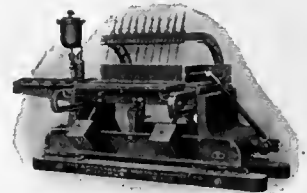
Dry Cars, all kinds

Clay Working Machinery

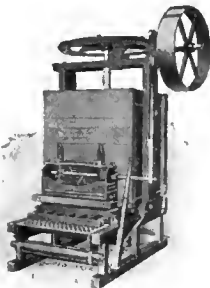
**"BUILT RIGHT—
RUN RIGHT"**

We build an entire line of Clay Working Machinery for the manufacture of Clay products by all processes, including Sand-Line Brick. Our yard supplies are the best. Kilm Irons, Cutting Wire and all supplies. Send for information or catalogue.

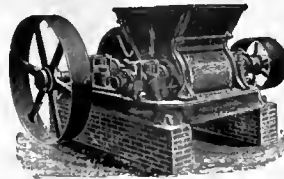
The American Clay Mch. Co...Bucyrus, Ohio



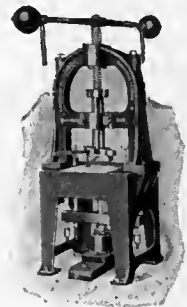
Hand and Power Cutters



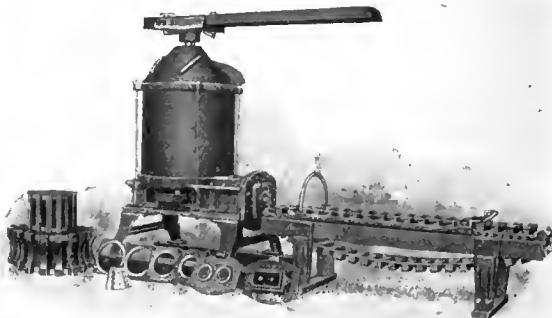
Soft Mud Machines, Horse and Steam Power



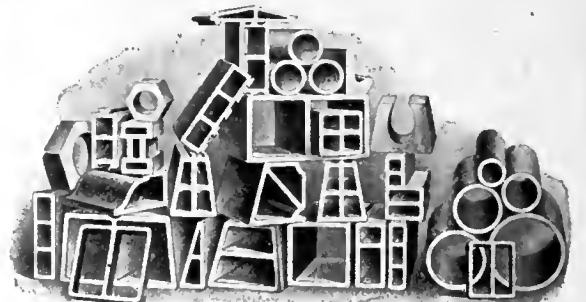
Disintegrators



Hand Power Screw Press

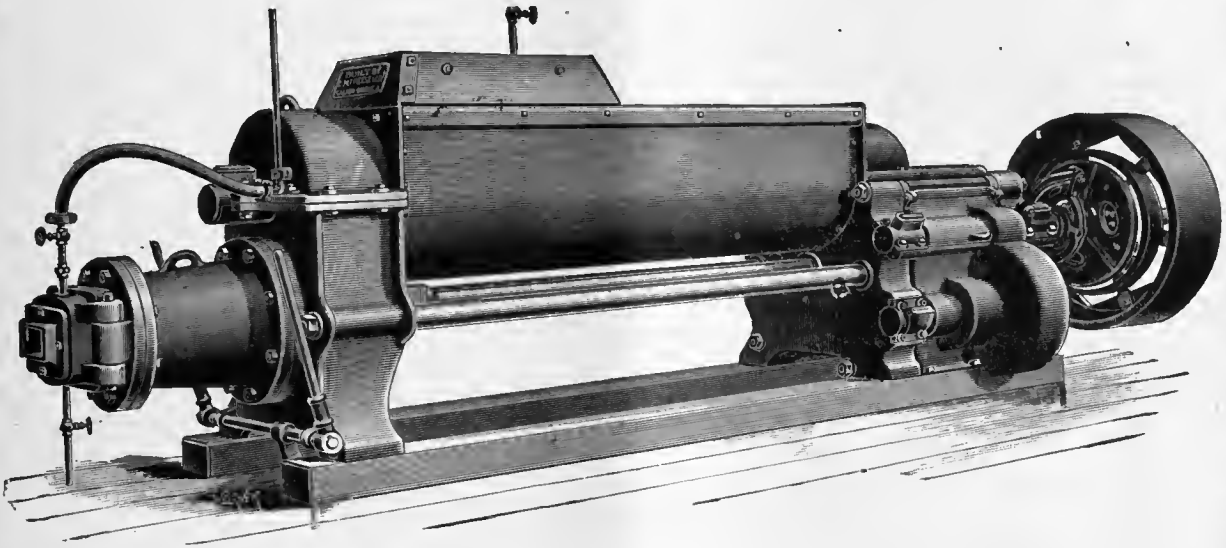


Horse Power Plunger Machine



Products of our Auger Machines

UNION MACHINES WITH PUG MILLS COMBINED



FIVE SIZES ALL CAPACITIES

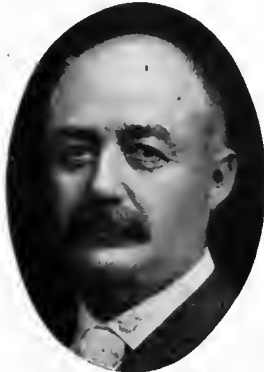
Outfits for Drain Tile, Hollow Ware, Building
and Paving Brick and other Clay Products

If interested write us for particulars and estimates.

E. M. FREESE & CO.
GALION, OHIO

Let Me Prove That 10 Acres of this Irrigated Land

Will earn **\$250.00** A Month For You



E. W. SHUTT, President
Rio Grande Land, Water & Power Co.

I Will Sell It To You For \$2.50 a Week

Irrigated, under cultivation, ready to earn at least **\$250 a month.**

Not in all the world have I ever heard of so good an opportunity for men of small means.

In this small space I cannot tell you all the steps that have been taken to safeguard your money in every way.

This is investment — not speculation — yet you get returns equal to those from successful speculation.

And all the while you are secured against loss by the finest farm land in the world, and your interest in water-rights that no man could buy for a million dollars.

There is no question like finding gold or striking oil about this proposition.

The land is there for all time. The water is there for all time to nourish and fertilize it.

You don't have to dig in the ground deeper than to plant seed.

There are no insects that destroy crops in this country.

There is no chance for drought.

There is no chance known to man for a single crop failure, ever.

And the abundant crops of large and in every other way superior, hay, grains, vegetables and fruits are equaled in only a very few favored spots, such as the Rocky Ford country. But I am going to prove by case after case that net returns from ten acres of this property rarely are as low as \$3,000 a year and often as high as \$10,000, according to the kind of crops.

The difference is not according to location of land or season or anything of that kind.

The land is near a prosperous and growing city — Albuquerque — the largest city in New Mexico.

Our main irrigation canal to run through the city.

The main line of the Santa Fe Railroad runs through our land from end to end.

And our own electric line is to supply additional cheap and convenient transportation to every section of these lands.

If you want to see the country for yourself, you can go with the next party I take to look at the property. Or you and your friends can band together and send a representative.

Or I will send you names of prominent men who have gone or will go and you can ask them what conditions they find. But this is the merest outline of what I will show you in detail.

There are many features of this Secured Land Contract that make it safe and profitable which I haven't space to touch upon.

I am only attempting to make it clear to you that if you can possibly save \$2.50 a week you can have an assured three to ten thousand dollar income in a few years.

Don't doubt — I have proof.

I have promised to lay it before you. All you have to do is to write for it — that can't cost you a cent more than postage.

And as fast as the mails can carry, I will send you proof that as sure as crops grow where climate, soil and water conditions are perfect, you can be financially independent in a few years.

Now, not to hurry your decision in the least, but to protect the price, write me personally at once.

For after the first lot of ten-acre tracts is contracted for we will ask more. But I make this promise. Every man or woman who answers this advertisement at once can have at least ten acres on these terms unless, of course, all our land should be already contracted for from this one advertisement.

Now, write at once. I can say nothing more in this advertisement except that, if I could, I would not tell you all you can confidently expect from this investment. For you would not believe it without the proof, which I cannot put in an advertisement. Address me personally, and believe me sincerely,

E. W. SHUTT, President Rio Grande Land, Water and Power Co.
658 Houser Building, ST. LOUIS, MO.

YOU know, or can easily learn from United States Government Reports, that irrigated lands in the Great Southwest, in selected crops, will net \$300 to \$1,000 a year per acre over and above the entire cost of cultivating them.

Anyone who knows the country will tell you that absolutely the surest, easiest way in the world to gain a large and permanent income for a small outlay is to get hold of a few acres of irrigated land in the Great Southwest.

But always before it has required at least a few hundred dollars and it has been necessary for the investor to live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest irrigated land in the world if you can save \$2.50 a week.

You can go and live on it — absolutely assured of an income from it alone of \$3,000 to \$10,000 every year without fail.

Or you can remain in your present position and add that much to what you earn.

For my company will cultivate your property for a small share of the crops.

You don't have to know a thing in the world about farming.

Now, I can and will prove all this from the highest authorities in the land.

All you have to do is — write me and say, "Prove to me that ten acres of your land will net from \$3,000 to \$10,000 a year above all cost of cultivating it."

I have the proof, so read what my company will do for you.

I will deliver to you at once a Secured Land Contract for ten acres of irrigated land in the Rio Grande Valley.

You must pay my company \$2.50 a week or as much more as you like.

Instead of your having to pay interest on deferred payments, I agree, for my company, to pay you 6% per annum on the money you pay in.

I also bind my company to fully irrigate your land and turn it over to you under full cultivation whenever you desire to mature your contract.

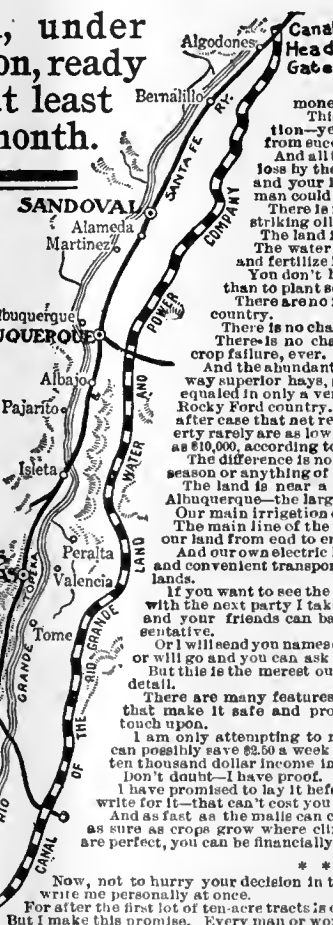
\$2.50 a week will mature your contract in 10 years.

But after you have paid \$2.50 a week for three years, or the same total amount in a shorter time, I agree and bind my company to loan you enough money to make all future payments and mature your contract.

Remember, the land will be fully irrigated and completely under cultivation, so your first year's crop should net you enough over and above the cost of cultivating it to fully pay your loan.

You would then own your land outright and have an assured income of from \$3,000 to \$10,000 a year.

Can you hope in any other way as safe and sure as this to have so large an income in a few years!



THE IRRIGATION AGE

VOL. XXII

CHICAGO, JUNE, 1907.

No. 8

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,

112 Dearborn Street, - - CHICAGO

Entered at the Postoffice at Chicago, Ill., as Second-Class Matter.

D. H. ANDERSON, Editor
W. J. ANDERSON .. G. L. SHUMWAY
Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

New Wyoming Project. An irrigation project of gigantic proportions has been undertaken by a company recently incorporated under the state laws of Wyoming. The articles were filed in the office of the secretary of state by Mr. William L. Rohrer and the concern is capitalized for \$1,000,000. Mr. Rohrer represents influential Chicago business men who have been induced to go into the project only after several months of investigation as to the resources of the country. The lands to be irrigated comprise 60,000 acres in Big Horn county and run from Hyattville, near the foot of the Big Horn mountains, almost to the city of Basin. They slope gently southward and will be watered by a main canal some 50 miles in length, which will receive its supply from a series of lakes in the Big Horn mountains in the heart of the Big Horn forest reserve. The fact that these mountain lakes are in the forest reserve is one of the strongest features of the project as it insures the perpetuity of the water supply.

It is estimated that the cost of construction of the necessary canals and dams will be close to \$500,000. The construction of the principal dams will be similar to that of the great Cheyenne City dam. The altitudes are favorable for the project, the lakes being 4,275 feet above sea level and the end of the 50-mile canal about 3,900 feet above.

The soil of the district is an alluvium of unusual richness and is over twenty feet in depth. Tests made of sugar beets grown in this soil show them to yield over 24 per cent of saccharin matter.

SUBSCRIPTION PRICE.

To United States Subscribers, Postage Paid,	\$1.00
To Canada and Mexico,	1.00
All Other Foreign Countries,	1.50

In forwarding remittances please do not send checks on local banks. Send either postoffice or express money order or Chicago or New York draft.

Official organ of the American Irrigation Federation.
Office of the Secretary, 309 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that *The Irrigation Age* is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. *The Irrigation Age* is 22 years old and is the pioneer publication of its class in the world.

Irrigation Congress. Few men even in the arid regions appreciate the absolute necessity for the existence of The National Irrigation Congress. While it is not of governmental origin, and not under federal control, it is so national in its function that every section of the country is benefitted by its success. The progress of irrigation has not been commensurate with the general prosperity of the country at large. The arid states have, in a measure, prospered without an equitable system of irrigation. The absence of laws governing water-rights has delayed progress and instigated feuds in every community. The laws are so varied in the different states that confusion is inevitable. In the terms used and in the value given these terms, even an expert is not certain of his ground. There should be national laws embodying general principles of irrigation and The National Irrigation Congress should take the initiative in formulating these laws. The interstate and international difficulties arising out of water ownership also need adjudication. While the National Congress makes the laws, the Irrigation Congress, which is the direct voice of the people, can by agitation and recommendation hasten the adoption of needed measures.

Evaporation Losses. The United States department of agriculture has recently issued bulletin No. 177 of the office of experiment stations on "Evaporation Losses in Irrigation and Water Requirements of Crops," compiled by Mr. Samuel Fortier, irrigation engineer in charge of Pacific dis-

trict, irrigation and drainage investigations. The pamphlet contains some sixty pages, exclusive of illustrations. The investigations and experiments have been carried on for several years by the office of experiment stations in co-operation with the state of California. The plan followed in determining the rate and amount of evaporation from soil surface was to remove from a field 300 to 1,300 pounds of soil, place it in a vessel as nearly as practicable in its natural position, and by periodical weighings ascertain the loss of moisture from the soil. The belief that soil should be cultivated after it is irrigated is general among western farmers and orchardists. By cultivation the condition of the soil is improved and the available moisture conserved, and the main purpose of Mr. Fortier's experiments was to determine how much water is lost by neglecting to cultivate after each irrigation. It was arranged so as to bring out two points: (1) The amount of water evaporated from the surface of soil from the time water is first applied until it is fit to cultivate, and (2) the losses by evaporation from cultivated and uncultivated soils which have been previously irrigated.

The conclusions reached are helpful as well as interesting. The experiments showed that the conditions having the greatest influence on evaporation from soils are the quantity of water in the top soil, the temperature of the soil and water, and the wind movement, and all of these can be controlled to a large extent by the methods of applying water and by subsequent cultivation of the soil. The application of the water in such a way as not to wet the top soil decreases the quantity of water in the top layer, and at the same time places the moisture in the soil beyond the influence of wind movements, and, to a considerable extent, beyond the influence of the high temperatures of unusually hot days. The daily variations in temperature almost disappear at a depth of 1 foot, the decrease in temperature from the surface down being very rapid on hot days. Saving may be had by applying water at night, when the surface soil is cool; by applying it at sufficient depths to keep it from coming in contact with the hot surface layer of soil, and by frequent cultivation to maintain a mulch of loose soil, which will prevent the excessive heat of summer reaching the moist soil, as well as destroying capillarity.

**Asked to
Encourage
Irrigation.**

The east is becoming more and more alive to the possibilities of irrigation. A striking example of this fact is the speech of President James W. Van Cleave of St. Louis on May 22 to the 1,200 delegates to the annual convention of the National Association of Manufacturers in New York. He declared the government's irrigation projects in the west to be among the nation's most important duties.

"We can all see now that the national irrigation law of 1902 bids fair to confer as vast benefit upon the American people as did the free homes act which President Lincoln signed in 1862. Some of these benefits have appeared already. Our reclamation service has dug canals which would stretch from New York to Galveston, Texas, or to Lincoln, Neb. It has built 100 miles of railway and has set up eight new towns, with 10,000 inhabitants, in what had been a desert.

"Moreover, the work has just begun. Surveys have been made covering an area as great as Massachusetts and Connecticut. That region will soon be dotted with the homes of resourceful and prosperous Americans. The area which will be reclaimed will afford homes for 10,000,000 people. The members of this association have a vital interest in this addition to our wealth and power."

**The Kansas-
Colorado
Decision.** Within the past month western papers have devoted considerable space to the decision of the United States supreme court as handed down in the opinion of Justice Brewer in the Kansas-Colorado case. The suit was brought by the state of Kansas to restrain the citizens of Colorado from diverting the waters of the Arkansas river for purposes of irrigation, the complainant alleging that numerous irrigation ditches in Colorado had so reduced the volume of water as to render a once navigable stream almost dry; to diminish the manufacturing power; to lower by about 5 feet the surface of the stream and entirely cut off water for irrigation in western Kansas. The reply of Colorado was that it had exclusive right to the waters flowing through the state, and refused to acknowledge the navigability of the Arkansas at any time.

The decision of the court is essentially a victory for the defendant state, although it was found that the flow of water into Kansas had been diminished, and that portions of the Arkansas river valley had suffered. To more than offset this loss is the fact that the diversion of the waters has transformed large areas of Colorado's lands from barren wastes to fertile fields. The amount of water which Colorado may use, however, is limited and the suit is dismissed "without prejudice to the right of the plaintiff to institute new proceedings whenever it shall appear that through a material increase in the depletion of the waters of the Arkansas by Colorado its corporations or citizens, the substantial interests of Kansas are being injured to the extent of destroying the equitable apportionment of benefits between the two states resulting from the flow of the river."

The most important feature of the decision, however, is the intimation that the national reclamation act, under which the government is now spending some

\$40,000,000, is unconstitutional. Justice Brewer does not specifically say so, but declares that Congress can only legislate in respect to such matters as are enumerated in the constitution. The power to legislate with respect to irrigation of arid land was not one of the enumerated powers granted by the constitution. The authority of Congress to irrigate its own lands, or that portion of the country wherein the property benefitted is chiefly that owned by the government, is unquestioned. But, the opinion holds, "we do not mean that its (congress) legislation can override state laws in respect to the general subject of reclamation."

Of course the decision opens the way for suits to be brought by private corporations to restrain the government from entering upon irrigation projects which might interfere with private undertakings. In fact one such suit is now pending—that brought by ex-Senator Turner of Washington on behalf of an Arizona company to restrain the government work on the Colorado river so that the corporation may use the water for irrigation purposes in California. It is not unlikely that the Twin Falls company in Idaho will bring a similar suit, as there is prospect of a conflict between the government and private enterprise along the Snake river.

EDITORIAL NOTES.

BY G. L. SHUMWAY.

BARON "PINCHOFF," as he is dubbed throughout the west, has eyes far too large for his capabilities, a fact amply illustrated by the accomplishments of the forestry department, with which he has been connected and has presided over practically ever since its origin. It had hardly been initiated when the reigns of government passed to the present chief forester, who has since posed in the limelight as the savior of the American forests.

ELIZABETH JACOBS of Washington is authority for the statement that while it costs the government \$2,000,000 a year to maintain the forest service, only \$400 a year is actually expended in planting trees. Inasmuch as the original purpose of the law which created the service was to reforest denuded lands, and the big eyes of Pinchot overlook the fact, it is time for executive decapitation. Less than one fiftieth of one per cent of the total expense of the department is expended for the cause for which the department was created.

OFTEN in his discourses and self-written eulogies he speaks of what reforestation of the mountain slopes will do to the streams and for prevention of floods. Annual planting of trees by the United States amounts

to around 150,000 trees upon about 400 acres, and only about 2 per cent of those planted survive. At that rate it will take something over a million years to reforest the denuded lands inside of forest reserves. And it will cost around fifty billion dollars. It will require something like fifty million years to replace the forests which the lieu lands clause took from the American public, if the present policies and ineffectiveness of the department remain.

ANOTHER favorite illustration which emanates from the star performer of the Kitchen Cabinet, is that of pouring water upon a bare table and observing how quickly it will disappear if the table is set at an angle, and then use the same table with a cloth upon it. With this he attempts to show what a covering of the mountain slopes with timber will do for the flood waters. Imagine if you can, the ludicrous example of the chief forester of the United States telling an intelligent audience that trees of the forest grow horizontally, that they are criss-crossed, and that they absorb water like cloth.

MOST of us who have ever been in the forest labored under a delusion that trees were perpendicular, with parallel trunks, and were of a fibre that did not take up water like a sponge. If this has been a delusion all these years we are prone to be shocked by the realization of Mr. Pinchot's illustration.

WE ARE again bold enough to ask the ear of the administration in behalf of the people of the West. We admit that it is with waning hope, yea, almost despair, that we call upon the chief executive of our country to shake off the fetters of dependency upon those so-called personal friends of his and stand for the people of this republic. He should abandon political intrigue to perpetuate the name and memory which should be the heritage of a man like him.

ONCE again I plead the cause of the West, without hire or hope of reward save the serenity of conscience of a duty well performed. Once again I say put special and secret service agents upon oath in their reports, and under bonds for damages if they fail to tell the truth.

THE public lands convention, which is to be held in Denver, June 18-19 and 20, bids fair to be well attended, and it is to be hoped that the West will get together upon some amendments to the laws if amendments are needed. We have expressed from time to time through the IRRIGATION AGE a solution of the public grazing lands question, and we herewith reiterate.

All public grazing lands should be classified, appraised, divided into range units sufficient to pasture a given number of stock. These units should be open to entry by payment of cash to the extent of one-tenth of appraised value. The other nine-tenths should remain a perpetual lien upon the land at a low rate of interest. Owners of adjoining tracts, homesteaders, and the like should have preferential privileges to enter. Entrymen should have the following qualifications and must observe the following rules. Should reside upon or in the vicinity of the tract, and must occupy and use it individually, subletting in whole or in part should work a forfeiture of claim. This in addition to the ordinary qualifications of citizenship.

THE residue of interest and payments, after deducting fixed fees, should be divided between road fund and school fund, and a new fund which has for its purpose the establishment of experimental farms to introduce new grasses and forage plants for the improvement of the range. The larger stockmen of the west may be averse to dividing the range into small ranches, but it is the only way to make real homes, and the claimants should have every privilege of ownership provided by ordinary ownership in fee, except the right of transfer, or ownership after abandonment. Occupancy and use should be the title. A home is never a home unless the title to it is vested in the homemaker.

THE MAYWOOD COLONY.

The Maywood colony at Corning, Tehama county, Cal., continues to attract the attention of western homeseekers. The reason for the popularity of the colony may be attributed to the good soil, good climate, good water, good rainfall, good drainage, good markets, good shipping facilities, good schools, good churches, good social conditions and good people.

The soil is classified as sedimentary, gravel and clay loams. Each kind of soil is good for some kind of crop. There is no alkali land in the vicinity. The climate is kind to both human and plant life. Some summer days seem hotter than necessary for human comfort, but these are the same days that make alfalfa grow an inch in a day, and fill with sugar the peach, pear and prune. There is great economy in this dry heat, for by it the fruit crop of the colony is cured. No one has ever been sunstruck there—not even pros- trated. The hot days are un- failingly followed by cool restful nights. The climate is not cold enough to affect the orange, or the more delicate lemon. Both grow in profusion and to perfection.

The water at Maywood is as soft as rain, clear and pure, and is a mild solvent, exerting a healing influence on affections of the stomach, bladder and kidneys. Water can be reached at from 10 to 30 feet below the surface. The average annual rainfall is 28 inches. More or less rain falls in all of the months except July, August and September, but most in December, January and February. Showers fall during the other six rain months. So regular is the rainfall in Tehama

county that a crop failure is not of record. Wild grass grows and is green for 8 months of the year, and is brown and ripe the remaining four months.

The slope of the land of the colony is toward the Sacramento river, and the fall is 27 feet to the mile. The river, 4 miles east of Corning, is 108 feet lower than the town.

The quality of the "Maywood Brand" of dried fruit is so high and well established throughout the east that anxious buyers for the entire colony crop begin to bid for the crop long before it is ready for delivery. The colonists pool their fruit on an equitable basis and thus do away with local competition. Stock companies, in which all stock is held by the colonists, conduct the sun-drying plants, the evaporator and the packing house. Any colonist may buy shares in the corporation and enjoy the benefits which it affords its members in the curing and sale of the fruit, as well as dividends arising from its operation. All fruit is cured on the colony. Eggs are sold through a local poultry association, and cream is sold to the two local creameries.

Running through the center of the colony, for a distance of 7 miles, is the main line of the Southern Pacific railway, with depot at Corning. Corning enjoys the same freight rates to eastern points, on car-load lots, as do Sacramento, Oakland and San Jose, and points of importance.

In Corning there is a grammar school employing nine teachers, and a high school in which there are six teachers. The high school fits pupils for entry into the state university, or Stanford university. Located so as to accommodate the greatest number of pupils, there are three other grammar schools on the colony, outside of Corning.

Until recently Corning with a population of about 2,500 was without local government, or control—no marshal or policemen. Late in 1906 the town was incorporated, and voted a dry, or no-saloon town. A good theater attracts all theatrical troupes passing up and down the valley. The Maywood Woman's club, incorporated under state laws, and owning its club building and grounds, is a most helpful factor in the way of receiving and introducing new comers to the colony.

THE NORTH PLATTE VALLEY.

The Chicago, Burlington & Quincy railroad has issued a new 20-page booklet on "North Platte Valley Irrigated Land," handsomely illustrated with agricultural scenes in Nebraska and Wyoming.

The valley of the North Platte river has as many attractions for the homeseeker and as much genuine merit as any recently developed section of America. It may be truly said that this valley is so situated and has such a combination of natural advantages that it should have first consideration of the prospective settler, in which event it is almost certain to receive final approval. The portion of the valley referred to is about 100 miles long and, roughly speaking, from five to twenty-five miles in width.

Send \$2.50 for The Irrigation Age
1 year, and The Primer of Irrigation

CALIFORNIA AND THE CONGRESS

J. J. ALLISON

The Fifteenth National Irrigation Congress, to be held in Sacramento, California, from September 2d to 7th, gives promise of being the most largely attended of any gathering in the history of that organization.

Governors of all the eastern and central states have announced their intention of appointing delegates, and every state in the Union will be represented.

Commercial bodies and industrial institutions of practically all the large cities of the United States are preparing to participate.

An unusually fine string of trophies has been offered to induce irrigation farmers and orchardists to exhibit, and this feature of the conclave will be more strongly emphasized than ever before.

Altogether the Fifteenth Congress will be the banner convention both in point of attendance and interest.

The history of California dates back almost as far as the discovery of the continent by Columbus.

The romance of the Spaniard, as evidenced by the names of rivers, mountains, towns, and political divisions, has permeated the lives of the people to the present day, giving them, in addition to their loyal democratic Americanism, a knightly bearing and an enthusiasm for their state not found elsewhere. When an outsider really understands them in their business, in their homes, and in their motives, experiences the beneficence of the wonderful climate, and comprehends, in a measure, the resources of the state, in timber, in minerals, and in agriculture, all the seeming exaggeration of California's greatness is accepted as only a meager attempt to tell the truth.

To write about the prosperity and happiness of the people; to dwell on the beauties of orchard and vineyard; to picture the peaceful home-life on the farm and in the city, enveloped in perpetual odor of roses and orange blossoms; to revel in all the ecstatic emotional sentiments engendered by mild climates and enchanting environments would be the work of the artist, the poet. Our province in writing is the more prosaic work of telling the readers of THE IRRIGATION AGE the advantages of living in a region already made delightful and productive by nature but rendered doubly desirable by the hand of man through systems of irrigation.

California is an irregular parallelogram 800 miles long and 200 miles wide, the Pacific Ocean and the Sierra Nevada Mountains forming the longer sides. The area is 156,170 square miles, about equal to the combined areas of the eight North Atlantic states, whose population is 25,000,000 against 2,000,000 for California. In the possibility of support from the products of the soil the ratio of population should be reversed.

In climatic conditions, and in variety and productivity of the soil, no state equals California. Mr. Elwood Meade, an irrigation expert, in his report to the United States Department of Agriculture says:

"As an agricultural state California stands alone. No other humid or arid commonwealth has as diversified products or high-priced farming land. In some respects the climate is marvelous in its possibilities. The usual limitations imposed by latitude are here set aside. Oranges ripen as early and surely at Oroville, 100 miles north of San Francisco, as at San Diego. 500

miles south of that city, and much of the state has the unique distinction of being able to grow all the products of New England and of Florida on the same acre of land. Sacramento, which has the same latitude as southern Illinois, is surrounded by districts where bluegrass lawns are shaded by palms and orange trees. The summers are not too hot for the turf nor the winters too cold for the trees. Nowhere east of the mountain barrier formed by the Sierras are these products grown together. On the east side of the range one has to travel south 500 miles to find a palm tree, while in Illinois the apple takes the place of the orange. It is the only state where crops can be harvested with absolute assurance that rain will not fall to injure them, yet where these crops can be grown by the aid of rainfall alone. In much of the cultivated portion of the state irrigation is not a matter of necessity, but of choice. If a farmer is content to raise wheat, ditches may be dispensed with. If he wishes to add alfalfa and oranges, and to beautify his surroundings with the perpetual green of a lawn, he must provide an added water supply.

"Although irrigation is not a necessity, it is everywhere of value, because its magic brings into full fruition all of the attractions with which the state is so generously endowed. By its aid midsummer can be made almost as lovely as spring. It obviates or lessens the dust and discomfort of the rainless season and makes it possible to create rural homes which on the whole represent an average of human comfort hardly to be equaled elsewhere in this country. It completes the marvelous combination which makes winter a season of seed time instead of stagnation; which gives to farmers many of the products of the tropics with the climate of the temperate zone; which withholds moisture in harvest time and thus relieves the husbandman of the most serious vicissitude of regions of ample rainfall. It is an aggregation of advantages which those who live elsewhere find it hard to believe exists, and which the people of the state do not fully appreciate."

Of the 100,000,000 acres of land in the state approximately 60,000,000 acres are range lands for stock, and 40,000,000 acres are agricultural lands. The greater portion of the fertile lands lies in "The Great Valley" formed by the Sacramento and San Joaquin rivers uniting near and flowing into the Suisun Bay. Much has been known and written of the marvelous develop-

ment of Southern California where lands once valueless, now irrigated, sell with producing orchards for \$2,000 an acre. The reason for inactivity in Northern California is primarily the lack of irrigation caused by the climate conditions being such that profitable crops could be raised without irrigation. In Southern California the water is all utilized at a high price and the land is all under intensive cultivation. In the Sacramento-San Joaquin the water is abundant and much of the land is not irrigated. The great activity in future development must come to these valleys. At present in

affairs has been changing. The wheat fields no longer bring in profitable returns, and the men who have insisted on planting their lands to grain continuously for fifty years have lost their holdings or are heavily in debt. From necessity these large tracts are being subdivided into twenty and forty acre lots where irrigation is possible. Fruits, alfalfa, and sugar beet crops on these small farms bring an adequate income for even luxurious living, and, at the same time, are productive of ideal community life by bringing families into close proximity. Many colonies are forming where high class

GOVERNORS OF CENTRAL AND EASTERN STATES WHO ARE INTERESTED IN THE COMING NATIONAL IRRIGATION CONGRESS AND WILL APPOINT DELEGATES TO IT.



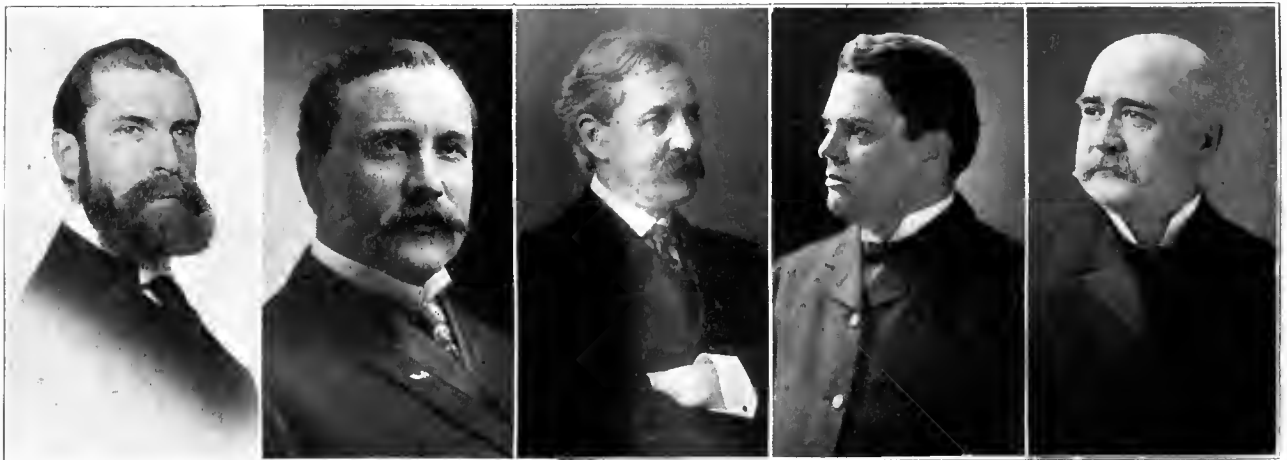
JOHNSON,
Minnesota.

HANLY,
Indiana.

HARRIS,
Ohio.

WARNER,
Michigan.

CRAWFORD,
South Dakota.



HUGHES,
New York.

DAVIDSON,
Wisconsin.

CUMMINS,
Iowa.

DENEEN,
Illinois.

STUART,
Pennsylvania.

the Sacramento valley about 75,000 acres are irrigated out of a possible area of over 2,000,000 acres, and approximately in the San Joaquin 641,000 acres are irrigated out of a possible area of 4,000,000 acres.

In California existing laws have not been definite, causing many disputes and deterring investors from undertaking irrigating projects. Also farmers with large holdings have been able to make fair incomes in raising wheat and barley without irrigation. The man who tilled his own fields was not held in high esteem, even tenants on the vast estates being "gentlemen farmers." But within the past few years this state of

families who cultivate their own fields enjoy life in its fullness.

In 1900 the United States Geological Survey began operations to establish a complete irrigation system to include the entire Sacramento valley. In this valley there are two extreme conditions to meet—the flood and the drought. In the spring-time the heavy rains and the melting snow of the mountains send out enormous quantities of water, and as the fall of the upper streams is very great, in places as much as sixty to one hundred feet to the mile, and as the channel toward the mouth of the river has a fall of but three inches to the mile,

the water cannot pass into the bay without flooding the bottom lands. In addition to the natural conditions that cause the low lands to flood, the early settlers considered mining paramount to everything else, and thus neglected the agricultural interests by permitting hydraulic plants to empty their debris into the river channels. To counteract this filling in process, owners of lands built dikes along the river banks. The system failed to control the water properly. To relieve the land owners the United States Geological Survey in conjunction with the National Reclamation Service have undertaken to form a system of reservoirs in which the flood waters may be impounded and when needed may be delivered through canals to the lands for irrigation purposes. The undertaking is one of the most stupendous in the world's history costing more than a hundred million dollars. The plan contemplates carrying the surplus water, of which there is a great quantity in the Sacramento, to supplement the flow of the San Joaquin whose supply is inadequate to its complete irrigation.

As the project is too large to be completed by any agency in whole, units of the general system have been under construction for some time. Upon application of The Water Users' Association, at Orland in Glenn county, the secretary of the interior has set aside \$650,000 for irrigating a small unit. Without doubt this is the beginning of a project that will make the Sacramento valley a veritable garden spot of the world with many millions of happy and enlightened people living in their own homes with environments that should satisfy the most fastidious.

Smaller private systems are now in operation with great results. These in time will in all probability be combined with the great system with mutual advantage.

What can and will be accomplished in the Sacramento awaits the San Joaquin. Much of the land in this valley is now under intensive cultivation, especially in Fresno county, owing to the fact that this is decidedly in the arid belt.

In San Joaquin county, of which the splendid city of Stockton is the capital, one of the richest and most prosperous communities of the state is found. The fertility of the soil cannot be surpassed nor can it be exhausted. Irrigation increases the products, but it is not essential. The average size of the farm is 225 acres, and the aim is to reduce the average to ten acres, increasing the population of the county from 50,000 to 1,000,000. The problem of caring for the flood waters here is being solved by a district assessed at \$25,000,000 which will make improvements to the amount of \$1,500,000 by bonding on long time, making the cost per year very light. Fruits, vegetables, grain and stock are found here in perfection and in great abundance. This is the banner county of the United States in producing potatoes. Land can be bought for \$100 an acre that rents for \$10 to \$20. A Los Angeles firm rents out 25,000 acres. A Jap rented a tract for \$7,500 and produced \$250,000 worth of potatoes. Grapes are the best crop. Added to a very rich soil and ideal climate Stockton has the advantages of river transportation.

Merced, Madera and Mendota are centers of rich, largely undeveloped counties, but the people are alive to their possibilities and will soon rival the older communities. Farther south Bakersfield and Porterville are noted citrus fruit regions. Fresno, the most intensely

cultivated section of "The Great Valley," is treated of in a separate article.

In Stanislaus county, of which Modesto is the capital, is the Turlock-Modesto irrigation system embracing an area of 260,000 acres, operated under a state law known as the Wright Act, by which all the land composing the district is taxed to build the system. The dam across the Tuolumne river costing \$550,000 is a diverting, not a storage dam. The water, which costs \$9 an acre, is to be paid for within forty years, and belongs to the land, the owner being assessed annually a tax of 50 to 55 cents an acre. These lands, which are first class for fruit, vines, alfalfa, melons, and sweet potatoes, sell for \$40 to \$100 an acre. The Wright law has been attacked in the courts, but has usually stood the test successfully, especially in the southern part of the state where more land is irrigated under its provisions. The people have not yet learned that the property rights in water are under state control in the same degree as the property rights in land.

A gravity system of irrigation is usually cheap, but some valuable land cannot be watered by gravity, therefore some means of lifting the water must be devised. Around Lodi, Stockton and other places windmill pumping is successful, for small acreage. Gasoline pumps are used also, but hydro-electric power is the most satisfactory, even including the greater expense. At Dixon, California, twenty-two miles toward San Francisco from Sacramento, on the main line of the Southern Pacific railway, the writer was shown a system of thirty-four plants operated by Mr. E. D. N. Lehe who rents power from the California Gas and Electric Corporation, and supplies the individual farmer. Mr. Lehe also furnishes several towns with lights.

Mr. Leland Hyde owns twenty-eight acres of land watered by means of one of these electric pumps at a cost of from two to three dollars an acre for an alfalfa crop. His well is sixty feet deep, but the pump has never lowered the water below eight feet from the surface of the ground. In addition to running his pump, he operates a milking machine, runs his separator and grindstone, lights his house and barn, and his wife runs her sewing-machine and heats her irons by electric power. The cost of the plant including the milker is \$1,300. He keeps thirty-three cows and averaged \$84 income a year on each, including profits on calves and separated milk. With a milking machine one man can care for sixty cows which can be kept on fifty acres of land in alfalfa, yielding as high as twelve tons to the acre. When asked how the cows liked the milking-machine he said, "They laughed at it." It is such a success that several neighbors have installed similar plants. The machine will be in full operation at Sacramento during the session of the National Irrigation Congress in September.

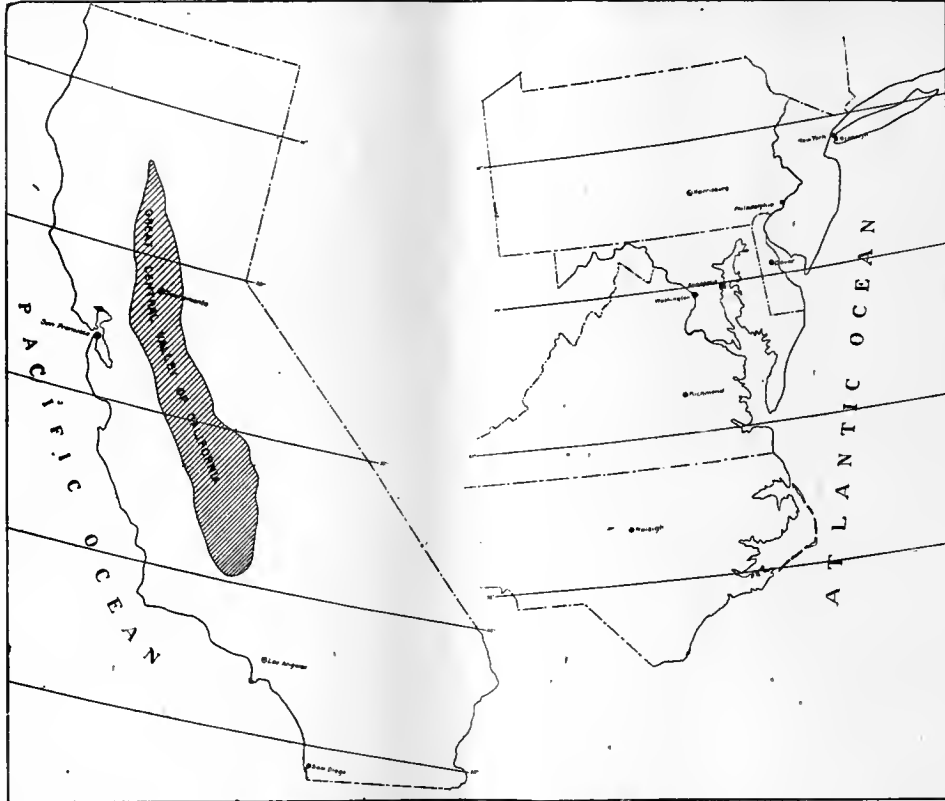
Commensurate and co-ordinate with the benefits derived from irrigation are the advantages from hydro-electric power. Waterfalls are near every part of the state, and power can be generated for every purpose for which it is needed. Ultimately cooking, heating, and all means of transportation will be included as resultants of hydro-electric power. The possibilities of the resources in this state have not been estimated, but enough power can be generated to run all the machines that will ever be used on the Pacific coast, and the uses to which it may be put will multiply as the years go.

Many sections of California can be irrigated by

means of pumps as the water is near the surface in great abundance. The cheapness and availability of electric power will enable every household to enjoy all the comforts of modern life. The soil is suited to alfalfa, making possible profitable dairy industries. The climate is mild and the growing season is long, giving green feed almost the entire year. The high prices make an exceedingly good income from growing hay.

In selecting a tract of land for cultivating a favorite crop, the farmer need not make a mistake. Coming into a new country with soils, crops, and conditions different from what a man has been accustomed to, he would be at a loss as to the selection of land. Anticipating this the United States Department of

Sacramento and the San Joaquin deltas into the finest asparagus fields in the world, or into potato and bean fields yielding prodigious crops. The peat swamps of Santa Ana became the center of a great celery industry. The hop vine found a congenial home in the micaceous fine silty sands laid down beside the streams flowing into the Sacramento. The strawberry of Florin grows in fine, sandy loam, where, owing to the impervious sub-soil, windmills furnish a plentiful supply of water. The sweet potato grown on the sands of Merced county stands unrivaled in edible and keeping qualities. On the shores of Clear lake, in Lake county, are soils which produce a stringless bean, and corn which remains tender throughout our long and rainless summer.



GREAT VALLEY OF CALIFORNIA.

Map showing latitude covered by the great valley of California, compared with latitude covered by Atlantic coast states. The products of the whole state of California are semi-tropical, caused by the climatic conditions being similar in every section of the state. The Atlantic coast states represent all climatic conditions from tropic to frigid.

Agriculture has given California a soil expert in the person of Mr. W. W. Mackie to whom the writer is greatly indebted for valuable information and pleasant visits. Mr. Mackie knows his business thoroughly. He will give his time and advice free to all who seek him. His headquarters are in Sacramento. In an article published in the *Sacramento Union* he says:

"The wonderful fruitful climate of California was recognized as our first great agricultural advantage; but inseparably connected with the climate was the almost boundless productivity and variety of California soils. Farmers soon recognized that adapting special crops to suitable soils gave immediate and permanent economical advantage. In this relation between soils and crops the California farmer found the key to almost unlimited success. He changed the overflowed peat soils of the

"This adaptation of the special crop to the particular soil type has been found equally indispensable for success with the fruit trees and the grape vine. The citrus grows to perfection on soils of striking character in limited localities. The peach for drying purposes thrives best on the sands and sandy loams of the great valley, but special shipping qualities are found in those from the hill soils—such as the granitic soils about Newcastle, Placer county. The apples of the Pajaro valley, the walnuts of Santa Ana, the lima bean of Ventura, the famous garden seeds of San Luis Obispo, the dry-wine districts in the bay counties, the raisin of Fresno county, and the oranges of Oroville, Fair Oaks and Porterville—all show the great success which follows the adaptation of crops to peculiarly favorable soils."

Every fruit grown in the temperate or semi-tropic



Where the waters of the Tuolumne river are raised and diverted so as to run in canals and ditches over the fertile, sandy loam of the big plains of the Modesto-Turlock irrigation district, Stanislaus county, central California.

region can be produced profitably in California. Walnuts, pecans, almonds, olives, figs, oranges, lemons, peaches, pears, prunes, plums, apricots, apples, cherries, grapes of all varieties, and berries in profusion. Hundreds of acres of asparagus, celery and hops make their producers rich. Canning and drying fruits engage a great number of people. Olives are canned and made into oil. All the intensive farming is due directly to irrigation which is in its infancy in northern California.

Fruits produce a net profit of \$500 to \$700 a year per acre. Berries as high as \$1,000 an acre. Grape vines—table, wine and raisin—cover 275,000 acres of land, often netting \$100 an acre.

In other irrigated countries or states operations must be confined to limited industries, but in California a man can follow any avocation in any way he chooses. He can be a "back East" farmer with diversified crops and with the ordinary results, or he can be a specialist in cultivating the most productive adaptable crop by the strictest scientific and intense method known to the irrigator, thereby increasing net returns almost a hundred fold; he can make a fortune in mines or in timber; he is needed in developing the varied industries now in their infancy; he has the opportunity to assist in building great cities whose resources are taxed to the utmost to handle adequately the ever increasing commerce, foreign and domestic; he can extend transportation facilities; and he can find a useful field for educational and religious work. He does not isolate himself and family, but becomes at once a related member of an established community of highly educated, prosperous Americans, with good roads, good schools, and good churches. Other sections of the West have unbounded opportunities, but with these opportunities they have privations and hardships. California adds to these opportunities the comforts of the old home.

To be truthful and, at the same time, to be moderate in statement of the blessings that come to life in this fair land is impossible. In traversing the Sacramento and San Joaquin valleys and their tributaries, in carriage, in automobile, and by electric and steam cars, each section visited was "the best," not only by the resident but by the visitor. It seems actually incredible what can be accomplished on this soil, in this climate.

As in every section of the country a little money will assist in a start, though there is plenty of work to be done at good wages. A thousand dollars with youth and health, pluck and labor will establish a man

and his wife on a ten or twenty acre farm. A living can be earned easily by raising vegetables and berries while the trees are growing for the permanent and larger income. To such the San Joaquin and Sacramento valleys offer unsurpassed opportunities to home-seekers who desire to take a hand in developing a mighty empire. Investors should rely on the official organizations for information. The Chambers of Commerce and the Development Association will not deceive one. They will shield one from the imposter.

Since California furnishes a climate suitable for all year residence no one need fear to make a permanent home there. Should the summer be too warm, the transportation facilities are such that a few hours at most will take one to a resort in the mountains.

No mention has been made of the excellent educational advantages in the state. The public schools are known as models throughout the world. The two great universities, the fine normal schools and the many private schools cannot be surpassed. The State University has established stations in the various parts of the state for experimental investigations into all the phases of agricultural interests. Churches of all denominations are found everywhere.

Treating of the effects of irrigation and "The Great Valley" principally, the other interests and the other sections of the state, important as they are, cannot be considered at this time.

Send \$2.50 for The Irrigation

Age one year and

The Primer of Irrigation

Sacramento, the Convention City

By J. J. Allison

To members of The National Irrigation Congress, for irrigators, and travelers in general "All roads lead to Sacramento" for next September.

If the reception given the advance guard by Messrs. G. W. Peltier, chairman of board of control; W. A. Beard, chairman of executive committee; H. O. Miller, secretary of the Sacramento Valley Development Association; Secretary Ing, of the Sacramento Chamber of Commerce, and many others, is a criterion by which we can measure the hospitality of the people of Sacramento, the delegates and friends of the National Congress shall want for no good at their next session.

The homes of the residents will be at the service of the visitors, and all means of making the Congress instructive as well as making it the most pleasurable event of the year will be used, and every facility possible will be employed to acquaint the strangers with the resources of the different sections of the state. Over \$50,000 will be expended in making this the greatest Congress ever convened. An excursion extending a thousand miles through the best irrigated section will follow the Congress.

During the session of the Congress an Inter-state Exposition of Irrigated-land products, forestry products, and minerals will be held, surpassing anything ever attempted by any state or country. The list of trophies to be offered for competition on this occasion will be published later. These trophies come from prominent men and business organizations and will draw large exhibits. The exhibit from California alone will be surprisingly great, outdoing the state's former remarkable collections.



The State Capitol of California at Sacramento.

The most conspicuous and interesting feature of Sacramento, outside her people, is the capitol and capitol grounds, situated in the center of the city. The capitol, elevated by a series of terraces, is being toned up by the expenditure of \$400,000. Approaching Sacramento from any direction the massive dome can be seen towering above everything else.

The grounds covering thirty-five acres are a monument to the city and to the state. Nowhere outside California could be found such an aggregation of plant life, for in no other state will the soil and climatic conditions permit the growth of trees and shrubs from such extremes of latitude and environment. Three hundred and fifty varieties of trees from every part of the world furnish a varied field of study and enjoyment to the specialist and lover of nature.

In the street parking surrounding the whole park is a row of magnificent palms. Inside the curb is a row of umbrella-shaped Italian pines at whose base the roses, grown only in California, are in almost perpetual bloom. The next concentric circle is the Deodar or cedar of India, a most splendid cone-shaped tree whose spring twigs of pale green set off the darker velvet back-ground of an older growth under whose restful



Fort Sutter, Sacramento, built in 1839.

branches the youth and maiden commune in "golden silence." Though "transplanted far beyond the sea," the Deodar has the same magic to strike the cords of love under the stars and stripes as it had "On India's coral strand." Kipling was in the mood when he wrote, "Under the Deodar."

Dressed in Italian form, tall and cylindrical, a row of cedars follows on the first terrace, like a military sentinel invading a peaceful home. An inner circle of orange trees, robed in rich green, trimmed in gold and white, occupies the second terrace, while on the third is found a circle of stately magnolias. Interspersed with all are the climbing wistaria, the olive, and numberless foreign and native trees resting in a rich bed of well groomed blue grass. In writing of California one must constantly exclude the whole outside world. Outside a limited area of the Sierras the famous redwood does not grow in its native heath, and nowhere else is known the "big tree" or Sequoia Gigantea. As sentinels, the "big tree" is planted, one on either side of each entrance way. When they grow to maturity, four hundred feet high, they will be 5,000 years old.

South of the capitol, "Memorial Ground" honors the "Boys in Blue," the state and the nation. Besides, it verifies the statement that California will grow any plants from the temperate climate. Labeled appropriately to commemorate the battles of the Civil war are growing vigorously the elm tree from Lincoln's tomb, Bull Run, Winchester, Wilson Creek, Malvern Hill; the maple from Harper's Ferry, Fredericksville, The Wilderness, Ft. Donaldson, Chancellorsville, Chick-

amauga, Gettysburg and Chattanooga, Missionary Ridge, Fredericksburg and Lookout Mountain; the flowering dogwood in bloom, from Arlington; the Judas tree or red bud from Cedar Mountain; the yellow poplar or tulip, Fair Oaks; the walnut, Seven Pines; the ash, Vicksburg; mulberry, Sailor's Creek, Spotsylvania and Appomattox; the locust, Ball's Bluff and McKinley's

and Chico, will be opened to Sacramento by the time the Congress meets, and will later extend the line across the Sacramento river from Chico to assist in furnishing beets to the factory at Hamilton. In the near future this road will be a most important factor in settling the valley as it will be extended in every direction. The Western Pacific (the Gould line) is building with all possible speed from Salt Lake through to Sacramento. The Vellejo and Northern is building a line from North Vellejo on San Francisco bay to Sacramento, a shorter line to San Francisco, tapping a great fruit region.

An electric line, a hundred miles in length, from Sacramento to Lake Tahoe, a summer resort, will be built, passing the ground on which gold was first discovered in California. Three electric lines from Sacramento to Stockton and on to the south are planned.

Five years ago Sacramento was at a stand still. Since that time progress has been moderate. Today a new spirit is felt; the people just begin to see a mighty movement to build a new empire in the valley. There can be no better opportunity presented to men and capital than is offered at this time with Sacramento as a center.

Other sections of the state and other cities are not disparaged by praise of the Sacramento-San Joaquin



Dairy herd grazing on young alfalfa near Modesto.

home; the pine, Chickamauga; oak, Andersonville. Doubtless many incidents of the late war will be rehearsed under these trees during the Congress.

Fort Sutter in Sacramento was founded in 1839 by General John A. Sutter who was prominent in the early settlements of California. Many interesting reminders of the pioneer days are preserved in this fort.

The Croker Art Gallery, The Chamber of Commerce with its splendid exhibit, the drives about the city, the trips on the electric car, the boat ride on the Sacramento to San Francisco will be of special interest.

Sacramento is the center of immense transportation systems, and is just beginning to awake to its importance. The steamers from Sacramento do a large



Orchard in the Penryn district, California.

valley. This valley has been neglected, has been overlooked. Its time for advancement has now come.

San Francisco, the hub of the whole state, of the entire coast, should have a complete issue of THE IRRIGATION AGE to herself. No single article could describe her importance, her part in the state's development, her commercial standing, her unparalleled heroism, and her brilliant future. Through her portals must pass in from the nations and out to the world the commerce of "The Great Valley."

The subdividing of the large tracts of land; the intensive cultivation of the small farms; the change from grain farming to fruit culture, sugar beet and alfalfa raising, and the dairy business; the splendid transportation facilities; the unexcelled markets opening up in the Orient; the building of the Panama Canal through which our own eastern markets as well as European markets, can be reached; and above and beyond all the rich soil utilized in the fullest by irrigation, and the matchless climate which has been called an "available asset, a tangible factor in state building," may make The Great Valley of California the home of 50,000,000 people with Sacramento the capital of the most prosperous agricultural state in the Union.



Scene at Fair Oaks, near Sacramento. In the foreground are olive trees—near the house are orange trees.

business. The Southern Pacific radiates to the north, to Portland, east to Great Salt Lake and Omaha, south to Los Angeles and the east, and west to San Francisco. The Northern Electric road now operating with passenger and freight traffic from Marysville to Oroville

NEW CONCRETE MACHINERY AND ITS PRODUCTS.

About the middle of this month the Cement Machinery company, of Jackson, Mich., U. S. A., the well known manufacturers of concrete block, brick, post and mixing machinery, will place upon the market several new machines. This company prides itself in being up-to-date and keeping in touch with the wants of the various contractors and cement workers all over the United States and foreign countries.

Heretofore many have preferred an exclusive face down block machine; others an exclusive side face machine, and this company finds there is a large demand for a combination of both these styles of machines. In other words, the two machines in one; and at the present time they are receiving many orders for their new machine which will be called the "New York Combination Face Down and Face Side Concrete Block Machine." It is a medium priced machine, adjustable to widths of 8 inch, 10 inch and 12 inch, 16 inches in length and 8 inches in height and is equipped with the very latest of designs for the widest range of work.

The advantage that this machine will have over face down machines is the fact that instead of pulling the cores horizontally and taking a chance of the material falling in while the cores are being withdrawn as is the case on some face down machines, the cores on the New York combination are not drawn until the mold is in a vertical position, and, by simply changing one door, this New York machine can be left in a vertical position and turned into an exclusive side face machine.

Another great advantage is that one width of bottom plates will do for all of the different widths of blocks, either side face or face down. This is a great saving in the matter of pallets as one width of pallet does for everything. It is a machine that will weigh, complete about 700 pounds, and is built very durably, and will certainly meet with approval as the trade demands a machine of this kind. We understand the price will be very reasonable.

This company has also perfected what they call an "Adjustable Column Mold" and they are now able to furnish it. This mold is for making square columns, hollow or solid, 8x8 inches, 10x10 inches, 12x12 inches, 14x14 inches or 16x16 inches, and is 9 inches high. It is built on the lines of their Practical Adjustable Sill, Cap and Step Mold which is adjustable to any length between 12 inches and 72 inches and any width from 5 inches to 14 inches. This sill, cap and step mold is being sold as fast as they can make them, and those who have not seen a booklet on this mold should secure one at once as it is said to be the most practical device on the market for the manufacture of solid concrete products.

The Cement Machinery company has also placed upon the market within the last week their "Adjustable Sidewalk Mold" which will make sidewalk blocks 4 inches high and in any dimension from 24x32 inches down to a minimum dimension of 12x12 inches which "Adjustable Molds" are absolutely adjustable; that is, they require no wood to be placed in them for backing-up purposes to secure the various adjustments which make them very popular machines. This company says that the price generally paid for lumber for backing-up

purposes will offset the price of one of these Adjustable Molds within two weeks after same has been installed.

This company has issued a special catalogue on their "Good Luck Cement Workers' Tools" and are said to have the most complete line of sidewalk tools ever offered to the trade either in nickel or bronze; and their line of sewer pipe molds is also giving the best of satisfaction, we are informed, and we are also advised that their mixer business so far this year has increased 50 per cent, and it has become necessary for them to get out a special model of mixer with a capacity of 15 to 20 cubic yards per day, especially for the Jamestown Exposition trade, and this mixer is called the "Systematic Jamestown Model." It is similar to their original 18 to 20 yard '07 systematic machine, but has a few improvements especially as to its cleaning devices, appearance, durability and price. We are informed that it is thoroughly practical for mixing of sand, cement, gravel or broken stone automatically in any proportion from 1 to 1, to 1 to 8. It requires no changing of plates for the different proportions, nor is not inconvenient to clean and it is an outfit that can be furnished with power for about \$260.00 and without power for about \$180.00. It is built for the express purpose, we are advised, of saving labor, material and expense; and, to anyone interested in securing a very durable machine which in its construction is made up of the best iron and steel and free from wood in every respect, this company will be pleased to send full printed matter and prices upon request.

The Cement Machinery company is recognized as the largest and oldest concrete machinery concern in the country, and its machines have been adopted by several governments and have received medals for superior merit in the shape of the highest awards at all of the various expositions; and all of its machines are offered to the trade as machines that "do things" and each and every one, we are informed by the company, is sold on an absolutely "Live and let live" basis.

THE LAND OF OPPORTUNITY.

The "Burlington Route" is doing big things in aiding in the settlement of the Big Horn river basin of Wyoming—a district which its new pamphlet so appropriately calls "The Land of Opportunity." Of all the districts of the United States which today are not fully settled, the Big Horn basin is probably the largest in area and the richest in undeveloped resources. Its possibilities are almost beyond belief and may well stir the imagination and kindle the enthusiasm of the most conservative. With resources until recently untouched it is now rapidly becoming one of the greatest wealth producing sections of America. This region has lately become one of the most popular for new settlers, because of the enormous amount of capital being used in its reclamation and development.

Will pay for the IRRIGATION AGE
\$2.50 one year and the PRIMER OF
IRRIGATION.

PAYETTE VALLEY, IDAHO.

"Of the family of states that form the empire of the northwest, Idaho is the Cinderella—the least known and the most fair, and her foremost foot is slipped by the Payette valley and its surroundings, even now the fairy prince who is to lead her to wealth and prosperity is heard."

These prophetic words were written less than ten years ago, at the beginning of the most prosperous decade ever witnessed by any of the new states of the union, until now, this "Cinderella," the "Gem of the Mountains," is attracting most favorable attention of many a prince from the older states. These courtiers, seeking the wealth now known to be among her resources need only to visit the Payette valley and remain with her people to realize their fondest hopes. Those who have proved the truthfulness of this statement are too numerous to mention but none has seized the opportunities offered with more nerve and energy or a firmer grip than C. E. Brainard, the modern "Moses," who



C. E. BRAINARD.

Promoter and Proprietor of the New Plymouth Land and Colonization Company.

brought the New Plymouth Colony out of the wilderness and into the "Promised Land." After spending fifteen years as an active homefinder and immigration agent in Colorado, Utah and Idaho, to him no other locality appeared to offer more attractive opportunities for the homeseeker and investor than the Payette valley.

The *Idaho Magazine*, published at Boise, mentions him as "the master home finder of Idaho," a man who, though not a politician, has played a potent part in state making in Idaho, one who has induced the investment within her borders of an incalculable amount of money in lucrative fields, and brought hundreds of useful, hardworking men and women to the larger and more abundant life and joy that its opportunities offer. He has, indeed, been the soul, and genius in turning the tide of wealth and home-makers Idahoward, and especially toward the Payette valley and the model, matchless New Plymouth bench, hence, shrink as he may at our assertion, he has claims on the gratitude and ad-

miration of, not only those whom he has been instrumental in vitally interesting in the state, but of all Idahoans who rejoice in the development of our lusty young commonwealth, along right lines. It is due Mr. Brainard to say he has never been the man to court publicity for himself, but he has been little less than a providence in heralding forth opportunities for which investment-seekers and home-seekers were eager, and he has proven the type of man to whose projects the investing public could safely tie, a fact which is its own comment on his honor and integrity. He is a man of performances and energy, but above all things he is a practical, hard-headed, hard-working business man, a man of shining candor, of unexampled initiative, and one who plays fair and treats his fellows with justice in all business life.

Mr. Brainard first devoted all his powers and energies to unfolding the great possibilities of the New Plymouth bench with its farm colony, only 12 miles from Payette, and in the very heart of the valley's most desirable lands. And this colony is still the object of his almost paternal solicitude and ambition, and well it may be, for its prolific acres are marvelously productive of all the fruits, vegetables, grain and hay grown in this latitude; it is a section indeed, which is the pride and glory of the Payette valley, and it is peopled with a higher type of farmers and fruit growers, probably, than any other given territory in the Union, an agricultural aristocracy, if you please, who enjoy nearly all the outgrowths of civilization.

The organization of the New Plymouth Land and Colonization Company and Farmers Co-operative Irrigation company under his inspiring leadership marked the transition of the whole Payette valley to new life and prosperity, and the dash and energy of his business methods gave a new thrill of energy and hope even to the state-makers of this section.

He had the far-reaching vision to see that thousands elsewhere were in quest of just such opportunities as this valley afforded, and although almost incredible has been the growth of the Payette Valley and New Plymouth Colony since Mr. Brainard's advent into it, it is still in the infancy of what it is capable of becoming.

THE FERTILITY OF THE YELLOWSTONE VALLEY.

"Irrigated Lands Near Billings, Mont.," in the Yellowstone valley, is the title of a pamphlet recently published by the Chicago, Burlington & Quincy railroad. The cultivation of sugar beets and the erection of a \$1,500,000 factory within the past few years has given a stimulus to the settlement of that part of Montana. Near Huntley, some 10 miles from Billings, before 1905, when water was first delivered to a part of this tract, there were no settlers; today 8,000 to 9,000 acres have been settled on in tracts of from 80 to 160 acres, and it speaks well for the confidence of the farmer in the future of the district that homes of a substantial character have been built and permanent improvements made on every hand.

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1 year, and the Primer of Irrigation

THE MAGIC OF IRRIGATION.

In the last three years marvelous changes have taken place in Butte and Sutter counties in the heart of the fertile Sacramento valley, California.

Immense wheat ranches have been cut into small farms; peach, fig, prune and orange groves thrive on the site of former fields of grain; cattle and hogs graze in luxuriant meadows of alfalfa and comfortable homes dot the plains which formerly stretched, almost un-



Building Main Canal, Sutter county, California.

marked and sparsely inhabited, from the Sacramento River to the foothills of the Sierras; new schools, new churches and new industries have sprung up all over this productive region and both counties are increasing rapidly in population and in wealth, yet they are only in the infancy of a development which in a few years is destined to place them in the front rank of the best agricultural districts of the country.

This magic in the fortunes of Butte and Sutter counties has been wrought by irrigation.

Irrigation is proving the wonderful fertility of this soil to the world; it is producing incomparable yields from orchard and field; it is attracting colonists from other states and building up a dozen homes where formerly there was hardly one. "Let well enough alone," was long the policy of Butte and Sutter counties. The wide level plain built up by rich deposits from the Feather River, which it carried from the Sierra Nevadas, yielded rich harvests of grain year after year. The opportunity for easy irrigation from the Feather River was there then as it is today. It was noted and discussed but the opportunity was neglected year after year. Man was expending unlimited energy and millions of money to solve irrigation problems in desert regions, remote from transportation and markets, but gave but little heed to the great opportunity which was presented in the Sacramento Valley. But the raising of grain year after year without crop rotation, and the shallow plowing, caused the harvests finally to decrease and so four years ago the owners of these great ranches were forced to place them on the market and the small farmer, raising diversified and more valuable crops began to settle in Butte and Sutter counties.

The country was level, the annual rainfall was

twenty to thirty inches, the Feather River carried a mean flow of nearly 8,000 cubic feet of water a second with a minimum discharge of 1,300 cubic feet a second; the soil was very fertile, the land sloped gently to the southwest and the Feather River ran on a ridge which it had built up so that water would flow from it over the land by gravity. This was the easy irrigation problem presented to the men who built the Butte and Sutter county canals.

In the fall of 1904 the work of building the Butte County Canal began, and on June 9, 1905, water was turned in at the headgate. The engineering problem was not a difficult one, but to make sure that the data was correct, J. D. Schuyler, the eminent engineer, was engaged to make a report on the plans. His verdict was favorable both on the engineering and commercial features of the system. Since that time the system has been extended until it now reaches into Sutter county and supplies 50,000 acres of land in that county with water for irrigation. In Butte county the water rights cover 30,000 acres, the capacity of the canal being 80,000 acres with a supply of 1 cubic foot per second for each 160 acres, a ratio of supply that is ample for the soil and climatic conditions.

The progress in population and production and the increase in values that have resulted from the building of the canal is remarkable. A large area of land has been sold in small tracts and about 200 families have settled in the Butte county region tributary to the Feather River system of canals. Values of all properties have advanced, though a successful and wise effort has been made to avoid an undue advance of prices for irrigable lands.

The Feather River, from which the canal system gets its supply, is a torrential stream. Its banks are



Weir in main canal, Butte county, California.

higher than the country to the west. This topographical feature of the region will be understood when it is explained that the Sacramento Valley is an immense elongated saucer, the central drainage artery of which is the Sacramento River. The Feather River, flowing into the valley from its canyon in the Sierra Nevada mountains to the east, pursues a southeasterly course on a portion of the floor of the saucer that is above the central river, and that continues its slope to the middle

outlet. The high ground, therefore, on which it was necessary to locate the canal is found near the river banks. Consequently the canal follows the course of the river and keeps rather close to it.

The engineering features of the canal are ingenious. The headgate is a sufficiently strong structure of concrete, reinforced by railroad rails buried in the material. Below the headgate is a cut of 1,000 feet ranging in depth from 20 to 28 feet. This cut opens into a natural slough which, having been enlarged and straightened and worked down to grade, carries the water for several miles. The canal then follows the high land along the river and distributing canals are carried to the west and south.

Water rights under this system of canals sell for \$10.00 per acre, and the annual rental charge for water is \$1.00 per acre. The cost of construction, while kept down by efficient management, has not been taken into account in fixing the price of water rights. Up to the present time the owners of the system have invested about \$500,000.

Distribution of water to the farmers is effected by a complete system of lateral ditches some of which are 20 feet in width on the bottom. The plans of the engineers contemplate caring for waste water by stepping it down to a lower lateral canal, and finally into a large drainage ditch which leads the surplus into the low overflowed lands bordering the Sacramento River. At one point where the canals runs near to the bank of the river a spillway is provided, as a safety valve and as a vent, in case it is necessary to close down the lower end for repairs.

The results of irrigation in that part of the Sacramento Valley served by this canal system are observed in the rapid change of wheat ranches into peach orchards, orange groves, alfalfa and beet fields and in the erection of homes. A striking illustration is afforded by a district immediately southwest of Gridley, the business center of the region. An area of 3,000 acres devoted to grain farming up to two and a half years ago made a home for three families, aggregating ten persons. During a portion of the year the places were the temporary homes of the men who were hired for the planting and harvesting. This same territory is now under irrigation and a portion of the land has been sold to settlers. Fifty families are actually living in their homer on this same area and ten others who have purchased have not yet settled on the lands.

Another district of about equal area west of the same town is now having the same experience. The advantages accruing to business, schools, churches, etc., are at once apparent. A population of twenty-five to the square mile is more satisfactory than a population of two to the square mile. The average size of the irrigated farms under this system of canals is about thirty acres, whereas the average size of the grain farms for the district affected, under the old regime, was about 600 acres.

LITTLE SNAKE RIVER VALLEY.

The Little Snake river valley in Routt county, Colorado, is the magnet which is attracting the attention of farmers throughout the country, as well as all

others who are interested in securing a good irrigated farm at a cheap price.

Fifty thousand acres of what is described as "The best land in the new Empire," are to be opened by the state of Colorado under the Carey act this summer. A large canal 65 miles long, with a big reservoir, is being built by the Routt County Development company, 814 Seventeenth street, Denver, Colo., to irrigate the land, the price of land and perpetual water rights being fixed by the state of \$25.50 per acre.

Preliminary contracts insuring the holders the choice selection in the tract, can be obtained by a deposit of \$5.00 per acre in either the International or Continental Trust company in Denver. This deposit draws interest at 3 per cent until the tract is thrown open. If the depositor is not satisfied with the selection of land he is able to make under his option, his deposit is returned with interest. This relieves the settler of the necessity of examining the land until the time comes for definite selection.

The Little Snake River valley is in the center of the greatest stock raising and stock feeding country in the west, and the Moffat road and the Union Pacific are both building into the valley. The tributary country is very rich in mineral. Extensive coal fields, which will attract thousands of people, lie north and south of the valley.

Under the Carey act, one person can select 160 acres, or a legal subdivision—40, 80, or 120 acres. This right can be exercised, even if a person has exhausted his homestead, timber and stone or other government land rights.

One eighth of the land must be reclaimed within three years or less from the time the canal is completed. The state then gives the settler a patent to the land. The settler owns a proportionate interest in the canal system. When 90 per cent of the water rights are sold, the canal system is turned over to the settlers as their property.

Work on the canal was started last year, and were resumed on an extensive scale May 1. Many preliminary water right contracts are being sold to farmers with teams, etc., who will go into the valley and work on the canal, examining the land at their leisure so they will be ready to make their selection when the land is thrown open. All water right payment will remain in escrow until the canal is completed. The Little Snake River valley is very fertile, as is shown by the products of the farmers under small ditches in the valley.

Reclamation Service News

OPENING OF HUNTLEY TRACT.

The opening to settlement of 700 splendid farms embraced in the Huntley irrigation project in Montana, which is scheduled to take place on June 26, promises to be both unique and spectacular. Uncle Sam will hold a lottery, and the farms will be drawn by numbers.

The new regulations of the secretary of the interior will eliminate the speculator and will offer an equal chance to all homeseekers. This will mark a rather wide depart-

ture from the old policy of permitting a free-for-all scramble, in which the non-resident land-seeker was always at a disadvantage. The method of procedure decided upon is as follows:

Any person desiring to make entry may, either through the mails or otherwise, present to the register and receiver of the land office at Billings, Mont., his personal affidavit, sworn to before some officer authorized to administer oaths in the Billings land district. These affidavits must reach the land office between 9 o'clock a. m. June 18 and 4:30 p. m. June 25, 1907. Beginning on Wednesday, June 26, 1907, the register and receiver, under the supervision of a representative of the secretary of the interior, will publicly open the sealed boxes in which the envelopes have been placed, thoroughly mix the envelopes, and then as they are selected number them from 1 to 1,500. The envelopes will then be opened and each person whose affidavit is found therein will be notified of his number, which will control the time and order in which he may apply to make entry. No person who does not hold a number assigned to him under these regulations will be permitted to make entry prior to a date to be fixed by the secretary, when all lands which have not been entered will become subject to settlement and entry under the provisions of the reclamation act of homestead law, subject to the rules announced in the secretary's order.

Relinquishments in favor of someone else will not be permitted, as the lucky numbers are not transferable.

The envelopes must be sealed and must not be marked in any way to indicate the sender, and no person may make more than one application. If the rules in this respect are not followed the application will be thrown out. All envelopes filed will be opened and recorded. If a person who has drawn a number has filed more than one application, his name and number will be canceled from the list. The event will be a notable one in the history of Montana, inasmuch as the Huntley will be the first project constructed under the reclamation law to be thrown open to entry in the state. The secretary of the interior will be present when the drawing begins.

The Huntley project is located about twelve miles east of Billings, Mont. The lands lie at an elevation of about 3,000 feet above sea level and slope gently toward the Yellowstone river. Unusual facilities for transporting crops are afforded by two lines of railroads which traverse the tract. The climate of southern Montana is delightful and the soil is of exceptional fertility, producing abundant crops when well watered. Cereals and alfalfa are the principal products at present, although apples, small fruits and garden vegetables do well. The fine range country produces about five tons of hay to the acre at present and is worth \$5 per ton in the stack. With assured crops of hay and feed the ranch men can increase their herds and the improved quality of the stock will make prices correspondingly better.

A beet sugar factory is now in operation at Billings and the farmers are increasing their acreage in this crop, as it is very profitable. This factory is only twelve miles from these farms and is reached by two lines of railroad.

The farm units will vary from 40 to 80 acres, depending upon the location, and averaging 40 acres of irrigable land. Wherever practicable a tract of grazing land has been included in the farm unit, bringing the total to 160 acres in a number of cases.

It is proposed to have eight towns in the project at about five-mile intervals along the two transcontinental railroads which now traverse the tract, and no farm will be more than three miles from a shipping point. Two of the towns will be common to both railroads; four more will be on the Northern Pacific railway, and two on the Chicago, Burlington & Quincy. Immediately after the drawing of the farms these town lots will be sold at public auction, and there will be openings for professional and business men and skilled and unskilled laborers.

The Huntley project embraces a part of the ceded strip of the Crow Indian reservation, and in addition to the government charge for water rights the settler will be required to pay \$4 per acre for the Indian price, \$1 at the time of entry and the remainder in four equal annual installments, beginning at the end of the second year. In addition to this, the government will charge the settler for the cost of building the irrigation works \$3 per acre for ten years, after which the irrigation system will be

turned over to the farmers. The cost of maintenance and operation will be about 60 cents per acre annually. The first payment of \$4.60 will become due as soon as filing is made by the successful drawer of a farm. Irrigated land in this section is worth from \$75 to \$200 per acre, according to the state of cultivation and the crops grown.

Full particulars concerning the method of drawing and the qualifications required of entrymen can be obtained by addressing the register and receiver of the land office at Billings, Mont., or the commissioner of the general land office, Washington, D. C.

Mr. Newell Honored.

Secretary Garfield has designated Mr. F. H. Newell, the director of the reclamation service, as the consulting engineer of the geological survey. This is in recognition of Mr. Newell's long service in building up the engineering work of that bureau, as it pertains to the measurement of streams and the determination of the water supply. This work was initiated by him in 1888 and carried on under his direction. It has gradually expanded from a few simple measurements into a system covering the greater part of the United States.

As a result a large amount of data has been brought together, covering the behavior of streams in different parts of the country and affording material upon which to base substantial development. The importance of these investigations will be readily appreciated when it is known that during recent years from \$3,000,000 to \$5,000,000 per annum have been expended in water powers and other works which would not have been invested if it were not for the existence of the data which have been procured by the geological survey. These records of river flow and the fluctuations in high and low water seasons extended through a number of years and are absolutely essential to the engineer and investor in planning important works for stream utilization.

It is proposed by the geological survey that this work shall be continued and still further expanded in various lines, and to assist in this Mr. Newell has been designated, as above stated, as the consulting engineer of the survey.

A New Lake in Idaho.

A new lake appears on the latest map of Idaho—Lake Walcott—and although an artificial body of water it is the largest lake in southern Idaho. Its area is three times greater than that of Big Payette lake, in the western part of the state, and is three-fourths the size of Jackson lake, in Wyoming.

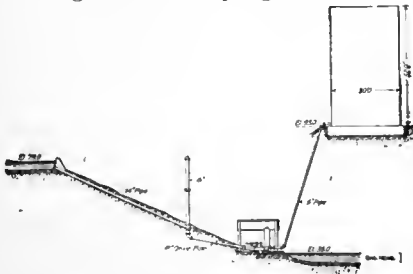
Lake Walcott is created by the back water above the great Minidoka dam, recently constructed by the reclamation service. It covers about 15,000 acres, is 35 miles long, and for more than 7 miles it has a width of about 2 miles. Near the headgates and dam plans are being made for tree planting and otherwise beautifying the shores. Lands bordering the lake will later be watered by means of pumps, thus increasing the attractions of the lake. The fish commission will be asked to stock the lake with fish. Already ducks and geese in large numbers are making it their summer headquarters. The country about the lake, until the advent of the reclamation service about three years ago, was an uninhabited desert. Today a population of 10,000 is living there. Three thriving towns have sprung up and a new railroad has been constructed.

The Minidoka project promises to become one of the most thickly settled agricultural districts in the state, and Lake Walcott will doubtless in time be a popular summer resort for people living in that part of Idaho.

For more than a month the reclamation service tried to secure a contractor to construct a simple earth fill dam and accessory structures located on Willow Creek, about five miles northwest of Augusta, Mont., but notwithstanding a wide advertisement of this fact no bidders were secured. The secretary of the interior therefore authorized the reclamation service to construct the dam by force account. The estimated cost of the dam by contract under the specifications approved was \$105,000. It is believed that the work can be done by force account, using the hydraulic method, at a considerable saving over these figures.

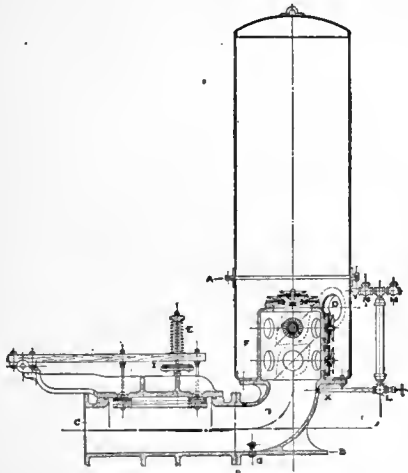
ECONOMICAL PUMPING PLANTS

The general idea of a hydraulic ram is that it is a small machine suitable only for raising a small quantity of water for country places, etc., but in reality there is practically no limit to the capacity of this type as now built, with automatic air-feeding device and highest efficiency. It has the advantage of possessing only a few wearing parts—easily and cheaply renewable—and operates without attention or expense. A modern ram as made by The Rife Engine Company of New York City will pump with good efficiency against heads of twenty-



five to thirty times the fall, the efficiency varying from 60 to 90 per cent, in proportion to the ratio of the fall to the pumping head. They will operate under two or more feet fall and elevate the water twenty-five to thirty feet for each foot of fall used.

The accompanying engravings show an installation of large Rife rams for the United States government naval



coaling station at Narragansett Bay, R. I., each ram delivering 232 gallons per minute, an efficiency of 91.25 per cent.

A plant recently installed at Kalispell, Mont. (water supply 800 gallons per minute, 18 feet fall, 159 feet pumping head), delivers 80 gallons per minute, the water being supplied to the Conrad Memorial cemetery, 85 acres, 50 acres being improved and provided with mains for irrigation.

These machines are rapidly being adopted by the railroads to supply their water stations for locomotives, and the expense of attendants for steam plants, the fuel, etc., is eliminated.

Land lying above the irrigation canals, often of the finest kind but valueless for lack of water, can be made more valuable than the land below the ditch by utilizing the fall and water from the ditch to operate the ram, thus delivering a portion of this water to an upper ditch or reservoir.

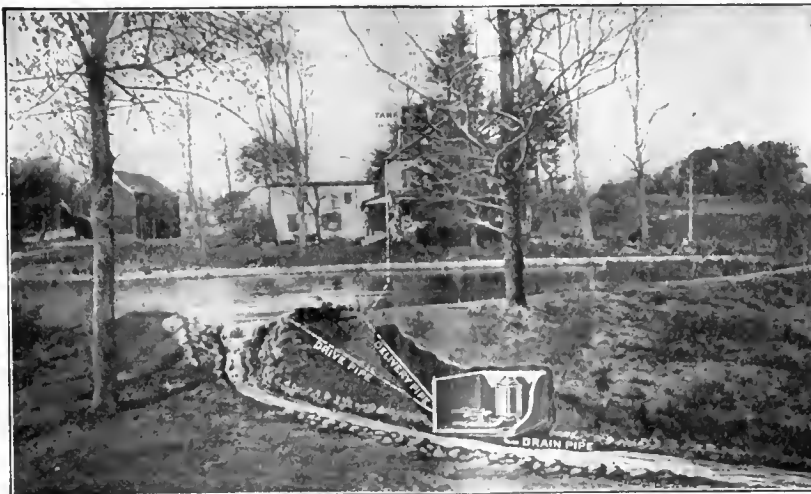
The manufacturers of this ram state that they will furnish these machines to responsible persons with the understanding that if, after thirty days' trial, the machines fail to fulfill the guarantee, they may be returned and need not be paid for.

Several illustrations here given show the simple method of installation of small plants for country residences, stock farms, etc.



The prejudice so long existing in the minds of engineers against rams as a satisfactory and reliable device for elevating water economically is disappearing, and the same engineers are the first to appreciate that the ram as now built is admitted to be the most economical method of elevating water known where the conditions favor its location.

The Rife Company state that they will send catalogue and estimates free to any one interested, upon application.



A Rife Engine in Position.

ELI BALING PRESSES.

When a man starts in at hay baling, he is anxious to have things move right along, without interruption or breakage or other delay. The baling press is just as important as any other piece of machinery used on the farm. As we look at it, you will be just as sure, perhaps more sure, of having the baling go on uninterruptedly if you buy the well known Eli press, as with any press you can find.

The Eli is an old timer. Most all hay balers know it by name, and by its work. The name "Eli" is not just one press, but it is the name applied to the long line of presses—38 styles and sizes—which have been developed through many years of hay press building by the Collins Plow Company, Quincy, Ill. Hardly anything in the way of a press could be thought of which will not be found already worked out in its best form by that company. The first thing to do, if studying the hay press question, is to write to the Collins Plow Company for catalogue and make careful examination of the Eli family. If you want a press of great power and speed, the Eli Power Press will take your eye. It does the work with a speed and a nicety that delights the hay man. It is a completely modern machine, with all improved appliances, and everything to facilitate and make the work easy.

The continuous travel horse press is just as much of a favorite in its class. If you are not engaged in doing contract baling, this style will perhaps be best adapted to your needs. A catalogue giving all particulars of the entire Eli line will be mailed free to any one writing for it.

Potato Culture

BY L. A. ASPINWALL.

[Concluded.]

Unlike blight, they thrive best in warm dry weather. Although blight has been known for more than sixty years, much has been developed during the last decade relative to its nature and methods of treating the disease. There are two forms, the leaf or early blight, and the late blight or rot. The early blight (*Alternaria Solani*) appears upon the leaves in grayish brown spots about the time the tubers begin to form. These spots enlarge, and in about ten days or two weeks involve half of the leaf, which in a month may be entirely consumed. The late blight, or rot (*Phytophthora Infestans*), appears later in the season. The leaves show brown or black areas, which soon involve the entire plant, and, under favorable conditions of extreme heat and moisture, seriously affect the tubers. As with pear tree blight, the ravages begin with a fungoid growth which feed upon the leaves and branches. These destructive germs, in common with many others, are not destroyed by the rigor of winter. With the decay of diseased potato vines, the germs or spores are gradually mixed with the soil, where they remain until

the return of warm weather with plant life adapted to their development, when the disease again manifests itself. No information explaining how the germs gain ascendancy to the vines has come under the writer's observation. He would suggest, however, that being diffused through the soil, the spores become attached to the tender sprouts of the potato (which being suitable for their development), and with their rapid



Figure 9. FOLIAGE SHOWING BLIGHT.

growth are carried above the ground. The rapid development of young potato vines accompanied by a moderately low temperature prevents the disease from gaining ascendancy at once. But with vines nearly or full grown, and a temperature ranging from 70° upward (favorable to germ development), the conditions



Figure 10. HORSE SPRAYER.

are reserved. Instead of an increasing supply of food, with a temperature unfavorable to germ development, we find the growth or food supply decreasing, which, with a favorable temperature for a spread of the disease naturally results in a rapid destruction of the vines. We can now see the importance of early spraying. With no visible appearance of blight, the tendency is to neglect the precaution. This leads us to consider the best mode of treatment. Paris Green being a necessity in the destruction of potato bug larvae, the application of Bordeaux Mixture for blight may also be made at the same time by mixing the two. Although the disease cannot be entirely overcome, early spraying with

Send \$2.50 for The Irrigation
Age one year and
The Primer of Irrigation

Bordeaux will destroy most of the germs and arrest its progress sufficiently to insure in most instances a large yield of potatoes.



Figure 11. HAND SPRAYER.

To destroy potatoes bugs take one-half pound of Paris Green, and add sufficient water to make a paste; stir thoroughly and pour into the Sprayer barrel with Bordeaux Mixture. If the Paris Green is adulterated, use a greater quantity. To destroy the bugs and arrest the progress of blight, frequent sprayings are necessary. Once a week ordinary will answer.

Bordeaux Mixture. Slack five pounds of fresh lime in a pail of water, stirring sufficiently to dissolve all lumps. Pour the slacked lime into 25 gallons of water. Dissolve five pounds of blue vitriol. (Copper Sulphate) in 25 gallons of water. The vitriol will dissolve quickly if put in a coarse sack and suspended in a barrel of water, keeping it near the surface. To test the mixture, take a half pail of Copper Solution and fill with lime water, stirring it well. The mixture should be of a deep blue color. If any tinge of green appears, more lime should be added, otherwise it will burn the leaves. To ascertain the strength, dip a polished knife blade in the mixture. If the least trace of copper is found on the blade after a few moments' exposure to the air, more lime should be added. When ready for spraying, the Copper Solution and lime water should be poured into the Sprayer barrel, pouring first a pailful of the copper sulphate solution and alternating with lime water, until the barrel is filled.

FUNGICIDES.

COPPER SOLUTION.

Copper Sulphate, 2 pounds to 50 gallons water.

For use only before the buds open. Do not use on growing plants.

BORDEAUX MIXTURE.

Copper Sulphate 5 lbs.
 Fresh Lime 5 lbs.
 Paris Green 6 oz.
 Water, 1 barrel..... 50 gals.

INSECTICIDES.

KEROSENE EMULSION.

Kerosene Oil 2 gals.
 Rain Water 1 gal.
 Soap 1/2 lb.

Dilute before using with nine parts water. This preparation is valuable for destroying aphides on rose bushes, etc.

PARIS GREEN AND WATER.

Paris Green 1/2 lb.
 Fresh Lime 1 lb.
 Water 50 gal.

Do not use iron or steel vessels for any of the above compounds. Use only wood, earthenware or glass. To avoid burning the leaves of plants, all spraying should be done in the early morning if possible. It is not best to spray plant foliage when the

day is excessively hot. However, during a continuance of such weather it becomes imperative.

How many bushels per acre may be reasonably expected? We frequently hear of three or four hundred bushels being produced on a single acre. Such results are truly flattering, however we cannot expect such yields from the average potato land. It is fair to presume that good land, well manured, with thorough tillage, will produce from one hundred and fifty to two hundred bushels per acre. The greatest profit is not always derived from the greatest bulk. The cost of handling should be taken into consideration. A variety of exceedingly fine quality, which commands the highest price, although moderately productive, will be found the most profitable. Where close planting is practiced, with heavy manuring, three hundred bushels per acre is not uncommon. Such results cannot be obtained from inferior seed on average land, when the distance of planting is fifteen inches in the row and three feet between them. It means first class seed, heavy manuring, close planting and thorough tillage.

Harvesting the crop is the most laborious part of potato culture. Where there is a market for early varieties, digging usually begins while the tops are green. A fork or hook is best in absence of machinery. Care should be exercised in digging and handling to avoid bruising. The English are very particular in this respect, also to wash the potatoes. Beautiful clean tubers present a fine appearance as shown in the markets of English cities. Late varieties should be fully ripe before digging, after which any convenient time will answer previous to frosty weather. When potatoes are in demand it is time to dig, and the work of harvesting should not be delayed.

Harvesting by machinery. With a large acreage, a machine digger is indispensable. The uncertainty as to procuring the requisite help, also the possibility of an early frost, make it imperative. Most diggers are now constructed upon two distinct principles, the elevator and rotary. The former, which by an endless chain of rods carries the earth and potatoes backward and upward from the shovel plow, depend upon a separation by gravitation. The latter, by a combination of rotary movements, not only separate by gravitation but are so arranged that the hills are partly inverted and spread laterally to the right side of the machine. Although the draft of all elevator diggers is heavy and the cost of keeping in repair great, the work is first class. The writer, however, claims a preference for the rotary type. The advantages are obvious, lightness of draft, durability, ability to dig under variable conditions, such as dry or wet, green or ripe vines, weeds, up or down hill, including all kinds of soil.

To protect the potatoes from frost, and even through winter, heaps should be made in the absence of commodious houses or cellars. A cool, dry location should be selected, and a space thirty-six inches wide scraped out to a depth of eight or ten inches, forming a ridge on each side and one end to keep the water out. The length may be as desired. The potatoes should be piled steep enough to shed the water after being covered. The covering preferably should be rye or wheat straw which has been threshed by hand. Two or three inches of straight straw is better than three or four which has been broken by a machine. As the heap progresses in length, the straw should be placed over the potatoes, butt-ends down, and covered with

two or three inches of earth. To more thoroughly shed the water, the earth should be made smooth with a spade or shovel. The trench formed by removal of earth for covering the straw should be continued a sufficient distance to carry off the water. Small tufts of straw for ventilators should be placed about six feet apart at the top. For wintering, six inches of earth is requisite; and when cold weather sets in a substantial covering of straw or coarse manure will be necessary to maintain the requisite warmth. By waiting until the ground is frozen before covering it, the frost will be retained, thus securing a more even temperature. A few boards or sticks of wood will serve

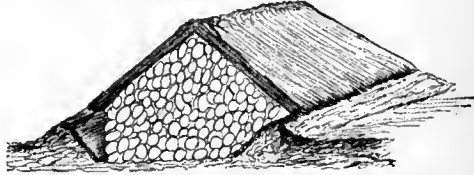


Figure 12. POTATOES IN A HEAP.

to secure the straw during windy weather. Heaps can be opened only during mild weather, otherwise must be left until spring. Although potatoes may be wintered perfectly in heaps, extra precaution is necessary.

Cellars or special repositories are preferable. Inspection can be made at all times and the temperature controlled. Although many are familiar with their management, it may be well to note the relation of temperature to ventilation. Unlike wintering in heaps, the ventilation of cellars naturally tends to a gradual rise in temperature toward spring. Stone foundation

is a good conductor of heat and cold, hence the necessity of too much ventilation to maintain the desired temperature, which should range from 33° to 35°. To avoid dampness, cement or concrete should not be used in making a foundation. A special repository constructed above ground is preferable. The structure should be of wood. If made with a ten-inch space on all sides and above, packed with planer shavings, a very uniform temperature can be maintained. Double doors and ventilators are requisite. Upon the approach of warm weather, one or both of the doors may be left partly or fully open at night to lower the temperature, when necessary. To more perfectly keep a few choice new varieties, they should be packed in dry sand, contained in barrels or boxes. It is the true way of wintering turnips or winter radishes.

Where many potatoes are grown a sorter is almost indispensable. One valuable feature of machine work is the absence of small or unsalable sizes among the marketable ones. Where the crop is being marketed as dug, placing the machine in the field will ordinarily save some handling. When storing them the sorting may be done when convenient. If sorted when taking them out of the cellar, all decayed and poor ones may be removed. If the weather is dry when digging and the pickers careful, but little soil need be carried in the repository. During wet weather it will be found advantageous to run the potatoes through the sorter previous to storing them. The agitation of sorting will remove most of the earth. The capacity of a good sorter is from 500 to 2,000 bushels per day.

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Cheaper than Paying Rent—Crops Large and Certain**

On Tuesdays, June 4 and 18, 1907, I will personally conduct you to this **LAND OF OPPORTUNITY**, to the growing towns and fertile, irrigated valleys of the **Big Horn Basin, Wyo.**, where you can enter 160 acres of irrigated land at 50c. an acre plus cost of water; also the Yellowstone Valley with its beet sugar factory and irrigated lands. **Do you want to go?**

The Government is spending millions for irrigation in these localities.

These lands, adjacent to the Burlington Route, are as rich and productive as any the sun shines on, and lie along beautiful streams with an abundance of pure mountain water. Plenty of timber and coal. Climate, ideal.

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SPECIAL ROUND TRIP RATES from Denver, Omaha, Lincoln and Kansas City, \$20, St. Louis, \$23, Chicago, \$25. Excursions leave Denver 8:45 p. m., Omaha 4:10 p. m., Lincoln 6:00 p. m., Kansas City 9:50 a. m. and 6:05 p. m., St. Louis 8:02 a. m., and Chicago 9:15 a. m., on dates named.

NEW FOLDER FREE. For our new folder with large map, telling all about these lands, the markets, what the farmers raise, how to acquire title, and much other valuable information, write to



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Kingman Implement Co.,	Omaha, Neb.
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Colorado Moline Plow Co.,	Denver, Colo.
The T. C. Powers Co.,	Helena, Mont.
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OPPORTUNITY. The advertiser is in a position to get hold of some of the best irrigation projects in the west today. He has gone over the field thoroughly and is able to show positively where great profits can be made out of these properties. In some instances only small capital is required.

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 No other machine can do it successfully for lack of original patents owned by us. No twist motion in our drive. No belt or switch necessary. No batteries whatever, for make and break or jump-spark. Water and dust-proof. Fully guaranteed.
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The Irrigated Farms Co.
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Figure 13. POTATOE SORTER.

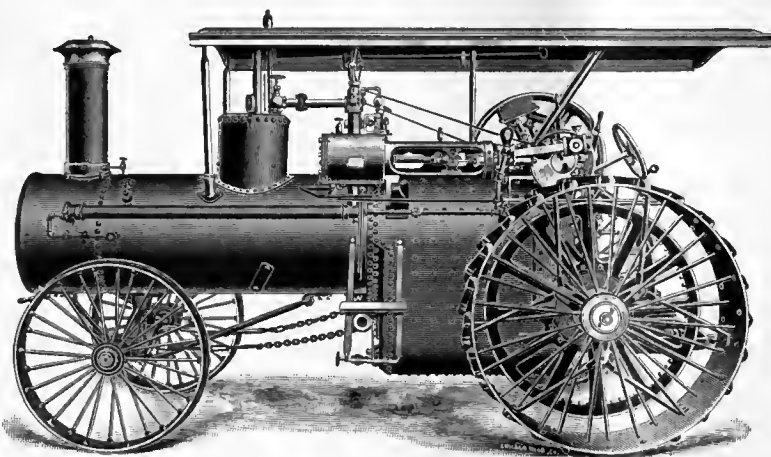
Cost of raising one acre of potatoes, where ten is the crop:

Interest on land at \$100 per acre.....	\$ 6.00
Plowing	1.50
Harrowing30
Twelve bushels of seed at 50 cents.....	6.00
Cutting seed with cutter.....	.30
Planting with Planter.....	.50
Harrowing weeds three times.....	.90
Cultivating three times.....	1.50
Applying Paris Green and Bordeaux.....	4.00
Two pounds of Paris Green.....	.50
Bordeaux Mixture	1.40
Digging with machine, two hundred bushels per acre	2.00
	<hr/>
	\$25.00

Two hundred bushels, cost of production as above, 12½ cents per bushel.

A summary of the foregoing shows conclusively the importance and advantages of heavy manuring and thorough culture. It is obvious a cost of \$25.00 per acre is the same whether the crop be one or two hundred bushels. But while the outlay is \$25.00 per acre, the actual cost of production is contingent upon the number of bushels harvested, so that instead of a cost of 12½ cents per bushel where the crop is two hundred bushels, it is increased to 25 cents where the crop is but one hundred bushels per acre. Allowance should be made for the cost of manure. Twenty loads to the acre is a liberal amount, which at \$1.00 per load will cost \$20.00. Adding this to the expense of cultivation and harvesting, there will still remain a profit of more than one hundred and fifty per cent, against less than one hundred per cent where the crop is one hundred bushels, more than double, or a difference of more than one hundred per cent in actual profit, as will be seen from the following statement:

200 bushels per acre, 45 cents.....	\$90.00
Cost of raising same.....	\$25.00
Twenty loads of manure.....	20.00— 45.00
	<hr/>
Net	\$45.00
100 bushels per acre, 45 cents.....	\$45.00
Cost of raising same.....	25.00
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Net	\$20.00



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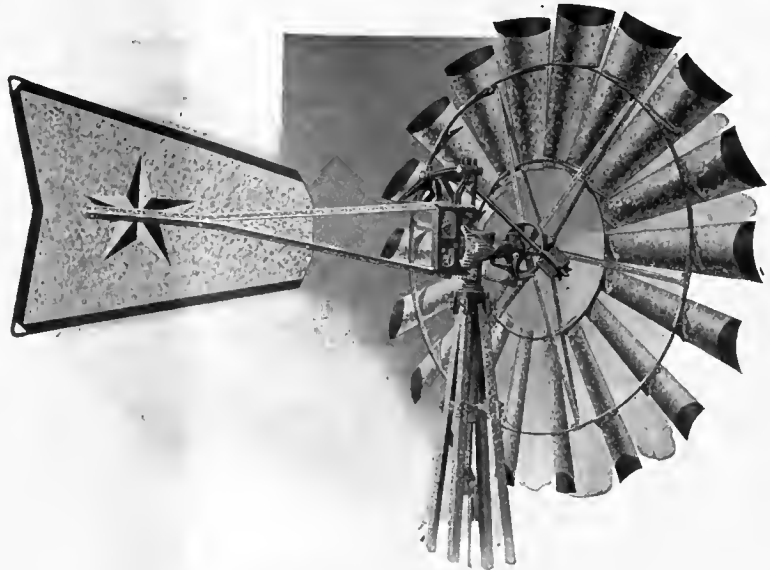
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NOTE—The Board reserves the right to reject any and all bids.

Suitable for Waterworks or Irrigation.

For further particulars write or see

D. E. BURKE, Superintendent
Pueblo Water Works, Pueblo, Colorado



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Best Irrigation System

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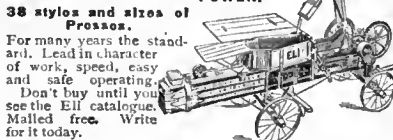


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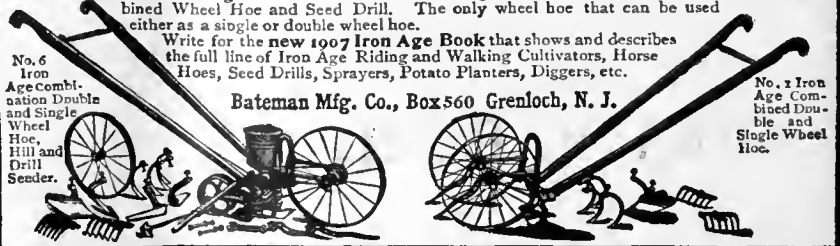
easily pay for themselves the first season, not only on account of the time and labor they save, but because they do better work and give you larger crops.

The No. 6 Iron Age combines a double wheel hoe, a single wheel hoe, and a hill and drill seeder. The most compact, practical and useful of all garden tools. Opens the furrow, sows the seed, covers and rolls the ground and marks the next row, in one operation.

The No. 1 Iron Age is the combined double and single wheel-hoe form of the No. 6 Combined Wheel Hoe and Seed Drill. The only wheel hoe that can be used either as a single or double wheel hoe.

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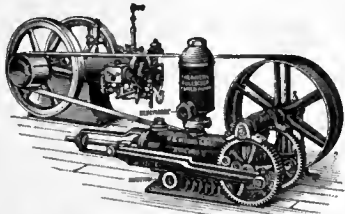
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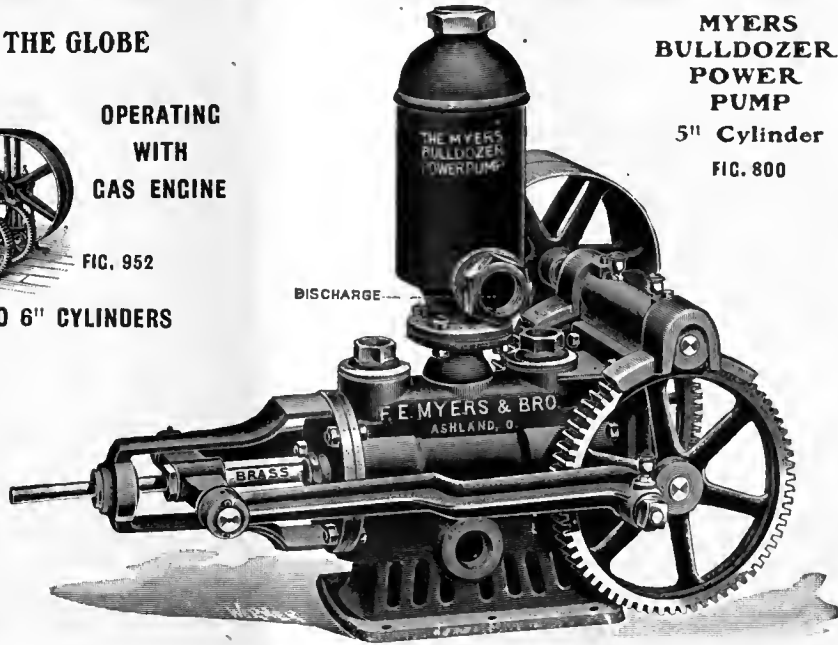
OPERATING WITH GAS ENGINE

FIG. 952

HORIZONTAL BULLDOZERS, 3" TO 6" CYLINDERS

MYERS BULLDOZER POWER PUMP

5" Cylinder
FIG. 800

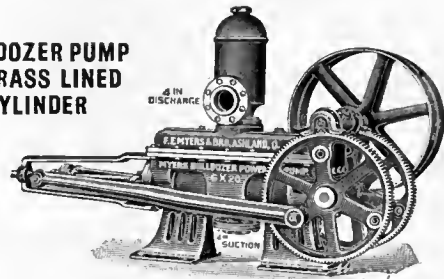


DISCHARGE

F. E. MYERS & BRO.
ASHLAND, O.

BRASS

FIG. 1079



BULLDOZER PUMP
6" BRASS LINED CYLINDER

4 IN DISCHARGE

MYERS BULLDOZER PUMP

SUCTION

BULLDOZER WORKING HEAD

MYERS BACK GEARED WORKING HEAD

TAPPED FOR 3" PIPE

5, 7½ AND 10" STROKE

FOR BELT, WIND OR HAND POWER

FIG. 1113



2½" DISCHARGE

16" PULLEY

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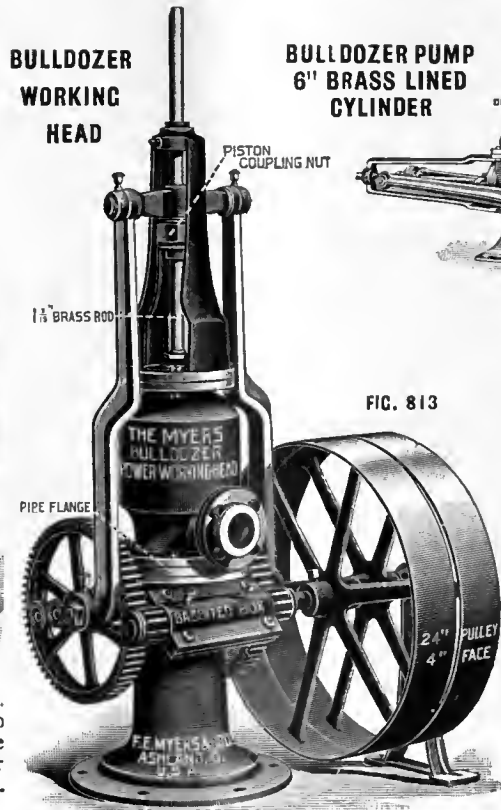


FIG. 813

PISTON COUPLING NUT

1½" BRASS ROD

PIPE FLANGE

BRASS

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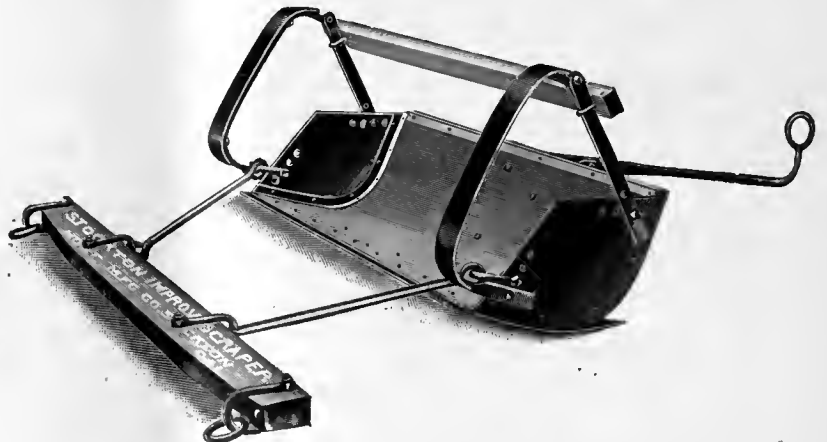
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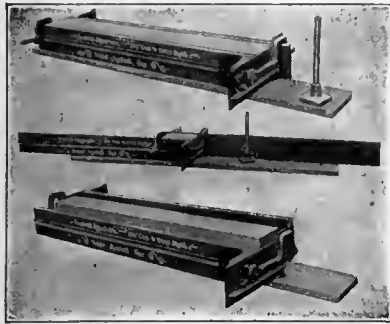
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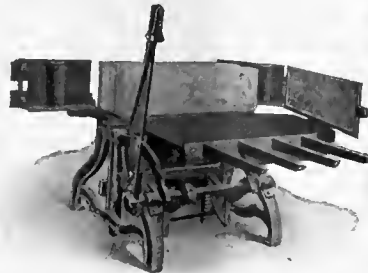
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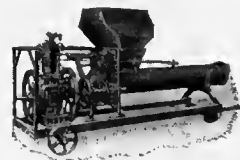
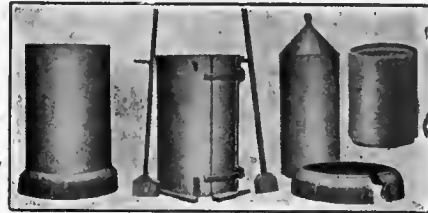


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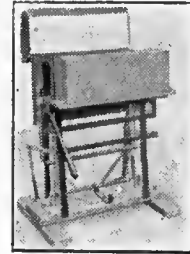
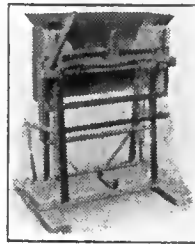
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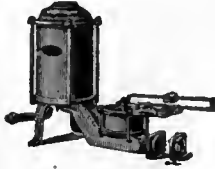
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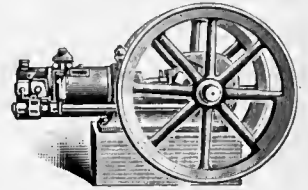
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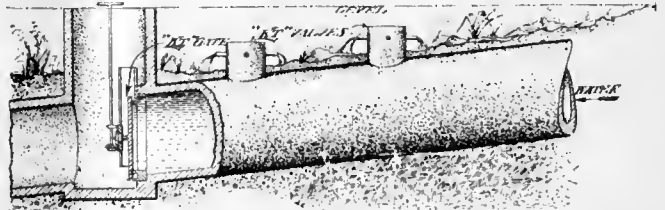
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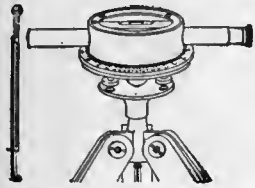
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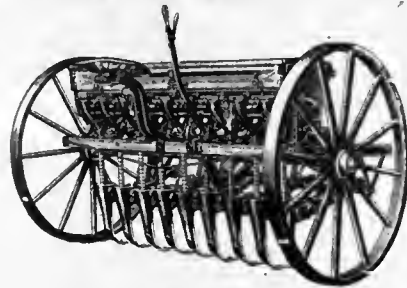
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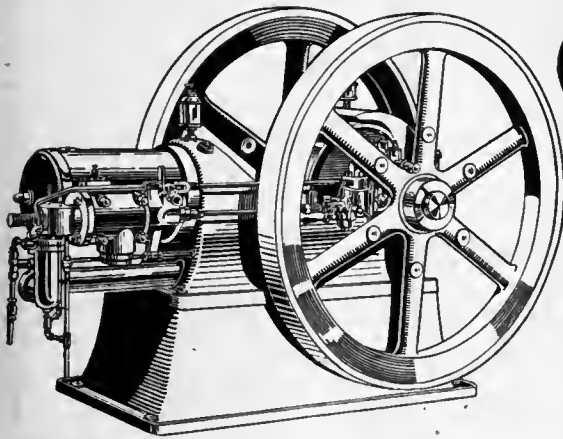
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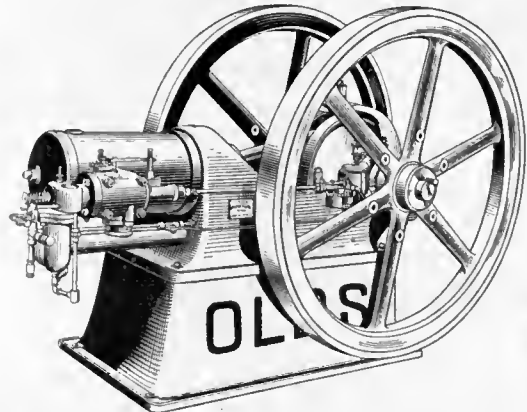
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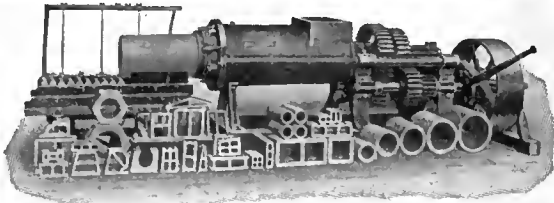
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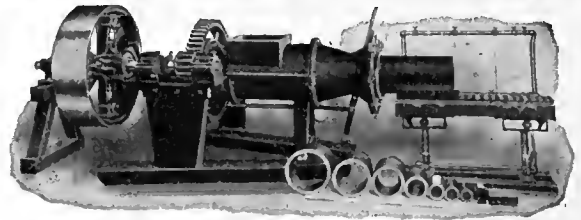
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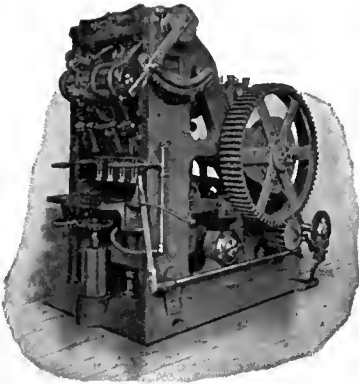




Centennial Auger Machine



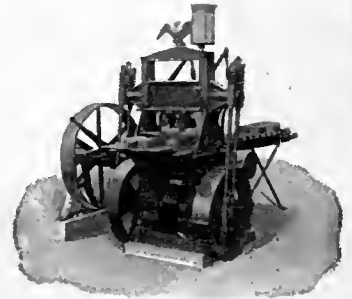
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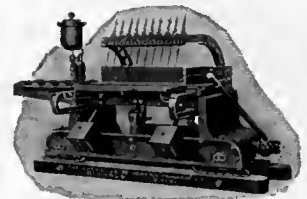
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Clay Working Machinery

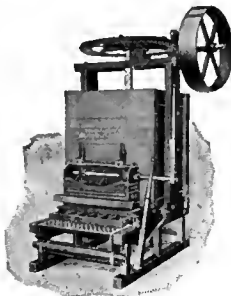
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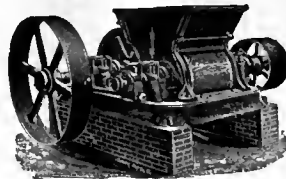
The American Clay Mch. Co...Bucyrus, Ohio



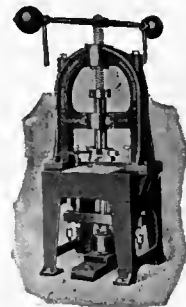
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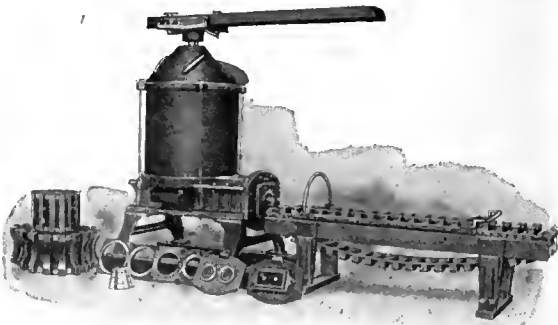
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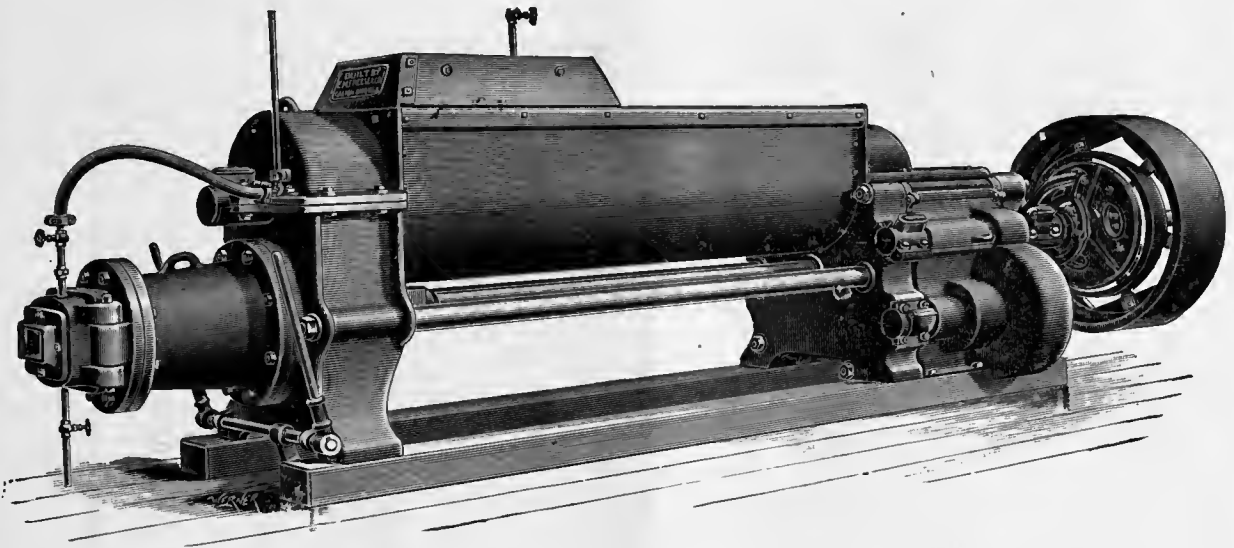
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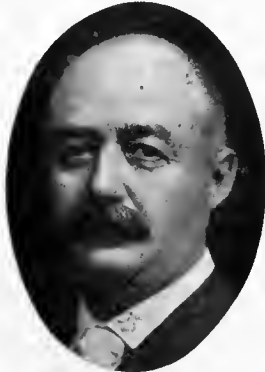
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Let Me Prove That 10 Acres of this Irrigated Land

Will earn **\$250.00** A Month For You



E. W. SHUTT, President
Rio Grande Land, Water & Power Co.

I Will Sell It To You For \$2.50 a Week

Irrigated, under
cultivation, ready
to earn at least
\$250 a month.

Not in all the world have I ever heard of so good an opportunity for men of small means.

In this small space I cannot tell you all the steps that have been taken to safeguard your money in every way.

This is investment—not speculation—yet you get returns equal to those from successful speculation.

And all the while you are secured against loss by the finest farm land in the world, and your interest in water-rights that no man could buy for a million dollars.

There is no question like finding gold or striking oil about this proposition.

The land is there for all time. The water is there for all time to nourish and fertilize it.

You don't have to dig in the ground deeper than to plant seed.

There are no insects that destroy crops in this country.

There is no chance for drought.

There is no chance known to man for a single crop failure, ever.

And the abundant crops of large and in every other way superior hays, grains, vegetables and fruits are equalled in only a very few favored spots, such as the Rocky Ford country. But I am going to prove by case after case that net returns from ten acres of this property rarely are as low as \$3,000 a year and often as high as \$10,000, according to the kind of crops.

The difference is not according to location of land or season or anything of that kind.

The land is near a prosperous and growing city—Albuquerque—the largest city in New Mexico.

Our main irrigation canal to run through the city.

The main line of the Santa Fe Railroad runs through our land from end to end.

And our own electric line is to supply additional cheap and convenient transportation to every section of these lands.

If you want to see the country for yourself, you can go with the next party I take to look at the property. Or you and your friends can band together and send a representative.

Or I will send you names of prominent men who have gone or will go and you can ask them what conditions they find. But this is the merest outline of what I will show you in detail.

There are many features of this Secured Land Contract that make it safe and profitable which I haven't space to touch upon.

I am only attempting to make it clear to you that if you can possibly save \$2.50 a week you can have an assured three to ten thousand dollar income in a few years.

Don't doubt—I have proof.

I have promised to lay it before you. All you have to do is to write for it—that can't cost you a cent more than postage.

And as fast as the mails can carry, I will send you proof that as sure as crops grow where climate, soil and water conditions are perfect, you can be financially independent in a few years.

Now, not to hurry your decision in the least, but to protect the price, write me personally at once.

For after the first lot of ten-acre tracts is contracted for we will ask more. But I make this promise. Every man or woman who answers this advertisement at once can have at least ten acres on these terms unless, of course, all our land should be already contracted for from this one advertisement.

Now, write at once. I can say nothing more in this advertisement except that, if I could, I would not tell you all you can confidently expect from this investment. For you would not believe it without the proof which I cannot put in an advertisement. Address me personally, and believe me sincerely,

E. W. SHUTT, President Rio Grande Land, Water and Power Co.
658 Houser Building, ST. LOUIS, MO.

YOU know, or can easily learn from United States Government Reports, that irrigated lands in the Great Southwest, in selected crops, will net \$300 to \$1,000 a year per acre over and above the entire cost of cultivating them.

Anyone who knows the country will tell you that absolutely the surest, safest way in the world to gain a large and permanent income for a small outlay is to get hold of a few acres of irrigated land in the Great Southwest.

But always before it has required at least a few hundred dollars and it has been necessary for the investor to live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest irrigated land in the world if you can save \$2.50 a week.

You can go and live on it—absolutely assured of an income from it alone of \$3,000 to \$10,000 every year without fail.

Or you can remain in your present position and add that much to what you earn.

For my company will cultivate your property for a small share of the crops.

You don't have to know a thing in the world about farming.

Now, I can and will prove all this from the highest authorities in the land.

All you have to do is—write me and say, "Prove to me that ten acres of your land will net from \$3,000 to \$10,000 a year above all cost of cultivating it."

I have the proof, so read what my company will do for you.

I will deliver to you at once a Secured Land Contract for ten acres of irrigated land in the Rio Grande Valley.

You must pay my company \$2.50 a week or as much more as you like.

Instead of your having to pay interest on deferred payments, I ask for my company, to pay you 5% per annum on the money you pay in.

I also bind my company to fully irrigate your land and turn it over to you under full cultivation whenever you desire to mature your contract.

\$2.50 a week will mature your contract in 10 years.

But after you have paid \$2.50 a week for three years, or the same total amount in a shorter time, I agree and bind my company to loan you enough money to make all future payments and mature your contract.

Remember, the land will be fully irrigated and completely under cultivation, so your first year's crop should net you enough over and above the cost of cultivating it to fully pay your loan.

You would then own your land outright and have an assured income of from \$3,000 to \$10,000 a year.

Can you hope in any other way as safe and sure as this to have so large an income in a few years?



THE IRRIGATION AGE

VOL. XXII

CHICAGO, JULY, 1907.

No. 9

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,

112 Dearborn Street, CHICAGO

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D. H. ANDERSON, Editor
W. J. ANDERSON .. G. L. SHUMWAY
Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

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Official organ of the American Irrigation Federation.
Office of the Secretary, 309 Boyce Building, Chicago.

Interesting to Advertisers.

It may interest advertisers to know that *The Irrigation Age* is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. *The Irrigation Age* is 22 years old and is the pioneer publication of its class in the world.

Mr. Beard
Honored

It is with much gratification that the readers of *THE IRRIGATION AGE* will learn of the election of Mr. W. A. Beard, chairman of the board of control of the Fifteenth National Irrigation Congress, to the position of secretary and manager of the State Board of Trade of California. Mr. Beard's work on behalf of the coming Congress and his years of tireless labor in the development of the Sacramento valley have shown to the people of the state his capacity and his call to a broader field is but a recognition of his superior attainments. He is a man of broad views, high ideals and indefatigable energy, and while his assumption of the duties of his new position will mean a loss to the Sacramento valley, it promises great things for the state as a whole. Mr. Beard assured the newspapers, however, that his elevation will in no way interfere with his position or work with reference to the National Irrigation Congress, to which he is to give his entire time until after the gathering in September.

Possibilities
of Drainage.

Elsewhere in this issue we print an article by a drainage expert relative to the immense possibilities of drainage under Federal supervision. When one considers that over 50,000,000 acres, an area greater than any one state in the Union, are now nothing more than pestilent mosquito-breeding swamps, the lurking place of malaria and the dread yellow fever, he wonders that the Federal government has not already made a move in the matter. True, individual states and corporations have expended thousands of dollars and years of time on drainage

projects, but the undertakings have been too stupendous, too large to be encompassed by individual effort, and the attempts have all been unsuccessful. It is the unanimous opinion of drainage experts that the government is the only force which can successfully undertake the project and the favorable report of the Flint bill by the public lands committee of the United States Senate during the Fifty-ninth Congress shows that public interest is becoming aroused. It took the advocates of the law authorizing the Federal government to reclaim arid lands, twelve years to force its passage; let us hope the Flint bill, or at least a measure embodying its chief provisions, will soon become a law. We have excellent examples of the working of the system in European countries so there need be no hesitancy on the part of law-makers because of a doubtful success.

Opening of
Huntley
Project.

On Wednesday, June 26, at Billings, Mont., occurred the dedicatory exercises opening to settlement the Huntley irrigation project, constructed by the United States government. The drawing for places was done in the presence of Hon. J. R. Garfield, secretary of the interior; Hon. R. C. Ballinger, commissioner of the general land office; Hon. Charles D. Walcott, director of the United States geological survey; Hon. F. H. Newell, chief engineer of the reclamation service, and Hon. Gifford Pinchot, chief of the bureau of forestry. First place was won by a resident of Billings, and second and third by citizens of Joliet, Ill. The Huntley reclamation project was begun in 1905 and was recently completed at a cost to the government of ap-

proximately \$1,000,000. Some 30,000 acres are reclaimed by the project, divided into 633 farms, of which two have been reserved from settlement for "demonstration farms," which will be under the charge of officers of the United States Experimental station at Bozeman. Eight town sites, situated either on the Northern Pacific or the Chicago, Burlington & Quincy railroads, have also been withdrawn from entry and no farm in the project is more than three miles from a railroad station. The main canal is twenty-three and a half miles in length according to present contract and draws from the Yellowstone river at a point two miles west of Huntley 400 cubic feet per second. There are three tunnels, 600, 1,550 and 390 feet long respectively, and the government has installed a telephone line along the main canal. The first charge for water will be in 1908, but it will be delivered free in 1907 in time for fall plowing.

Big Horn Basin.

The Editor of THE IRRIGATION AGE had occasion recently to visit the Big Horn Basin in Wyoming, at which time an opportunity was given him to look into some of the work along irrigation lines under private control in that rapidly developing country. He visited the new town of Worland, which has sprung into existence during the past year, looked over the land of the Hanover Canal Company, lying east of the Big Horn river, and surrounding the town; he also saw the work of the Big Horn Development Company on the west side of the Big Horn River, and an illustrated article concerning these various projects will appear in an early issue of THE IRRIGATION AGE.

The Big Horn Valley possesses a greater future, perhaps, than any similar area in the entire west. Surrounded by a high range of mountains, lying like a basin with the mountains for a rim, it has an unequalled climate, and has long been known as a fine stock range on account of its grasses and mild climate.

The government is reclaiming many thousands of acres of land near Cody, while what is known as the Wiley Ditch will reclaim something like 200,000 acres along the principal valleys in the basin. Capital is being attracted to this section, new towns are rapidly springing up, and the Burlington Railway has built within the past year from Frannie to Worland, and is at present extending its line south through the basin, the intention being to make a direct line between Denver and Laural, a point on the Northern Pacific Railway west of Billings, Mont. It may be readily determined what a great change a line like this will create throughout a section which has heretofore been several hundred miles from the nearest railway. The Northwestern Railway is also building through Wyoming, and it is stated that one of their objective points is the Big Horn Basin, so there will be no lack of

transportation when the lands now being reclaimed are under a state of cultivation.

Mr. Elwood Mead once stated that Wyoming is the best watered state in arid America, and one can readily verify this by a visit to the Big Horn Valley where millions of dollars in value of water are going to waste. It would be difficult to estimate the value of water which pours down from the mountains forming the rim of this basin and flows away unused to the sea. When even a part of this water is saved and put out over the land great results, in an agricultural way, are possible, and the men who are devoting their energies to the development of the Big Horn Basin will stand out prominently in the future as benefactors to their race and particularly to the State of Wyoming.

Public Land Congress. The Public Lands Congress which was held in Denver recently, brought out many strange features in connection with the development of the West. It, in the first

place, emphasized the fact that the western people are becoming alive to the possibility of a centralization of power followed by such careful scrutiny of all attempts of development in the West as to, in a way, seriously retard the growth of that attractive field, and at the same time create such a feeling that capital will hesitate to reach in and aid in this work.

Owing to an unusual amount of work, it was impossible for the editor of THE IRRIGATION AGE to attend this congress, but the tone of the western press would indicate that a very firm stand has been decided upon by the strong men of that section against interference by the heads of bureaus in Washington. One good result of this meeting which may be looked for is a clear exploitation of the fact that the President's advisers are frequently in error and it is safe to say that President Roosevelt, who, it is our impression, desires to be fair, will reach out for suggestions from prominent men of the West rather than take the word of a few of the hired representatives of the Government, who have been placing data before him, a good part of which has resulted in creating a feeling which made necessary a meeting of this character and a public expression of disapproval.

It has always been the impression of THE IRRIGATION AGE that President Roosevelt would do much better to accept statements and facts presented to him from such men as Senator Heyburn of Idaho, Carter of Montana, and other leading lights throughout the West, than to base his actions on information furnished by men whose acquaintance with the West and western conditions is so limited as to make them incompetent judges of the needs of that section.

In studying the situation one is almost inclined to believe that President Roosevelt is narrow in his reasoning. Some of his recent moves, such as the segre-

gation of large areas for forest reserves, would lead one to believe that not being able to carry out his plans comfortably, he becomes vindictive. This is rather a questionable impression to get out concerning the head of our nation.

THE IRRIGATION AGE is in no way in politics; its interests lie in the clean and rapid development of our western country under irrigation, and unless the men representing the Government in the West possess superior ability and exhibit good judgment, grave errors are liable to creep in which will materially retard this great work.

In discussing the subject before the Land Congress Congressman Mondell of Wyoming spoke as follows: "The methods practiced and the arguments used in bringing the proposed new policy before the public and in presenting it to Congress, is, I think, quite familiar to all of you and therefore a recital of it is not necessary at this time.

"Certainly no one will attempt to deny the extraordinary character of the proposal of the radical departure it contemplates from our past policy of non-interference with the use of the grasses of the public domain. It not only proposes making the Government a permanent landlord over all the public domain, but assumes municipal right of sovereignty by the nation over all the western States, and places in the hands of one man—the secretary of agriculture or some one designated by him—absolute control over the vast estate thus created without limit to his authority or appeal from his judgment. *I think I can truthfully say that no such grant of absolute power over the use of so vast an area of land has ever been given, in time of peace, in any civilized country.*

"Should this proposed legislation become law every person grazing stock on any acre of the public lands—except by direct permission of the Secretary of Agriculture or his agents—would be a trespasser and, of course, subject to pain and penalties therefor. Under such legislation the Secretary of Agriculture would have the authority to lease every acre of the public land to one individual, or he could refuse to lease a single acre of public land to any one. Under such a law the Secretary of Agriculture would have authority to charge a grazing fee of any amount for every domestic animal grazed anywhere on any part of the public domain by anybody, or he could charge a grazing fee for the privilege of grazing on the public lands in one locality and not make any charge in another."

From the above by Congressman Mondell it may be readily seen what power would thereby be placed in the hands of Forester Pinchot.

Notwithstanding the remarks of the President at Jamestown, concerning the ability of this man Pinchot, there are thousands of people in the West who are of the opinion that an individual of his mental make-up

should not be vested with this great power, nor should any one; in case it is necessary to control the range, as suggested by some of the friends of the administration, it would be much better to appoint a commission to be selected by Congress, said commission to be composed of a representative from each of the States interested, as well as one or two of the heads of the bureaus in Washington. In this way it is the impression of THE IRRIGATION AGE that much better results may be obtained.

THE IRRIGATION AGE will at a later date publish a complete statement of the work performed by the chief forester and will attempt to prove that while he may be a faddist and sincere in his efforts at reforestation, he is not a man of large enough caliber to fill the position of dictator to the entire West.

The attention of our readers is called to the editorial notes by Mr. Shumway published in this issue, which will, perhaps, give a clearer idea of what was accomplished at the meeting.

EDITORIAL NOTES.

BY G. L. SHUMWAY.

The Public Lands Convention recently held at Denver was the most important one in the history of the West. We observed many of the old vanguard who have attended the Irrigation Congress, the Trans-Mississippi Congress and similar gatherings. It proved a disappointment to the politicians of the East inasmuch as it developed itself into a sober deliberating body determined upon advising the President of the sentiments of the West, instead of a catspaw to please the politicians.

The sentiment was decidedly one way, not of course unanimous, but probably two to one. While Colorado and Wyoming held the largest number of delegates those from distant states were equally determined in expressing their sentiments. E. W. Ross, Land Commissioner of Washington, Senator Carter of Montana, Walter H. Graves, of Idaho, and L. Bradford Prince of New Mexico, were in evidence.

Colorado's splendid congressman, F. H. Goudy, and Congressman R. W. Bonyng, and Congressman Mondell of Wyoming, the senators from various States, including Teller of Colorado and Clark of Wyoming, in temperate addresses informed the representatives from Washington that there was nothing the matter of the West that needed remedies or surveillance. It was a scene well worthy of going miles to witness, where a convention made up of people, 90 per cent of whom were admirers of President Roosevelt, deliberately repudiated some of the policies he has inaugurated.

It was the general opinion that he had been wrongly advised. In fact his Jamestown speech seemed to indicate to the West that if there was any criticism to his administration relative to public land laws it was due to the advice of his chief forester, Gifford Pinchot. The presence of Mr. Pinchot, of the Secretary of the Interior, James R. Garfield, of Land Commissioner Ballinger, of F. H. Newell, A. P. Davis, C. J. Blanchard and other Federal officials did not cause the convention to swerve from the duty which it had to perform. There was almost an element of sadness pervading that brainy aggregation of western characters in being thus bound to tell Teddy of his Error.

Murdo McKenzie was there strenuously supporting Pinchot policies. Mr. McKenzie runs some 140,000 head of cattle upon Indian lands leased from the Government. The large cattle barons and large sheep men favor the administration policy but the home builders and the men of small flocks and herds were practically a unit against the inauguration of new ideas relative to public domain.

The situation was a most embarrassing one for the chief forester, but from expressions which he made from time to time during the convention we are led to believe that he has miscalculated the mettle and the temper of the West and that he is willing, at least in a measure, to conform his ideas to those as set forth in the resolutions which were adopted. Perhaps this anticipation is born of hope rather than fact. The report of the committee on resolutions was unanimous. There were some flurries and debates on the floor of the convention after the report was made but the resolutions were adopted without amendment. I would like to go into detail in commenting upon the addresses of the various delegates, of Clark, the poor man's senator of Wyoming, of Teller and others, but space would forbid; one of the strongest points brought out by the latter was his reference to the disappearance of the timbers in northern Michigan. "What became of the forests there?" he asked, and in answer stated they went to build the homes of the people of the land. What became of the land thus denuded, we might ask, and in answer state "It is occupied as homes and used for raising sugar beets and other valuable products."

IDAHO DATA.

The following data compiled from the records of the United States weather bureau office at Lewiston, Idaho (covering a period of six years), reveals the following facts. The annual mean temperature is 54 degrees. The coldest month, January, averages 36 degrees, and the warmest month, July, 75 degrees; the summer months pass the 90 degree mark on an average of 44 days, and the highest point ever reached was 108

degrees. The average daily maximum temperature is 65 degrees and the minimum temperature 43 degrees. The winter temperature averages 37 degrees, or 5 degrees above the freezing point; the minimum temperature falls to or below the freezing point on an average of 64 times each year, and zero or below readings have been recorded on three days only.

The annual precipitation (including snow) is 13.73 inches; July and August are the dry months, averaging only .67 of an inch, and March and May give the highest average, 1.60 inches. The annual number of rainy days (.01 of an inch or more) each year is 102; July and August average 3 rainy days each. The summer rains occur in the nature of showers of short duration, while the winter rains are more or less of protracted nature and of a fine misty character. The greatest amount of precipitation ever recorded in 24 consecutive hours was 1.54 inches. The average annual snowfall is 9.3 inches.

The average number of clear days each year is 145, partly cloudy 95, and cloudy 125, foggy days average 3 or 4 days each year. During the summer months there is an abundance of sunshine, July and August averaging 24 clear days, 5 partly cloudy days and 2 cloudy days each.

The average wind movement is low (4.5 miles per hour) and it is rare that a storm velocity 40 miles per hour is attained, and the highest velocity ever attained was 62 miles per hour. The prevailing wind direction is east for every month in the year. The topography of the eastern part of the state causes the remarkably mild climate of the Lewiston Valley. The Coeur D'Alene and the Bitter Root ranges are barriers against blizzards.

The cold winds in passing over these mountains lose much of their moisture by condensation and are warmed by compression as they pass to lower levels, giving the valley of the Snake River tributaries a climate where temperatures below zero are seldom experienced. In summer, daytime temperatures are high, but the nights are usually cool.

Economical Construction.

The construction of the Upper Deer Flat reservoir of the Payette-Boise irrigation project, Idaho, by force account, affords an illustration of the economy effected by the government in doing its own work under certain conditions. The lowest offer for moving earthwork for this dam was 36 cents per cubic yard. The actual cost of doing the work during the month of March, 1907, when labor conditions were not particularly favorable and the weather was raw, shows that the total cost to the government was less than 18 cents per cubic yard, or less than one-half of the lowest bid received. This includes what is known as the overhead charge, that is, the cost of the equipment and getting the material on the ground.

While this result is somewhat exceptional, the results justify the stand taken by the secretary of the interior at various times in refusing to accept bids which appear to be high and in ordering the work done by the competent engineers on the ground. Most of these men have been selected with reference to their experience and ability in handling work, and under the present conditions in the west are more competent to carry on work economically and efficiently than the ordinary contractor, more especially as they do not have to provide for extraordinary emergencies which must be considered by the contractor in offering his bid.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation

THE LOWER YELLOWSTONE PROJECT

Great Undertaking in Montana and North Dakota Which Means the Reclamation of 66,000 Acres of Arid Land and the Construction of a Canal 70 Miles in Length.

By J. S. Conway, Engineer U. S. Reclamation Service.

The Lower Yellowstone project comprises 66,000 acres in a fertile valley between the Great Northern and Northern Pacific railways on the west bank of Yellowstone River. About two-thirds of the total acreage is in Montana, while the remainder or northern portion lies in North Dakota.

Stock-raising has been carried on in this district for about twenty-five years, and it is believed that the assurance of a good forage crop for winter feed, combined with the unlimited areas of open range available for summer pasture, will make this industry, now somewhat of a chance, a profitable certainty. The soil is productive, as has been shown in years of abundant rainfall, when large crops of hay, grain, potatoes and garden vegetables have been raised. Farther up the Yellowstone private irrigators have made a success of the sugar beet, and there is no doubt that it will ultimately be grown here.

Construction of an irrigation system has been taken up by the United States Reclamation Service as the result of a reconnaissance of western North Dakota made by Mr. F. E. Weymouth (now engineer in charge of the project) shortly after the passage of the reclamation act. There is contemplated the diversion of about 830 second feet of water from Yellowstone river at a point nineteen miles north of Glendive, Mont., into a canal seventy miles long extending to the Missouri river, which forms the northern border of the project.



Headgates structure, nearly completed.

The general plan of the work is simple, consisting of a low diversion dam, and a canal parallel to the river, with laterals branching off to water the intervening strip of land. Complicating what might seem an easy problem, it must be remembered that this land is located on the eastern edge of the arid belt and is subject to occasional heavy rainfall in the spring, which is drained off by a number of creeks crossed by the canal, necessitating an unusual number of structures. In the case of the headgates and dam, extra precautions have been required on account of ice-gorges in the river, which occur some seasons; and, furthermore, the upper part

of the main canal, before the irrigable land is reached, traverses a rather rough and broken country, involving deep cuts and heavy side-hill work.

To give some idea of the magnitude of this undertaking before taking up a few salient features more in detail, some quantities and comparisons might be quoted. The amount of excavation, almost wholly in



Concrete culvert on main canal.

earth, approximates 6,500,000 cubic yards which, if dumped in a cone-shaped heap, would cover a thirty-acre field to a central height of 400 feet. One hundred and forty carloads of cement, each containing forty tons, will be used for mixing concrete, and if the steel bars used for concrete reinforcement were placed in a straight line, they would extend 150 miles.

DIVERSION DAM AND HEADGATES.

The diversion dam is a rock-filled timber structure on a pile foundation, 700 feet long at right angles to the current, and will raise low water in the river about four feet. It is specially designed to resist the destructive effects of ice, by having the approach on a slope of three to one, while the down-stream face is ogee-shaped, with a heavy rock apron immediately below. Grinding of the face timbers will be largely prevented by steel straps, four inches wide and one inch thick, spaced two feet center to center. The location of the dam is exceptionally favorable, the river channel being straight and uniform, unbroken by the many small islands which are so common a feature in its course. The west or head-gate bank has a sheer height of from fifty to sixty feet, while on the east bank where the ground is much lower, a concrete abutment has been built, backed by a dike faced with riprap and extending inland to high ground.

The headgates structure is entirely of concrete, containing approximately 5,000 cubic yards. The main wall, parallel to the river, and the upstream wing wall are gravity sections, sufficiently heavy in themselves to resist the maximum effects of flood. The downstream wing wall is designed as a retaining wall for earth, and is heavily reinforced with steel bars. In the front wall,

about 160 feet long, are located eleven sluice gates, each five feet in diameter, to control the entrance of water to the main canal. Each of these gates is set in a separate recess, the entire front of the wall being protected by 12 by 12 timber ice-guards, spaced two feet center to center.

MAIN CANAL AND LATERALS.

On account of the slight fall of the river, which averages only about two and a fifth feet per mile from the point of diversion to its confluence with the Missouri, it has been necessary to run the canal on the light grade of one in 10,000, or about six inches to the mile. This grade is maintained for nearly forty-six miles, and is then gradually increased as the canal becomes smaller. Two important points are indicated here, necessity for accurate level-work, and use of a comparatively deep canal section to insure sufficient velocity.

Starting from the headgates, the canal is located in thorough-cut for four miles. The excess material has been used as a dike on the side adjacent to the river, to



Partly finished lateral, with new town of Sidney, Mont., in the distance.

protect the canal in event of ice gorges. Lighter work then follows to the ninth mile where there is about three-quarters of a mile of side-hill work. Burns creek, one of the largest tributaries to the Yellowstone in the length of the project, is crossed in the tenth mile, following which is a short stretch of thorough-cut, then a location at the foot of steep bluffs to the thirteenth mile. Continuing for about twelve miles from this point, there is a gradual climb of the side-hill, with some interruptions. A comparatively small acreage of irrigable land is covered by the canal in this length, although there are occasional areas which are easily watered. One of the largest of these is reached in the twentieth mile by a lateral which will be dropped through turbines generating sufficient power to pump water to about 2,500 acres of fine bench land lying above the canal. From the twenty-sixth mile there is about eight miles of location in fairly flat country. In the thirty-fourth mile the canal approaches Fox creek, the largest creek in the project, and encounters two miles of heavy side-hill work. Beyond this creek the canal is located almost entirely on level bench lands, with large irrigable areas bordering it. As seventy per cent of the total irrigable acreage lies below Fox creek, the canal rapidly decreases in size until at the sixty-seventh mile it becomes a lateral, watering a part of the Missouri bottoms.

In addition to the main canal, 205 miles of laterals are required to distribute the water to the farms. By reason of the comparative narrowness of the irrigable area these laterals have been kept down to moderate sizes, and have been located along section-lines as far as topographic conditions will allow, to avoid cutting up the farms inconveniently.

CANAL-LINE STRUCTURES.

All structures on the main canal have been constructed of reinforced concrete. Creek crossings have been accomplished in four ways: (1) by carrying the canal under the creek in a conduit on grade; (2) by carrying the creek under the canal in culvert; (3) by carrying the canal in an inverted siphon under pressure, entirely below the bed of the creek, and (4) by carrying the creek over the canal in a superpassage or flume.

(1) *Conduits.* This type of crossing has been used for three larger creeks with somewhat irregular flow, where sufficient head can not be spared to use a siphon. It consists typically of a box-shaped concrete



Side hill work just before crossing Fox Creek.

passage designed to carry the canal at about double its ordinary velocity, joined to the regular canal section by wing walls, and long enough to accommodate the maximum discharge of the creek flowing over it. To prevent the creek from cutting back under the conduit, a riprap apron edged by sheet piling is provided on the downstream side, and to prevent the storm-water from washing into the canal, dikes are built on the upstream sides of the creek.

(2) *Culverts.* Culverts are used for all small drainage areas, where the storm-flow may be estimated somewhat definitely. On account of the low head room which usually exists between the bottom of canal and bed of rock, a flat box-shaped section has commonly been found advantageous. The outer slopes of canal bank have been protected by flaring wing walls. Vitrified pipe has been used instead of concrete for small water courses, the minimum size being twenty-four inches diameter. A total of over sixty culverts will be required in the entire length of canal, ten of which might be classed as major structures.

(3) *Siphons.* Viewed from the engineering standpoint, these structures present the most interesting features of the project; and are used for seven creek crossings on the lower half of the work where the canal has reached a level above the general surface of country.

These siphons are reinforced concrete pressure pipes, passing under the creeks, with concrete inlet and outlet chambers, joining the earth section of canal. The largest of these is at Fox creek, having two barrels built together, each seven feet in diameter and 225 feet long, while the smallest is at Ferry Coulee, with a single barrel two and a half feet diameter and 290 feet long,



Location of headgates from east bank of Yellowstone River.

all being designed to withstand a water pressure of twenty-five feet, representing the distance of the center line of barrel at its lowest point, below normal water surface in canal. To drain these siphons at the close of the irrigating season, each is provided with a drain valve, connecting with a vitrified pipe leading into the creek channel.

(4) *Flumes*. Flumes are used to convey storm water over the canal, where the location is in thorough-cut, and consist of rectangular concrete troughs, the sides of which act as girders to carry the structure with a full load of water. About twelve flumes are used, all but one being very small.

In addition to these structures for cross drainage, a number of others are necessary for the regulation of flow in the canal. These comprise sluiceways for emptying the canal in the autumn or in case of emergency, spillways for maintaining a uniform depth of water, and turnouts for regulating the admission of water to the laterals.

A sluiceway consists of a chamber in the canal bottom, about five feet below grade, and leading to sluiceways on the side next the river. These gates operate in front of openings in the side wall of the chamber, through which the canal is drained. Retaining walls on the sides, lining and paving on the bottom, from an artificial channel which leads to the natural water course nearby.

A spillway usually is located near a sluiceway, to take advantage of the same drainage channel, and consists of a concrete weir with crest at the desired maximum level of water in canal. The usual length of weir is about 100 feet, which gives ample capacity for any sudden rise of water in the canal—caused for instance by shutting off a lateral farther down stream. A concrete lined ditch is provided to carry the waste water away from the structure.

A turnout or lateral headgate is a concrete box

through the canal bank with wingwalls at inlet and outlet and a sluiceway on the inlet side to control the supply of water to the lateral.

INCIDENTAL STRUCTURES.

Other work in connection with the project includes a telephone line running the entire length of the valley from Glendive on the Northern Pacific Railway to Mondak on the Great Northern, a total of about seventy-seven miles. This greatly facilitates the management of the work, and will be of even greater benefit to the maintenance of the completed canal, as well as to the business of the valley generally. Buildings have been erected for office purposes and as quarters for the engineers at six points along the canal. The office at the headworks is intended to be used in the future as a residence for the gatekeeper of the canal. The other buildings have been constructed with a view to disposing of them to settlers when the work is completed, but all have been put up in a substantial and workmanlike manner. It has also been necessary to arrange for bridges crossing the main canal and laterals at convenient points. Steel bridges with concrete abutments will be used on the main canal, while those on the laterals will be built of timber.

The work is being carried on under the supervision of Mr. H. N. Savage, supervising engineer for Montana, North Dakota and northern Wyoming. Mr. F. E. Weymouth, who first investigated the district in the early days of the reclamation service, is in charge, and construction is directed by Mr. Chas. H. Paul, who has had long experience in hydraulic work. The project is separated into divisions varying in length from six to twelve miles with resident engineers as follows:

Mr. E. C. Bebb, Division 1, including headgates and dam; Mr. H. S. Morse, Division 2; Mr. H. F. Burkart, Division 3; Mr. R. H. Fifield, Division 4; Mr. P. M. Fogg, Division 5, and Mr. G. H. Bliss, Divisions 6, 7, 8 and 9.

The project offices are located at La Mesa, about thirty-two miles from Glendive, where in addition to



Crop of oats raised on irrigable land near Fairview, Mont.

the work of administration, designing, accounting and disbursing are carried on. The settlers in the valley have organized themselves as the Lower Yellowstone Water Users Association, with offices at Sidney, Mont., and are actively co-operating with the reclamation service in its efforts to make the valley a region of productiveness and prosperity.

IRRIGATION IS A SUCCESS IN SPOKANE COUNTRY.

BY DAVID R. M'GINNIS.

Enormous profits derived from the sale of fruits grown on its irrigated lands has drawn the attention of the nation upon the state of Washington, and more especially what is known as the Spokane country, embracing 150,000 square miles in eastern Washington and Oregon, northern Idaho, western Montana and southeastern British Columbia, declared by experts to be the most resourceful and productive district in this or any other country.

In the Rogue river and Hood river districts of Oregon, in the Yakima valley of Washington and along the Columbia river, even as far up its valley as Kettle Falls, along the Okanogan valley and up the Snake river in Idaho, and in the Spokane valley, are produced fruits of form, flavor and color which bring from 150 to 500 per cent higher prices in the great fruit markets of the world than the best commercial apples produced east of the Rocky mountains. The Spokane, Yakima, Columbia or Snake river orchardist, if he has taken care to plant the proper varieties of fruits and has given them intelligent care, thinks nothing unusual of making a net profit of from \$150 to \$2,200 an acre in a single year from his fruit.

When the first projectors in the arid part of Washington struggled year after year to install irrigation upon sagebrush arid lands they little estimated the enormously profitable industry which would follow as a result of their pioneering.

Washington apples have already acquired such a reputation in the fancy fruit markets of the world that it is nothing rare for a single apple to sell for from 10 to 25 cents in New York or London, and upon the tables of high-class hotels the chefs will have these apples and other fruits for their patrons, no matter what the cost.

It is an instructive lesson in the control of man over nature when we see an acre of arid, dusty, drouth-stricken soil worth, possibly, 50 cents an acre, turned by irrigation into valuable producing land. In an irrigation district opened 12 years ago in Washington the land was purchased at from \$1.25 to \$6 or \$7 an acre. It was called "starvation flat" because the land was so dry and apparently worthless that nothing would grow upon it. A far-sighted man, of energy and enterprise, interested Eastern capital and placed water upon this land. The result is that today this comparatively small tract is so covered with fruit farms and homes that it is practically a town, and the land has a ready sale at from \$800 to \$1,200 an acre.

Another irrigated district on the Columbia river has seen the valuation of fruit lands rise from \$160 an acre in 1903 to from \$600 to \$2,200 an acre in 1907. But, to obtain these results in fruit raising far exceeding the most hopeful calculations, where an acre, in bearing fruit during 1906, produced as high as \$2,200 profit from the fruit sold from a single acre—or a profit larger than a whole section of 640 acres of fine land in the East—it is necessary not only to have a soil and climate combining the extraordinary fertility and warm sunshine of the Columbia basin, but to plant the

proper varieties of fruits and give them the cultivation and attention that are absolutely necessary to secure these colossal returns.

It is no uncommon thing now, in certain irrigated districts of Washington, to see a five or ten-acre farm bring a net income of from \$3,000 to \$5,000 a year.

Of course, where such profits are realized, the rise in the price of land is rapid and in the old irrigated districts in the central part of the state land has already attained a valuation of from \$350 to \$2,000 an acre. This has greatly stimulated new irrigation enterprises which are placing their lands upon the market at from \$90 to \$300 an acre, thus enabling those who invest in them to in turn realize the profits which are inevitable, as they in turn are settled upon and developed.

One irrigation enterprise in the south central portion of Washington on the Columbia river has added 32,000 acres to the irrigating area of the state. This alone will support a population of 15,000, and should have an effect upon the growth of Spokane and the other cities.

Specific instances of unusual success in fruit raising in the irrigated districts of the state are shown by the experience of one man who realized a net profit of \$719 an acre from apples in 1906. The fruit went to London and New York. Another irrigation farmer has 28 winesap apple trees, from which he sold 436 boxes of fruit from the crop of 1906 at \$2 a box, thus securing an income from these 28 trees, on less than one-fourth of an acre, of \$698, or an average of \$24.93 per tree. This orchard, at the rate of 160 trees to the acre, would have produced \$3,880 worth of fruit per acre. Only a few years ago this same land was purchased for \$50 an acre. A farmer bought 25 acres of land for \$20 an acre six years ago. Ten acres of this was sold for \$7,000 a short time ago. Another grower realized \$3,750 from six acres of apples.

These are but samples of dozens of instances of large returns realized by fruit growers of Washington. Five acres in the proper kinds of apples, pears, cherries, peaches, apricots, grapes or other fruits, can be made to average from \$700 to \$1,000 an acre every year.

There need never be fear of over-production of the kind of fruit that is bringing these prices. The fruit is in a class by itself, and, no matter what prices are for ordinary fruit, fancy Washington, Oregon and Idaho products will have a market of their own, uninfluenced by the prevailing prices for the ordinary classes of good fruits. So much for intelligent irrigation as practiced in the Spokane country.

A GOOD FARM LEVEL.

The following letter explains itself:

Byers, Colo., April 19, 1907.

Bostrom-Brady Manufacturing Company,
Atlanta, Ga.

Dear Sirs: After seeing one of your levels I have made up my mind that I can't do without one. Please send me one of your \$12.50 levels at once. You will find postoffice order enclosed. This level was recommended to me by A. M. Russell of Greeley, Colo.

Respectfully,

M. F. Cook.

A STUPENDOUS DRAINAGE PROPOSITION

If Congress Passes the Flint Bill it Will Mean the Reclamation of Swamp Lands of an Area Larger Than the Combined Areas of Iowa, Indiana and Ohio.

If business interests of the United States can be increased one billion five hundred million dollars annually from the swamp land districts, many of which are contiguous to the great commercial cities, is not the effort worthy the attention of the business men of the country?

There are swamp and overflowed lands in 33 states in the union, a total of at least fifty million acres—an area larger than the states of Ohio, Indiana and Iowa. If these swamp lands could be drained and divided into 40-acre farms they would afford homes to 2,500,000 families and would put 12,000,000 people on the lands which are now practically worthless. If people moved on these lands they would expend approximately \$2,000 for houses and equipments on their farms. This would mean an expenditure on the waste lands of today of more than \$5,000,000. An average family of five will spend \$600 per year. This will mean to the business interests an increased trade of \$1,500,000,000 over what is now enjoyed.

These figures may be startling, but they are from government sources and easy of verification. Drainage is not a new subject; it has been seen tried by states, counties, townships and individuals. The results have never been satisfactory. The acres to be drained are so enormous that it will require government aid to bring about the reclamation of these lands, and when reclaimed, they are most productive, and, in many cases, close to the best markets in the world. If the dismal swamp of Virginia was reclaimed, it would in a few years more than pay for the cost of drainage and then forever after pay handsome returns in the shape of varied and continued crops. The state of Virginia cannot accomplish it, but the general government can. If it has been legal for the federal government to appropriate over \$33,000,000 to reclaim arid lands, is it not just as legal for the government to expend its funds for the twin hand-maid of agriculture, drainage?

Under the wise provision of the Flint bill, which has received a favorable report from the public lands committee of the United States Senate which augers well for its passage during the sixtieth congress, some of the very wisest provisions prevail and permits of vast drainage projects, which states, counties, townships or individuals cannot accomplish.

So fraught with importance was the subject of drainage that it attracted widespread attention throughout the country. This attention resulted in calling a conference at Oklahoma City, Okla., December 5, 6, and 7, 1906. At that conference seventeen states and territories were represented. After a full discussion of the great advantages to the entire country to be obtained from a general drainage law, it was determined to organize an association which should be more than local in its nature and workings. It was finally determined that an association should be formed which would be national, one that would study the interests of every locality, one that would endeavor to have such legislation enacted, as would bring about beneficent results

to all states or territories having swamp or overflowed lands within its borders.

The National Drainage Association was organized, with a president, two vice-presidents, a secretary, treasurer, and an executive committee composed of six. The congressional work was placed in charge of the chairman of the executive committee with headquarters at Washington.

So much thought has been given to the subject of drainage by the members of the Senate committee on public lands that a favorable report on the Flint bill was obtained during the last days of the session. When it is remembered that it took over 12 years to pass a reclamation law, and the expenditure of vast sums of money, the friends of drainage have every reason to feel highly encouraged over what it has accomplished in such a short time and confidently believe that a general bill will be passed during the sixtieth session of Congress.

Drainage has been most successfully carried on for a long time in Europe and some of the eastern states. The Dutch have reclaimed vast areas in Holland from the encroachment of the ocean. Thousands of families live and farm below the sea level, gaining their security by magnificent feats of engineering and persistence. They now contemplate the draining of the Zuyder Zee, reclaiming some 1,350,000 additional acres of meadow lands. American drainage, in most cases, would be far more simple and less expensive. It is simply a question as to whether the nation will see the wisdom of setting its hands to this work.

This infant movement in a great cause ought to be encouraged and expounded until it becomes an accomplished fact. Like the irrigation movement, it is entitled to the earnest support of every American, whether or not he is a present or prospective land owner, since by adding to the real worth and producing capacities of the country it would decidedly tend to maintain and even increase the present season of unparalleled prosperity. To subdue and render fruitful one's country, is far better than conquering empires or acquiring far distant lands. The swamp lands of the United States can be made to produce hundreds of millions of dollars annually.

Agricultural lands are becoming scarce; we are not making new lands, but the population of the country is increasing at the rate of one million annually. We must provide homes for these people, and where can better farm homes be found than upon the reclaimed swamp lands of the United States?

The question may arise why do not the several states owning swamp lands do their own reclaiming? This is being tried and tried and in a number of instances with most unsatisfactory results. The state having taken hold of the subject, it soon became evident that it was unable to cope with it, because of complications due to the possession of these lands by private individuals, by the federal government and by the states themselves.

As demonstrated by the history of irrigation de-

velopment, the only possible agency through which drainage work can be planned and constructed in a broad or modern principle, without the complications arising from divided ownership, is the federal government. Realizing this, the Flint general drainage bill was prepared, introduced and favorably reported upon by the public lands committee of the United States Senate. It is safe to assume that favorable legislation will eventually follow. It will take a form analogous to that under which a similar problem of reclamation by irrigation has been worked out in recent years by the reclamation service of the United States.

Think of what undrained lands mean to the country. It means that where these lands prevail is a dreary uninhabitable waste; even the animals scorn and avoid them. The only inhabitants of such areas are the lizard, the tadpole and the frog. The word drear may be seen in striking characters by the observer, written on every inch of their surface. They are shunned alike by saint and sinner. Even the wild beasts of the forest will not live in such places. The elements of surpassing fertility are there, also the elements of producing power; nitrogen, phosphoric acid and potash and even lime are there in ample supply. And water, so essential to the growth of plant life is also there, but it is there in superabundance; it is there to the extent of neutralizing all the growth that would otherwise be obtained from the elements named, if these were not smothered beneath a superabundance of water.

The drainage of these swamps and overflowed lands means simply the readjustment of these elements to one another, and that readjustment makes the difference between a land inhabited by lizards and overspread with malaria and one filled with happy homes, where children play in the dooryard, happy as the day is long. Every acre of land reclaimed from watery saturation is virtually an acre to the producing area of the country. While undrained, such land is of no more account than if it were at the bottom of the sea, but the moment it is drained it becomes a source of revenue to the state.

Enough has already been stated to show what an important contribution to the national wealth of this country must result from the drainage of swamp lands. It is a matter of sufficient importance to give national interest to the question as to how this work may be best accomplished. In many of the districts like the Everglades, and the coast country of the Carolinas, the areas are so vast, and the land in its present condition, that it will be years, if at all, before the owners of the land can take up and carry out this work. The best informed believe that the federal government must take the direction of this work, provide funds and then let the owners of the land repay this after the lands have been put in condition to be settled and cultivated. This policy has been carried out by a number of European countries in the reclamation of swamp lands. England appropriated \$20,000,000 to be used in this work. Italy and Germany both assisted in the construction of important works or aided land owners to do so by subsidies.

The effort to drain swamp lands began, like the movement to irrigate the desert, with the individuals. It was taken up by the corporation or colony and is now fast becoming the concern of the nation. In northern New York, Ohio, Illinois, Indiana, Minnesota, and other states, private enterprise has done a great deal in the reclamation of swamp lands, but in a number of

instances the task has been too stupendous, and now the request is made that the general government shall do for the swamp lands what it has done for the arid lands. No one denies the wisdom of Congress in its irrigation projects; no one will question the right of Congress in reclaiming its swamp lands.

In California what are known as the tule lands have to a certain extent been drained; they are now growing most profitable crops of asparagus, celery and onions.

One of the most important drainage projects that has been agitated is the St. Francis basin. The soil, freed from its surplus of moisture, would be among the fertile in the world and 3,800,000 acres, with sixteen feet alluvial deposit, would become cultivable. The territory involved would more than double the area of the land which the British government has secured by spending \$25,000,000 on the Nile in Egypt.

Our marshes are sources of disease, because there is no way of ridding them of decaying organic matter, and because they are breeding places for mosquitoes that carry organic matter, and because they are breeding places for mosquitoes that carry the germs of zymotic disorders, and are indeed, the prime agencies of their increase. The swamps would not cost much to drain, but the drainage would pay in most cases, as a commercial proposition, because the lands would make the very richest, therefore the most productive.

The swamps are often caused by beavers building their dams in such a manner as to back the rainfall into low, flat lands, and the natural outlets become blocked through an unexpected agency.

James J. Hill, president of the Great Northern railway in 1879 and 1880, had forty miles of ditches dug at his own expense. It took the people several years to become convinced that the Hill plan for the reclamation of swamp land through which his road ran would afford them any relief. Six years later that same gentleman headed a subscription with \$10,000 for a complete topographical survey of the Red River valley. The state legislature turned a deaf ear for an appropriation to carry on this great work. Again the president of the Great Northern railroad showed his faith in drainage by contributing the sum of \$25,000 with which to make a beginning. No better investment was ever made. Lands that were utterly worthless were drained and soon became among the most fertile of the celebrated Red River valley of the north. Reports from year to year showed that most of the ditches were maintaining their original capacity; some were increasing, while a few were gradually filling up, a process not unusual nor unexpected where the slope was small and where the water from a sandy loam soil, carrying more or less fine sand, was discharged into the ditch.

The benefits attending all this work have been threefold. The first and that for which they were dug, was an immediate physical benefit. On this point good testimony appears in the "Report of the Board of Drainage Commissioners" for the year ending December 31, 1901. The inspection engineer says: "The immediate

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1 year, and The Primer of Irrigation

result of drainage has forced itself upon the attention of your engineer by the remarkable change coming to the farms situated within the influence of the ditches. Your engineer has traveled by team over dry land along many of the ditches during the present inspection, where three years before he was obliged to travel on foot, and that, too, with high top rubber boots. During the same period he has noticed swamps transformed into splendid grass lands; grass lands too wet to warrant cutting, becoming the best of meadow lands, and wet meadow lands joining the area for the production of the justly celebrated 'No. 1 hard.' Indeed, the valley furnished not a few examples where the ditches changed this whole range from peat bog and swamp to highly cultivated fields, taken place under the eye of your engineer during the time of his five annual inspection tours."

The second result of these pioneer ditches, and perhaps the most potent and far-reaching, was of an educational nature. Each ditch became at once a great object lesson; a great physical demonstration. One of Mr. Hill's earlier ditches, or even one of the larger state ditches could bring no physical benefit to a farm outside of its drainage area, but it soon began to wield an influence as far as men traveled who had seen its work of reclamation.

Minnesota was the first state to ask and receive

federal aid for topographical surveys for its overflowed Indian lands. During the fifty-ninth Congress \$25,000 was appropriated. Work on the Red Lake Minnesota reservation by the geological department shows that these lands can be reclaimed at three dollars and a quarter per acre. Ditches are to be dug on every quarter section connecting with the main ditches. These lands when drained, like all of such character, make the very best farms.

The contemplation of what can be accomplished by reclamation of the swamp land of the country, how much wealth can be added to the business of the United States, is cause enough for the interest and enthusiasm exhibited by the chairman of the executive committee of the National Drainage Association with thirty-three states of the Union having more or less swamp lands. Mr. Bernard is very sanguine of obtaining the votes of the representatives of these states for the passage of a general drainage bill, which has already received a favorable report from the Senate committee on public lands.

When the bill becomes a law and in operation, it will be realized that lands reclaimed by drainage are more valuable than those reclaimed by irrigation. The question of national drainage is of sufficient importance, that every business interest should lend its aid toward the passage of the bill through both houses of Congress.

THE COMING CONGRESS

Preparations Being Made to Entertain Immense Crowds Which Will Visit Sacramento in September. Some of the Prizes to be Awarded Exhibitors of Irrigated Lands Products.

As everybody interested in irrigation knows the Fifteenth National Irrigation Congress will be held in Sacramento, Cal., from September 2 to 7, the week just prior to the annual state fair of California. That Sacramento is preparing to give its guests of those two weeks a welcome such as only Californians can, is evidenced by the enthusiasm and zeal with which the executive committee, with Mr. W. A. Beard at its head, is going about the preparation. Up to a short time ago the principal work of the committee was along the line of publicity, interesting public and prominent men all over the country and supplying bulletins to the daily and weekly press of the interested districts. That part of the work has been successful beyond the most sanguine expectations, the newspapers of the whole country realizing the great national benefit to be derived. The term "National" will be strictly applicable to the coming conclave as the commercial east, the agricultural south and the undeveloped north are to be represented as well as the new west. Indeed it is a question if the term "International" would not be more fitting as applied to the congress, as many foreign countries, among them Australia, the farthest away, and Canada, our neighbor, will have representatives present. An opportunity will be offered at the session to further national effort in conservation and development and speakers have been chosen to discuss the effect of such effort on the various industries of the country who have made a thorough study and know whereof they speak. Not only have irrigationists and agriculturists been invited, but also the manufacturer of the east, whose

business is dependent upon streams for power, the southerner who must drain his land in order to make it fruitful and the man of commerce whose interest is in navigation.

One of the most promising features of the Congress is to be the interstate exposition of irrigated land products. The management announces a magnificent list of handsome and valuable trophies, comprising no less than sixteen handsome gold and silver loving cups especially designed and manufactured for the occasion and offered for interstate competition by prominent men and business houses of California and other states. Enthusiasm for this event is already being felt, especially throughout the irrigated area. Irrigation districts are preparing to send their best in order to capture some of these handsome prizes. Farmers on irrigated land are already preparing to forward prize fruits and grains and vegetables.

Interest already manifested throughout the irrigated area indicates that this will be the finest exhibition of the products of irrigated lands ever made in this country, and Californians are preparing to celebrate the occasion with a magnificent allegorical irrigation parade, which, if carried out along the lines now contemplated, will be the finest pageant ever witnessed in the west.

The design has been received for the Baker & Hamilton trophy for the best display of irrigated cereal products. This magnificent gift, which is one of an extensive list of costly and beautiful prizes to be awarded at the interstate exposition, consists of a silver

punch bowl of massive proportions and exquisite workmanship. It stands $15\frac{3}{4}$ inches in height and measures $13\frac{3}{4}$ inches in diameter across the top of the bowl. The decorative scheme is worked out in repousse hand-work, illustrating cereals grown on irrigated land. The minutest details of this feature of the design are vividly



Hon. George E. Chamberlain, Governor of Oregon and President of the Fifteenth National Irrigation Congress.

developed, the corn tassels and barley beards standing out in the most natural manner. The artistic management of this effect reflects great credit upon the skill and taste of both the designer and the manipulator of the precious metal. Inscriptions will be placed on medallions left plain on the exterior surface of the bowl for that purpose. Upon one of these will be wrought the official medal of the Fifteenth National Irrigation Congress.

Former Governor George C. Pardee, of California, who was twice president of the congress, has offered a silver loving-cup for interstate competition in the exposition. The Pardee cup will be given for the best state exhibit of fruits grown by irrigation.

The Pabst Brewing Company, of Milwaukee, Wis., has offered to the management of the congress a \$500 loving-cup to be hung up for interstate competition at the exposition. The Pabst cup will no doubt stimulate wide-spread interest and keen competition. Most of the irrigated states grow hops to some extent; some are large producers and exporters. There are no strings to the Pabst cup, the board of control of the congress be-

ing authorized to have the same made and bill sent to the company for the amount named.

The list of trophies to be offered at Sacramento continues to grow. It now numbers no less than sixteen handsome gold and silver loving-cups and especially designed trophies, representing an aggregate cost of nearly \$10,000. Competition is open to all states except California.

Congressman Theodore E. Burton, of Ohio, chairman of the Inland Waterways Commission, has notified the chairman of the executive committee that the commission will be represented at the fifteenth session. The following members of the commission have been delegated by Mr. Burton to represent that body in the irrigation congress: Senator Francis Newlands of Nevada. Senator John H. Bankhead of Alabama, Gifford Piuchot, United States Forester; F. H. Newell, director reclamation service; and Dr. W. J. McGee, secretary of the commission, and former president of the National Geographical Society. The presence of members of this very important body will be an important factor in the congress. To what extent the specific work of the commission will figure in the discussion



Hon. John H. Smith, First Vice-President of the Congress.

cannot be foretold, but it is certain that the larger effort in the direction of the streams and the preservation of their watersheds will form an important topic of general discussion.

The suggestion that the eastern forest reserve question be discussed at the session has created much in-

terest among prominent men of the eastern states who are identified with the movement to establish reserves in the Appalachian and White mountains. Letters have been received from all over the eastern states approving the suggestion and expressing the hope that the matter will be scheduled for discussion at the Sacramento meeting. The officers of the Fifteenth congress are:

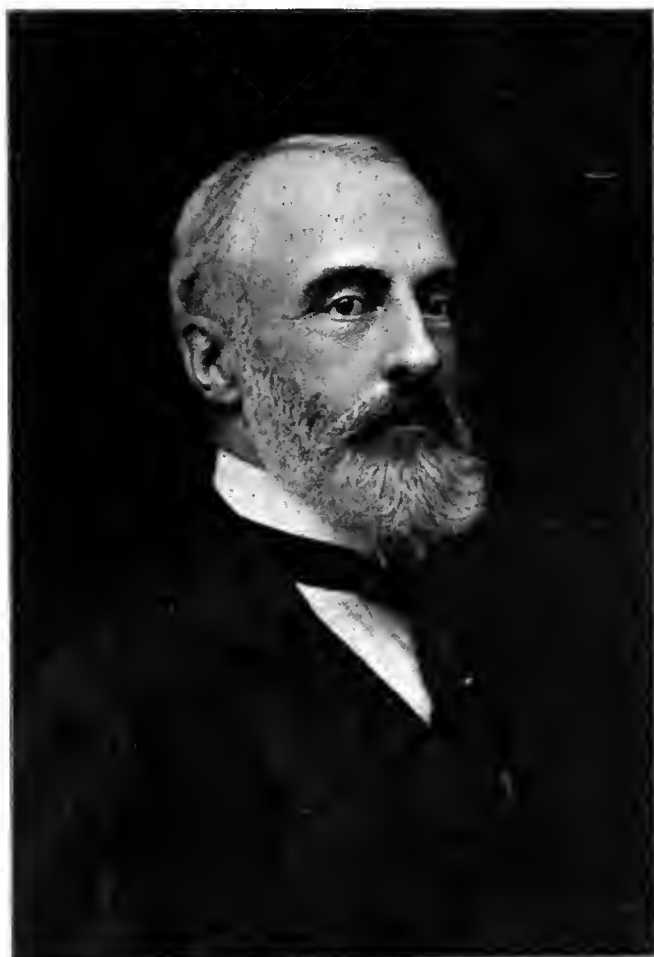
President, Hon. George E. Chamberlain of Oregon.
 First vice-president, Hon. John H. Smith of Utah.
 Second vice-president, Hon. H. B. Maxson, Nevada.
 Third vice-president, Hon. G. E. Barstow of Texas.
 Secretary, D. H. Anderson of Chicago, Ill.

The members of the board of control, which is putting much time and effort on the plans are: George W. Peltier, vice-president of the California National bank, chairman; Governor James N. Gillett, Mayor M. R. Beard, Attorney W. H. Devlin, ex-Senator Marshall Diggs, President C. F. Dillman of the D. O. Mills'



Hon. H. B. Maxson, Second Vice-President.

chairman being authorized to appoint the members of his committee: Reception headquarters and reception of delegates, M. Diggs, chairman; decorations, Colonel H. I. Seymour, chairman; accommodations, J. M. Henderson, chairman; entertainment, Mayor M. R. Beard, chairman; meeting place, George W. Peltier, chairman.



Hon. George E. Barstow, Third Vice-President of the Fifteenth Congress.

R. D. Stevens was made chairman of the finance committee.

Chairman Beard of the executive committee has issued a call for a meeting of this committee to be held in Chicago, July 6th. This preliminary meeting is for the purpose of laying plans that will make it national in scope and to outline a program that will cover the interests of the entire country. The executive committee members reside in many states and territories. The call for a special meeting follows an extensive correspondence in which the move has been approved by practically the entire membership. The meeting is called in Chicago in order that it may be easily accessible to eastern as well as to western members, and representatives of both the East and of the West will be in attendance.

bank, Colonel E. A. Forbes, Cashier J. M. Henderson of the Sacramento bank and Colonel H. I. Seymour, manager of the Buffalo Brewing company.

Executive Chairman W. A. Beard has now turned his attention more to the local end of the gathering and has appointed committee chairmen as follows, each

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 1 year, and the Primer of Irrigation

TILE SUB-IRRIGATION.

To the Editor:

I am much interested in "Tile Sub-Irrigation," by B. W. Rice, Caldwell, Idaho, in THE IRRIGATION AGE for April.

I would like very much to know a few things about it. I live in the hills on the divide between the Mouse and Missouri rivers. This country does not drain. The water runs into the hollows and forms sloughs which sometimes continue for years and sometimes dry up and grow hay.

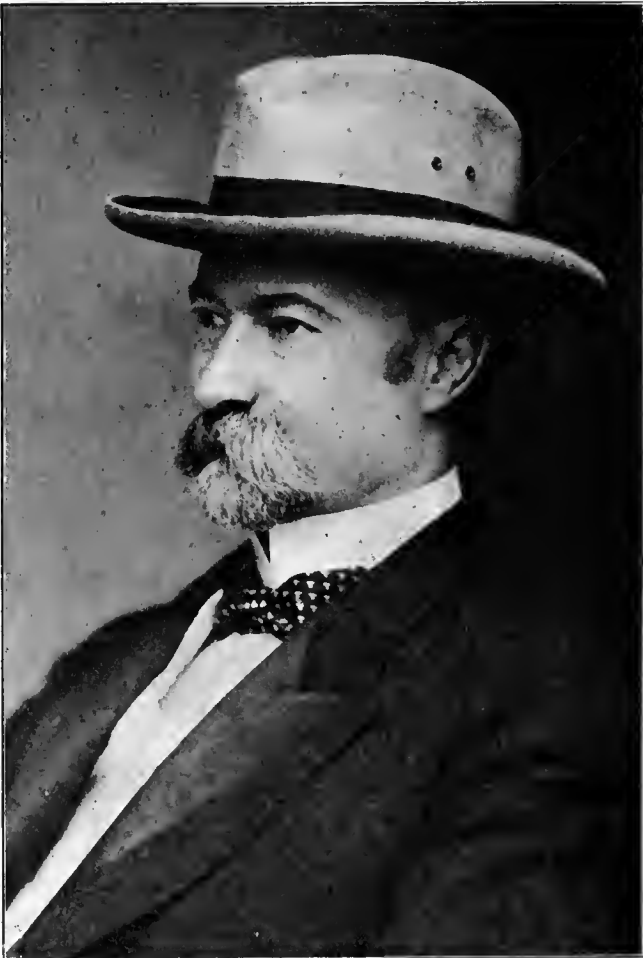
By Mr. Rice's method this water could be used on the adjoining land and as that isn't near enough, the economy of the method would be an important item.

How deep should the tile be planted?

How often would it need to be renewed?

How does the cost of 1,000 feet of two-inch tile compare with 1,000 brick?

Would it be necessary to turn the water in at the upper end?



Hon. Charles W. Fairbanks, Vice-President of the United States, Who Has Expressed His Intention of Attending the Fifteenth National Irrigation Congress.

Could water be forced through an eight-inch tile to a height of 30 feet, and if so, how deep would it have to be planted?

Would the water seep through the tile broadside or escape at the joints?

It appears from Mr. Rice's statement that one cubic foot of water will by this method grow a crop on 100 square feet. Has this result been found by experiment?

ALEX HAY.

Max, North Dakota.

Mr. Rice's answer follows:

Many soils will "water" by tiling from the bottom, that would absolutely refuse a "flooding" or surface wetting. The tile would have to go just deep enough to do the business. In some soils a foot is enough, in others the tile would go deeper. If a tile would not serve fifty years it wouldn't pay. The alkalies in the soil, the "make" of the tile and other conditions figure in its life, of course.

A thousand feet of two-inch tiling ought to cost less than a thousand brick in the same vicinity. With the tiling practice in vogue the making of this material would be greatly reduced and ought to be brought where two-inch tile could be delivered on the field for \$5 a thousand feet. It should not be burned. When the tile is filled with water it will wet the land, and the water can be put in from below by pumps if so desired. My idea is to make holes in the tiling for the water to escape. These must be made to expedite the matter. An eight-inch tile would stand a thirty-foot pressure. It would have to be made to stand it if necessary. A better quality would be needed for that much weight of water.

There are countries where one cubic foot of water would not grow a hundred square feet of vegetation and there are countries where no additional moisture above the natural precipitation is required to grow whole townships of stuff, so it will readily be seen that there are evidently places where the cubic foot would just do it. In Idaho and other similar Western states the foot of water dismissed one foot under the surface and the surface handled as it should be, would grow a crop as long as 40 cubic feet flooded on the surface and then the surface attended to as it must be after a flooding. I mean now of course those crops which must be frequently cultivated. For grasses and grain this same thing will be maintained.

I know of no experiments on a large scale that would demonstrate what is being stated in these articles. My interest in the whole affair has been created and kept hot from observation throughout the large territory I traverse in this part of Idaho, the careful examination of growing plants and the closely estimated supply of water actually consumed by various products of the Idaho soils. My writing is more particularly intended to arouse just such men as Mr. Hay to an actual test and experiment for themselves.

Of course tile must not be permitted to fill up. It must not be made of material that will go to pieces in the soil after it is placed. Tests must be made on every 40 acres here in the West, for the soil is "spotted." Those who first enter the tiling field on a large scale will simply demonstrate the beauty of vicarious suffering. All pioneering means just that.

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THE STATE OF WASHINGTON.

A Glance at the Resources, Commerce, Productions, Conditions of the Soil and Climate of the West Side.

The state of Washington is one of the most progressive and prosperous in the Union, to which it was admitted in 1889. By the census of 1900 its population was 518,103. The State Bureau of Statistics announced the number at 874,310 at the close of 1905, an increase in five years of 356,207. This growth is more

mountains into east and west sides, the former being somewhat the larger. The west side is the rainy or wet region, not because the precipitation is uniformly excessive. For, in the locality of Everett, on Puget Sound, the average annual total is only a little more than thirty inches and about five inches more at Seattle.

While the mean rainfall along Puget Sound will but little exceed that of Des Moines or Chicago, it is drizzled over a larger number of days. These frequent rains and many cloudy days continue from about October to June; July, August and part of September are generally clear and dry.

People get used to this wet weather and business,



Hon. Fred J. Kiesel, of Ogden, Utah. Mr. Kiesel is, more than any other man, responsible for the great successes of the last four congresses, held respectively at Ogden, El Paso, Portland and Boise. He is a man of extraordinary ability, and it was through his personal efforts that the Irrigation Congress was made a permanent institution. He was chairman of the executive committee of the thirteenth congress.

than the total census of Vermont and not far below that of New Hampshire. It was an annual average expansion of 71,241. And it will be found that in the prosperous year of 1906 this fortunate state added to its inhabitants not far from 100,000, now has 975,000 and when the national census of 1910 is completed will have 1,200,000 within its borders, and will take rank close to Nebraska and West Virginia.

Of course, there must be good reasons why people flock to Washington. Barren, unattractive states do not increase their census figures by more than 100 per cent in ten years. Only the best can do that.

Washington is divided by the Cascade Range of

schools, church and social affairs proceed just as if the showers were not present. And they will tell you that the rainy weather is the more healthful—the worst weather is the best! And this is true, odd as it seems.

Along the coast and at certain places near the mountains the rainfall is far greater than near the sound, amounting to more than 100 inches a year at one or two points. The areas of this great precipitation are covered with splendid forests of pine, hemlock and other trees.

There are six principal occupations in western Washington, namely, lumber business, sea commerce, manufacturing and wholesaling, mining, fishing and

agriculture. This state possesses one of the grandest supplies of merchantable standing timber in the United States, now probably not less than 180,000,000,000 feet. This is enough to keep the many mills of the state busy for perhaps eighty years to come and employ many thousands of hands. The product is shipped to all parts of the world and is a great source of wealth.

Four transcontinental railway systems connect with the Pacific Ocean steamship lines at Puget Sound and the Columbia river, and these roads with local lines and the many factories and wholesale houses reciprocate with a great and growing sea traffic, international, coastwise and local. Alaska buys principally from Washington markets and the gold, furs and fish catch from that great northern empire flow into the ports of the state in exchange.

Wood products, including lumber, sash and doors and furniture, smelted metals, flour and millstuffs, are made extensively in the factories of western Washington, while ironworks and many other industries are growing constantly. Bellingham, Everett, Seattle, Tacoma and Gray's Harbor are the principal manufacturing centers. Seattle, Tacoma and other points have an extensive and prosperous wholesale trade in all the customary lines.

This state has the only coal mines of importance near the west coast of the United States. It is all bituminous, and is produced extensively for local use and shipment. Gold mining is not yet largely developed, but is assuming considerable importance. The mountains are rich with many varieties of mineral deposits.

The waters in and surrounding Washington on two sides are the greatest salmon fishing fields in the world and the catch is shipped to all the leading national and many international markets.

To a farmer from the Iowa prairies the hills about Puget Sound do not look like good farming lands. It takes work—the real strenuous kind—to dig out the stumps, but once cleared, much of that unattractive looking soil will grow big crops of strawberries, raspberries, blackberries, cherries, apples, pears, prunes, vegetables and other products.

The river valleys have been the principal theater for agricultural activity heretofore. Some of these have almost national fame—that of the Puyallup river, for instance. Here immense crops of strawberries, raspberries, hops and other growths yield phenomenally. Net returns of \$500 an acre are not at all uncommon. Wheat does not ripen well in this wet region, but grows rank and is used for stock and poultry food. All this part of the state is a fine grass and dairy country. Stock thrives the year around. The winters are so mild, little feeding for warmth is necessary.

It is rainy, cloudy and at times foggy during the winter around the sound, but there is no cold weather to speak of. It is not unusual for roses to bloom nearly all winter. There is little snow and that which falls soon melts. In summer the sound country is one of the most comfortable places in the United States.

CORNING AND MAYWOOD COLONY.

Well toward the northern lines of the Sacramento valley, where its level plains first change to gently rolling areas and thus give notice of the foothills and rugged steeps beyond, lies the town of Corning. Ten years ago Corning was but little more than a settlement on the west-side branch of the Southern Pacific Railway, where was clustered the usual group of business places ordinarily drawn together at a railroad stopping place. Round about the little hamlet waved broad fields of grain, and upon the higher slopes grazed the herds of the ranchers who populated the floor of the valley. Beyond the confines of the little town, homes were separated by long stretches of grain fields. Here and there in the yards of ranch houses there bloomed and bore fruit a few of the different varieties of deciduous trees, which, though illy cared for, paid to the housewife an ample revenue for the labor expended on them. Once in a great distance might be found an orange or a lemon tree which had been brought from the southland and nurtured almost as a curiosity. For years these conditions had existed; every landowner seemed satisfied, and sought not for the fulness of the soil's possibilities. This satisfaction cut off all experimental work in horticulture, and brought about the same yearly round of seed-time and harvest and hauling to the warehouses at Corning of the annual yield from the broad fields.

But the rich soil was by no means destined to forever be devoted to the production of cereals. In 1891 the change first began. Keen eyes noted the productiveness of the scattered fruit trees, and speculative brains figured that if the soil would produce such fruits almost without care, then certainly with modern methods of culture it would do still more. The result was a combining by purchase of the most available lands surrounding Corning, and the founding of what is today one of the brightest examples of California possibilities—the Maywood Colony.

The history of Maywood tells of a small beginning wherein far-seeing investors looked into the future for their reward. Gradually the area of the colony's lands extended until it comprises today, in the eleventh year of its existence, thirty-nine thousand acres, twelve-thirtieths of which has passed into the hands of individual owners. The town, where but a decade since there was little of life or business, has been transformed into a bustling community, with its shops and markets, its schools and churches.

Maywood Colony may certainly attribute its success to a combination of natural advantages. Noting that to the seeker after a home in this favored section, blocks of ten acres were the most attractive, the colony's founders caused the entire area to be cut into such tracts, and between all of these subdivisions constructed broad roadways, which are today among the most perfect in the state. There are in the colony no less than 186 miles of these highways, and owing to the class of soil from which they are constructed, in less than a day after the severest rain-storm they are as dry as the most expensively constructed macadam. Most of these roads are bordered by trees of some kind, thus fringing these miles of driveway with examples of the colony's prosperity.

Upon hundreds of ten-acre tracts there have been constructed comfortable homes, many of them sur-

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rounded with a wealth of flora which blooms from end to end of the year.

At the outset the attention of Maywood's people was turned principally to deciduous fruits. All classes of this horticultural family will grow upon any acre of Maywood without irrigation, and the result is shown today in several thousand acres planted to this class of fruits, much of which has already reached a point where it is a source of revenue to its owners. Where less than ten years ago there existed great holdings of land exclusively devoted to wheat culture, there flourish today 630,000 deciduous fruit trees, divided into scores of holdings, each one not only capable of self-sustaining, but producing a rich interest on the amount invested. One of the great secrets of deciduous successes at Maywood is the water question, which is forever thoroughly settled by the nature of the soil and its surroundings. The formation of the land is such that water exists at a depth never more than twelve feet, and its supply is unceasing even in the dryest season. Thus irrigation for deciduous fruits becomes absolutely unnecessary at all times.

While classed as a deciduous fruit, the olive is always considered separately from its sisters—the peach, the apricot, and the almond. Maywood successfully fosters the entire family and, in addition to those deciduous productions already mentioned, there are today growing within the colony's limits 4,200 acres of olives. The fig, too, has found a home here, most attention being given to the white fig of Smyrna, which grows in profusion, matures quickly, and possesses a delicious flavor.

Maywood Colony is an example of the oft-repeated fallacy that the climate of northern California is antagonistic to the perfect development of citrus fruits. Nowhere in the state is there produced more perfect oranges, limes, and lemons than within the colony's limits. With these fruits irrigation becomes a necessity, but the water is here in immense quantities and at little cost. Anywhere in the colony a well sunk to the depth of twelve feet will develop an ample water-supply, and those conditions have caused the planting of 36,000 citrus fruit trees, now varying from one to eight years in age, the older trees, in full bearing. The quality of the fruit is the best, its date of ripening preceding that of southern California by about four weeks.

The lowest range of thermometer ever recorded at Maywood was 28 degrees above zero. There has never been a known case of injury to either fruit or trees from frost.—*Harper's Weekly*.

The Secretary of the Interior has awarded the following contracts for the construction of canals and structures of the Fort Shaw unit of the Sun River irrigation project, Montana:

Division 1—D. W. Lovell, Minneapolis, Minn., consisting of about 6 miles of canal, at \$48,470.

Division 2—6 miles of canal, to J. C. Farman, of Augusta, Mont., at \$24,700.

Division 3—21 miles of lateral ditches, to Sequist, Clark & Johnson of Simms, Minn., at \$30,240.

Division 4—About 39 miles of laterals, including 12 miles of sub-laterals and 17 miles of waste water ditches, to Charles E. Crepeau of Ft. Benton, Mont., \$25,310.

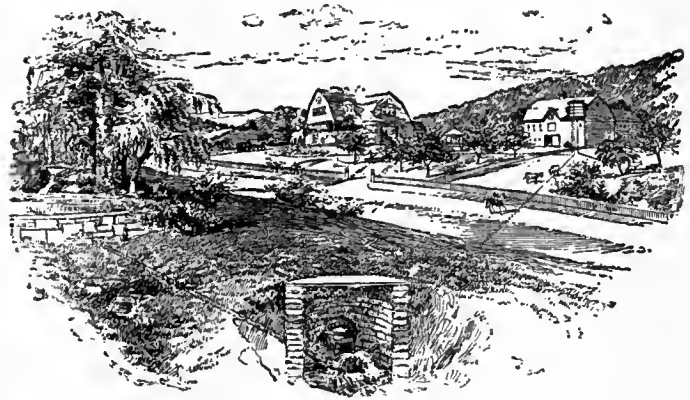
Division 5—24 miles of lateral ditch, including 9 miles of sub-lateral, to Bailey & Dupee of Great Falls, Mont., \$19,720.

ABOUT HYDRAULIC RAMS.

Some Interesting Pointers on a Subject of Vital Importance to Agriculturists.

Manufacturers of pumps occasionally receive inquiries which would indicate that many people are not informed on the principle of the hydraulic ram. Its operation is a closed book to many an agriculturist who pumps water by hand or by some costly and unsatisfactory makeshift, sacrificing time, labor and money.

Occasionally a manufacturer is asked "What is a hydraulic ram?" or, "How may it be used?" followed by some inquiry indicating a total ignorance of the first



principles of the most convenient pumping appliance ever offered the farmer and irrigationist. Stating briefly the principle on which is based the operation of the hydraulic ram, it may be compared with the act of driving a nail with a hammer, which by the hand and arm of the operator is given a force to produce a result greater than the mere impact of its own weight.

It is located below the spring or other source from which it draws its supply, the water from which, flow-



ing down the inclined pipe to the ram, enters it with a velocity gathered in the descent. The opening of a waste valve sets this column of water in motion, and after a certain velocity is acquired, the waste valve is suddenly and automatically closed. The moving column has by this means acquired certain energy, which it expends in forcing a portion of its volume through a

check valve, to a higher head than its source. The water hammer, which operates the ram, must have sufficient weight and velocity to give the necessary power per stroke to open the check valve. The stroke of the impetus valve may be shortened or lengthened, depending on conditions. The speed with which it operates depends on the length of its stroke, perhaps twenty-five to forty or fifty per minute.

The quantity of water which the ram will deliver varies according to the conditions under which it operates. The quantity of water supplied to it, the height from which it descends, the distance to the point of delivery, and the elevation, all are important and are features to be reckoned with. In general, one-seventh of the water may be said to be delivered at the storage point.

The illustration at the head of this article indicates an ideal installation. While it is necessary to alter these features somewhat in nearly every instance, the general rules apply, and may be safely followed.

One of the leading manufacturers of hydraulic rams is the Deming Company, of Salem, Ohio, whose advertisement appears elsewhere in this issue. They build a number of different sizes, according to the quantity of water required and supplied, and will be pleased to furnish information on request. The lower illustration shows their No. 7 ram. Other sizes, ranging from No. 2 to No. 8, are also offered.

THE MONARCH BLOCK MACHINE.

The Cement Machinery Company, of Jackson, Mich., the oldest and largest concrete machinery manufacturing concern in the country, has just placed upon the market a new face down block machine, which is built exclusively for one width, as this style of machine seems to be very much in demand by many, notwithstanding the fact that there are many adjustable machines on the market which, of course, sell at a very much higher price.

This company is able to offer this Monarch face down 8 by 8 by 16 machine, complete, to the trade and ship promptly at the very low price of \$48 f. o. b. Jackson, Mich. They can also furnish the 8 by 10 by 16 Monarch, complete, at \$54 and the 8 by 12 by 16, complete, at \$60.

It has the latest designs, is built very strong and is composed of the very best gray iron castings as well as steel and considerable machine work by skilled workmen is also put upon it before it leaves the factory. With this machine you can put a rich face on the front of the block or on the back. The cores, two of them, pull horizontally with a lever.

This style of machine has always been in demand, but could not be secured on account of the high prices charged for this style of machine. But when one stops to figure out the proposition and the complete equipment they can hardly believe that \$48 will buy this excellent proposition. For further information, we would advise that you write the above company and ask for their catalogue M.

From Our Exchanges

Denver Field and Farm:—The ranchers who have been pinched by Baron Pinchot's forest reserve policy are not the only ones among the oppressed who have a big kick coming. More than one-fourth of the area of Colorado available for homesteads and mining is barred from entry. In certain localities mining development has been entirely stopped on account of the annoyance and persecution of petty officers. The more complaints against a ranger, the more he is praised and favored by the forestry bureau. The ranger is omnipotent on his reserve, can perpetrate any kind of injustice and rules with an iron hand. The position is a good opening for graft and suspicion is not always without reason. Some friends of the rangers are known to cut all the timber they want while others are prosecuted for the least imaginary infraction. Mining patents are not granted except upon impossible conditions and subject to the approval of the ranger who never approves. This is preventing capital from coming to Colorado. A number of good mining properties remain at a standstill on account of the rulings and the mischievous rangers. The reserve policy has made it practically impossible to start a new mining camp and everybody knows what this means to the future of Colorado.

El Paso News:—Some Coloradoans appear to be very greatly exercised over the thought which, evidently, has just come to them, that the water which is to be stored by the Engle dam will not be used to irrigate some lands which they hold, and they hold Texas and El Paso responsible for what they call a great outrage. The *Denver Post* recently published an article in which El Paso was unmercifully scored because this city is so fortunate as to be the metropolis of the vast region of fertile lands which are to be watered from the big dam, and an interview was printed with an attorney for several irrigation companies of Colorado in which the threat is made that the federal government will be asked to rescind its action in giving this section access to the Rio Grande waters for irrigation purposes. At least, it is proposed to have the regulation so modified that the Colorado people may get the water first, leaving the lands in Texas, Mexico and New Mexico to take what is left. This is the way the Colorado land owners feel about it according to the *Post*:

"Texas is the villain in the case, and Old Mexico, which has been blamed by the people of the San Luis valley for preventing them from using the waters of the Rio Grande beyond a certain extent, is duly exonerated.

"A few boomers at El Paso seem to have more influence at Washington than the entire state of Colorado, for the 60,000 acres in Mexico which are to receive the waters of the Engle dam, according to treaty, could easily be supplied without interfering with the irrigation of the San Luis valley. But the El Paso people managed to influence the reclamation service so that most of the water from the dam will go to lands in southern New Mexico and part of Texas. As a result Colorado must pay the fiddler."

American Falls (Idaho) Press:—Eight years ago W. A. Johnson filed on a homestead about three miles from American Falls. "Everybody," said Mr. Johnson to a *Press* representative, "thought I was crazy. And when I bought a lot of fruit trees and put them out they were certain of it, but I guess some of them are not so positive about it now. I have never had a fruit failure since the trees began to bear. I account for it by the fact that they bud later. I suffered no injuries when Boise valley and Utah fruit was injured recently. I have apples, pears, prunes and cherries, about 600 trees altogether. I have about 100 prune trees which last year returned me \$3 per tree. I did not keep close account of my apples, but I estimate that I had about 400 bushels. I sold them for five cents a pound and could have sold many more. The apples are all hardy varieties, mostly Jonathans. My cherries have always yielded well. The varieties are Marillo, Duke and Early Richmond." The success which Mr. Johnson has had should be an inspiration to every owner of irrigated land. Considering that 110 trees can be grown to an acre, if they yield but \$2.50 per tree, what crop will be so profitable? The market for Idaho fruit is world-wide.

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Boise Statesman.—The portions of this state where land can be irrigated, if the practical results of dry farming continue to be satisfactory, will not be the only sections in demand among homeseekers and practical men who are seeking to secure all possible return from their efforts, if a project now being considered by Senator Heyburn is carried out.

With the growth of the dry farming propaganda the idea recently suggested itself to Senator Heyburn that it might be possible to find a way in which it may be feasible to grant or sell land on which no water could be secured, for the purpose of cultivation of crops by the new method. He accordingly has prepared the framework of a bill under which land may be entered under the desert act but without the requirement that water shall be put on it, while residence will not be necessary.

The price of land, it is stated, will be probably fixed at \$1.25 per acre. Should the bill, or one similar, pass congress it would open up thousands of acres of land that might not otherwise be cultivated, and would without doubt be a great incentive to the broader experimentation with the already promising results secured from cropping without water.

Deseret Farmer (Salt Lake City).—The subject of practical irrigation from the viewpoint of the small land holder and as a practical and actual part of the conduct of agricultural pursuits, rather than as a matter for the larger operator and as a, perhaps, scientific theory, is attracting more and more attention. In this western part of the United States and those sections particularly where the rainfall is confined to the wet season, or winter months, every agriculturist and horticulturist is, if he has not already done so, beginning to take an interest in irrigation as a practical science and one absolutely necessary to best results, and perhaps necessary to any results at all. Of course, the necessity for irrigation and the interest that individual landholders take in it is a matter dependent entirely on local conditions which may and do vary within a comparatively short distance. This naturally requires local application, but the general theory of irrigation is an accepted principle, and all the more progressive growers of products of the soil are studying this subject with interest. Within the confines of California may be found almost every condition of soil, from the extremely fertile, where often no irrigation is necessary, to the absolutely barren and entirely arid regions. The value of water to the soil, even to arid sections in this state, is very remarkably illustrated in the orange growing territory in the southern end of the state, where in most cases a once barren desert has been truly and literally made to bloom and blossom as the rose, and one in traveling through many parts of California is particularly struck by the abrupt change in the character of the country, passing, as one travels along, from the desert to the highly productive orange groves, and back into the desert again within a few miles. This change is brought about almost entirely, and in most cases absolutely, by the application of water to the land, and irrigation in that section has been studied and reduced to what might be called an exact science.

Sacramento Union.—The bane of irrigation in every country where employed has been the development of alkaline salts upon the surface. If, as reported, this tendency has been counteracted by government experiments at Fresno, and at a cost that bears small relation to the value of the land, there has been that achieved which will be worth hundreds of millions to California, thousands of millions to the arid west, and millions of millions to the world.

Sacramento (Cal.) *Bee*.—The area of the floor of the Sacramento Valley, as determined by actual surveys—not "estimated"—is a fraction over 2,661,000 acres, all of which is subject to irrigation from the projected government works. In addition to this, there are several thousand square miles of foothills and tributary valleys, which may be included in the tillable area of the Sacramento basin. The thing most needed to break up the remaining big ranches is irrigation. For many years the tendency of wheat growing has been toward increase rather than decrease in the size of farms, because it is relatively cheaper to grow wheat on a large than a small scale, owing to the use of gang plows, traction engines and combined harvesters. But when an abundant supply of water is brought to a large ranch it may be subdivided and sold in parcels of ten, twenty or forty acres, at good prices, so that it is no longer worth while to continue growing wheat upon it. Thus water is the best solvent for land

monopoly ever discovered. The government irrigation works, added to the private irrigation enterprises now under way in this valley, will result in a great increase of its population and in multiplying the number of its rural homes. One of the best features of the federal irrigation law is that it requires subdivision. Water will not be supplied to any farm unit larger than 160 acres.

Pocatello (Idaho) *Tribune*.—A definite step toward the application of water to 60,000 acres in the Fort Hall tract will be taken this week by Civil Engineer W. A. Samms of this city, who has been awarded a contract for surveying an immense storage reservoir on Little Blackfoot River, as a part of the big Fort Hall irrigation project, for the construction of which congress at its last session appropriated \$350,000. Engineer Samms will leave with his corps of assistants on Wednesday and estimates that the work will take the better part of two months. The first camp will be established at Henry. It is the plan of the government to construct somewhere on the Blackfoot river an immense storage reservoir for the conservation of the flood waters of that stream and its various tributaries. This will insure plenty of water for the irrigation of the 60,000 acres of land in the reservation and the land in the ceded land within the five-mile limit owned by whites. While it is not expected that actual construction of the storage reservoir and canal system of the Fort Hall project will begin this year, at the same time it is believed that everything will be placed in readiness before snow flies next winter for work next year, and it is not impossible that the Fort Hall tract will be under water in time for the irrigation season of 1908. Engineer Samms' work will be the running of lines along the Little Blackfoot river to the main stream of that name, and to select a convenient point of diversion for the main canal. The work will be under the general supervision of the Indian office at Washington.

Bulletins and Publications

Manual on Semi-Arid Farming.

The latest contribution to the literature of semi-arid agriculture is a new edition of "Campbell's Soil Culture Manual," a handsome volume of 320 pages filled with information of immediate value to every farmer of the western country. This literature is not as yet very extensive. The few bulletins that have been issued concerning it have been looked upon with suspicion. A good many farmers are unaware of the fact that general agriculture is now extensively carried on in regions which had long been relegated to the coyotes or given over to the herds. The accepted theory that twenty inches or more of annual rainfall was absolutely necessary to general farming has persisted, and it has stood in the way of the development of the west. But practical farmers, armed only with determination and some good sense, have pushed back the border line until nobody now pretends to know where it is.

This latest manual is by Mr. H. W. Campbell, of Lincoln, Neb., who is perhaps the best known of the workers in this particular field. He has devoted his life to experiment and investigation of the problems which have faced the western farmers. During more than twenty-five years of steady application he has farmed in a half dozen states and has conducted experiments all the way from Canada to Mexico. Here he has embodied what he has learned of the way to conquer the drouth. Mr. Campbell has made good in the semi-arid region. He has got results. He has not accepted anybody's dictum that this or that could not be done. He has tried until he has found the way. His plan is simple and yet it involves so much that in application it is not an easy matter. He would cultivate the soil with special reference to conserving and storing the soil moisture, and he would follow this up so closely that not a drop of the precious water could get away without being used in some manner. While thus making a strong point of saving the moisture he would so cultivate and treat the soil as not only to keep up its quality but to actually make available soil fertility by a process of building up the soil.

He puts great stress upon summer tillage, but distinguishes it from summer fallow, in which the soil is permitted to lie idle. He would get a proper physical condition of the soil, not by cultivation during the growing season, but by care the year round. And in this way he has got not fair crops, but big crops in the face of failures all around him.

The new manual seems to be complete, in simple and direct language, and it is practical. Published by the author, H. W. Campbell, at Lincoln, Neb. \$2.50 by mail. It is handsomely illustrated, and is a readable book in every way.

The United States Geological survey has recently published a number of volumes which are of interest to the people of the arid and semi-arid regions of the west. Among them are the treatise by Willis T. Lee on the "Water Resources of the Rio Grande Valley in New Mexico, and Their Development," and the "Determination of Stream Flow During the Frozen Season," by H. K. Barrows and Robert E. Horton. Other bulletins issued by the same department are "The Prevention of Stream Pollution by Strawboard Waste," by Earle Bernard Phelps; "Flowing Wells and Municipal Water Supplies in the Southern Portion of the Southern Peninsula of Michigan," by Frank Leverett and others; "A Preliminary Account of Goldfield, Bullfrog and Other Mining Districts in Southern Nevada," by Frederick Leslie Ransome; "The Economic Geology of the Kittanning and Rural Valley Quadrangles, Pennsylvania," by Charles Butts; "The Yampa Coal Field, Routt County, Colorado," by N. M. Fenneman and Hoyt S. Gale; and "The Analysis of Silicate and Carbonate Rocks," by W. F. Hillebrand.

The annual reports of the Department of Agriculture at Washington, and the Agricultural Experiment Station of the University of Wisconsin have also been received at the office of THE IRRIGATION AGE.

Bulletin 143 of the Maine Experiment Station "The Seeding Apples of Maine" is just being sent out. The purpose of this bulletin is to call attention to those varieties of Maine origin which are worthy of wider dissemination; and to record, as accurately as possible, the history of such varieties.

While Baldwin, Greening and other standard varieties, mostly of New England origin, will doubtless remain for many years the leading market sorts, new and valuable sorts are continually appearing, and these will be most likely to excel near their native home, or in their native state. The wholesale injury to orchards by the cold of the past few years is also an incentive to search out the merits of native hardy varieties.

Among the most valuable of the thirty-eight native sorts mentioned in the bulletin are Deane, Dudley, King Sweet, Rolfe, Starkey and Stowe. Some of those described in pomological manuals are said to be wholly or practically extinct; though at one time of considerable importance.

The Colorado Experiment Station at Fort Collins has issued a number of bulletins, among them "Notes on Alfalfa, Sugar Beets and Cantaloupes" compiled by P. K. Blinn; "Advice to Plains Settlers," by J. E. Payne; "The Spring Grain-Louse," by C. P. Gillette; "Spraying for Coddling Moth," by C. P. Gillette; and "Fruit Growers' Associations," by W. Paddock.

The bulletins recently issued by the Department of Agriculture at Washington are: "Forest Planting in Illinois," by R. S. Kellogg; "Beans," by L. C. Corbett; "The Danger from Tubercle Bacilli in the Environment of Tuberculous Cattle," by E. C. Schroeder, M. D. V., and W. E. Cotton; "Directions for Making the Camembert Type of Cheese," by Theodore W. Issajeff; "A Comparative Study of Tubercle Bacilli from Varied Sources," by John R. Mohler, V. M. D., and Henry J. Washburn, D. V. S.; and "The Terrapin Scale," by J. G. Sanders.

The University of Wisconsin Agricultural Experiment Station has published several treatises and bulletins within the past few weeks, among them one on "The Spread of Tuberculosis Through Factory Skim Milk With Suggestions as to its Control," by Dr. H. L. Russell, who is to succeed W. A. Henry as dean of the agricultural department of the university in September; "Drainage Conditions of Wisconsin," by A. R. Whitson and E. R. Jones; "Sugar Beet Experiments During 1906," by F. W. Woll and C. W. Stoddart; "Land Drainage," by A. R. Whitson and E. R. Jones; and "Principles and Maintenance of Soil Fertility," by A. R. Whitson and C. W. Stoddart.

Reclamation Service News

Corbett Tunnel Completed.

A telegram received from the engineer in charge states that the work of excavating the Corbett tunnel of the Shoshone irrigation project, Wyoming, was completed on the afternoon of June 21. This tunnel is three and a half miles long and has a cross section of 10 by 10 feet. The actual work of excavation was commenced January 14, 1906, under contract. The failure of the contractors to carry on the work satisfactorily made it necessary for the government to take over the work on August 9, 1906. After some delay in reorganizing and securing labor the work was prosecuted more rapidly, and considering the difficulties involved the progress made is very gratifying. The water impounded behind the Shoshone dam will be conducted down the channel of Shoshone river for sixteen miles and then diverted through Corbett tunnel and the canal system out upon the lands to be irrigated. The tunnel has a capacity of 2,000 acre-feet every twenty-four hours. Two concrete mixing plants have been erected and the excavators have been closely followed by a crew putting in the cement lining. It is expected that the lining will be completed by Sept. 1st. Work on the Garland canal, which takes the water from the tunnel, is also progressing rapidly.

New Assistant Attorney.

Mr. Ralph B. Williamson of Oregon has been appointed assistant to the United States attorney for the eastern district of Washington in cases needing immediate attention in connection with the operation of the Sunnyside canal and Sunnyside irrigation project. Mr. Williamson is authorized to institute injunction proceedings to restrain the unlawful taking of water from the Sunnyside canal or its laterals, when called upon to do so by the engineer in charge of the Sunnyside reclamation project.

Under previous conditions when difficulty was encountered with individuals breaking the headgates, ditches, or measuring boxes for the purpose of taking water in excess of their allowance during the low water season, no relief could be obtained for several days, as the United States attorney resides a distance of nearly 250 miles from North Yakima.

The matter of protecting the water supply is of the utmost importance to the settlers under the Sunnyside irrigation project and incidentally to the entire arid region, as the failure by the United States to properly control the irrigation system would cause enormous losses to the settlers and render it impossible for the United States to enforce collections under the reclamation act, amounting to over a hundred thousand dollars annually.

An extension of time of three months from April 20, 1907, has been granted to Messrs. Mason, Davis & Co., of Portland, Ore., for the completion of their contract for a portion of the main canal, Klamath irrigation project, Oregon-California, subject, however, to the provision that they would complete and deliver such portions of the work as may be required for irrigation during 1907 on or before May 10, 1907. The extreme weather conditions and bad roads so seriously interfered with the progress of the work that it was impossible for the contractors to complete the work on time.

The Secretary of the Interior has executed contract and approved the bond of Bailey & Dupee, of Great Falls, Mont., for the construction of about 24 miles of lateral ditches, including 9 miles of sub-laterals, in connection with the Fort Shaw unit of the Sun River irrigation project, Mont. The work involves the excavation of 75,600 cubic yards of material and 16,000 cubic yards of overhaul. The contract amounts to \$19,720.

Stands the Test.

The greatest flood in twenty-four years on the Belle Fourche river, South Dakota, occurred on the 26th of May after five days of heavy rainfall. The bottom lands in the valley were flooded and much damage was done to private property.

It is a matter of considerable gratification to the Reclamation Service to learn that the new dam across the river, just completed, stood the test splendidly, the only damage being the displacing of a small amount of riprap below the sluice gates. The big canal in process of construction carried a stream of water 11 feet deep for nearly half a day, the water passing off through a cut made in the banks to protect the uncompleted portion of the canal.

The principal injury to the government work occurred at this point, and was due to a large wash, which will necessitate 5,000 cubic yards of earth to fill. It is probable that waste gates will be constructed at this point to prevent any similar occurrence in the future.

Contractor Robinson's plant suffered most as a result, many forms, considerable cement and numerous parts of his equipment being destroyed.

While no accurate measurements of the flood were taken, it is estimated that from 12,000 to 15,000 cubic feet per second of water went over the diverting dam. This is the greatest flood since 1883.

An extension of six months has been granted the International Contract Company of Seattle, Wash., for the completion of their contract for the construction of highway bridges over the main canal, Klamath irrigation project, Oregon-California. The contract called for the completion of the work by March 5, 1907.

This extension was granted on account of the fact that the company experienced unavoidable delays in obtaining timber. The contractors have agreed to erect temporary crossings for the convenience of the public during the interval that will elapse before the completion of the bridges.

The Secretary of the Interior has granted an extension of thirty days to Pickering & Rush, of Mitchell, Neb., for the completion of their contract for the construction of a portion of the distributing system under the Interstate Canal, North Platte irrigation project, Nebraska-Wyoming.

Scarcity of labor and unusual severity of the weather made the delay unavoidable. The work was to have been completed by April 1st.

An extension of time of thirty days has been granted to the Camden Iron Works of Camden, N. J., in which to complete their contract for furnishing pumping apparatus for the Garden City irrigation project, Kansas.

The Secretary of the Interior has approved the contract entered into by Christian Andersen on behalf of the United States, and Frederick W. Rosenfelt of Pogue, Wash., providing for the construction of schedules 8, 10, 11, 13 and 14, of the main canal, Okanogan irrigation project, Washington.

The work consists of about 59,100 cubic yards of excavation, and Mr. Rosenfelt's bid amounted to \$17,188.



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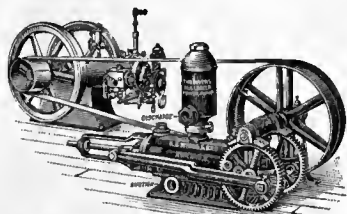
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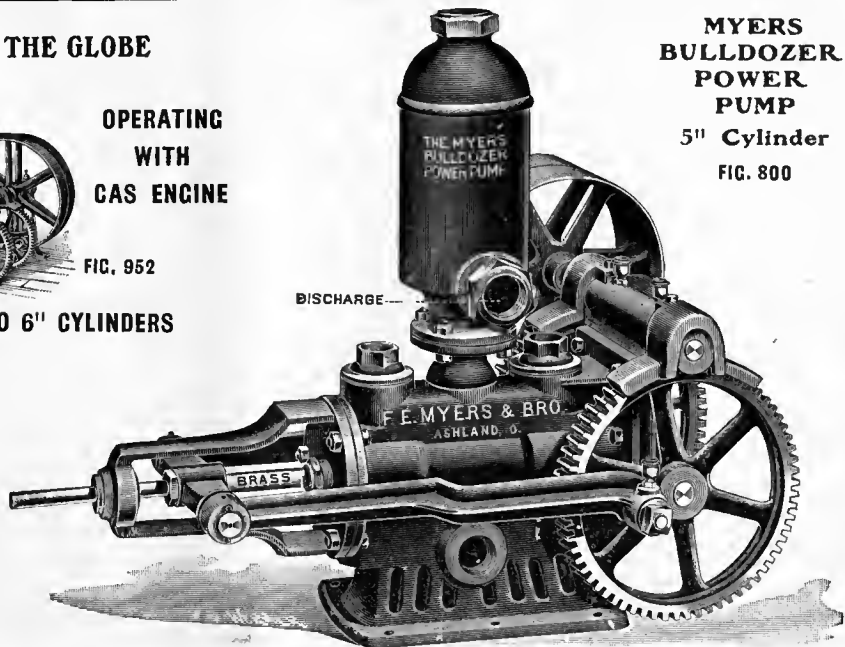
WITHOUT AN EQUAL ON THE GLOBE



OPERATING
WITH
GAS ENGINE

FIG. 952

MYERS
BULLDOZER
POWER
PUMP
5" Cylinder
FIG. 800



HORIZONTAL BULLDOZERS, 3" TO 6" CYLINDERS

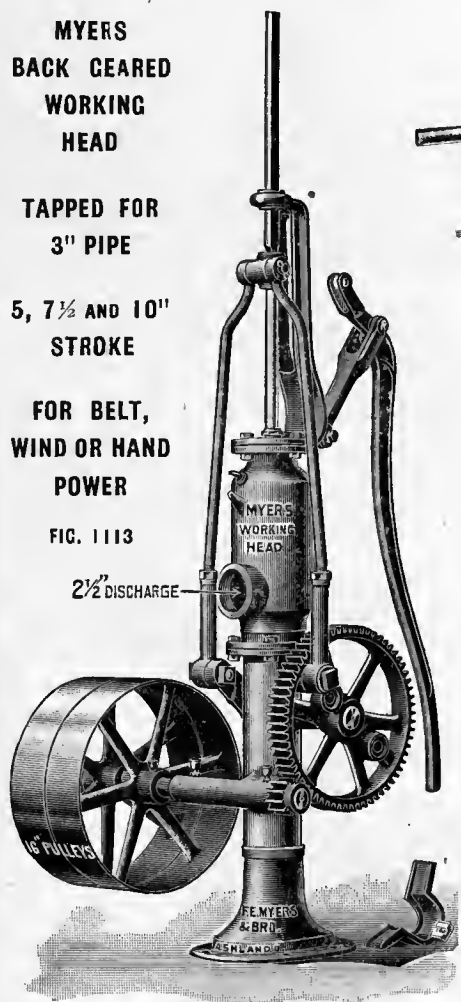
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5, 7½ AND 10"
STROKE

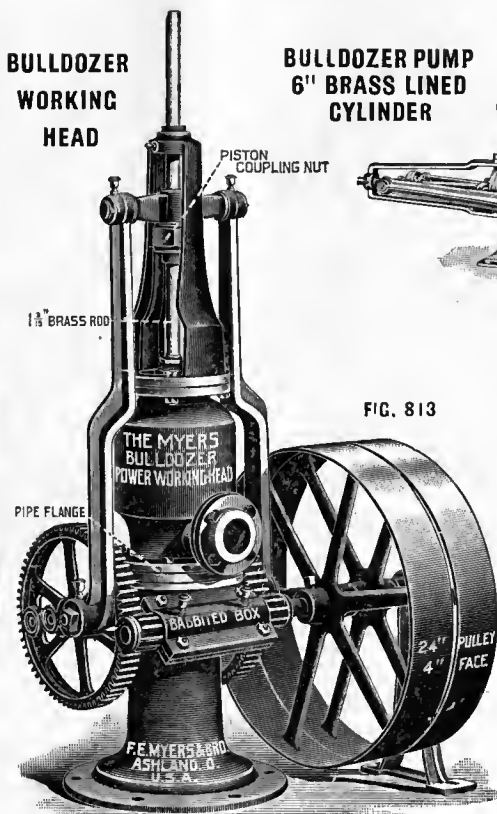
FOR BELT,
WIND OR HAND
POWER

FIG. 1113



2½" DISCHARGE

BULLDOZER
WORKING
HEAD



1½ BRASS ROD

PIPE FLANGE

PISTON
COUPLING NUT

FIG. 813

BULLDOZER PUMP
6" BRASS LINED
CYLINDER

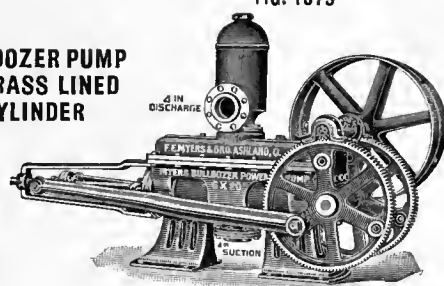


FIG. 1079

MYERS BULLDOZER
WORKING HEADS

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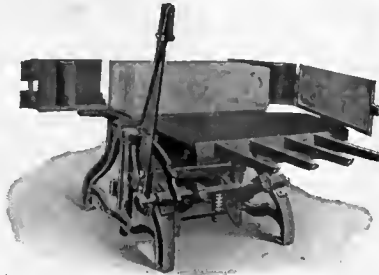
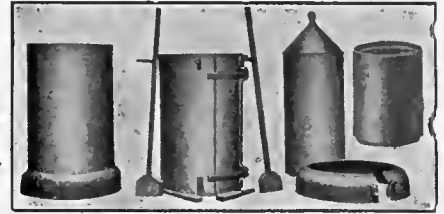
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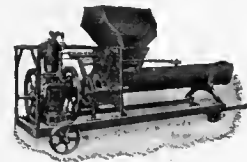
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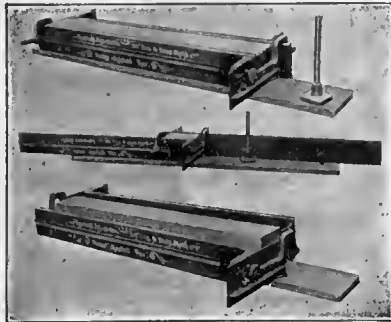


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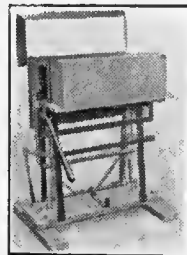
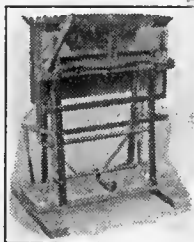
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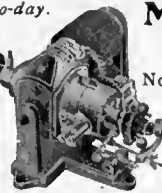
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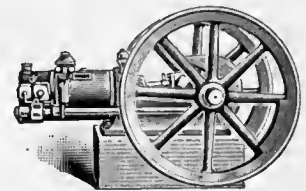
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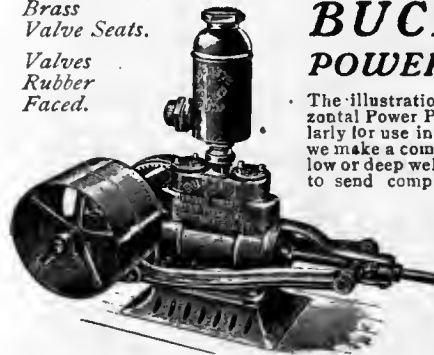
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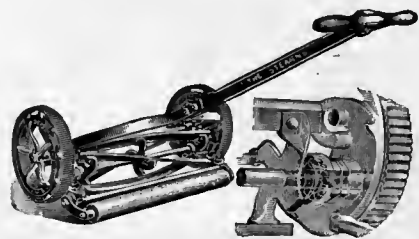
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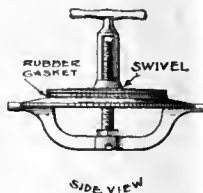
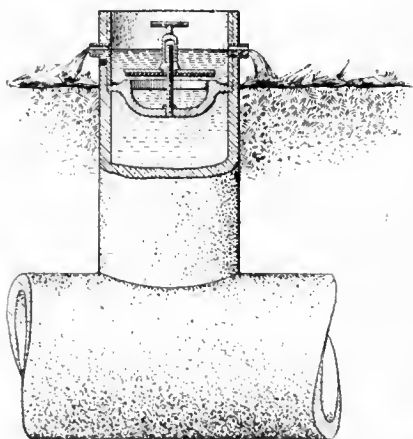
On its accurate ball-bearings the cylinder of the Stearns Mower revolves at high speed with the free movement of a bicycle wheel.

Every part is made on the interchangeable plan. All oil holes and adjusting screws are easily reached from the upper slide. The roller adjustment is simple.

The knife steel is the finest ever used on lawn mowers. Can be adjusted to cut as close as three-eighths of an inch. Dust proof, hardened and ground bearings. Patent ball retainers. 10-inch wheels.

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The "K T" valve is used to regulate the flow of water from cement or vitrified pipe lines. Each stand pipe on the headline operates as an independent hydrant. The valve system overcomes the difficulties encountered in irrigating uneven or hillside land. By using the "K T" valve all of the water may be allowed to flow from one standpipe or a little simultaneously from a great number of standpipes. The "K T" valve is mechanically perfect. The working parts are made of non-corrosive material. Swivel gate prevents sticking. The use of the "K T" valve means economy, as it prevents the waste of water and lessens labor. Prices upon application. Address **KELLAR & THOMASON, Covina, Cal.**

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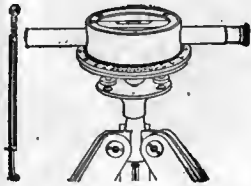
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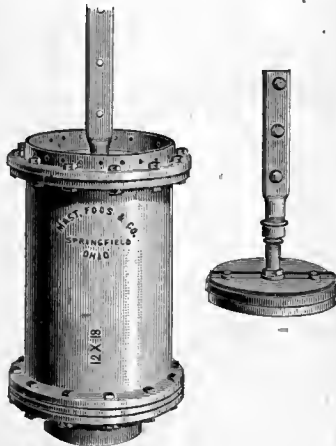
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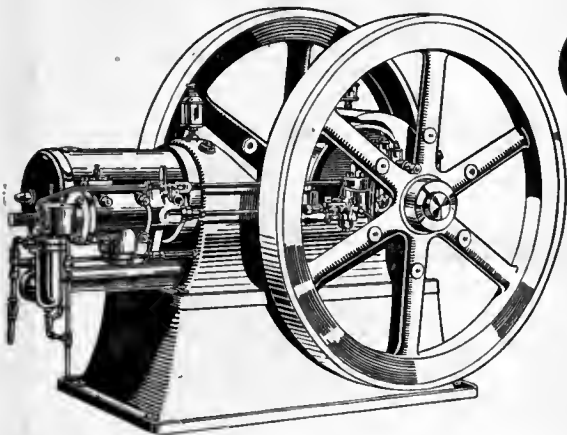
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He wanted to emphasize the fact that every land owner, no matter how well fixed his farm might be as to irrigation ditch facilities, ought to take advantage of the wonderful ample underflow waters.

The way to have the best pumping facilities on your own farm is to get an Olds Engine, which is the ideal engine for this purpose.

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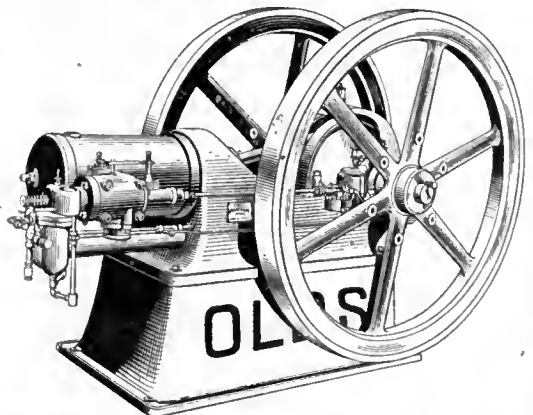
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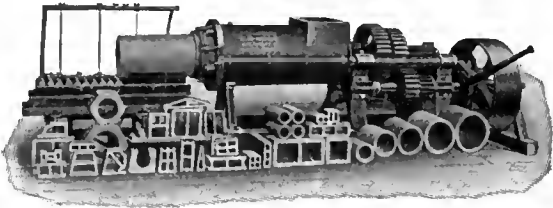
It is up to date, designed by engineers and built by mechanics who have had years of experience in the business. Every part inspected and tested. Every complete engine is run and tested three times by different men, so we know they are perfect before they leave the shop.

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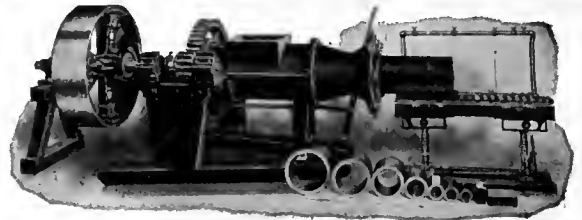
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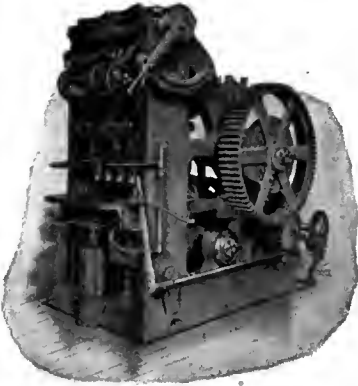




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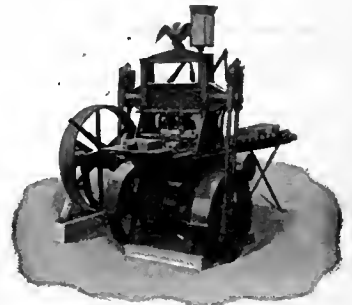
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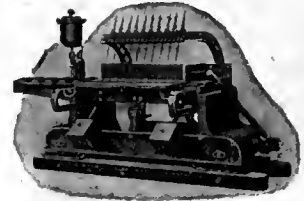
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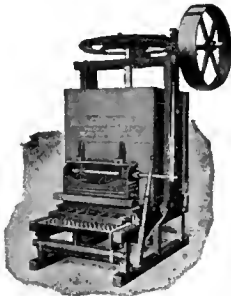
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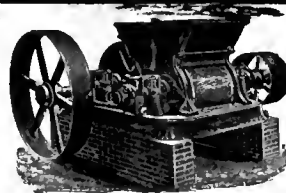
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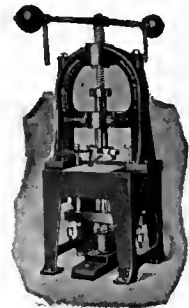
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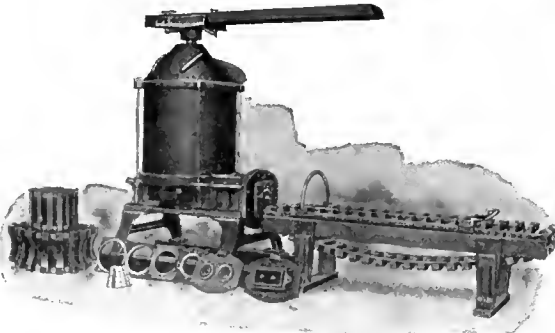
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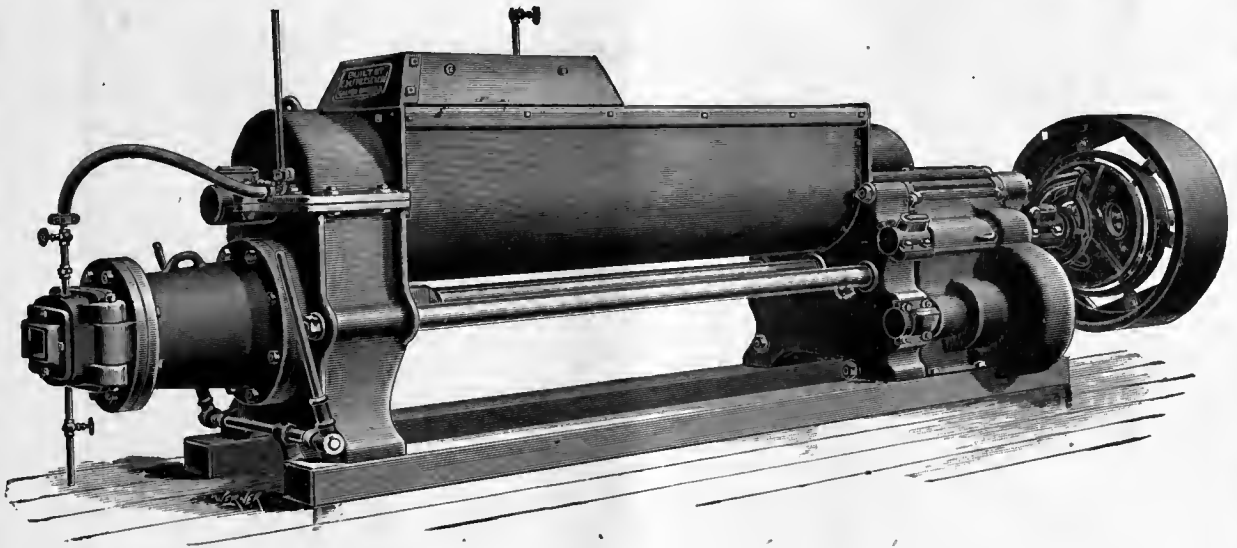
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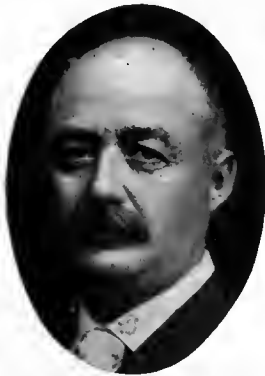
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Irrigated, under cultivation, ready to earn at least **\$250 a month.**

Not in all the world have I ever heard of so good an opportunity for men of small means. In this small space I cannot tell you all the steps that have been taken to safeguard your money in every way. This is investment — not speculation — yet you get returns equal to those from successful speculation. And all the while you are secured against loss by the finest farm land in the world, and your interest in water-rights that no man could buy for a million dollars. There is no question like finding gold or striking oil about this proposition. The land is there for all time. The water is there for all time to nourish and fertilize it. You don't have to dig in the ground deeper than to plant seed. There are no insects that destroy crops in this country. There is no chance for drought. There is no chance known to man for a single crop failure, ever. And the abundant crops of large and in every other way superior hay, grains, vegetables and fruits are equalled in only a very few favored spots, such as the Rocky Ford country. But I am going to prove by case after case that net returns from ten acres of this property rarely are as low as \$3,000 a year and often as high as \$10,000, according to the kind of crops. The difference is not according to location of land or season or anything of that kind. The land is near a prosperous and growing city — Albuquerque — the largest city in New Mexico. Our main irrigation canal to run through the city. The main line of the Santa Fe Railroad runs through our land from end to end. And our own electric line is to supply additional cheap and convenient transportation to every section of these lands. If you want to see the country for yourself, you can go with the next party I take to look at the property. Or you and your friends can band together and send a representative. Or I will send you names of prominent men who have gone or will go and you can ask them what conditions they find. But this is the merest outline of what I will show you in detail. There are many features of this Secured Land Contract that make it safe and profitable which I haven't space to touch upon. I am only attempting to make it clear to you that if you can possibly save \$2.50 a week you can have an assured three to ten thousand dollar income in a few years. Don't doubt — I have proof. I have promised to lay it before you. All you have to do is to write for it — that can't cost you a cent more than postage. And as fast as the mails can carry, I will send you proof that as sure as crops grow where climate, soil and water conditions are perfect, you can be financially independent in a few years.

YOU know, or can easily learn from United States Government Reports, that irrigated lands in the Great Southwest, in selected crops, will net \$300 to \$1,000 a year per acre over and above the entire cost of cultivating them.

Anyone who knows the country will tell you that absolutely the surest, easiest way in the world to gain a large and permanent income for a small outlay is to get hold of a few acres of irrigated land in the Great Southwest.

But always before it has required at least a few hundred dollars and it has been necessary for the investor to live on the land and develop it.

Now, my company makes it possible for you to get ten acres of the finest irrigated land in the world if you can save \$2.50 a week.

You can go and live on it — absolutely assured of an income from it alone of \$3,000 to \$10,000 every year without fail.

Or you can remain in your present position and add that much to what you earn.

For my company will cultivate your property for a small share of the crops. You don't have to know a thing in the world about farming.

Now, I can and will prove all this from the highest authorities in the land.

All you have to do is — write me and say, "Prove to me that ten acres of your land will net from \$3,000 to \$10,000 a year above all cost of cultivating it."

I have the proof, so read what my company will do for you.

I will deliver to you at once a Secured Land Contract for ten acres of irrigated land in the Rio Grande Valley.

You must pay my company \$2.50 a week or as much more as you like.

Instead of your having to pay interest on deferred payments, I agree, for my company, to pay you 5% per annum on the money you pay in.

I also bind my company to fully irrigate your land and turn it over to you under full cultivation whenever you desire to mature your contract.

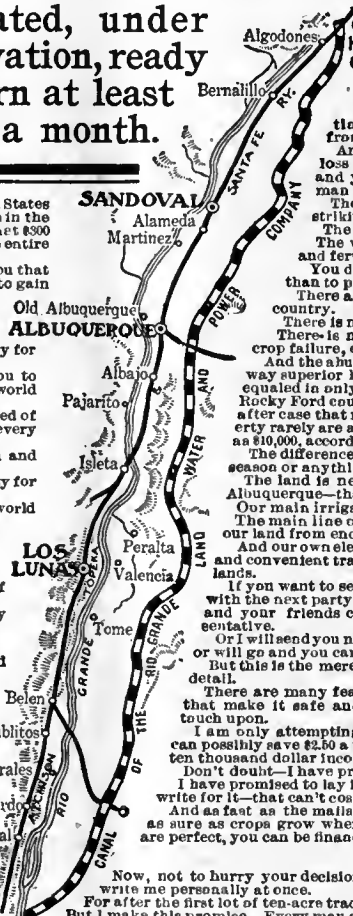
\$2.50 a week will mature your contract in 10 years.

But after you have paid \$2.50 a week for three years, or the same total amount in a shorter time, I agree and bind my company to loan you enough money to make all future payments and mature your contract.

Remember, the land will be fully irrigated and completely under cultivation, so your first year's crop should net you enough over and above the cost of cultivating it to fully pay your loan.

You would then own your land outright and have an assured income of from \$3,000 to \$10,000 a year.

Can you hope in any other way as safe and sure as this to have so large an income in a few years?



Now, not to hurry your decision in the least, but to protect the price, write me personally at once. For after the first lot of ten-acre tracts is contracted for we will ask more. But I make this promise. Every man or woman who answers this advertisement at once can have at least ten acres on these terms unless, of course, all our land should be already contracted for from this one advertisement. Now, write at once. I can say nothing more in this advertisement except that, if I could, I would not tell you all you can confidently expect from this investment. For you would not believe it without the proof which I cannot put in an advertisement. Address me personally, and believe me sincerely, E. W. SHUTT, President Rio Grande Land, Water and Power Co. 658 Houser Building, ST. LOUIS, MO.

THE IRRIGATION AGE

VOL. XXII

CHICAGO, AUGUST, 1907.

No. 10

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS;

112 Dearborn Street, CHICAGO

Entered at the Postoffice at Chicago, Ill., as Second-Class Matter.

D. H. ANDERSON, Editor
W. A. ANDERSON .. G. L. SHUMWAY
Associate Editors

ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

Feature Articles.

In the September issue THE IRRIGATION AGE will begin the publication of a series of six or more articles dealing with the detail work, the results, the possibilities, the hardships and vicissitudes and individual experience in irrigation farming on a small scale. There has been ample exploitation of irrigation as a factor in development of the West and its part in the reclamation of arid lands, and there are still features of it which have been untouched by editorial pen and will later do their part in reclamation history; but we are going to retrace our steps, if you please, and get in touch with the man who is making his living, who is working out his destiny, on the lands which the AGE, together with other publications, has "boosted" for years. The readers of this periodical have learned of what private promoters and the government have done on irrigation projects; now we propose to bring them into contact with the thousands who have followed in the wake of the government and the promoters, to have them meet the overworked but happy "man with the hoe." To use a homely parallel, we have had the lesson reading and the sermon; it is time for the "experience" portion of this irrigation meeting and "testimonies" are in order. Our plan as outlined, is this: A special correspondent will be sent into a certain district for a period of months and in a series of articles, written by one who is in no way an expert on irrigation matters, give a brief outline of the history of the region, its adaptability to certain crops, its water supply and kindred matters and then write of the results as obtained by the people now cultivating the lands. Our first district will be that

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Interesting to Advertisers.

It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 22 years old and is the pioneer publication of its class in the world.

in the vicinity of Denver and the same treatment will be accorded other districts in turn. It is our aim to make these articles simple, accurate and readable in an effort to exploit and develop the possibilities of the agricultural West.

Another Wyoming Project.

The Eden, Wyo., Irrigation and Land Company has obtained title from the state of Wyoming to the waters of the Big Sandy river, the Little Sandy river, the New Fork river and some other smaller streams, amounting in all to sufficient water to irrigate 206,000 acres of land. There have been segregated, under the Carey act, 60,000 acres and the segregation of 40,000 more is about completed. This land is adjacent to 100,000 acres that can be obtained at any time by the company, as it commands the water supply to it. The company owns a natural reservoir sufficient to irrigate 20,000 acres and the United States government has granted the corporation a natural reservoir known as the Lecky Basin, into which there are five streams of water constantly flowing. The basin holds sufficient water to irrigate 60,000 acres and the canal system, the right-of-way, survey, etc., are the property of the company.

Yuma Valley Up in Arms.

Did the reclamation service officials make false representations to the settlers of Yuma valley in order to secure signatures to mortgages of their homes to the government for an unknown amount? This is the basis of a petition signed by all of the officers of the Yuma Valley Water Users' Association and others for a meet-

ing in Sacramento on August 31, two days before the convening of the Irrigation Congress. The petition is said to voice the protest of practically all the settlers along the Colorado river in California. Among other grievances of the settlers is one that charges the government agents with grossly misrepresenting and exaggerating the estimated cost of the irrigation works to be constructed. Resolutions will be drawn up at the meeting which will demand an investigation of the work in the Yuma valley and convey to President Roosevelt a formal protest against the manner in which the signatures were obtained. It is not improbable that the matter will have an airing in the Congress. Engineer J. B. Lippincott is the official of whose dealings the investigation is asked.

Secretary Garfield's Western Trip. The visit of Secretary of the Interior James R. Garfield and the three members of the Inland Waterways commission to the western states should result in much good to the west and establish excellent relations between the people of these regions and the Department of the Interior. Personal contact and acquaintance with the projects which the government is undertaking cannot help but impress the secretary and the members of the commission with the importance of the work. Not for one instant do we mean to imply that the secretary is not fully capable of attending to the arduous duties of his office, but better understanding always tends to better labor and more intelligent management. On the other hand the people of the west will learn that Mr. Garfield is earnest and sincere in his efforts, and that while he is at the head of the department the work which was so ably started under the administration of Mr. Hitchcock will be carried to completion by a competent official in whose honesty and integrity there can be only the greatest confidence.

Program Is Outlined. Before the AGE again appears the Fifteenth National Irrigation Congress will be a matter of history, but from the preparations under way to make it a success there is no doubt but that its influence will be widespread and lasting. Not only have the local committees been working zealously to make the gathering a record breaker in every way, but a program has been roughly outlined which will undoubtedly be followed out. This latter was done at the meeting of the executive committee in Chicago on July 6. At this meeting it was determined to have two sessions of the Congress each day with the exception of Monday, that day being given over to the reception of delegates and the locating of quarters. As national irrigation is the most important feature of any congress, it is naturally entitled to first consideration, and Tuesday's meetings will deal with

the reclamation service and its work. The forestry service is also given a day (two sessions); and the department of irrigation and drainage, of the United States Department of Agriculture, and state experimental work will take another day. Half of the time in all of these days is to be given over to papers by government officials and others, while the remainder will be taken up in the discussion of the various papers and addresses. Under no conditions is any paper or address to exceed fifteen minutes in duration. The inland waterways commission of the government will occupy one session, and other related subjects, such as private irrigation projects, state laws, etc., will be discussed at the other sessions. On Saturday morning the reports of the committees will be given consideration and officers will be elected. The executive committee also extended formal invitations to President Roosevelt and Secretaries Garfield and Wilson, the President being asked to address the gathering. The matter of planning a discussion of the land and grazing questions was left to the discretion of the executive chairman, Mr. W. A. Beard.

Dr. Mead's Resignation. Dr. Elwood Mead, who for a number of years has been the chief of the department of irrigation and drainage investigations of the United States Department of Agriculture, has recently resigned to accept a position as consulting engineer for one of the large irrigation companies of the West. The many friends of Dr. Mead regret his action in that it cannot but temporarily, at least, lower the standard of efficiency which his department has attained, for his work has been most ably performed. He has become one of the foremost, if not the leading, authority on irrigation practice and law and his place will be a hard one to fill. Dr. Mead was recently offered the position of chief engineer of the irrigation institutions of Australia at a salary of \$8,500 a year and was somewhat inclined to accept the offer. The ill health of one of the members of his family, whom it would have been impossible to have taken to that far off country, determined the doctor to give his services to the western company and remain in this country. The remunerative part of the new position is treble that of the position which he resigned. It is rather a sad commentary on our national institutions when a man of Dr. Mead's capacity and ability must resign from government service in order to obtain a proper remuneration. The best wishes of a host of friends and admirers go with Dr. Mead in his new work, and while it is to be deplored that the department of agriculture will lose his services it is sincerely hoped that his influence may be felt in a larger field.

Apropos of the resignation of Dr. Mead is that of Mr. C. E. Grunsky from the reclamation service to

engage in private practice as a civil engineer. He is peculiarly fitted to take up the work, as his professional experience includes some years of private practice in California and some time in the public service of San Francisco, the state and the United States. Again it is to be regretted that the government loses the services of so capable a man as Mr. Grunsky and the public is to be congratulated upon his return to private practice.

What the Government Is Doing. Even those who have followed the work of the reclamation service closely cannot realize the extent to which the government is going in the reclaiming of arid lands. A correspondent of the *Burley, Idaho, Bulletin* in the issue of July 12 summarizes the fifth annual report of the reclamation service. The significance of the figures cannot be overestimated. More than three million acres of land are ultimately to be covered by the projects now under way and of these 1,344,000 acres will receive water within a year. When the 1,344,000 acres are taken up by settlers they will yield to the government \$5,372,000 annually, an amount sufficient to build two large projects. The acreage will make 33,000 farms of forty acres each and assuming that the families settling on these farms average four members—which is a small estimate—more than a million people will have homes on lands that a few years ago were considered worthless except for grazing purposes.

The sentiment of the people of the west is voiced in the statement of Statistician J. C. Blanchard, "Certainly these are pleasing facts. The proximity of the day of such rich returns makes us all feel good. It will inspire us to harder work, and occasion general rejoicing in the western irrigation states."

EDITORIAL NOTES.

BY G. L. SHUMWAY.

In the early days of Nebraska, J. Sterling Morton initiated a splendid work in forestry when he secured the passage of the resolution by the State Agricultural Society urging the creation of Arbor Day. Later this was passed by the state legislature and the governors of Nebraska by an annual proclamation have set aside a certain day to plant trees, and it has now become a custom in nearly every public school.

Nebraska, with her miles and miles of prairie on which no trees were found, was a fertile spot for the birth and growth of this idea. Later on, when Grover Cleveland called Mr. Morton into his cabinet, the diminishing forest lands were attracting attention and the fact was brought out of the dull labyrinths of federal statistics.

Mr. Morton saw the only sensible solution was planting trees. The forestry department found its birth, and if Grover Cleveland did do all the wrongs of his administration credited to him, he atoned for it all by calling the Nebraskan to Washington and by his subsequent approval of the creation of the forestry department.

There is no logic in fencing the forests we have. We need them to build homes. The only manner to provide forests for future generations is to plant more trees. In this particular, the forestry department of the United States, under the present management, has been singularly derelict. It has been stated and spread through the press as an accomplishment of the department, that it has planted 280,000 trees the present season. Two hundred and eighty thousand as a glance may appear a staggering array of figures, but without any organized effort, except the inspiration of beautifying homes, there are now planted annually in the United States several thousand times that number of trees; in fact, the estimate is 600,000,000 for the present year.

According to the report of Chief Forester Pinchot the average cost of planting a thousand trees by the government is about \$5. Actually, out of the extensive appropriations of the forest service, amounting to about two millions per annum, some \$1,400 was expended in following out the original intent of the creators of the forestry service. That is an improvement over previous years, for it is understood that last year only about \$400 were expended in planting trees.

At the Denver convention a few dull statistics were arrayed, which might be worthy of recapitulation. It was stated that 127,000,000 acres of public domain were in forest reserves, only a very small percentage of which were actually forest lands, or had any prospect of ever being anything but grazing land. It was stated that 4,000 applications for homesteads had been made by prospective settlers by and under the forest reserve homestead law. The law has been in effect about two years, and of the 4,000 applications only about 1,000 had been acted upon. It was not stated the number approved, nor the number whose judgment the forest rangers had questioned.

It will be seen by comparison of the acreage within the reserves and the number of applications which have been acted upon that it will take a period far beyond the expectations of the present generation, and several future generations, before the public domain can be occupied under the operation of that "joker" homestead law.

It will be seen also by the foregoing that President Roosevelt was off on the wrong foot; in other words, he is crediting to some of his official family the happy faculty of being infallible, assuming that the people who had built the West, are, as a whole, wrong in their conclusions as to the disposal of the public domain. He is credited with saying in the Brownsville matter that "All men should be reinstated who are willing to prove themselves innocent of any part of the shooting." This seems to have been the promulgated policy relating to public lands—a man must prove his innocence or stand convicted of felony. We are asked to submit a remedy where no remedy is needed. An undesirable condition is alleged to exist which is not apparent to us who dwell in the West. Mr. President, the difficulty is not in the West but in your own official family. Mr. Pinchot is sick. You don't believe it, possibly he does not himself, but we of the West know it is true; therefore, the Denver convention was called to diagnose his case and give him a dose of quinine or assofoetida as the case might require. I am of the opinion that the dose administered, while the milder of the two, may have a salutary effect upon his system.

THE STATE OF WASHINGTON.

The East Side a Land of Wheat, Fruits, Plenty from the Soil, Mineral Wealth, and Healthful Climate.

The east side of the State of Washington is the portion east of the Cascade range of mountains and comprises a little more than half the entire area. It differs from the west side in that the rainfall is less, the skies are clearer, the atmosphere more dry, and there is no seashore. In a general way it dips gradually from north to south, the upper end being mountainous, the south end comparatively level and intruded upon by but one mountain ridge, a projection of the Blue range from northern Oregon. This butts into the southeast corner.

Near the Cascades the land is more dry than toward the east side and requires irrigation. One of the successfully irrigated districts of the West is that of North Yakima, "home of the big red apple," where other fine fruit, alfalfa and various products are grown with bountiful abundance. In the valleys, up in the region of beautiful Lake Chelan and all along the north end of this section of Washington, the soil yields big crops of wheat, oats, alfalfa, potatoes, apples, apricots, strawberries and other choice things from the field and garden. Stock and poultry thrive there.

Over in the eastern counties is the great Palouse wheat district, where most of the 35,000,000 bushels annually harvested in the state are garnered. This is one of the phenomenal grain-growing regions of the United States. The rainfall is comparatively light but comes at just the right time to start and develop the great fields of winter wheat. But this southeast corner is not a one-crop country. On the contrary it is a region of extraordinary diversity of farm products. At the Portland Exposition in 1905 some of the finest cherries

on exhibition from all the cherry paradise of Washington, Oregon and Idaho were sent in almost daily, fresh and delicious enough for the gods, from the orchards of Eastern Washington. Besides these, there were royal apples, choice peaches, fine grapes, other fruits, English walnuts—even almonds—a grand aggregation of soil riches ranging all the way from those of the cool temperate to those of semi-tropical lands.

All through the northern mountains of this end of Washington various kinds of mineral wealth exists. Gold has been found and is being mined. Very rich iron deposits are said to exist. The best coal mine in the state is east of the Cascades. Marble, clays, building stone and other valuable deposits are known to exist and with the many mineral possessions of this section of the state will unite in the future with its many agricultural advantages to make it one of the most prosperous places in the entire West. The climate generally is dry and wholesome. Here one can choose altitudes but a few hundred feet above tidewater up to the levels of 3,000 and even 5,000 feet above the sea, as he likes. If the valleys or lower elevations become warm in summer, he can run to the mountains where the trees offer their refreshing shade, the fountains and cataracts cool the air in day time and where at night blankets are comfortable and sound sleep is hard to avoid. About Lake Chelan and all through Northern Washington—this east end—there is abundance of scenery, a great deal of which is scarcely excelled in beauty and magnificence.

The people of this fortunate land are enterprising and progressive, up with the times. Their schools, churches and institutions are everywhere modern, and there is a disposition to favor clean, anti-graft government.

The principal town is Spokane, one of the most energetic and promising cities in the entire West. It is a place of 75,000 population, and has a fine water-power. Walla Walla has about 15,000 people and is in the midst of the wheat district. North Yakima is over toward the Cascade mountains and is a wide-awake city, of 10,000 inhabitants, the capital of a very successful irrigated section where the finest kinds of fruits are grown.

And there are many good towns in this end of the state. Too much praise can not well be given to the State of Washington.

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Age one year and

The Primer of Irrigation

OFFICIAL CALL

Fifteenth National Irrigation Congress

To the People of the United States, Greeting:

The Fifteenth National Irrigation Congress will be held in Sacramento, California, September 2-7, inclusive, 1907.

The four great objects of the Congress are to "save the forests, store the floods, reclaim the deserts and make homes on the land."

All who are interested in the achievement of these objects or any of them are invited to attend the Congress, and, by participating in its deliberations, contribute to a wise direction of national policies and development of practical methods of conserving and developing the great natural resources of the country, thereby insuring a greater stability of prosperous conditions, extending the habitable area, increasing the products of the land, and increasing internal trade and commerce.

National and State officials, irrigation and forestry experts, engineers, farmers and irrigators, manufacturers, professional and business men, industrial workers, editors and other representatives of the press will attend the Congress.

Simultaneously with the Irrigation Congress there will be held at Sacramento an Interstate Exposition of Irrigated Land Products and Forest Products. The largest and finest list of trophies and prizes ever offered at any event of this kind will stimulate competition. The exhibition of irrigated products will be the finest ever assembled anywhere in this country.

The California State Fair will follow the Congress, opening on September 7th, when the joint closing and opening ceremonies will be attended by a great irrigation celebration, the day closing with a magnificent allegorical irrigation parade and electrical illumination.

California affords many opportunities for the study of irrigation, irrigation practices and results, irrigated crops of every kind and irrigation opportunities. Sacramento, the capital city of California, where the Congress will be held, is situated near the center of the great valley which extends lengthwise through the state a distance of nearly five hundred miles and comprises approximately ten million acres of fertile land. Colossal plans for the construction of storage dams and distributing canals for the irrigation of this great plain are now being made by engineers of the Reclamation Service and money has been apportioned from the reclamation fund for the construction of an initial unit of the great system contemplated.

September is a season of fruits and grapes in California and visitors to the Congress will have opportunities at Sacramento and throughout the state of enjoying the best that California orchards and vineyards yield and of enjoying it fresh from tree and vine.

The program of the Congress will consist of addresses by men eminent in this and other countries, carefully prepared papers by administrative officials and engineers of the National Reclamation Service and Forest Service, with ample provision for volunteer speeches and discussion.

The personnel of the National Irrigation Congress will be as follows:

The permanent officers of the Congress.

The President of the United States.

The Vice-President of the United States.

The Members of the Cabinet.

Members of the United States Senate and House of Representatives.

Governors of States, Territories and Insular Possessions of the United States.

Members of State and Territorial Legislatures.

Ambassadors, ministers, consuls and other representatives of foreign nations and colonies.

Members of State, Territorial and Insular Irrigation and Forestry Commissions.

Fifteen Delegates appointed by the Governor of each State or Territory.

Ten Delegates appointed by the Mayor of each city of the United States of more than twenty-five thousand population.

Five Delegates appointed by the Mayor of each city in the United States of less than twenty-five thousand population.

Five Delegates appointed by each Board of County Commissioners or County Supervisors in the United States.

Five Delegates appointed by each State organization, having as its object the advancement of the public welfare of that State.

Five Delegates appointed by each State Irrigation, Forestry, Agricultural or Horticultural Society or Association.

Five Delegates appointed by each National or Interstate Association interested in the objects sought by the National Irrigation Congress.

Five Delegates by each State Association of professional, commercial, fraternal, patriotic, religious or labor organizations.

Two Delegates duly accredited by each Chamber of Commerce, Board of Trade, Immigration Society or Commercial Club.

Two Delegates duly accredited by each regularly organized Irrigation, Agricultural, Horticultural or Forestry Club, Association or Society in the United States.

Two Delegates duly accredited by each Irrigation Company.

Two Delegates duly accredited by each Agricultural College, and by each College or University having chairs of hydraulic engineering or forestry in the United States.

Two Delegates duly accredited by each regularly organized society of engineers in the United States.

Appointment of Delegates should be made as early as possible, and notice of appointment with full name and postoffice address of Delegates forwarded without delay to the National Irrigation Congress Headquarters, Sacramento, California.

Delegates appointed to this Congress should communicate with the Board of Control at Sacramento, in order that accommodations may be reserved.

The Board of Control, consisting of prominent citizens of California, supported by unanimous sentiment throughout the state, and aided by committees representing various portions of the state, have arranged a splendid program of entertainment, and will accord Delegates a cordial welcome.

Special railway rates have been made for delegates to the Congress and will prevail over all transcontinental lines.

All tickets will include a free trip to San Francisco, where rebuilding operations are being carried forward on a scale so vast as to render that city today the greatest and most interesting exhibition of man's constructive genius, civic pride and commercial enterprise ever witnessed in the world.

Special excursions will enable Delegates to see California. These will cover the Sacramento and San Joaquin Valleys, with their great farms, vine-yards, orchards and irrigation districts. They will penetrate the mountains, pass through magnificent pine forests to the great mining districts of the Mother Lode and to the famous copper belt of the north and rich gold mines of the Siskiyou.

These excursions will extend to the famous vintage district and giant redwoods of the north coast counties, to the beautiful Santa Clara and other delightful valleys of the south coast, to sea coast resorts of world-wide fame, to the palatial hotels and beautiful landscapes of the southern counties, to the Yuma project and Imperial Valley, where the border land between the United States and Mexico has been transformed from a desert to a garden. They will extend from the Klamath country where the National Government is building in California and Oregon a great irrigation system, to the Truckee-Carson irrigation project in Nevada and on to the great mining districts of southern Nevada, where mines of fabulous wealth are attracting the attention of the civilized world.

Tickets may be purchased via Los Angeles, the splendid southern metropolis of California, via Portland, the rose city of the Northwest, or via the bustling and rapidly growing cities on the shores of Puget Sound.

Delegates who desire may come via the northern line and return via the southern, or *vice versa*, and thereby traverse the entire Pacific coast of the United States, a territory rich in natural resources and scenic beauty.

Information relative to the Congress, Interstate Exposition and Program will be furnished upon request from the Irrigation Congress Headquarters, Sacramento, California.

Sacramento, California.

July 3, 1907.

THE EXECUTIVE COMMITTEE,

By W. A. BEARD, Chairman.

THE BOARD OF CONTROL,

GEO. W. PELTIER, Chairman.

Approved:

GEO. E. CHAMBERLAIN, President.

D. H. ANDERSON, Secretary.

DOUBLE-POWER WIND MILL.

The experience of practical men is always valuable when you want to inquire into the merits of any implement or tool that is offered for sale. The *Prairie Farmer* has carried an advertisement of the Double-Power Mill Co., of Appleton, Wis., for a long while, and we are constantly having inquiries from our readers asking whether this mill will do all that is claimed for it. A practical man from the *Prairie Farmer* office has gone to the factory at Appleton, Wis., and examined into every detail of its construction, and besides he has seen the mill in actual work and has interviewed many who have used the mill during the past year. In every case the mill has fulfilled even more than is claimed for it by its makers. In a recent letter from George McKerr-

row, of Pewaukee, Wis., he says: "The Double-Power mill is a dandy in a gale, because the governor keeps her steady when other mills are in danger, and in these strong winds she develops great power. In a light wind she runs steady and strong." There are many other things that we might say in regard to this mill, but we believe it will best pay our readers to send to the above company for its illustrated catalogue showing up the mill in detail.—From the *Prairie Farmer* of Chicago, issue of December 22, 1904.

We are pleased to receive this endorsement from a paper well known for its conservatism, which has won a large circulation and wide success by its own merits. We feel that this endorsement is worth preserving. Money could not have purchased it.

DOUBLE-POWER MILL Co.,

Appleton, Wis., U. S. A.

CALIFORNIA'S IRRIGATION PROBLEM

Commonwealth That Has Greatest of Natural Facilities to Place It in the Front Rank of States Growing Irrigated Products Does Not Protect Its Farmers by the Enactment of Adequate Irrigation Laws, Thereby Jeopardizing Its Agricultural Welfare.

By H. A. Crafts.

No one conversant with existing conditions can for a moment deny that agriculture is the most important of California's varied industries. No one who has looked over the situation, even with a casual eye, can deny that California has developed that industry to a marvelous degree. California stands today unique among all the pastoral regions of the world. Yet when the subject has been stripped of all its glittering generalities, and resolved into its practical phases, one vital element stands out in bold relief.

And that element is irrigation! Talk as we may, agriculture in no part of the commonwealth is susceptible of its fullest development without the aid of irrigation.

Certain parts of the state, it is true, may have a large average rainfall; but so long as that rainfall is not evenly distributed throughout the growing season what does it avail in the maturing of crops? California has a dry season in all that the term implies. What profits it if the rainfall during the wet season does amount to 20 or 30 or 40 inches, when, during the dry season, it amounts to nothing at all?

If California generally was not one of the best watered sections of the United States the situation might seem discouraging. It is safe to say that if the state's water supply could be evenly distributed there would be sufficient annually to thoroughly irrigate every arable acre of land within its boundaries.

But before going into the subject of available water supply, or constructive irrigation, the question of irrigation legislation should be considered, and considered with a most profound regard for its paramount importance to the welfare of the state.

An observer from abroad who is at all conversant with the subject is surprised upon coming to California and finding that the state, for some unaccountable reason, has virtually stood aloof and refused to accord to irrigation that care and protection that its vital importance to the well being of the people should demand. It is not that the California irrigation laws are defective; they are deficient. California's sin is not so much one of commission as of omission.

Some say that we have the Wright law, and therein evince an ignorance both of the true nature of that law and the needs of irrigation legislation in general. If they will look into the matter they will find that the Wright law does not affect the legal status of a water right at all. It merely permits a community to mortgage itself for the construction and maintenance of an irrigation system, or a plant, for its own common good. An irrigation system constructed under the provisions of the Wright law has the same legal standing with reference to the state, or to a competing irrigating system, as any individual or corporate owner. Wright systems have been made the subjects of litigation just the same as others. Let a survey be taken of the great semi-arid West, and California, the foremost in agriculture and agricultural possibilities, appears to be the most de-

ficient of all in laws intended to foster, to develop and to protect irrigation. It seems in the beginning to have neglected to perform one of its highest duties, and then to have permitted the wrong to exist by a course of easy-going procrastination. In the meantime the evils growing out of this lapse of duty have gone on from bad to worse, and have borne much bitter fruit. The day of reckoning is yet to come, all the same, and the sooner California turns her face sternly to the front and sets her house to rights the better it will be for the present as well as all future generations.

In recounting the ills that have naturally flown from this long neglect of a manifest public duty it would seem hardly necessary to animadvert to the long train of litigation that has not only depleted the pockets and vexed the souls of scores of contestants, but has lumbered up the dockets of the civil courts, to the hindrance and detriment of other legitimate and pressing matters and to the great cost of the taxpayers. It is a matter of history and common repute, and will long remain a blot upon the state's fair name and a thorn in the side of the loyal citizen. It is stated upon good authority that in two California counties alone nearly two millions of dollars have been expended in irrigation litigation. The state's conduct in the premises appears like the complete shifting of the burden of the defining, establishing and maintaining of water rights from its own shoulders to those of the courts: when, instead, it should have codified, enacted and placed upon the statute books the most perfect set of irrigation laws that could be devised by human wisdom, and left to the courts their mere interpretation on such occasions as they might be brought into dispute.

The statutes of California say that "the right to the use of running water flowing in any river or stream or down a canyon or ravine may be acquired by appropriation."

That "a person desiring to appropriate water must post a notice in writing in a conspicuous place at the point of intended diversion."

The notice is required to contain a statement of the amount of water appropriated, the purpose for which it is to be used, the means of diversion and size of conduit. The law also says that a copy of this notice must be recorded, within ten days of date of posting, in the office of the recorder of the county in which it is posted.

This is the entire law governing the method of appropriation and of recording of claims, upon which property worth millions of dollars is based. It will be observed that there is no provision for the exercise of public authority over these appropriations, nor over the diversion and distribution of water taken under them. And still other sinister results have grown from this dereliction of public duty. Many a meritorious irrigation enterprise has been abandoned through actual or threatened litigation. Immense sums of money in the aggregate have either been lost or tied up in these

disastrous enterprises. Thousands of acres of rich lands lie fallow because of the abandonment of these enterprises; thrifty agriculturists have been forced to seek other fields of effort; irrigation enterprise generally is in a stagnated condition; a cloud of doubt rests over the title to many a water right in the state, and not only is agriculture retarded in its development, but other interests languish in consequence.

The fact that the legal phase of the irrigation question is so fundamental in its character should be a most powerful incentive to speedy action. Legislation should have been the initial point and foundation stone of the whole structure. Unless protected by the strong bulwark of the law, the irrigation system of a state fails of that substantial and abiding quality that imparts a feeling of security to capital and labor, the two elements upon which devolves its ultimate development.

Where legislation has failed in the beginning, all the more haste should be made in taking remedial action. It is worthy of being taken up with a most profound sense of duty. Neither sectional jealousies or political prejudices should be allowed for the briefest moment to stand in the way of prompt and effective action.

In the formulation of a code of irrigation laws California should find but little difficulty. She has minds within her precincts ripe with knowledge and experience. She may have the works and the personal advice of the ablest irrigation experts by the asking. She may have working models in the statutes of other states, some of which are claimed to be as near perfect as may be made in the light of present needs. It was twenty-five years ago that Colorado set about the task of codifying and enacting a system of irrigation laws. These have been amended from time to time, but still they are not considered so broad and effective as those of Wyoming. Colorado began by providing for the adjudication of all existing water rights in the state. This task she delegated to the various district courts. These courts in turn appointed referees whose duty it was to take testimony of all persons coming before them with claims for water rights. The reports of these various referees were made the basis of water decrees issued from the district courts, and these decrees, being placed upon the public records, formed the evidence of title to water rights, and at the same time constituted a guide to those officials whose duty it became to supervise the diversion of water and its distribution.

The state was divided into water districts, and each water district was divided into irrigation or commissioner districts. Over each water district was placed a superintendent of irrigation, and over each irrigation district an official known as a water commissioner. The last named official was charged with the duty of keeping a record of the flow of each stream in his district from which water was diverted, and to see that the water was distributed according to the size and priority of each ditch within his jurisdiction.

During the irrigation season the water commissioner is in constant touch with all ditch owners in his district, and keeping constantly informed of the amount of water flowing in the streams supplying water for the ditches, he is enabled to see that each ditch gets its rightful share of water. On rare occasions there may come a conflict of opinion, and then the superintendent of irrigation is appealed to; and if he finds it impossible to settle the difficulty the case may be carried to the state engineer, who is at the head of the entire irri-

gation department of the state, or into the courts for final adjudication. The system has worked with comparative smoothness, and has imparted a stability to the administration of irrigation affairs that is truly gratifying.

Wyoming, in the adjustment of its water question, took a much wider view. It began by passing an act declaring all of the water in the natural streams, not theretofore appropriated, to be the property of the commonwealth. Then it provided for the installation of a state board of water control, to have general supervision of irrigation. The board began its labors by passing upon all existing water claims, in a manner similar to that followed by the district courts of Colorado. Their findings were made of public record as an evidence of title to water rights and as a guide to the future administration of the department. Then the state was divided and subdivided into water districts in the same manner as has been described with reference to Colorado, over which were placed the necessary subordinate officers. A careful measurement of all the streams in the state has been made, in order to ascertain the amount of unappropriated water that may be flowing in them. As soon as all the water of a stream has been appropriated the board of control becomes cognizant of the fact, and permits no further appropriations, thus shutting off any vexatious contention among consumers as to a division of the water. Under the workings of this system irrigation affairs in Wyoming have assumed a condition of almost perfect order, and both land owners and water appropriators feel secure in their possessions.

While the methods described might need some modifications if applied to California conditions, yet they would appear to furnish the framework for action in this state.

It seems almost beyond belief how a state so far advanced in most things as is California, could so long permit the question of irrigation to remain in a state of abeyance. If the question was not such a vital one to the welfare and material prosperity of the entire commonwealth; if the people of California were not of such general intelligence and progressiveness; were not the benefits of irrigation so obvious; and if instances of the evil effects of non-action in the premises were not so many and so marked, there might appear some excuse for so much public dereliction. Indeed, there appears to be no valid excuse.

Then the next thing is to find some explanation. Let us say that gold mining for a long time overshadowed the interests of agriculture; that monopoly and the bonanza idea have long hampered the development of that industry; that there has existed too much ignorance as to the general needs and the best interests of the commonwealth at large; that there has been a lack of unity among the people of the state at large in furthering the general welfare of the state; that the state has been rent with local prejudices and jealousies; that there has been a lack of system and of sustained effort on the part of the friends of irrigation reform. Let us do these things, I say, and we may see a glimmering of the reasons why the irrigation system of the state today is in such a condition.

Judging by the character of its irrigation laws one would say that the state of California, proceeding upon the proposition that the question of irrigation was an extremely difficult and vexatious one, had, after the faintest attempt to settle it, thrown it overboard as a

bad job, and had permitted it simply to drift. After merely declaring that the right to water might be acquired by appropriation; and after prescribing in the crudest manner possible how appropriation might be accomplished, all the water flowing in the natural streams within its boundaries was turned over to the tender mercies of the mob.

The result has been that indiscriminate and extravagant claims have been made upon many of the streams of the state. Professor Elwood Mead, government expert in charge of irrigation investigations in California, in Bulletin No. 100 of the Department of Agriculture, on page 36, says: "There are three consecutive claims to all the water of the San Joaquin river, and the aggregate of all claims in California represents enough moisture to submerge the continent."

Continuing, the professor says: "The evil comes in the failure of the law to afford any adequate protection to those who comply with its provisions. * * * Of the policy of doing nothing, deciding nothing, there has been enough. Something more is needed. This is a comprehensive code of laws, which will be as just and effective as those of Italy or Canada or Wyoming; which will represent the knowledge of the twentieth century rather than a blind adherence to the conditions of fifty years ago."

The flood of litigation; the fighting of law suits from the lower courts to the Supreme Court of the state, and from the Supreme Court of the state to the Supreme Court of the United States and back again; the stirring up of bad blood; the instigation of open violence; the many instances of bankruptcy, and the general hampering of material progress, are too patent to need more than a passing reference; they are matters of history and common repute. Nor does time in any wise tend to cure this long list of ills; on the contrary, it seems to aggravate them.

Upon the courts has been thrown the burden of sifting and finally adjudicating this mass of extravagant and conflicting claims, and that the courts of California are not infallible is evidenced by the fact that they still cling with fatal tenacity to the fallacy of riparian rights, that relic of medieval England which has been so generally abrogated and set aside in the irrigated communities of both the new and the old world. At best it is but an outcome of the old English common law, and is so antiquated and so poorly adapted to modern conditions that it has been summarily declared null and void by both the legislatures and courts of England's own colonies.

In Colorado, Wyoming, Utah, etc., it has long been a dead letter. Legislatures have legislated and courts decided against it. In a word, the law of riparian rights sets up the proposition that the owner of land fronting upon a natural stream of water has the legal right to demand that the water flowing past his possessions shall not by the act of man be polluted nor diminished in volume for all time. If this law applied to one piece of land fronting upon a stream it would seem in right and justice to apply to all other land fronting upon that stream; so it would seem that if the law was to be carried to its extreme logical conclusion, even the riparian owner would be forbidden to so much as lead his horse or cow to water in the stream, lest the animal in treading too near the water's edge should pollute the water, and in slaking its thirst should diminish its flow, to the damage and detriment of each

and all riparian owners of land on the stream below. In a larger sense the right to divert water for any purpose whatever by a riparian owner would appear to be denied in toto; then irrigation under the reign of the law of riparian rights would hardly seem to be a legal possibility.

But the courts of California have decided that a riparian owner may not only divert water for the irrigation of his own land, but he may divert water to be disposed of for speculative purposes. Thus under the name of riparian rights they have set up a new law of their own, which in fact is an absolute abrogation of the principle of riparian rights, and at the same time establishes the right of any owner of land fronting upon a natural stream to not only take all the water he may see fit to use upon his own land, but to set up a water vendor's establishment and to dispose of all the water he may desire to for profit.

So both the legislatures and the courts of California have confirmed the proposition that the water of the natural streams of the state is the property either of those whose land fronts upon the streams or those who are disposed to acquire it by appropriation; whereas the advanced theory of water rights declares that the water flowing in the natural streams of the state is primarily the property of the state, but may be used for beneficial purposes when appropriated according to rules and regulations laid down by the state and diverted under state control.

The tardy recognition of the importance of irrigation by both general and state governments should be a matter of wonderment among all enlightened and thinking men. The rights of miners and navigators to the public waters of the land have enlisted the prompt and assiduous attention of legislators and publicists, but the rights of the farmers have gone begging for years and years, and even now are regarded with more indifference than otherwise. Of course there are reasons for this. Commerce is ever alert and vigilant of its interests; agriculture is always modest in its demands. The inauguration of our national Department of Agriculture is of comparatively recent date, while the recognition of the importance of irrigation by the general government seems to be the occurrence of but yesterday. Yet how paramount to the welfare of the whole people is the question of agriculture! When compared with it the interests of mining and commerce dwindle almost into insignificance.

Nor has the importance of irrigated agriculture received the thought and consideration due it. How many among us stop to think that perhaps the great irrigated west may some time save the country or perhaps the world from a widespread famine. It was only a few years ago that this proposition was accentuated. In 1901, when the drouth devastated the great food producing states of Kansas, Missouri and Nebraska, Colorado, with her two millions of acres of irrigated lands, produced most bountiful crops, and not only contributed largely toward making up the deficit in the food-stuffs market caused by the eastern drouth, but lined the pockets of the Colorado farmers with money by reason of the great advance in the price of farm products. Nor did Colorado escape the drouth of that disastrous year, but her supply of irrigation water lying among the peaks of the Rocky Mountains, as well as in her scores of storage reservoirs, saved the whole situation.

Thus a shortage of crop in the humid regions, no-

matter from what cause, brings prosperity in a proportionate degree to the irrigated arid regions. Picture, if you will, the profits that would accrue to California were her agriculture to be developed, as it might be under a judicious development of her available water supply in the event of a widespread drouth in the east, in Europe or in Australia! That one year of big prices for farm products in Colorado created a marked effect upon the prosperity of the state, and the effect was not transitory, but lasting. Farm mortgages were lifted by the score and the hundred, farm improvements were observable on all sides, and local trade was stimulated to a remarkable degree.

What California needs today is more attention to the production of the farm staples. Fruits in great variety are plentiful and cheap, while the substantial and indispensable foodstuffs range high in price. What California wants to do is to raise more wheat, barley, oats, corn, potatoes, alfalfa, meat, etc. With the proper development of her water supply available for irrigation these staples might be raised as cheaply and sold at as good a profit as anywhere in the world.

California should make an effort to restore her lost prestige as a wheat producing state. There has been no increase in her wheat product for fifteen years; on the contrary, there has been an enormous falling off. In 1890 California produced in wheat 1,007,876 tons; in 1903 only 465,028 tons, a falling off of more than 50 per cent; and 1904 and 1905 showed a continued falling off. To make the matter worse, even the diminished product of wheat is of such an inferior quality that the millers of the state are compelled to import eastern wheat to mix with it in order to bring their flour up to the standard of ordinary excellence. California also at one time enjoyed the reputation of being an important exporter of wheat and flour. In the year 1882 San Francisco exported 1,128,031 tons of wheat of 919.898 barrels of flour; in the year ending June 30, 1904, she exported only 54,381 tons of wheat and 882.486 barrels of flour.

Irrigation, and irrigation alone, can restore this lost ground; irrigation in all the valleys of the north, the center and the south. The great wheat farms must be cut up, not into fruit tracts, but into small general farms, and the land must be irrigated. Again I must go to Colorado to point a moral. In the early days Colorado raised wheat and little else but wheat. New land would produce from 40 to 60 bushels to the acre. Wheat sold at two cents per pound. For a few years the farmers prospered. Then wheat fell to three-fourths of a cent per pound, and the yield, in consequence of an unbroken cropping of the land, fell to 18 and 20 bushels to the acre.

Something had to be done. The farmers began rotating crops. They put their wheat lands into alfalfa, they turned their alfalfa into beef and mutton and milk, butter and cheese. As soon as another change was needed they plowed up their alfalfa fields and planted potatoes and raised a quantity of "spuds" that have made themselves famous. After potatoes came wheat, and the land was found to have been restored to its original state of fertility, for now it produces again from 40 to 60 bushels to the acre.

These three crops are just as well adapted to California conditions as to Colorado, and their cultivation under irrigation and rotation will bring equal if not better results.

THE FIFTEENTH CONGRESS.

Big Gathering Which Convenes Next Month Promises to Be Largest Yet Held.

As the time approaches for the convening of the Fifteenth National Irrigation Congress interest in it is becoming more wide-spread and there is little doubt but that it will prove the best attended and most interesting of any gathering of the organization. The publicity work of the board of control and the executive chairman has never been equalled for any convention and its effect is being seen in the interest manifested throughout the whole country. On his return from the meeting of the Executive Committee in Chicago Chairman W. A. Beard made stops at Springfield, St. Louis, Kansas City, Topeka, Denver and Cheyenne and everywhere the greatest possible enthusiasm was shown. We quote from an interview with Mr. Beard on his return to Sacramento:

"After leaving Chicago on my way back I stopped at Springfield. I there met the governor of Illinois and members of the state geological commission. They discussed with me the coming congress and I was assured that they felt a cordial interest in it. The governor assured me he would appoint delegates to the congress and some of the members of the state geological commission spoke very favorably of the chances of their coming to the congress. At Kansas City I met the mayor and a number of bankers and found them all favorably disposed toward the congress.

"Everywhere I went I found that the knowledge of the congress had preceded me. Governors, mayors and members of congress had all received the official call and all had made arrangements for appointing delegates. At Topeka, Kan., I missed Governor Hoch, with whom I have had considerable correspondence, as he was absent, but his secretary told me he had made arrangements for appointing delegates and that all or nearly all of them would come to the congress.

"Everybody in every city I visited seemed to know about the Congress and I learned that large and enthusiastic delegations are coming from all quarters. The fact that the Congress is to be held in Sacramento, California, has brought this city to the front more than any other means that could have been suggested.

"Our office has furnished articles on the Congress to every newspaper in the United States and I found wherever I went that these articles have been published widespread and have been effective in setting the people to talking of Sacramento and California in general.

"The exhibition features of the Congress will be attractive in themselves and in the Western States great efforts are being put forth to win one or more of the attractive trophies that are to be presented for exhibits. I was closely questioned about exhibits in many places and I have received a request from the Denver Chamber of Commerce for literature on the subject, as Colorado intends to make a State display.

"The program of the Congress will include a discussion on national lines and will be on a broader nature than ever before known. For instance, the subject of the use of public lands for grazing purposes and the proposed establishment of forest reserves in the Appalachian and White Mountains, running up and down the backbone of the country on the eastern coast, will be matters of absorbing interest.

"The fact that Dr. T. E. Wills, Secretary of the National Forestry Association, came from Washington to attend the meeting of the executive committee in Chicago, is an indication of the strong interest and feeling that has developed in these subjects in the east. During my hurried trip I met many of the governors and other prominent men of the various states. I stopped in and they all demonstrated a great interest in the subject and promised to send large delegations to the Congress. I am well satisfied with the results of my trip and I feel assured that the Congress will be a great success."

Every effort is being made to make the deliberations and discussions as broad and expressive of public opinion as possible, and with that end in view the following letter has been sent to leading authorities on irrigation:

"At the irrigation congress held in Boise in 1906 the subject of interstate water rights was under consideration and a resolution was passed appointing a committee to collect data on the subject of rights to water from interstate streams and present to the next congress a report on the nature of the issues involved and methods which should be adopted for determining and protecting such rights. This committee was composed of Elwood Mead, Washington, D. C.; Frank Freeman, Willows, Cal.; Morris Bien, Washington, D. C.; John F. Lewis, Salem, Ore., and Ira P. Englehart, Yakima, Wash.

"Since this committee was appointed the United States Supreme Court has rendered an important decision in the case of *Kansas v. Colorado*, in which it seems to be established that rights to water for irrigation must be primarily established under state laws. The laws of several adjoining States are at present unlike in the principles governing water rights and methods of their establishment and the settlement of interstate questions in these states must therefore involve both the division of the stream between the states and the principles which control this division. Your opinions on this phase of the subject are especially desired. In the broadest sense, however, the committee wishes to present the matured thought and experience of those who have taken a leading part in the settlement of water-right questions within the states, and has framed the following inquiries with a view to ascertaining, first, what is, and second, what ought to be. It is realized that these questions are addressed to busy men whose time is valuable but it is hoped that, recognizing the importance of these questions, you can give to this inquiry enough time to enable you to submit a statement of your views regarding the topics outlined below.

"1. Regardless of existing laws or decisions, in your opinion what governmental agency should control interstate water supplies used in irrigation? That is, should each state have exclusive control within its borders, or should the nation control regardless of state lines, or should there be divided control?

"2. What principle should govern the division of the streams between the upper and lower states? And how should they be adjusted where the procedure of one state provides for a more exact determination of rights and quantities than the other?

"3. If you believe the doctrine of appropriation is the correct one and that priority of appropriation should

govern, what tribunal should determine the order of these priorities and the amounts of the appropriations? And how should its mandates be enforced?

"4. If you believe in an 'equitable division' among riparian owners, how is this division to be determined and by what tribunal?

"5. Where riparian rights are recognized in one state and appropriations in the other, how can these conflicting principles be adjusted to secure an 'equitable division'?

"6. If it should be determined that rights in a lower state are entitled to water being used above, what officer is to close the headgates in the upper state?

"7. How would this regulation of gates affect state control as now exercised in the upper state?

"8. Under existing conditions, are interstate water-right controversies likely to arise in your state? If so, on what streams?

"9. What other suggestions occur to you that would assist in the consideration of the matter?

"The committee believes that the extension of irrigation and the best interests of irrigators will be promoted by a close approach to uniformity between the nature of rights and the methods of establishing and enforcing them in the different states, and that no other factor will so conduce to this end as a full and candid consideration of this subject."

The board of control which has in hand the arrangements for the coming session has a unique plan for taking care of visitors on arrival, and all who come will be assured of accommodations with the least possible trouble to themselves. The idea is to have a pavilion of some sort adjacent to the depot where all incoming delegates will arrive which will be used as a hotel office, as it were. All rooms at the disposal of the committee will be of record there, and delegates and visitors will be assigned to them from that point, and sent with their baggage under personal charge of bell-boys and porters so that they will have no difficulty in getting located. This is only one of the many novel ideas that have been hit upon to make the stay of delegates both profitable and pleasant.

The complete list of trophies and prizes to be awarded for exhibits at the Interstate Exposition, which will be held in this city simultaneously with the congress, has been announced. It consists of twenty magnificent and costly prizes, the gifts of prominent public-spirited citizens and commercial organizations of California and other western states, with many large cash prizes for individual displays. All states are eligible to compete for these prizes with the exception of California.

The trophies offered are undoubtedly the finest and most valuable collection ever hung up for any event of its kind. There are twenty in all, ranging in value from \$250 to \$2,500. These are the most splendid examples of the silversmith's art. Most of them are especially designed and manufactured by Shreve & Company, of San Francisco. Each is of massive proportions with especial decorative scheme appropriate to the character of the exhibit for which it is offered. All are worked out with wonderful fineness, rendering every trophy not only intrinsically valuable but artistically superb.

THE FLATHEAD RESERVATION

Picturesque and Fertile Valley, Which the Government Is to Open Up for Settlement.—A Trip Around the Shore of the Largest Inland Lake West of the Mississippi.

Probably no tract about to be opened by the government is attracting more attention on the part of irrigationists and prospective western settlers than the Flathead Indian Reservation, the greater part of which the government will throw open to settlement within a few months. It is located in Flathead county, Mont., in the northwestern part of the state, on the west side of the main range of the Rocky Mountains. It is fifty miles in length, north and south, and thirty-five miles in width, east and west. Flathead county contains about 8,000 square miles.

The bill providing for the opening of the reservation has passed both houses of Congress, been signed by the President and become a law. It provided for an immediate survey of all the lands within the reservation. It is estimated that there are about a million and a quarter acres of land within the reservation. As soon as all the lands embraced were surveyed, allotments were made under the provisions of the allotment laws of

the lands may be settled upon, entered and occupied by persons entitled to make entry thereof. No one will be permitted to settle upon or make entry of the lands except as provided by the proclamation. The price of the lands shall be the appraised value as fixed by the commission. Settlers under the homestead law who shall reside upon and cultivate the lands for five years, as required by the homestead laws, shall pay one-third of the appraised value in cash at the time of entry and the remainder in equal installments to be paid one, two, three, four and five years, respectively, from and after the date of entry, with the usual homestead fees and commissions. If it is desired, commutation proof can be made at the end of fourteen months' residence and cultivation. Timber lands shall be sold and disposed of to the highest bidder for cash at public auction.

The Flathead reservation is a continuation of the fertile and beautiful Flathead valley, which has attained its position as one of the most productive sec-



Kalispell, the Gateway of the Region.

the United States, to all persons holding tribal relations and belonging on the reservation. About a quarter million acres were thus allotted, leaving about a million acres of land for disposal. After the completion of the allotment to the Indians, a commission, consisting of five members and appointed by the President, proceeded to inspect, classify and appraise all of the remaining lands on the reservation, which were divided into the following classes, to-wit: First, agricultural land of the first class; second, agricultural land of the second class; third, timber land; fourth, mineral land; fifth, grazing land. After the classification had been approved by the secretary of the interior the lands were to be disposed of under the provisions of the homestead, mineral and townsite laws of the United States, except timber lands, and sections 16 and 36, which said sections in each township were granted to the state of Montana for school purposes. The lands are opened to settlement and entry by proclamation of the President, which described the time when and the manner in which

tions of the country within the past fifteen years. Some idea of the fertility and attractiveness of the region may be had from the accompanying illustrations of Flathead valley lands. Kalispell, on the Great Northern railway, is the gateway of the reservation, and great efforts are being put forth by the Chamber of Commerce of that city to interest prospective home buyers. The city is at the north end of Flathead lake, the largest body of water west of the Mississippi river, having a superficial area of more than 350 square miles. The length of this body of water is thirty-five miles, and its width varies from ten to twelve miles, while in some places it is as much as 600 feet deep. Secretary George F. Stannard of the Kalispell Chamber of Commerce, like all other people of the valley, is enthusiastic over the possibilities of the region, and writes most interestingly of them. He says:

"People who came here from states east of the Mississippi say they would not want to go back there to live again. Our winters are so mild that the men

work all the year round, never stop earning good wages, and when spring comes they have a nice little bank roll, saved during the winter. The climate is very healthy, and there is but little sickness. The altitude is less than 3,000 feet, and we are surrounded by pine forests, from which we are ever inhaling the balsamic odor.

"Probably the best proof of the resources of the

feet every twenty-four hours. Here also is the newest and best box factory in the northwest, where Armour & Co. are having their boxes made and shipped to Chicago. Here also is the tie-preserving plant of the Great Northern railroad. From here you will take the steamer Klondyke, and after a beautiful trip across Flathead lake, which will take nearly three hours, you will be



Orchard on Shore of Flathead Lake and Grain Field in the Valley.

country can be shown by the fact that the station of Kalispell paid in 1905 one-fortieth of the gross earnings of the Great Northern Railroad Company. This alone should show you that there is something doing in the Flathead valley.

"Now, the Indian reservation is at least five times as large as the Flathead valley, the soil is just as good, and the climate, if anything, a little better. I will take you for a little trip over the reservation. The United States land office is in Kalispell, Flathead county, and all lands in Flathead county must be entered at the Kalispell land office. There are 1,056 square miles, or 675,840 acres of the reservation in the Kalis-

landed at Polson, at the foot of the lake, where you will find good accommodations if you desire to stay over night. You are now fifteen miles south of the north boundary of the reservation, and almost in the center of the best land.

"You will have noticed that the shores of the lake are covered with a thick growth of fine timber. Several pretty islands will be passed, where some day fine residences will be built for summer visitors. At Polson the land is open prairie, good soil and very productive. There is quite a ridge about one mile south of Polson which prevents one looking over the reservation, but when you get on top of this ridge in front of you, look-



Farming in Flathead Valley.

pell land office district, practically all of the best land in the reservation.

"On leaving Kalispell you will pass through some very fine farming land for about eleven miles, with plenty of good timber and pure water. You will then arrive at Somers, where one of the largest sawmills in the northwest is located, belonging to the John O'Brien Lumber Company. This mill has a capacity of 250,000

ing south one has probably the finest panoramic view possible.

"There are over thirty miles of magnificent prairie land, almost level, with rich black sandy loam, which has been used for a range for the cattle and horses belonging to the Indians and halfbreeds. This magnificent stretch of prairie is bounded on the east by the Mission range of mountains, that rise some 5,000 feet,

covered with pine, fir, and larch. Innumerable small streams flow down the mountain sides to come together and form Mud creek, Post creek, Mission creek and Crow creek, which run from the mountains on the east across the prairie lands and into the Pend D'Oreille river, which flows out of Flathead lake and forms the western boundary of the three hundred and sixty square miles that we are looking at. In the distance we can see the largest herd of pure blood buffalo in existence today; they are not fenced in, but roam at will over this garden spot; it is too good for them to leave, so they are perfectly happy. Traveling south over this vast stretch of agricultural land we pass several very comfortable homes of the well-to-do halfbreeds, who do not, however, cultivate much land, as it is easier to live off the cattle and horses that are fattening on the range. We cross all the creeks above mentioned, and see the mountain trout, both cut-throats and brook trout, jumping at

trees. Every year these are covered with the finest fruit I ever saw, and are actually breaking down from the weight. This valley is very narrow, merely a pass through the mountains, through which flows the Jocko river. Following up this stream one comes to the Arlee Valley, where the Indian agency is located, and where the agent and most of the Indians reside. The soil in this valley is very good, rich, black loam, but will no doubt be all taken by the Indians who reside there. We are now near the southern boundary of the reservation, and the land is hilly and rough—in fact, mountainous—and as there will not be any land in this part of the country left for the settler, we will go back to Ravalli, where McDonald has his fine orchard, and proceed west down the Jocko Valley. Leaving this point we follow down the Jocko through a very nice little valley, but with very little agricultural land, principally grazing land, until we get to Dixon, on the Pend D'Oreille



Outlet of Flathead Lake. This Stream Has a Fall of 200 Feet in Three Miles and Its Power is Totally Undeveloped.

the flies as we stand on the bridges. Along these creeks the cattle owners cut thousands of tons of hay every year to feed their stock during the winter, and vegetables of all kinds can be seen in small patches. Around the St. Ignatius mission, where the Catholic priest and Sisters have a beautiful mission, the gardens and fruit trees are remarkably fine looking, showing the fertility of the soil and the mildness of the climate. Going on south of the mission you climb up gradually a range of hills covered with luxuriant grasses, Montana bunch grass, the finest feed in the world, and after crossing this ridge, which is thirty miles south of Flathead lake, you drop down to the Jocko Valley, and there you see what can be done in the way of gardening and fruit raising. Duncan McDonald, a half breed, well educated, however, has an orchard here of some two thousand

river, which we will cross and go north again, only on the west side of the Pend D'Oreille. We here come into a large stretch of rolling pasture land, interspersed with pretty valleys, where some nice stretches of agricultural land can be found. West of this we again find timber. Coming on northwest we reach the Bitterroot Valley, where there is good land around the foot hills; but there is some poor land out on the flats; this, however, may be all right if irrigated. I would call this more of a stock country than a farming country, although there are a number of nice farming places. Here close to the ranch of Garcon Demers, are located some of the finest hot springs in the United States, where hundreds of people go every year for an outing and baths; they have the reputation of curing rheumatism that other sanitariums have failed to cure. These hot

springs will be reserved by the government for the use of the general public, a bill having passed through congress reserving 160 acres of land for that purpose. This same bill reserves townsites at Polson, Ronan, Ravalli, Dixon, Arlee and St. Ignatius. Coming away from the Hot Springs we travel north and east and pass through a rolling grazing country with some nice locations for ranches, with 50 to 160 acres of agricultural land around the spot. We now come back to the arm of Flathead Lake, where there is quite a settlement along the north boundary of the reservation.

"The Pend D'Oreille River, which drains Flathead Lake, falls 200 feet in the next three miles, after leaving a point about one mile from the outlet. This we have one of the finest water powers in the west, totally undeveloped at present, but when the reservation is opened

blizzards, cyclones or bad storms, neither too hot nor too cold, and always cool nights in summer.

"We have never had a total failure of crop.

"We can work out of doors all the year round.

"We have fine hunting and fishing, and the most magnificent scenery in the world, including glaciers within thirty miles of the city of Kalispell, where there is perpetual ice.

"We raise the best apples, plums, pears, cherries and small fruit, without irrigation, that are raised in any country.

"And we have as good a system of schools as you can find anywhere.

"In 1888 there was no town in the valley with more than 100 people. Probably 100 homestead entries and squatters' claims were in existence. In 1890 the



A Scene on the Banks of Flathead Lake.

it will no doubt be utilized for electric railroads, milling, smelters and irrigation.

"It is remarkable what little rainfall is needed here to raise good crops. The average rainfall has about been 16.5 inches during the year, but we have a heavy dew, coming from the precipitation after the evaporation from the large surface of water in our lakes and rivers. There is also more or less sub-irrigation all through the country.

"I would like you to answer one question: Where can you find a country with the combination that we have here?

"We have the finest agricultural land in the United States.

"We have the largest body of growing timber in Montana, enough to last fifty years.

"We have gold, silver, copper, lead, zinc, coal and petroleum in abundance.

"We have the finest climate I ever lived in; no

first advertising matter about the Flathead valley was published, known as "Flathead Facts," and next year the railroad (Great Northern) came through the country, and settlers commenced coming into the valley more rapidly. The city of Kalispell was started in 1901, and now has a population of about 5,000 inhabitants, and is a modern town in every way. At that time land could be purchased for \$10 an acre. Today the same lands are selling for from \$40 to \$60 per acre, according to local conditions. You cannot tell, when looking over the country, that there is any difference between the looks of the farms here from what you would see in Iowa or Illinois. Lumber has been cheap, and the improvements are good. The soil is wonderfully productive and the markets are always good. We have about forty school districts, twenty-four sawmills, splendid roads all the year around, the lands are well fenced and well cultivated. Our two national banks in Kalispell have \$1,300,000 on deposit, showing that most of the farmers are well to do."

POULTRY AT MAYWOOD COLONY.

Maywood colony continues its onward march to the front as one of the most productive regions of California. There are numberless ways to make money there, and not the least profitable by any means is the raising of poultry.

For years Corning has enjoyed the distinction of



Another View of the Outlet of Flathead Lake.

being the biggest turkey shipping point in California. In the foothills, west of Corning, turkeys are raised in herds of from 500 to 2,500. At Maywood the turkey raisers have from 500 to 1,000. At Thanksgiving and Christmas time carloads of dressed turkeys leave there. For years the price per pound has ranged from 20 to 30 cents. The turkey is a seven month crop, and is counted immensely profitable.

Maywood is rapidly coming to the front as one of the leading egg shipping stations in California. Practically every colonist carries from 50 to 500 hens, and they report a yearly profit of from \$1 to \$1.25 per hen.

A hen is an egg mill. You can grind out of her just what you put into her. Feed her food for eggs and she will turn out eggs for food. She does more. She becomes a fertilizer factory; also a soil cultivator. And she is a high-grade scavenger, as well as a destroyer of tree and plant pests. She is especially the fruit man's friend. Ten hundred hens in ten acres of trees will increase the crop from 10 to 25 per cent. They will consume the growing grass and weeds which sap the soil and mar the looks of the land. They will form a fine soil mulch under and about the trees which will arrest the evaporation of moisture. They will destroy bugs, grubs and caterpillars, which otherwise would prey upon the leaf, bark and root of the orchard.

At Maywood Colony a White Leghorn hen, fairly treated, will lay an average of thirteen dozen eggs a year. The review of the market at this place during the three years past shows the average selling price of eggs to have been 22 cents a dozen. This makes the average annual gross earnings of a hen \$2.76. Inquiry among poultry people here show the average annual cost of caring for a hen to be \$1.50. These figures show a net credit to the hen of \$1.26. For the sake of safety let's set aside the odd 26 cents, and we have a net profit of

\$1 per hen. A hen produces this profit for two years. She is then ready to be fattened and to go into the kettle with dumplings. For this purpose she brings you 50 cents more, and gets off your expense account, having left you, by her presence, better off to the tune of \$2.50.

In some sections of California hens are run at the rate of 200 to the acre. But at Maywood Colony the rule is 100 hens to the acre, or 1,000 hens on a ten-acre lot. This plan allows ample room and results in better returns.

The climatic conditions of Maywood Colony are just what suits the hen. Neither the cholera of the East nor the roup of the coast regions are factors to be figured with. Some vermin exists, but the proper construction of houses reduces this trouble to the minimum.

Food for the hen is easily and cheaply provided here. There is an abundance of wild or natural green grasses for seven months in the year. Alfalfa is available during the other five months. The ordinary wind-mill raises water enough to raise a patch of alfalfa sufficient in size for from 500 to 1,000 hens. Maywood is surrounded by big wheat farms. You can buy direct from the farmer, if desired, getting your wheat at first cost. The other articles which enter into a balanced ration for the hen can be bought as cheaply here as elsewhere.

At Maywood there is a poultry association, well organized and conducted, which handles the egg crop so as to get the most out of it. Eggs are cleaned and graded before shipment, so that top prices are realized. Membership in this association costs \$1 and the annual dues are \$1.

THE NORTH PACIFIC COAST COUNTRY.

One of the most attractive pamphlets issued in recent months is that published by the Chicago, Milwaukee & St. Paul railway exploiting the northwestern states and the region into which the road is building. The material is compiled by Mr. Charles S. Young, in charge of the advertising, and fills a booklet of fifty-odd pages, each one of which contains one or more illustrations. Seattle and Tacoma are the objective points of the extension and considerable space is devoted to the opportunities to be had in those cities. The views are from cities in Montana, Idaho, Oregon, Washington, Alaska and British Columbia and Rainier National Park. The pamphlet is truly a work of art.

The secretary of the interior has withdrawn from any form of disposition whatever under the public land laws the following described lands, for use in connection with the North Platte irrigation project, Nebraska-Wyoming: Sixth Principal Meridian, Nebraska.

T. 23 North, R. 55 W., NW. $\frac{1}{4}$ Sec. 3, NW. $\frac{1}{4}$ Sec. 17, SE. $\frac{1}{4}$ and NE. $\frac{1}{4}$ Sec. 24.

T. 24 N., R. 56 W., N. $\frac{1}{2}$ NW. $\frac{1}{4}$ Sec. 32.

T. 24 N., R. 57 W., NW. $\frac{1}{4}$ Sec. 27.

T. 25 N., R. 57 W., N. $\frac{1}{2}$ NE. $\frac{1}{4}$ Sec. 31, and N. $\frac{1}{2}$ NE. $\frac{1}{4}$ Sec. 32.

T. 24 N., R. 58 W., All Sec. 23.

These lands were segregated subject only to the Homestead Act in October, 1906, but it has since been found that they will be required for construction purposes.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation

NEW PLYMOUTH, IDAHO.

The advent of the railroad into the heart of the Fayette Valley, with its present terminus at the very attractive little village of New Plymouth, has in one season literally turned the face of the earth upside down. The vast fields of alfalfa and clover which followed the first crops of grain on the newly cleared sage brush land during the settlement period of the past

and hardships of frontier life, but a community or settlement replete with modern conveniences, telephone, rural mail delivery, electric light and power, good schools and churches and a vigorous and healthy atmosphere in which to develop the minds and bodies of his children and young people, and those who desire to engage in business, profession or manufacture, the towns of New Plymouth, Fruitland and Payette are certainly ideal, and in the Payette Valley capital will always find an attractive and profitable field for investment.



Apple Orchard at Fruitland, Idaho.

five years has now been turned under, and, with this best of fertilizing, is now producing astonishing crops of sugar beets, averaging in many cases from 20 to 25 tons per acre, a few fields yielding even greater tonnage, an average of \$30 per acre, clear, after paying all expenses, being considered a fair revenue, although double this amount was cleared last season by several farmers in the vicinity of New Plymouth and Fruitland, and one man netted \$76 per acre. The raw land from which these valuable and sure crops are now realized was purchased less than five years ago at from \$35 to \$40 per acre, including water right, and was then 12 to 15 miles from railroad, while today the remaining few hundred acres of unimproved land, located from two to five miles from New Plymouth, can be purchased at from \$45 to \$50 per acre. Not so, however, with the improved lands. These have steadily advanced in price in proportion to the revenue derived from each suc-

Bulletins and Publications

"Opportunities of Today," a high class monthly magazine built upon entirely new and original lines, will make its initial bow to the public with the September number. As its name implies, the publication will deal with bringing to the notice of opportunity seekers, the many and various chances for wealth and homemaking that are opening throughout all the United States. The home of the new magazine is the entire seventeenth floor of the Majestic building, 73 and 75 Monroe street, Chicago, where Mr. R. L. Bernier, the editor and publisher, has surrounded himself with a thoroughly experienced and competent staff of assistants. Advance sheets of the publication indicate that no effort will be spared to make it one of the most striking and elaborate pieces of work of its kind ever



Farm House at Fruitland, Idaho.

cessive crop, until many of the 40 and 80 acre tracts are now a profitable investment at from \$100 to \$200 per acre, some smaller tracts having been sold at \$250 to \$300 per acre during the past six months.

The rich harvests and the rapid development of the New Plymouth bench under irrigation is in striking contrast to the apparently worthless sage brush plain so recently transformed by the bringing together of the elements of success—rich soil, abundance of water, Idaho sunshine and "the man with the hoe." For the modern homeseeker, who no longer seeks the privations

published in this country. The first issue will represent an expenditure of very nearly \$30,000. Agriculturists will be particularly interested in the articles which will appear from time to time, dealing with the advanced ideas of farming, the development of farm and stock lands in the various parts of the continent, and the irrigation and reclamation of lands, and in fact everything pertaining to the productions of the country.

A handsomely illustrated booklet entitled "A Circular of Information about the Agricultural College of Utah" has recently been issued by the publicity department of the institution at Logan. More than half of the pages of the pamphlet are taken up by photographs of scenes on

the college campus, in the class rooms, laboratories, shops and kitchens, while the remainder of the space is devoted to an explanation of the work, the courses offered, the requirements for admission, etc. The authorities have surely struck upon an attractive and unique way of advertising.

Two bulletins which will prove of much interest and value to irrigation farmers have just been issued by the bureau of soils of the United States Department of Agriculture. Both have been compiled by Clarence W. Dorsey and deal with the reclamation of alkali lands and soils, No. 43 being devoted to the Salt Lake valley, Utah, and No. 44 to the lands near Billings, Mont. The experiments in both tracts have been very successful in proving that one of the great drawbacks to irrigation farming can be overcome.

The geological survey of the Department of the Interior has recently distributed a number of volumes, among them treatises on "Zinc and Lead Deposits of the Upper Mississippi Valley," by H. Foster Bain; "Economic Geology of the Independence Quadrangle, Kansas," by Frank C. Schrader and Erasmus Haworth; "Report on Progress of Investigations of Mineral Resources of Alaska in 1906," by Alfred H. Brooks and others; "The Interaction between Minerals and Water Solutions with Special Reference to Geologic Phenomena," by Eugene C. Sullivan; "The Potomac River Basin,"—its geographic history, rainfall and stream flow, pollution of water, and kindred relations—by Horatio N. Parker, Bailey Willis, R. H. Bolster, W. W. Ashe and M. C. Marsh; "The Geology and Water Resources of the Western Portion of the Panhandle of Texas," by Charles N. Gould; "Underground Waters of Coastal Plain of Texas," by Thomas U. Taylor; "Weir Experiments, Coefficients, and Formulas" (a revision of Paper No. 150), by Robert E. Horton; "Water Supply of Nome Region, Seaward Peninsula, Alaska," by John C. Hoyt and Fred F. Henshaw; "Pollution of Illinois and Mississippi Rivers by Chicago Sewage," a digest of the testimony taken in the case of the State of Missouri vs. the State of Illinois and the sanitary district of Chicago, by Marshall O. Leighton; "The Quality of Surface Waters in Minnesota," by R. B. Dole and F. F. Westbrook; "A Geologic Reconnaissance in Southwestern Nevada and Eastern California," by Sydney H. Ball; "Economic Geology of the Amity Quadrangle" (Eastern Washington county, Pa.), by Frederick G. Clapp; Part I of "Contributions to Economic Geology, 1906," by S. F. Emons and E. C. Eckel, geologists in charge; "The Juneau Gold Belt, Alaska," by Arthur C. Spencer, and in the same volume, "A Reconnaissance of Admiralty Island, Alaska," by Charles Will Wright; and "Geology of the Marysville Mining District, Montana, A Study of Igneous Intrusion and Contact Metamorphism," by Joseph Barrell.

Reclamation Service News

Stands High Water Test.

Mr. C. E. Grunsky, consulting engineer of the reclamation service, who has been investigating conditions on the Lower Colorado river in California, reports that conditions on the Lower Colorado river are very satisfactory. Ever since the work of turning the river from its temporary inland flow back into its proper channel, leading to the Gulf of California had been successfully accomplished, the question, "How will the new works withstand the spring rise of the river?" has been uppermost in the minds of those in charge of the work, as well as in the minds of those whose homes and property had so long been menaced. The river has now in all probability passed the highest stage of this season and the defensive works have fully met all expectations. There have been no signs of weakness during the high stage and the river has so fully restored its regimen that an unusually large flood dis-

charge has passed down the river at a height barely submerging the river banks.

Great credit is due to the Southern Pacific Company which, acting for the canal companies, has had charge of and has directed the work of river control, for the thoroughness with which the work has been done and with which preparations were made to meet any emergency. Mr. H. T. Cory, the manager and chief engineer of the California Development Company, who has had direct charge of all these works, is now turning his attention to the construction of new canals in the Imperial valley and to the betterment of the main and distributing systems. He has a large force of engineers at work under the immediate direction of Mr. F. C. Herrmann, formerly connected with the bureau of Irrigation investigations of the Department of Agriculture.

Water for 1908 Season.

Township plats have been issued and the secretary of the interior has given notice that water will be furnished

6% Bonds at Par

Secured by Mortgages on Farm Lands, adjacent to the City of Denver, Colo.

Proportion of Security, 3 to 1, With Rising Values
Denominations, \$1,000, \$500 and \$100

Due serially from three to ten years. Interest payable semi-annually at The American Trust & Savings Bank, Chicago.

THE BONDS ARE SECURED—

First: By mortgage on all of the property, canals, reservoirs, etc., of the Denver Reservoir Irrigation Company.

Also: By Collateral Security in the form of mortgage liens deposited with The American Trust & Savings Bank, Chicago, Trustee, on farm lands to secure deferred payments for a perpetual supply of reservoir water.

Lands estimated worth three times the amount of the bonds, and rapidly increasing in value.

Dr. Elwood Mead, of Washington, D. C., Chief of Irrigation and drainage investigation of the Department of Agriculture of the United States for the past ten years, was employed by the Company to make a complete report upon this system.

We quote from this report:—

"In conclusion, it is my conviction that this Company has an assured water supply; that it has an assured market for water, and that the price which can be obtained for water makes its securities an absolutely safe investment and the enterprise one having every promise of a handsome return for its owners."

ELWOOD MEAD,

Consulting Engineer.

Mr. Mead's full report will be mailed upon request.

J. G. White & Company, of New York, Engineers and Contractors, have investigated and reported favorably upon this enterprise, and are the engineers and constructors of all extensions and enlargements of the systems.

Legal opinion by Mr. Charles B. Wood, of Wood & Oakley, Chicago.

Engineers' reports and Attorneys' opinions furnished, also full particulars and circular with map upon application.

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from the Belle Fourche irrigation project of South Dakota, under the provisions of the Reclamation Act, at the opening of the irrigation season of 1908 for the irrigable lands shown upon the following farm unit-plats:

- T. 9 N., R. 3 E., B. H. M.
- T. 9 N., R. 4 E., "
- T. 9 N., R. 5 E., "
- T. 8 N., R. 3 E., "
- T. 8 N., T. 4 E., "
- T. 8 N., R. 5 E., "

These plats are on file in the local land office at Rapid City, S. D. The size of the farm unit has been fixed at approximately 80 acres, varying slightly in some cases on account of topography and other conditions, except in the vicinity of the townsite, where the size of the farm unit will be about 40 acres. The limit for water right application for lands in private ownership is 160 acres for each land owner. The building charge for the irrigation system is \$30 per acre, payable in not more than ten nor less than five annual installments. Operation and maintenance charges for the season of 1908, and until further notice, will be 40 cents per acre of irrigable land, the first installment of \$3.40 per acre being payable on or before December 1, 1908, at the local land office at Rapid City. As soon as data is available the charges for operation and maintenance will be fixed in proportion to the amount of water used, with a minimum charge per acre of irrigable land, whether water is used or not. The United States will operate and maintain the storage and diversion dams and main headworks, the main canals and main laterals, the cost thereof to be included in the operation and maintenance charge above stated. The sub-laterals constituting the remainder of the distribution system are to be maintained by the water users to be served therefrom at their expense, under regulations to be approved by the secretary of the interior.

The secretary of the interior has executed contract with the General Fireproofing Company, of Youngstown, Ohio, whereby the latter agrees to furnish and deliver about 350,000 pounds of steel for the reenforcement of con-

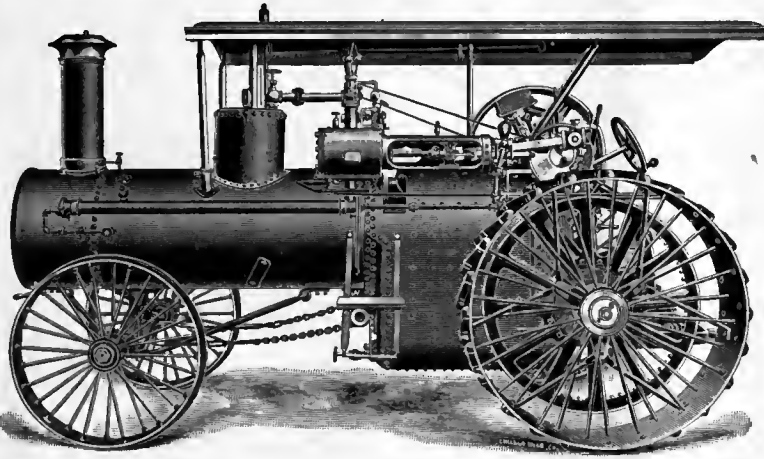
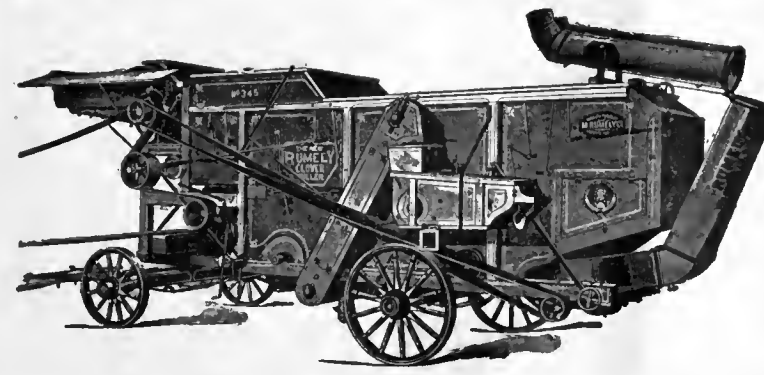
crete and structural and for structural purposes, in connection with the Belle Fourche irrigation project, South Dakota. The contracts amount to \$14,200.22.

The secretary of the interior has approved the contract entered into by J. L. Lytel on behalf of the United States and Henry Gardner, of Spanish Fork, Utah, whereby the latter agrees to furnish for use by the reclamation service in the construction of an electric transmission line under the Strawberry Valley irrigation project, Utah, 1,600 red pine poles 25 and 30 feet long. The amount to be expended under this contract is \$2,920.

More than two hundred thousand acres of land which were withdrawn in connection with the Lower Yellowstone irrigation project, Montana, have been restored to the public domain and will be subject to settlement under the public land laws on or after September 3, 1907, and entry, filing or selection may be made on or after October 3, 1907, at the United States land office at Miles City, Montana.

The secretary of the interior has approved the contract entered into between I. W. McConnell, acting on behalf of the United States, and Smith Brothers, of Montrose, Colo., whereby the latter agrees to construct and complete a portion of the South Canal, lying about 9 miles southeast of Montrose, Uncompahgre irrigation project, Colorado, including pipe culvert and concrete piers for highway bridges. The work involves the excavation 54,800 cubic yards of material and the contract amounts to \$18,254.50.

The secretary of the interior has approved the contract entered into by J. L. Lytel on behalf of the government and Herman Snow, of Salem, Utah, for hauling 1,000 tons of supplies, materials, etc., in connection with the Strawberry Valley irrigation project, Utah. The sup-

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Manufacturers

LAPORTE :: :: INDIANA

plies will be hauled from Mile Post 679, on the R. G. W. railroad to the east and west portals of the tunnel, and the expenditures under the contract will amount to approximately \$8,750.

Contract has been awarded to Devore Brothers & Farlow, of Vale, S. D., for the construction of about eight miles of the south canal of the Belle Fourche irrigation project. The work involves 132,500 cubic yards of excavation and 70,000 cubic yards of overhaul, and the contract amounts to \$72,800.

The secretary of the interior has approved the contract entered into between Joseph Jacobs on behalf of the United States and A. G. Moodhe, of Spokane, Wash., by which the latter agrees to construct the Columnar tunnel and the approaches thereto of the main canal, in connection with the Tieton irrigation project, Washington. The amount of the contract is about \$18,217.

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Today the great opportunities in farming, in cattle-raising, in timber and in commercial lines are in the country and in the towns along the Pacific Coast extension of the

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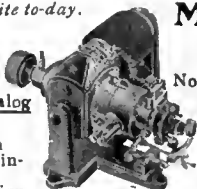
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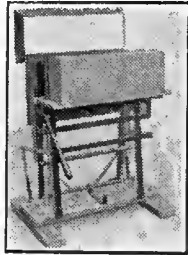
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The No. 6 Iron Age combines a double wheel hoe, a single wheel hoe, and a hill and drill seeder. The most compact, practical and useful of all garden tools. Opens the furrow, sows the seed, covers and rolls the ground and marks the next row, in one operation.

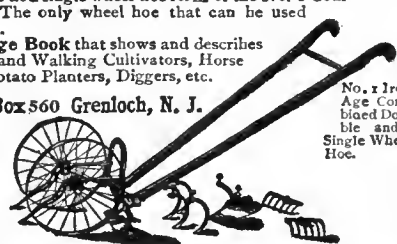
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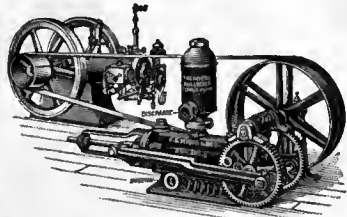
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OPERATING WITH GAS ENGINE

FIG. 952

HORIZONTAL BULLDOZERS, 3" TO 6" CYLINDERS

MYERS BULLDOZER POWER PUMP
5" Cylinder
FIG. 800

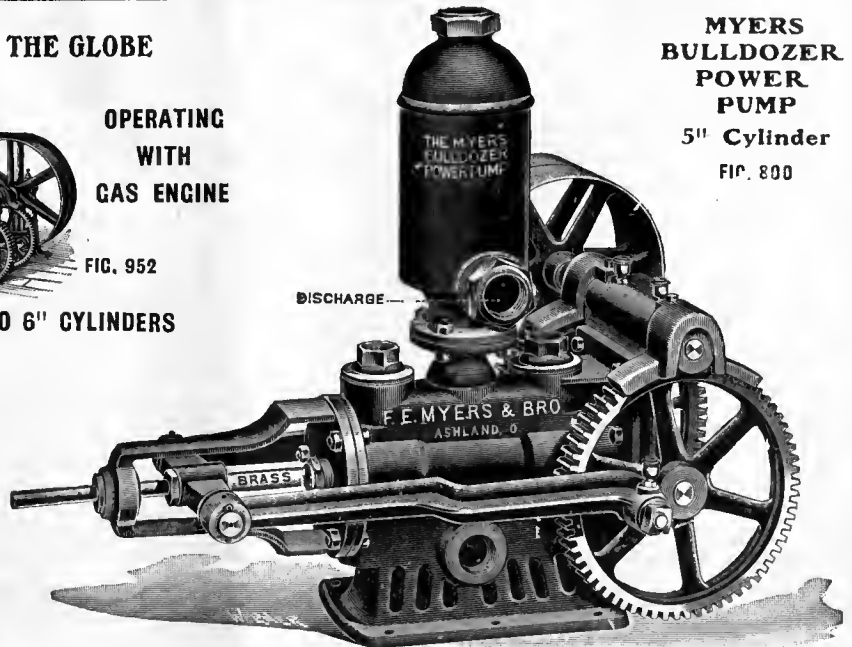


FIG. 1079

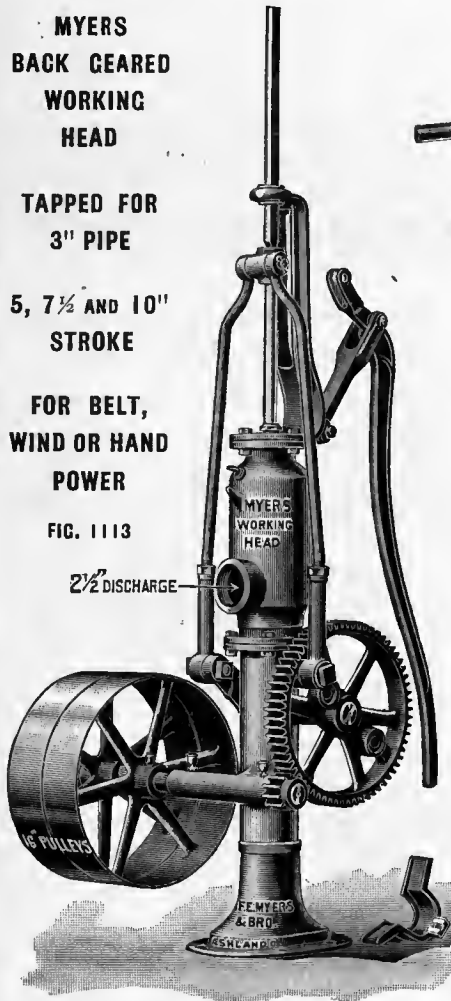
MYERS BACK GEARED WORKING HEAD

TAPPED FOR 3" PIPE

5, 7 1/2 AND 10" STROKE

FOR BELT, WIND OR HAND POWER

FIG. 1113



BULLDOZER WORKING HEAD

BULLDOZER PUMP 6" BRASS LINED CYLINDER

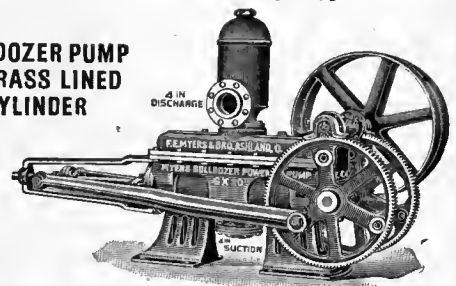
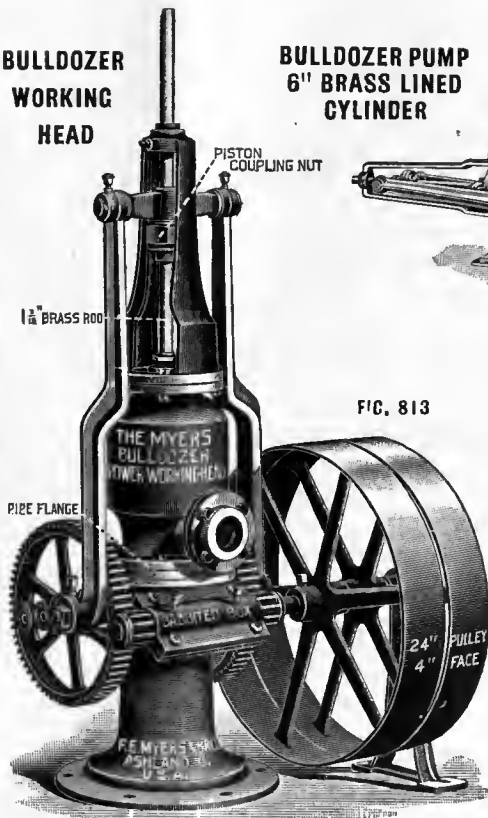


FIG. 813



MYERS BULLDOZER WORKING HEADS

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5", 7 1/2", 10" STROKE
DISCHARGE 2 1/2" OR 3"
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SUCTION 8" OR LESS

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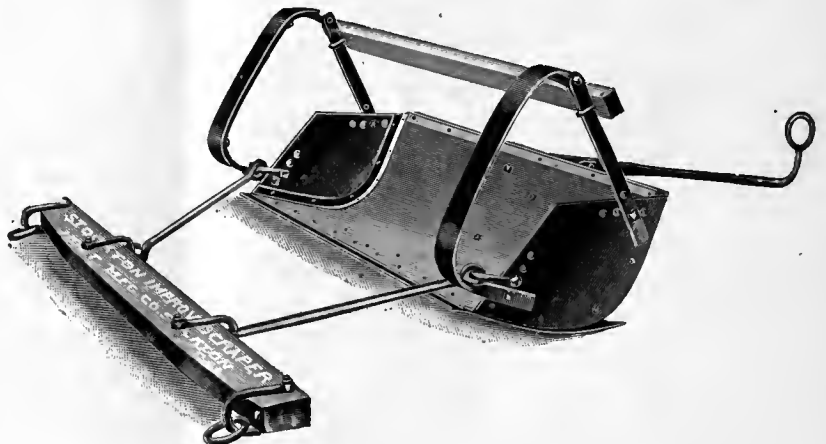
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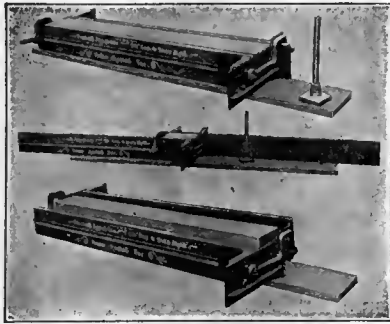
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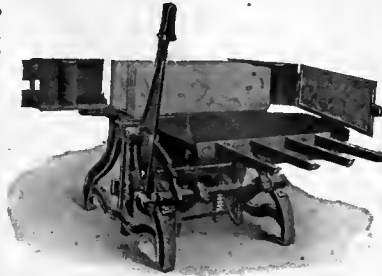
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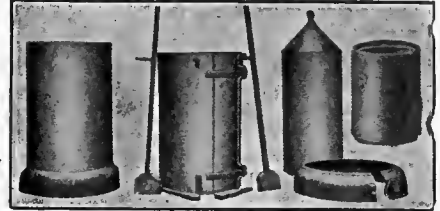
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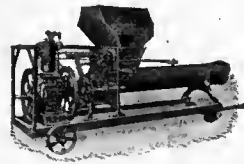
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Elevates water 30 feet each foot of fall.
6,000 in successful operation. Sold on 30
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and at the same time save money by dig-
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Vulcan Steam Shovels are built in 10
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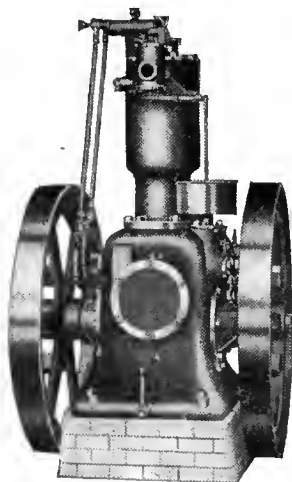
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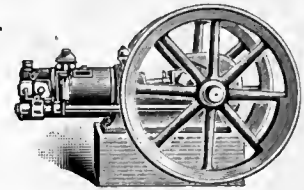
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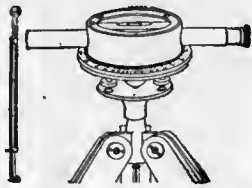
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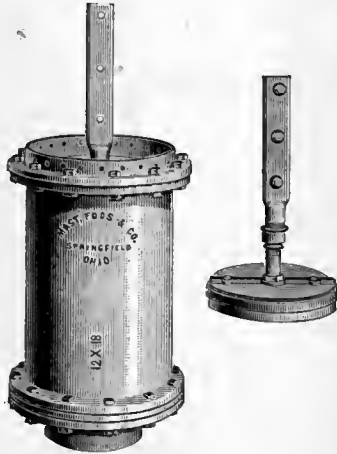
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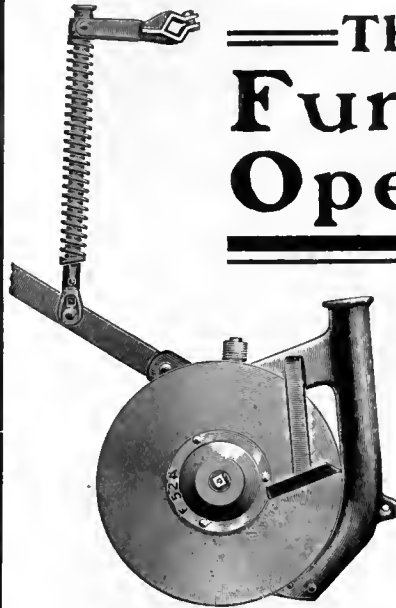
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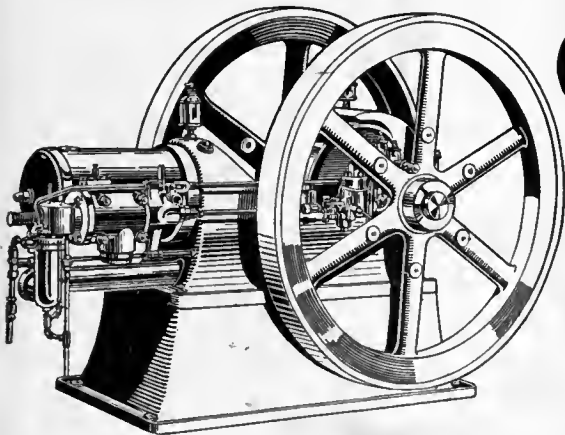
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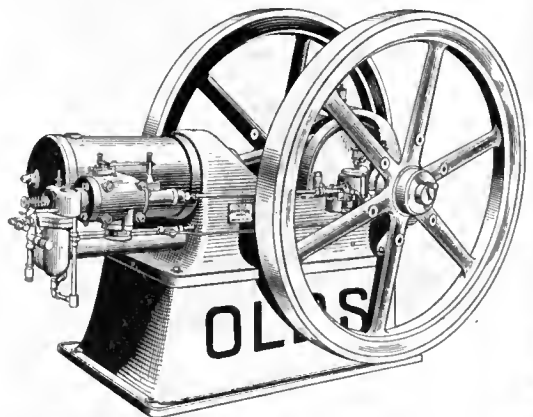
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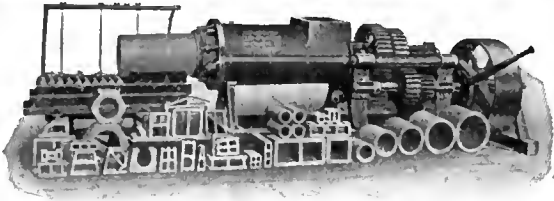
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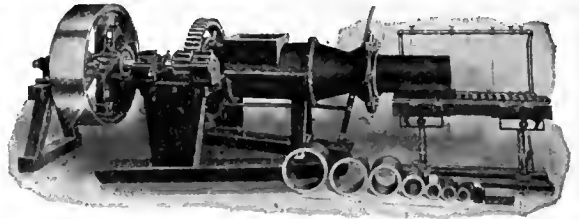
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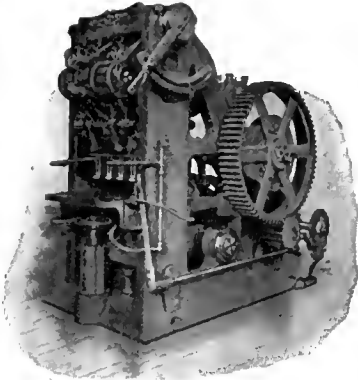




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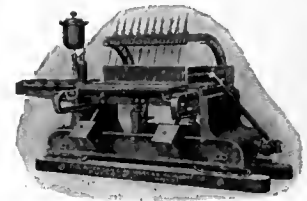
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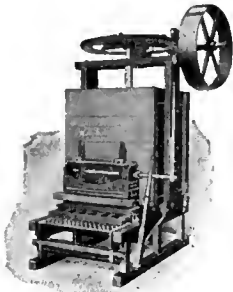
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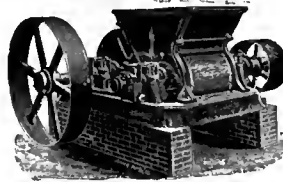
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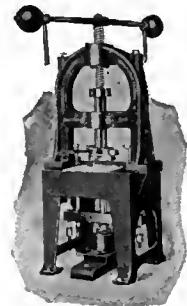
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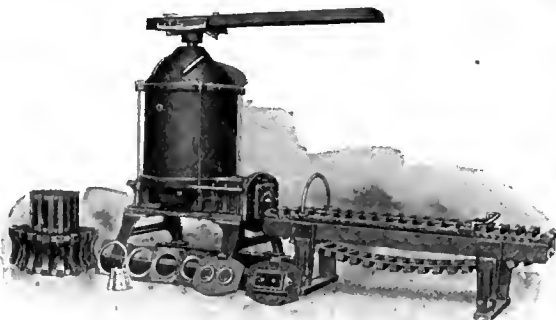
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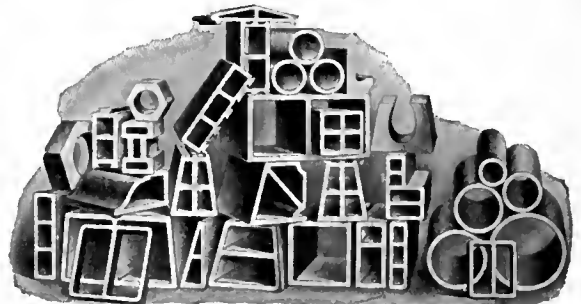
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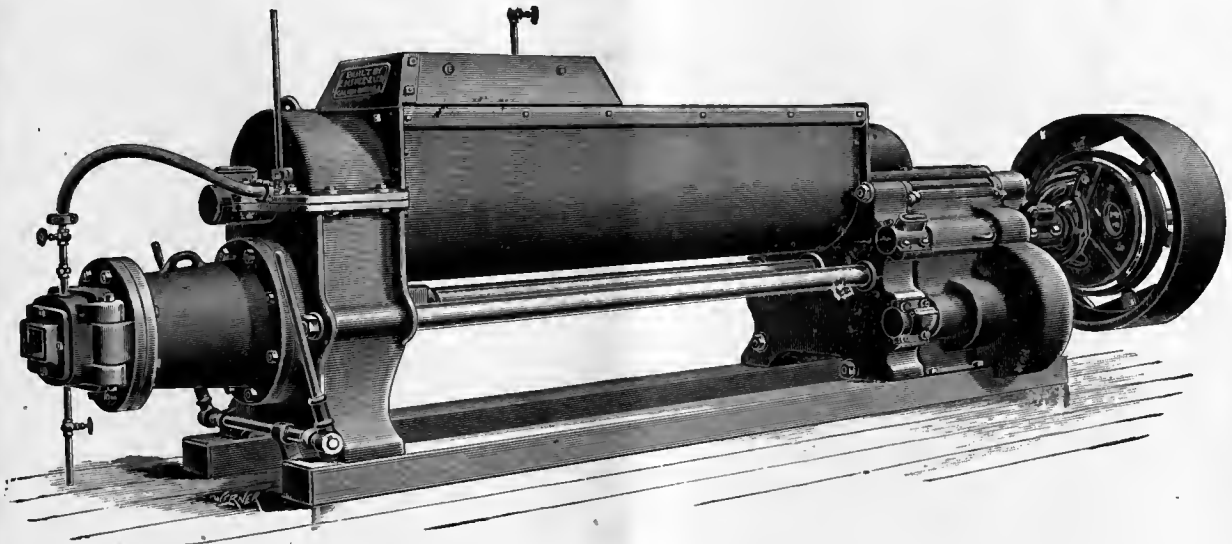
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1909



THE IRRIGATION AGE

VOL. XXII

CHICAGO, SEPTEMBER, 1907.

No. 11

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,

112 Dearborn Street, CHICAGO

Entered at the Postoffice at Chicago, Ill., as Second-Class Matter.

D. H. ANDERSON, Editor
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ANNOUNCEMENT.

"The Primer of Irrigation" is now ready for delivery. Price, \$2.00. If ordered in connection with subscription, the price is \$1.50.

Delayed Account Congress.

A word of explanation about delay in getting out September IRRIGATION AGE may be necessary. The editor and assistant were in attendance at the Irrigation Congress at Sacramento, and as the work of the Congress was not completed until September 8, and as it seemed desirable to publish a summary of the proceedings in the September AGE, it was necessary to postpone the issue until the 20th instead of the 10th, the regular date of issue.

Filing for a Pastime.

The fact that out of the first fifty awarded claims under the Huntley, Mont., project only ten filed on the date set for filing (July 22), has caused some righteous indignation among the people of the west. The Billings Gazette has the following to say of the outrage:

"It is too bad that such a farce was made of the opening of the first reclamation project carried to successful completion under government supervision. It bears out the statement made in the Gazette some time ago that hundreds of those who filed did so through idle curiosity and had no intention of taking up one of the farm units even if successful. It is too bad that there is no method of punishing them for such a crime against the rights of those who registered and really intended to become bona fide settlers: The experience of the government in this case, it is hoped, will cause some action to be taken to prevent a repetition of the offense at future drawings. It ought to be a crime punishable by imprisonment for a person to register without any intention of filing if successful."

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It may interest advertisers to know that The Irrigation Age is the only publication in the world having an actual paid in advance circulation among individual irrigators and large irrigation corporations. It is read regularly by all interested in this subject and has readers in all parts of the world. The Irrigation Age is 22 years old and is the pioneer publication of its class in the world.

The Influence of the Congress.

When, through the efforts of the Irrigation Congress, government reclamation of arid lands became an accomplished fact, many people thought the organization would dissolve or become an influential body. In fact an effort was made to practically do away with the Congress as an institution by merging it with another organization, but the attempt failed through the influence of men who foresaw that in future it was to be of more potential usefulness than ever before. To those who are most closely connected with the working of irrigation and reclamation in general it is apparent that the congress has but entered upon the period of most influence and practicability. The foundation of the growth of the west may be in large measure traced to irrigation and upon it in the same measure are dependent the prosperity of the section. The working out of ideas and the fulfilment of plans to extend this reclamation work and its contingent prosperity is a matter wherein not only the west but the whole country is vitally interested. And where can be found a better place to put forth these plans and get a thorough and earnest discussion of them than in the Irrigation Congress? There is no other body, no other institution of any character that can obtain such a wholesome and vigorous discussion of the administration of public policies affecting these once arid regions as can the congress. While only a small proportion of the people interested can attend the gatherings the publicity given the expressions of opinions on the various phases of the work cannot but be helpful to those whose welfare depends upon irrigation. The influence of the

Irrigation Congress is each year doing more and more toward formulating public opinion and in directing the course of our national legislature. There can be but one result from a gathering of this kind, formed of highly intelligent and influential citizens whose utterances are the result of years of experience and study, and that is to bring about a reformation or betterment in the practice of reclamation. The national government must of necessity take heed of the ideas promulgated in the institution and where necessary modify existing laws or revise the method of administering them. Each session of the congress more strongly emphasizes the fact that it is becoming a critical body and that it is a chautauqua whose expressions are to be the governing and guiding principles of reclamation work both national and private. No better example of this can be had than the Fifteenth Congress just ended.

Storage of Water. As the great districts of the arid west are being constantly reclaimed irrigationists are realizing more and more the necessity

for storing and conserving the flood waters for irrigation purposes. This has become such a prominent part of the work that engineers are now turning their attention more to the laying out of plans for reservoirs and the means of bringing water into them than to taking water from streams. The time is past when the irrigation farmer depends upon the rivers to fill his ditches. He now looks for property which is irrigated from reservoirs where are stored the waters which formerly swept down the valleys in the early spring and fall. And this system of reservoirs is in many ways superior to the manner of obtaining water from streams. It does away with the litigation incident to the taking of water from rivers and streams, especially where two or more companies are receiving their supply from the same source, no question of priority being involved. It also does away with the danger from wash-out from spring floods and should a season of drouth come and the streams run dry the agriculturist is assured of his water supply. The construction of these reservoirs must of necessity be a matter of private enterprise for some years to come. It is true that the national government has taken some action in the matter but the practical development of national enterprises is always slow and looks more to the development of new areas than to the adoption of measures to better the conditions of already partially developed regions. So the onus of the work falls on the private corporation in cases where river supply has already done something toward the reclamation of a section. It is indeed doubtful if any section has developed its irrigation possibilities to their full capacity and the only way in which it can be done is by the construction of reservoirs for the conservation of the waters which now go to waste.

There are at the present time many fertile districts still barren which can be reclaimed by the application of water; but the only way in which water can be put on the land is by the saving of the rainfall in the flood times of the year and the application of it when needful. Probably no section of the United States better illustrated what may be done by the impounding of water than the northern part of Colorado. This section has proved as fertile as any in the world and was the first section of the state to be irrigated. As the number of settlers increased each year it was found that the water supply of the streams was insufficient, so the construction of reservoirs was begun. The number of these has increased each year and they proved the salvation of a large acreage which otherwise could not have been reclaimed. The reservoirs are filled during the non-irrigating season—from October until May—and when the streams run dry in the hot summer months the waters from the reservoirs can be easily applied. The prediction that the future of irrigation lies in the conserving of the water supply is undoubtedly true.

Sunnyside Valley Memorial. The Sunnyside, Wash., Water Users' Association has presented to Secretary of the Interior Garfield a memorial setting forth the ideas of that association as regards the Sunnyside irrigation project now under way. It is needless to say the memorial also voices the grievances of the settlers and members of the association. There are seven paragraphs of which consideration is asked. Practically all the land under the project is private property and it is shown that the conditions of irrigating the public domain do not obtain. Nor is there any shortage of water which the government has been asked to remedy. It was understood when the water users' association was formed in 1906 that the government would install pumping plants to water certain lands lying below gravity flow. Now the engineers in charge of the project have apparently seen fit to decide that no pumping plants would be installed and have told the settlers that the only way to obtain such plants was to club together and construct them, leasing the water right from the government. The association maintains that the settlers are not financially in a position to do this and that the erection of plants can only be made by capitalists or corporations who can then charge settlers an extortionate price for water. The second point brought out by the memorial is in regard to the laterals. It was understood that the government would pursue a policy of building and maintaining (or of maintaining where already built) a system of laterals leading to or as nearly as possible to each forty-acre tract. On the lands possessing water rights from the old company it would not be economical or feasible to build new laterals nor would it be an easy matter to proportion the cost of laterals on the new lands among the

settlers of the old. It is asked that the government take charge of laterals watering old as well as new lands and that some plan be devised whereby an equitable division of the cost of construction may be made. Another complaint, and one, by the way, which comes from many other parts of the irrigated section of the country, is that forty-acre tracts are not sufficiently large to allow a farmer to make a good living, and the association petitions for an extension to eighty-acre tracts. Complaint is also made that the government is forcing certain settlers on the lowlands to reclaim their land twice by the turning of the over-supply of water from the canal on to their lands, leaving the settlers to drain the lands and to face the question of wiping out the effects of the alkali brought down by those flood waters. It is asked that the government take some action to drain the lowlands of the valley. The memorial respectfully suggests that the people of the valley, who are practical irrigators and farmers, and who will ultimately pay the cost of the project, have some voice in the work. And it is undoubtedly true that better results could be obtained in many places if the people directly interested be allowed to use their knowledge in connection with government projects.

Dry Farming.

There is no doubt but what a success can be made of the so-called "dry-farming" in the arid regions. The government is doing much in the line of investigation and research and there are thousands of acres being taken up each year by farmers who hope to be able to earn a livelihood by this method of agriculture. And the AGE sincerely hopes that they will succeed and a portion at least of vast area of the arid west where water cannot be applied may be reclaimed in this manner. But there are certain facts which the man who undertakes the work should bear in mind. In the first place there can be no such comforts as can be obtained by irrigated agriculture, such as fruits, trees, and vegetables; and there is no assurance that even a drouth-resisting crop will mature. Dry farming means one endless round of work for the agriculturist, much more even than in the humid regions, as he must take advantage of every drop of water which falls on his land and bring it to its utmost effectiveness. Should a season of drouth occur the dry-farmer is "up against it" and he must make provision in the years when he matures crops to tide over the seasons of excessive dryness. The past few years have had enough rainfall to mature dry-farm crops and there is likelihood that the prospective buyer of dry-farm land will become too confident of the success of his efforts. There is no means of telling how soon we may have a season of drouth, but that there will be years when even crops on humid lands will not mature is an assured fact. Colorado offers a fine example of what may be done in dry-farming. In 1890 and 1891 there

was an excess of the average rainfall of fourteen inches; then for four successive years there were seasons of drouth and the dry-land farmer's crops did not mature. In some cases the agriculturists were able to "stick it out" but in most instances the failures meant the devastation of homes. The AGE does not wish to discourage the effort to reclaim arid lands by dry-farming, but is it not a question whether the railroads and others who have the disposal of these lands are not putting too roseate a hue upon the possibilities of this method of agriculture? We suggest that the prospective buyer investigate the matter fully and that he get in touch with the Department of Agriculture before consummating a purchase of such lands.

List of Executive Committeemen and Honorary Vice-Presidents—selected by the delegations from each State to act during the coming year:

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New Mexico—R. E. Tweitchell, executive committeeman; Gov. Geo. Curry, vice-president.

Arizona—B. A. Fowler, executive committeeman; Dwight B. Heard, vice-president.

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Massachusetts—W. F. Rane, executive committeeman; Herbert Myrick, vice-president.

California—Judge Raker, executive committeeman; Mrs. Lovell White, vice-president.

Owing to a misunderstanding a complete list of the members of the Executive Committee and Honorary Vice-Presidents were not furnished the secretary and it will be impossible to secure a full list before the proceedings are published and distributed in the usual form.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation

The Fifteenth National Irrigation Congress.

A Record Breaker—Twenty-three Hundred Delegates Attended—Judge Goudy, President; B. A. Fowler, Secretary—Albuquerque, New Mexico, Next Meeting Place.

The Fifteenth National Irrigation Congress goes down in history as the most successful gathering of the organization. Not only in point of attendance was it a great success, but also as denoting the growth and development of irrigation and kindred branches. Sacramento citizens went out of their way to entertain the delegates and other visitors, and that it was royally done everybody who attended will testify. What the Irrigation Congress means to the national government was evidenced by the number of government reclamation service officials present.

The congress was opened by the address of welcome of Mayor M. R. Beard of Sacramento, to which Gov. Geo. R. Chamberlain, president of the congress, responded. Vice-President Fairbanks spoke at some length. Portions of his address follow:

the faithful execution of the law will result in bringing under a high state of cultivation many millions of acres of land which are now unproductive.

"The effect of irrigation in this western country can be appreciated only by those who are familiar with it from personal observation. The change made in the conversion of an arid waste into fruitful fields seems almost incredible. There is no more radical transformation to be found anywhere than in the parched valleys and plains which have been irrigated and which prior thereto produced nothing but sagebrush. The most unproductive land has become the most fertile. From the worst, it takes rank as the best. It is hard to find anywhere more apparently unproductive land than that which is occupied by sagebrush, and no more bountiful harvests are gathered than those which this same forbid-



A Partial View of Convention Hall, Fifteenth National Irrigation Congress. Scene on Opening Day.

"The suggestion that the government should participate in the work of irrigation awakened some opposition among those who had given little thought to it and who failed to realize its tremendous possibilities. I look upon no incident of my public service with more satisfaction than the support which I gave to the reclamation act upon the statute books. The measure now speaks for itself. Its critics have become its supporters, and the marvel of it all is that its virtues were not earlier foreseen and such a measure sooner enacted. The work of development under it may sometimes seem to be slow. The results, however, are sure. Those who are familiar with what has been done by the government will agree that much progress has been made and that

ding land produces when touched by the vitalizing influence of irrigation.

"There are promising fields today where there was no sign of habitation before we entered upon the present reclamation policy, and what is being done is but prophetic of what we shall accomplish if we faithfully adhere to the policy upon which we have entered and carry it out to the limits of its possibilities.

"We have long since passed the experimental stage and it only remains to push the work wherever feasible with the utmost vigor. The reclamation of every 10 or 20 acres of land means the creation of a homestead which will comfortably support a family of industrious, intelligent and patriotic American citizens.



Gov. Joseph H. Kibley, of Arizona. Geo. W. Peltier, of Sacramento, the man whose ability made congress possible. Judge F. C. Goudy, President. B. A. Fowler, Secretary. Judge J. E. Raker, Vice-President.
President and Secretary, Sixteenth National Irrigation Congress.

"The development of irrigation by the national government must have a profound and far-reaching influence upon the general subject of irrigation throughout the country. It will tend powerfully to the extension of irrigation into portions of the country which have hitherto relied largely upon rainfall in the cultivation and growing of crops. There is no more important subject for the consideration of farmers in many of the humid and semi-humid regions than that of so-called supplemental irrigation. We must prepare more and more for the increased demand upon our food supply which comes with the multiplying millions of our population. Therefore, the development of the subject of irrigation is of interest, not only to the farmers of these great western regions, but to the farmers and consumers everywhere.

"We have not fairly begun to appreciate the full value of our streams and rivers. We have not fairly

begun to appropriate them to the benefit of our agriculture, industry and commerce. The waters which come down from the sides of these mountains may be converted into electrical power and carried hundreds of miles with but little loss to the initial energy and appropriated to lighting and heating cities, operating mines and driving the wheels of industry. We have thousands of miles of rivers which may be made navigable with little expense to the government compared with the benefits flowing from their use in carrying commerce. There are thousands of miles of rivers which are navigable in a degree but which should be deepened and improved so as to meet our growing needs. It is impossible to give too much emphasis to the importance of this subject. Our rivers are the natural highways of commerce, and the growing density of our population and the increase of our production make it essential that there should be additional facilities to insure cheap and ready transportation. The capacity of the railways of the



Vice-President Charles W. Fairbanks Addressing Congress. On the platform are the governors of five Western States.

country is already taxed to the utmost and the rapid development of traffic makes it necessary that we should largely augment the means of carrying it in the future. Moreover, there is no better equalizer of rates than water competition. Water transportation is a perpetual and certain guaranty against monopoly on the part of common carriers."

President Roosevelt sent his greetings and advice to the congress by Gifford Pinchot, chief of the Department of Forestry. Following is the message:

"To the Officers and Members of the National Irrigation Congress, Sacramento, Cal.:

"Gentlemen—I send you hearty greetings and my earnest wishes for the fullest success of your convention. I congratulate you on the progress of the great movement you represent. There is no movement more emphatically for the benefit of the small farmer and the small ranchman. There is no other way to assist the actual settler and home maker who owns and tills his own land so powerfully as through this movement of yours for the wise use and preservation of the waters and the forests. The Reclamation Service and the Forest Service are directly adapted to help the small man make and maintain a prosperous home; and they are doing it. These services were recently inspected on the ground by the Secretary of the Interior and the Secretary of Agriculture, who have them in charge, and I congratulate you on the high standard of integrity and efficiency they have attained.

"It is a matter of sincere satisfaction to learn that you will not confine yourselves to questions of irrigation and forestry, nor even to the control, use and conservation of streams, vastly important as these are to every citizen of the United States. I am glad to know that you will give attention also to that problem of which forestry and irrigation and water conservation form but a part, the fundamental problem of the conservation of all natural resources. The work of the government along the line of this greater problem cannot be made effective without the approval and support of the whole body of citizens.

"By educating, guiding and crystalizing public sentiment in this direction, by bringing the needs of the people clearly and forcibly to the knowledge of their representatives, you are rendering a service of the first importance to the nation as a whole.

"THEODORE ROOSEVELT."

The only discordant note in the whole proceedings came on the second day, when, following an address by Pinchot, in which he stated that at the present rate of consumption, the lumber resources of the United States would be exhausted in thirty years, Judge J. E. Raker moved that it be the sense of the convention that all duties on lumber be repealed in order that the domestic supply be conserved. This precipitated a lively discussion, during which Delegate John Fairweather of Fresno asked Pinchot if he was in favor of the repeal of duties on lumber.

In reply Pinchot said: "You have smoked me out." He said he had declined to take a public stand on the question for the reason that if the "Forest Service had declared itself in favor of the admission of lumber free into the United States it would have secured the united opposition of the lumber interests, instead of what it has now, the united support of these interests, who own four-fifths of the forests of the country."

This latter remark was used during the afternoon

session by Delegate White Smith of Inyo county, Cal., one of the protesting Owens valley members. He gave an impassioned appeal, urging fair play and criticising President Roosevelt for his attitude on the Imperial valley matter.

United States Senator Francis G. Newlands, of Nevada, a member of the Inland Waterways Commission, received a warm welcome. He delivered an interesting address on the subject with which the Inland Waterways Commission deals.

Senator Newlands said that the Inland Waterways Commission had only been in existence a few months. It had been engaged thus far in the work of investigation, and had not formulated its recommendations. What he said, therefore, must be regarded as his individual views rather than as the conclusions of the commission. After referring to the appointment of the Inland Waterways Commission by President Roosevelt, Senator Newlands said that the letter of instructions from the President enjoined upon the commission the study of all questions relating to inland waterways, with a view to recommending practical legislation upon the subject. The President's purpose was to undertake now a plan of practical utilization, improvement and development, which might in the coming years be worked out comprehensively and successfully.

"While the primary purpose of this inquiry," Mr. Newlands said, "is to facilitate water transportation, it is impossible to perfect the machinery of the waterways without taking into consideration the related questions of forest preservation, of irrigation of arid land, of reclamation of swamp land, or bank protection, of clarification of streams, and other kindred questions."

The afternoon session was devoted principally to addresses. Dr. W. J. McGee, of the Bureau of Soils, and a member of the Inland Waterways Commission, was one of the principal speakers.

M. O. Leighton, United States hydrographer, also addressed the gathering, saying:

"We could now use, with profit, all of the water that goes to waste. In a comparatively short time the saving of that water will be a dire necessity. If started now, the conservation of water resources could be accomplished with comparatively small expenditure. Every year that it is postponed will add to the price. This is a federal matter, conforming closely to the accepted definition of a federal matter, and it would be difficult to find a question that affects more specifically every man, woman and child, without reference to locality, or that is so utterly regardless of state boundaries.

"The problems were laid down ages before state boundaries were thought of, and it would be futile to attempt to separate these problems according to state boundaries, as it would be to bring about a distribution of the winds to conform to the specific needs of each state."

John A. Fox of Arkansas, representative of the National Rivers and Harbors Congress, spoke at the opening of the afternoon session on the important work of his organization.

Dr. W. J. McGee of the United States Bureau of Soils and a member of the Inland Waterways Commission, then delivered an address on "Conservation of Our Soils."

J. A. Holmes of the Department of the Interior followed with an address on the "Conservation of the Mineral Resources." He was followed by M. O. Leigh-

ton, United States hydrographer, on "Conservation of Water."

At the evening session Morris Bien of the United States Reclamation Service spoke on the "Community Idea in the Reclamation Act."

"The Work of the National Reclamation Service" was the subject discussed by F. H. Newell, director of the Service. It was illustrated with stereopticon views.

The feature of the session of Wednesday was an address by E. H. Harriman, the railroad magnate, who had stopped off at Sacramento to attend the Congress. Mr. Harriman gave a short address, in which he justified his acts and told the Congress of his early belief in the possibilities of irrigation. When he suggested to his associates east of the Mississippi that they take hold of the Union Pacific they regarded him as being almost out of his senses and asked what he was going to do with the great desert to be traversed.

"I told them of the possibility of irrigation," said Harriman, "but they replied that it would come in another generation, not in ours. I had to go it alone and perhaps some of them now regret that I did not use more force and persuasion to have them go along with me."

Harriman then said that his organizations controlled much timber land in Oregon, but that it was not being sold or the timber cut, but is being saved for future generations.

Harriman referred to the work done in improving the Union Pacific and said it was necessary to secure control of the Central Pacific and improve it likewise, otherwise traffic would be choked up at Ogden. He closed by saying he hoped the people of the west would not consider his organization selfish, and added that everything possible was being done to develop the west.

After Harriman resumed his seat Gov. Chamberlain, referring to the Oregon forest lands and their preservation, said the people wanted something done for the present generation, and not for the future, adding:

"I do not want to get into a discussion with Mr. Harriman, but I would like to know how many acres of the original grant have been sold by the railroad at a price in excess of that fixed by the grant. I do not think companies should be permitted to hold such large grants. I would like to see Mr. Harriman build into Oregon, and invite him to do so."

Mr. Harriman, replying, said there was little inducement to build into a country which was so thinly populated. He referred to Oregon as a very fine state, but called attention to the fact that shoveling of snow would be required for several months out of the year.

He, however, promised that when times became better and the credit of local organizations was re-established, he would build a road into Oregon, whether it paid or not.

The addresses of Wednesday included one by Dr. Elwood Mead, who spoke on "Some Things Needed to Secure the Highest Development of the Arid Region."

Prof. E. J. Wickson of the Agricultural Department, University of California, read the paper of A. C. True, director of Experimental Stations, Department of Agriculture, who could not be present. The subject of the paper was, "Irrigation and Drainage Investigations."

W. A. Ward, director of the Rice Growers' Association of Beaumont, Tex., had as his subject "Rice Irrigation."

Robert D. Manson, a Chicago banker, spoke on "Financing Irrigation Enterprises."

Governor Kibbey of Arizona was heard at the afternoon session on "Water Users' Associations."

W. K. McAllister, general agent of the Southern Pacific Railway, spoke on "The Settlement of Irrigated Lands," saying:

"The question of settlement of our irrigated lands which have been reclaimed through the efforts of the Reclamation Bureau and by private enterprise should receive an animated and thorough discussion, for it is one of the crying needs of this western country that we not only reclaim its arid wastes, but that we people them with those elements of foreign birth which go to make up the sturdy, upright, cosmopolitan character of the average American citizen. There is just as much need of the settler as there is of the reclaimed land itself, and one of the important questions for this congress to decide is how these lands shall be settled with a desirable class. The land is there but the people are elsewhere. Our reclaimed wastes and the thousands of the better classes of Europeans should be brought together by some systematized plan.

"Over 1,000,000 immigrants arrived from Europe during the fiscal year ending June 30, 1906, and there seems to be no indication of a decrease. This immigration is harmful only when the immigrants are allowed to remain in the congested cities of the East.

"It is estimated that the United States is short 500,000 common laborers and this shortage is a menace to the prosperity of our manufacturing industries, which depend upon the common labor of the country for their raw material.

"Another feature of this problem is the loss to the middle west by immigration to Canada. It is stated that emigration from the United States to Canada in 1896 was 49; in 1897, 712; in 1898, 919, and in 1906, 100,000. Thirty thousand have gone from Iowa in the last year or two and two carloads of emigrants from Colorado left Denver in August and September, 1906, for western Canada. The situation has become so alarming that senators from Wyoming, Idaho, Kansas, California and from other western states have begun an attack upon our homestead laws, hoping to stop the exodus from those states to Canada. But it is not the homestead laws that are responsible for this remarkable trekking to the Canadian Northwest. It is their superior system of colonization that is drawing from the United States and not because their lands are more productive or their laws more liberal and just.

"We should study the plans in operation by the Canadian government very carefully for the fact that 150,000 Americans have left the middle west to settle in the Canadian Northwest during the last few years proves beyond a doubt that our own system of colonization is far inferior to the Canadian system."

L. L. Dennett of Modesto, Cal., spoke on "Municipal Irrigation Systems."

Prof. Samuel Fortier delivered an able paper on "The Greatest Need of Arid America." His main contention was the settlement of irrigated lands. He said that the irrigation projects amounted to little without the strong arm, sound judgment and tireless energy of the farmers. He stated that 5,000,000 acres of land were to be opened for homes after irrigation projects were completed and every effort should be made to encourage settlement.

Fred L. Reeding of the Department of Agriculture spoke of the "Relation of Irrigation to Dry Farming."

On this day also the committee on resolutions "squelched" the Imperial valley delegation's resolution,

which contained sharp criticism of the administration.

Interest in Thursday's session centered around Luther Burbank, "the wizard of California." Mr. Burbank chose as his subject the cactus and made the prediction that the thornless variety would become the great fodder of the arid regions.

He told the congress of his experiments in trying to produce a thornless cactus. He had all but succeeded, he said, a lack of the nutrition desired being the only obstacle to be overcome. He predicted that this thornless cactus would become the great fodder of the arid region, for all kinds of stock relish it and fatten quickly. About 200 tons can be grown per acre, an extraordinary output compared with other kinds of feed. The development of the high nutrition is being assiduously pursued by Burbank and the grazing men will soon have some important news from the wizard.

A delegate asked Burbank if he had a secret of developing plant life and if the secret would die with him. Burbank replied that he has no secret and that he is always glad to assist others.

The first address of the day was that of E. A. Sterling, chief forester for the Pennsylvania Railroad Company. He delivered an interesting talk on "Forestry and the Railroads."

The relation of range products to the water supply was the subject of A. F. Potter, chief inspector of grazing of the United States Forest Service.

Another event of the session was an address by F. William Rane, forester of Massachusetts, who spoke on "State Forestry and Forest Administration."

After four days of addresses and discussion, the congress Friday took up the big work of the gathering, when the report of the committee on resolutions was submitted by its chairman, ex-Gov. George G. Pardee, was adopted.

There is an endorsement of the policy of President Roosevelt and his administration in connection with the policy of reclamation, irrigation, forest preservation and conservation of resources. The departments having the big work in hand are endorsed. There is a recommendation that the government only charge enough for timber cut from forest reserves to pay for maintenance of the Forest Service.

Congress is asked to pass a law providing for the preservation of the Calaveras big trees by the exchange of her timber land for them. The Irrigation Congress is asked to make every effort to have the seventeenth session of the congress held in Washington, at the same time the national congress is in session, and provides for a committee of five to promote the matter. Protection is also asked for the beet sugar industry and aid for the work of irrigation, reclamation, preservation and conservation.

The only resolution objecting to administration ideas is one protesting against further enactment of legislation favoring Philippine sugar to the injury of the beet sugar industry in America.

The following officers were elected: President, J. C. Goudy, former congressman, Denver; first vice president, George E. Barstow, Barstow, Tex.; second vice president, Judge John E. Raker, Modoc county, Cal.; third vice president, William E. Straine, Mantana; secretary, B. A. Fowler, Phoenix, Ariz.

The gentlemen named are all men of high standing and will perform their duties in a creditable manner.

The next place of meeting will be Albuquerque, N. M.

There were accredited delegates to the congress from Europe, Asia, Africa, Oceania, North and South and Central America, Hawaii and the Philippines.

NOTES OF THE CONGRESS.

The delegates of the Fifteenth National Irrigation Congress are to be congratulated on their selection of both President and Secretary.

Judge Gowdy, the newly elected President, whose home is in Denver and who is one of the best known men in his state, has large irrigation interests, and with his partner, Mr. Geo. Twitchell, conducts one of the leading law offices in Colorado. Judge Gowdy, personally, is a delightful man to meet, and his work prior to and during the Fifteenth Congress will result in great good to the West generally.

Mr. B. A. Fowler, who was elected Secretary, is a man of fine attainments and a good executive, who also has had large experience in irrigation lines, having filled the position of president of the Leading Water Users' Association in the Salt River Valley in Arizona. Mr. Fowler has some decided ideas as to the conduct of the congress, and was instrumental in having a resolution passed which makes the President and Secretary of the congress ex-officio members of the Executive Committee.

Considerable complaint was heard during the Fifteenth Congress at the manner in which the program was shaped up, and many openly criticised the officials for giving so much time to the department heads and their assistants from Washington, which in a sense eliminated discussions by delegates who had no official standing other than that of a regularly appointed delegate. It is our impression that this error will be corrected at the time of the next congress, as Messrs. Gowdy and Fowler no doubt realize that the arrangement of the program for the Fifteenth Congress was very unsatisfactory to many in attendance. It must not be understood that THE IRRIGATION AGE is in any sense criticising the gentlemen who took part in the congress; the error was evidently on the part of those who shaped up the program; in fact, the program was arranged almost entirely by the local committee at Sacramento; this is now recognized as a serious mistake on the part of many of the delegates. It was understood that the department heads from Washington and their assistants were all to be fully recognized in the congress and given ample opportunity to exploit the work carried on by the Reclamation Service and the Forestry Bureau, and at the meeting of the Executive Committee held in Chicago some three months prior to the date of the congress, Mr. Beard, chairman of the Executive Committee, was instructed by those in attendance to so shape up the program as to carry out these views. It was not expected, however, that he would give 80 or 90 per cent of the time to the government officials to the exclusion of delegates who were visiting the congress with complaints or papers which would have been highly interesting to those in attendance if they had been permitted to deliver them.

This matter is mentioned simply with a view to suggest some means of correcting that error in the future, and it is the impression of the writer that the program for the congresses in the future should be prepared directly under the supervision of the President and Secretary, and that they should be consulted at all

times as to the general outlines for the program. This must not be understood as more than a mere suggestion, as it would be difficult to criticize Mr. Beard, who performed such a splendid work in connection with the congress.

We are showing in this issue a portrait of Mr. Geo. Peltier, a leading banker of Sacramento, to whom the financial success of this congress is wholly due. Mr. Peltier is one of the best-known men in banking circles on the Pacific Coast, and performed a splendid service to Sacramento, California, and the West in general in the good work prior to and during the congress. There has never been a time in the history of the Irrigation Congress when so much money was spent for advertising, decoration purposes, and the entertainment of the delegates, nor has any other congress in the past been honored by the attendance of so many prominent men. There were governors from half a dozen states, United States Senators, Congressmen galore, as well as many other western "Sunbursts."

Perhaps two of the most interesting features of the congress, without any attempt to criticize the quality of the many splendid papers delivered there, were the visit of Mr. E. H. Harriman and his talk to the congress, and the visit also of the "Wizard of Southern California," Mr. Burbanks, who kindly consented to tell the delegates something about his recent experience of improving the cactus plant and bringing it under the head of a forage plant. We will print in a future issue Mr. Burbanks' talk, as well as that of Mr. Harriman, both of which are well worth the perusal.

Mr. Harriman left a very good impression with those who heard him; in fact, his visit to the congress may be considered as his first real introduction to the people who are working to develop the West.

He spoke clearly, evenly and somewhat guardedly as his position was a delicate one, and there were many, no doubt, in attendance who would have been glad to discover a "slip of the tongue" or a flaw which would place him in an unfavorable light. By careful maneuvering Mr. Harriman avoided all topics which would possibly have created friction, and left a decidedly good impression on his audience.

Gov. Geo. E. Chamberlain of Oregon, who acted as President of the Fifteenth National Irrigation Congress, filled the position very creditably indeed; in fact, many expressed the opinion that he was the best presiding officer that the Irrigation Congress has ever had. Governor Chamberlain has a good, clear voice, decides and acts quickly, and as a result of his ability the deliberations of the congress were greatly facilitated.

One peculiar feature of this past Congress was the introduction of what may be classed as the "Railroad Idea" and "Railway Influence." This is all the more surprising when it is considered that there has been more or less friction between the Federal Government and the large railway corporations. It seems now that through some means or other the railways have been reached and their representatives instructed to support all measures brought out or suggested by the Reclamation or Forestry Bureaus, a rather strange condition when one considers the position taken by President Roosevelt and the bitter feeling which existed against him until recently in railway circles.

A great deal more could be said on this subject, but it is deemed advisable to investigate the situation more thoroughly before discussing it further.

RESOLUTIONS ADOPTED BY THE FIFTEENTH NATIONAL IRRIGATION CONGRESS.

Resolved, That the great work of the Reclamation Service and Forestry Service brings to the small farmer and home-builder opportunity and prosperity, and we congratulate those in charge of these branches of the public service upon the high standard of integrity and efficiency that characterizes their work and has uniformly prevailed throughout their management and we heartily endorse the forestry and irrigation policy of President Roosevelt and the present administration.

That this Congress heartily endorses the valuable services of the Bureau of Soils of the Department of Agriculture in making soil surveys and aiding in the development to the fullest extent of the soil resources of the United States and especially in the irrigable West. Presented by Sacramento Valley Development Association.

That in view of the insufficiency of the laws of some of the States, the Legislatures of the various States and Territories be urgently requested to pass laws for the protection of Government and private irrigation works.

That we heartily commend the timely efforts of the National Rivers and Harbors Congress to awaken the American people to the economic value of these great natural arteries of commerce.

That we highly commend and heartily endorse the action of the President of the United States, the Hon. Theodore Roosevelt, in his appointment of the Inland Waterway Commission for the complete investigation of this subject.

That we urge upon Congress the necessity for now entering upon the development and improvement of these waterways upon a systematic and comprehensive scale providing for the rapid completion by adequate appropriations.

That a committee of fifteen be appointed by the president of this organization to represent this body at the National Rivers and Harbors Congress to be held in Washington, D. C., on December 4, 5 and 6, 1907.

That the National Irrigation Congress respectfully urges the members of the National Senate and House of Representatives to provide in the next Sundry Civil bill, a sufficient appropriation to permit the continuance of the investigation of water resources by the U. S. Geological Survey until such time as said work may be provided for under a new Bureau of Hydrology which in the judgment of this Congress should be created.

That the National Irrigation Congress recognizes the importance of the engineering works necessary to determine the nature and extent of the swamp lands of the country and the possibility of their drainage, and heartily commends the efforts of the National Drainage Association to have this work provided for by the Congress of the United States and recommends that the president of the Irrigation Congress appoint a committee of five of its members to co-operate with the National Drainage Association in securing the passage of legislation with a view to this end now pending or being urged by that association.

That the National Irrigation Congress respectfully but insistently urge upon the Legislatures or other authorities of the various States, Territories, Insular Possessions and the United States the principle that no man have a right to use his property in a manner inimical to the prosperity of the State or the people thereof, and the consequent necessity of immediate legislation to so regulate the use of privately owned property that the wasteful and unnecessary destruction of the forests and other natural products of the country may be stopped; such waste and destruction being injurious to the public good, opposed to good public policy and inimical to the whole people.

That we urge upon Congress the necessity of the enactment of a law that will empower the Secretary of Agriculture to appoint proper inspectors of the Forest Service who shall have power to summon witnesses, administer oaths, and take testimony in the investigation of any alleged wrong in forest reserve management.

That the Congress of the United States be respectfully urged to acquire, by exchange or otherwise, the grove of Sequoia Giantea, in the State of California, known as the Calaveras Big Trees, the said trees, among the largest and oldest on the face of the earth, being in private ownership and in imminent danger of destruction.

That the National Irrigation Congress heartily approves the recommendations of President Roosevelt and of the American Forestry Association and of the many National organizations in different parts of the country; that National Forest Reserves be established by the Congress of the United States in the southern Appalachian and the White Mountain regions for the protection of the forests, the soil and the streams in these important portions of the eastern country.

That the Fifteenth National Irrigation Congress urges upon the people of California the need of enacting a law giving the State Board of Forestry power to examine all private forest holdings on the watersheds of irrigable streams and to designate such rules for timber cutting as in its judgment will secure the continuity of said forests and prevent injury to said streams; and that this Congress also urges delegates to use their influence to secure appropriate action requiring County Supervisors or Commissioners to protect trees on the public highways.

That the action of the National Drainage Association in seeking to have the National Congress pass the "FLINT GENERAL DRAINAGE ACT" meets with the hearty approval and endorsement of the Fifteenth National Irrigation Congress.

That inasmuch as the irrigation and drainage investigations of the United States Department of Agriculture deal with questions of such vital importance to the agricultural development of the Nation and have assumed such rank and standing in the Department as to warrant the establishment of a separate and independent bureau, this Congress favors the creation of such bureau and urges that legislation to this effect be enacted at the forthcoming Congress of the United States and authorizes the president of this Congress to appoint a committee of five to urge the enactment of such legislation.

That we recommend the transfer of the care and management of the National Parks in the Western States to the United States Forest Service in order that the same system of forest extension and protection against forest fires may be applied throughout both the parks and the adjacent National forests.

That the necessities of the irrigation of the arid and semi-arid States and Territories have far exceeded the previously acquired ideas of its originators and have assumed so much greater proportions than were, at first, deemed possible; and, that, therefore, in order that the people who desire to make homes upon irrigated lands in such States and Territories may have the opportunity to do so, the Congress of the United States be respectfully requested to extend such further aid toward the purposes of the Reclamation Act as may be possible.

That the United States topographic and geologic maps are of such great importance to the proper development of the country and its forest and other resources that the National Irrigation Congress urges upon the Congress of the United States and the Legislatures of the various States and Territories the more rapid extension of said maps.

That we respectfully ask that steps be taken as early as practicable toward the procuring of such international agreement between this country and Mexico and the British Empire as will enable the Reclamation Service to construct and operate canals over Mexican and Canadian territory to such extent as may be necessary for the successful construction and operation of such systems of irrigation as may be undertaken by this Government.

Recognizing that the fundamental industries of agriculture, mining and commerce demand and deserve special and extended investigation and treatment under which the torrential streams having their source in watersheds, such as the Sacramento and San Joaquin valleys, from whose mountains many millions of gold have been mined, and from whose storehouses vast amounts of gold will be mined in the future, that the Congress urge that the Government continue to select in such watersheds the most favorable and available sites for reservoirs for the storage of water to the end that destructive floods may be averted, and the waters of the streams stored and utilized for agricultural, mining and transportation purposes, and also to select suitable tracts of waste lands and to formulate plans whereby the detritus from torrential streams may be deposited on such waste lands so as to reclaim the same and gradually convert them into lands suitable for forestry and agricultural purposes, and at the same time remove from such streams their burden of detritus so

that they may cease to be a menace to the navigable portions of such streams.

That, recognizing the importance of fuel resources to the larger development of the arid and semi-arid States under modern irrigation and dry farming conditions, the National Irrigation Congress joins the American Mining Congress in commending the efforts of the President to secure such conservation of the mineral fuel lands still owned by the Government as will permit the opening of the surface of the many million acres of these lands for homestead and agricultural purposes, and the separate working of said underlying fuel resources in these lands under such conditions as will best promote their use, but for a time at least retain their ownership in the United States for the benefit of the people.

That, recognizing the importance of mining in connection with the larger developments of the country, and especially of the arid and semi-arid regions, the National Irrigation Congress commends the efforts of the American Mining Congress in behalf of the establishment of a National Bureau or Department of Mines on a scale commensurate with the increasing importance and diversity of this industry, and we ask the Representatives and Senators from the various States to use their best endeavors to secure at the next session of the Federal Congress the passage of the legislation necessary in carrying out this purpose.

That the Government part with the title to its agricultural lands to actual settlers only and should retain title to all other lands (except those containing valuable metalliferous deposits), permitting the use of these lands or their underlying mineral deposits under such regulations as will protect the interests of the people.

That the Desert Land Act should be so amended that the number of acres susceptible of entry by any one person shall not exceed one hundred and sixty acres.

That it is the sense of this Congress that the prices for timber and grazing and for privileges within the National Forests should not yield a profit to the Government, but that bona fide miners, stockmen and farmers should be allowed to acquire these products and enjoy these privileges for a consideration not to exceed the cost of improvement and administration thereof.

That the National Irrigation Congress urges upon the Congress of the United States the necessity of providing better and more numerous roads and trails through the National Forests and Parks not only as a means of stopping the fires and of disposing of the surplus forest products, but as a means of travel across these large areas by the people in the several States living on opposite sides of their areas; it also urges the Senators and Representatives in Washington from the several States to endeavor to secure the appropriation needed for this purpose.

That the National Irrigation Congress again extends its thanks, in behalf of the people of and the homeseekers in the arid and semi-arid States and Territories of the Union, to the President and the Congress of the United States for the many blessings which have flowed and will flow to the people of the United States from the Reclamation Act.

That inasmuch as the acreage of sugar beets in arid America has increased amazingly during the past ten years, and such acreage will be greatly added to in the near future, thus affording our farmers an annually growing and additional income if this wealth-producing resource of the American farmer is not interfered with, we therefore protest against the enactment of any further legislation favoring Philippine sugar, and urge that legislative agitation and attacks on the sugar production of this country cease to the end that this great industry of arid America may be rapidly and fully developed.

That the general policy of conserving all our natural resources for the use and benefit of all our people be, and is hereby adopted by the National Irrigation Congress as a basis for future work; and that we urge on our representatives in the Congress of the United States the adoption of a similar national policy.

Recognizing and appreciating the excellent work done by the Publicity Committee created and appointed at the Boise Convention, and believing that the work of such committee should be continued, we recommend that the present committee be authorized to further prosecute its work and that the president of this Congress be given authority to fill all vacancies on such committee.

(Concluded on page 346.)

Mountain Home, Idaho

Something About the Wonderful Development of a Large Irrigation Project—Great Western Beet Sugar.

It has been truly said that without irrigation there would be no populous and prosperous West. It was the first weapon seized by civilization in its battle with desolation. When Brigham Young assumed the awful responsibility of moving his 10,000 followers to the desert valley of the Rocky Mountains he did it upon the faith that irrigation, one of the oldest arts of the Old World, could be successfully applied to the land he proposed to settle and before the close of the day of his arrival in the Salt Lake Valley he began the building of the first irrigation canal. Time, in its gentle manner, has shown wonderful results that have been realized through the



Mouth of Tunnel and Flume, Mountain Home, Idaho.



Steam Plow at Work on Land Near Mountain Home, Idaho.

the water supply during the hot summer months when lands were thirsty.

Away back in the Bennett and Saw Tooth Mountains are, until the middle of each year, immense bodies of snow. As the snow melts in the spring of the year the streams are large rivers, emptying into the great Snake River, and then to the Pacific Ocean, and are lost. The problem was to husband this great volume of water and retain it in the mountains, until the hot summer days arrived and the fields were thirsty.

Through the process of elimination it was found that the extension of irrigation in the Mountain Home district of the Snake River Valley could not be expected unless effort was applied to large storage reservoirs. It was useless to expect any extension of irrigation by relying on streams already taxed to their limit.

If all this vast region could be brought under the field of observation it would present a most picturesque aspect. In the view would appear snow-capped mountains, their life-giving reservoirs of water flowing to the plains at their feet. The streams which find in these glaciers their source have flood maximums wherein their waters have run to waste. When all of the precipitation which is caught by the condensing uplifted surfaces of the mountain ranges and the sub-surface reservoirs of water are so developed as to be applicable to the fertilization of this arid area, it requires but a superficial knowledge of the topographical and meteorological conditions of this region to declare that sev-

irrigation projects both large and small in the arid regions of the West; and yet today there are millions of acres of desert lands that could be reclaimed, if the vast waters that flow down the mountain creeks and are lost could be stored for use during the hot summer months.

• A number of years ago a few settlers believed that



Grain "Stacks Up" Well at Mountain Home, Idaho.

the immensely fertile lands in the Snake River Valley at a point where is now located the town of Mountain Home, Idaho, could be reclaimed through waters taken from the mountain creeks. A small per cent of the lands in this part of the Snake River Valley was placed under irrigation and cultivated. Such magnificent grain and fruit crops as were obtained from this comparatively small area of cultivated land created a great deal of interest and ways and means were sought to increase



Grain Field, Mountain Home, Idaho.

eral hundred thousands of acres of land may be made subject to properly devised systems of irrigation within a radius of sixty miles from Mountain Home. Three large storage reservoirs have been built, but still the reclamation of this great country has only begun. Future years will witness an extension of this plan of irrigation in this region until practically every acre of the valley land will be made a garden spot. But the fertility of the soil which is to be called into life by the vitalizing influence of water from these mountain reservoirs, while constituting a permanent basis, does not

yield from forty to seventy bushels of wheat to the acre, from sixty to one hundred bushels of oats, and from three hundred to seven hundred bushels of potatoes. The crops never fail and the tiller of the soil can sow with pleasure and reap with profit. When the farmers of the middle and eastern states are praying for rain, the farmers of Southern Idaho have only to raise the head gates of their ditches, and irrigation does the rest.

The soil is largely of volcanic origin, and from the surface down to the deepest depth it is of the same character and fertility. Artificial fertilization is never needed, and fields which have been cultivated incessantly for twenty years are still pouring forth every season the same wondrous harvest that they did at first. The Snake River Valley in Idaho is in the same latitude as Spain and Italy. It stops at no precedence of production and knows no such words as crop failure. The climate is unsurpassed and the death rate is lower than in any other part of the United States. In fact, Southern Idaho is a land where man can eat bread without scarceness, and where he shall lack nothing in it. It is unquestionably the finest fruit section of the United States. Nowhere do peaches, apples, pears, apricots, prunes, etc., grow to such an enormous size.

There are no extremes of heat and cold in this section. Southern Idaho has three hundred days of sunshine each year, and with but three exceptions the thermometer had not registered zero in ten years. Farmers plow every month in the year, the winters being so mild that an overcoat is seldom necessary.

This particular Mountain Home, from which the writer has just returned, is located on the main line of the Oregon Short Line Railroad, the leading route from Chicago to Portland. It is 1,772 miles west of Chicago, and one night's ride from Portland, Oregon, or Salt Lake City. Irrigated improved lands in the vicinity of Mountain Home are worth from \$100 per acre up, while bearing orchards sell from \$400 to \$700 per acre. Mountain Home has a population of about 1,700. Its altitude is 2,970 feet. It is an up-to-date progressive town. Elmore county, of which Mountain Home is the county seat, has more square miles than Massachusetts, Rhode Island and Vermont combined. The land at Mountain Home is perfectly level, and it is very easy to run the water over the entire surface, once



.. Bean Field Near Mountain Home.

comprise all the vast resources of this region. It possesses a mineral wealth, the value of which is beyond all human calculation. When the great undertaking at Mountain Home, upon which nearly a million dollars has been expended, shall reach final accomplishment, the agricultural resources of this section of Southern Idaho, constituting the theater of this vast operation, will possess a full round of resources furnishing the basis and foundation of a civilization equal in magnitude to that of some of the smaller eastern states.

It is true that the project to irrigate these arid lands near Mountain Home has been opposed by well meaning individuals. With but little knowledge of the reservoir system, men have declared the scheme was impracticable. Others have objected because of the fact that a large area of government land would be taken from the grazing privileges of the sheep men. These objections, while possessing no real merit, naturally placed stumbling blocks in the way of capitalists whose faith in the plan never faltered. Today the objectors have all fallen into the background and nothing can be heard but words of commendation for the men who are constructing these canals and reservoirs, and which will irrigate a tract of land sufficient to maintain a population that will make Mountain Home one of the prettiest and most prosperous cities of its class in the west.

Improving natural soil moisture is a very old art. The classic writers extol drainage and archaeologists locate prehistoric irrigation canals in various parts of the earth, and of six sites for the Garden of Eden for which the ancients contended, all were in irrigated regions. Investment in irrigation projects is like all other investments and governed by the same economic laws.

There is no place where the landless man can find better opportunities for agricultural results than on the manless lands of Southern Idaho when the water is turned on to these vast areas of sage brush lands. It is a land of fruit, grass and golden grain. The valleys



A Stack of Alfalfa, Mountain Home, Idaho.

it is plowed. Five irrigations during the agricultural season are sufficient for the growing of any crop. Water for domestic use at Mountain Home is obtained in abundance from wells at a depth of from 15 to 20 feet.

(Concluded on page 347.)

COLORADO'S AGRICULTURAL WEALTH.

State has valuable asset in its farming capacity, and is truly one of the richest states in the Union in this respect—Some results obtained by Colorado farmers—The property of the Denver Suburban Homes & Water Company.

A stranger coming to Colorado is often skeptical as to the possibilities of the country as set forth in railroad advertising pamphlets and the prospectus sent him by a hustling real estate man. That it may be a wonderful country he is ready and willing to admit in his superior knowledge, but he feels that facts have been overdrawn and enlarged upon, that imagination has run riot in an effort to exploit and advertise. From his viewpoint such achievements as are quoted to attract settlers to the state are impossible. You can't tell him



Castlewood Dam.

that land which for centuries has raised nothing but cactus and sage-brush can with the application of water do twice as much as the fertile sections of Wisconsin, Illinois, Iowa and Indiana. If the stories you tell are true, why, he wants to know, was not all this territory exploited before and why have not all the large markets turned to Colorado and similarly situated states for their agricultural supplies? Why are not the farmers of the eastern and middle states rushing westward as the gold seekers did to California in 1849? Surely there is a great deal more in farming by irrigation, if one has the faculty of comparison, than in agriculture as we were taught the science of it, and unless he can be shown actual results he is not going to believe that a man can clear \$300.00 in one year from an acre of cabbages; that on a 320-acre farm, of which 210 acres were under cultivation, an agriculturist in a single season cleared \$6,750.00. This stranger is the man that the people of Colorado are anxious and willing to show that in no way have they exaggerated upon the resources of the state, for they appreciate that when he becomes convinced he will either join the rapidly swelling ranks of new citizens or become a "booster" who will help them in bringing others to settle.

When a man becomes a citizen of the commouwealth of Colorado he is made, either consciously or unconsciously, a member of its "booster" corporation, for enthusiasm seems to be as much of a requirement for citizenship as does ability to read and write. Everybody enthuses over the climate, the man interested in agriculture, whether it be dry or irrigation farming, will tell you there is no place like Colorado for the raising of fruit, grains, alfalfa and vegetables; the interested mine owner or stock seller never knew or heard of any state or

region that has such unlimited mineral wealth; the manufacturer says that he has few labor troubles, good markets, fine power and is in every way perfectly satisfied; and so it is with all of them. And they are far from reluctant to show you wherein their wealth and happiness lie. There is no occasion to go into the history of agriculture in Colorado; suffice it to say that many men attracted to the state by the "lure of gold" in 1859 and 1860 tired of mining before many months or found themselves unable to successfully carry on their operations through lack of capital or supplies, and turned to agriculture as a means of livelihood. The experience of the Mormons in Utah had shown that the soil would grow almost anything were water applied to it, and these early agriculturists experimented. The results were startling in their enormity. The field of these "experimental farms" was in the northern part of the state, east of the Rocky Mountains. To these regions the Colorado enthusiast will take the skeptical visitor and show him that in agriculture alone the state has an incalculable asset.

Take the trip from Denver to Greeley, on the Colorado & Southern line, as an example. This is rather a roundabout way to get to the seat of Weld County, but it is not a journey for business alone. The South Platte river leaves the mountains some twenty miles southwest of Denver and its course is northeasterly for a hundred miles to where it is joined by the Cache-la-Poudre. Before this latter stream becomes part of the Platte, however, many smaller streams, such as Bear creek, Clear creek, Boulder creek, the St. Vrain and the Big and Little Thompson, add their flow to the Platte. After leaving Denver the train goes northward across the valley of Clear creek, where may be seen fields under irriga-



One of the Lateral Ditches of Denver Suburban Homes and Water Company, with Orchard in Background.

tion growing varied crops; thence into the valley of the Boulder and the beautiful city of that name, where the state university is situated. From Boulder the route turns to the east for a distance and then north toward Longmont, famed for its pumpkins, where each year a day known as "Pumpkin Pie Day" is given over to feasting and merriment. At Longmont has recently been erected an immense factory to make into sugar the thousands upon thousands of tons of beets raised in the vicinity each year. Still farther north, about eighteen

miles, is Loveland, and if your visitor, constantly growing less doubtful of the possibilities of the region, cares to stop for a few hours, the citizens and farmers will amaze him with some stupendous figures as to the sugar beet crops of this and former years. He will be astounded when he is shown five sugar beets that weigh forty-five pounds ready for the Loveland factory, which factory, by the way, was the first one erected in northern Colorado. And right here it may not be out of place to give the acreage and results of the sugar beet industry at five of the stations along the Colorado & Southern.

	Acres planted.	Tons harvested.
Greeley	8,000	110,000
Windsor	5,900	85,000
Fort Collins	11,000	158,000
Loveland	11,700	201,000
Longmont	11,300	175,000
	<hr/> 47,600	<hr/> 729,000

From Loveland the route leads still north to Fort Collins, the site of the state agricultural college. This is a city of between 8,000 and 9,000 and is situated in the fertile valley of the Cache-la-Poudre. Residents of the valley maintain that it is the most productive in the trans-Missouri country, and they certainly show results which justify their claim. On his farm five miles southwest of Fort Collins Mr. Sam Webster's yield of Defiance wheat ran fifty-eight bushels to the acre, weighing sixty-two pounds to the bushel. Last year he had sugar beets on this same ground and got a little better than twenty tons to the acre. The year before that from the same ground he got twenty-nine tons of sugar beets per acre, while the year previous to that the same soil produced 160 sacks of potatoes to the acre, and of a high grade.

From Fort Collins the train turns southeast toward Greeley in Weld County, passing through a region where potatoes and beets are the principal crops. The returns on these two products for the season of 1906 was enormous, \$1,700,000 being paid to the farmers for the yield from 22,000 acres of sugar beets. The price ranges from \$4.50 to \$5.00 a ton. Nine thousand carloads of potatoes were shipped from Greeley. Sugar beets are practically a new crop to Colorado as they

Should the visitor still be unconvinced let him take a trip across the mountains to the valley of the Grand, fondly called "The Little Empire of the Western Slope" by its enthusiasts. The valley is forty miles in length, averages six miles in width, and contains 150,000 acres of irrigable land. Fruit is the chief product of the valley and it is becoming as famous as Michigan for its peaches. It is estimated that the 1906



Castlewood Lake, from which Denver Suburban Homes and Water Company Gets Its Supply of Water.

fruit crop of 2,200 cars brought the growers \$1,250,000, while the 1905 harvest of 1,599 cars netted \$954,507. Within the past three years nearly 2,000,000 fruit trees have been set out in the valley and the above figures are from about thirty per cent of the 17,000 acres planted to fruit, the trees on the other seventy per cent not having as yet matured sufficiently to bear. Here are the results obtained from ten acres planted to peaches in 1900, net returns above all expenses, 1902, \$129.98; 1903, \$1,036.24; 1904, \$2,490.10; 1905, \$1,448.10; 1906, \$4,992.45; total receipts, \$10,096.87.

Or let the skeptical visitor go to the San Luis valley on the southern boundary of Colorado, which lies about the center of the state from east to west. It is between 7,500 and 8,000 feet above sea level and is surrounded on every side except the south by rugged mountains. The valley is about a hundred miles in length and at its widest place is forty miles across. In this valley the field pea is revolutionizing agricultural pursuits. This pea is drilled into the ground and kept moist by irrigation until it is of good growth. Then lambs and hogs are turned into the fields when it is grown and allowed to graze on the products. Hogs do particularly well, being fattened and ready for market in a remarkably short time. There is said to be some element in the feed which makes the flesh of the animal far more desirable for market purposes. At any rate, these pea-fed hogs of the San Luis valley bring thirty cents more per cwt. to the farmers than do the hogs on the Chicago market. It has been demonstrated that a quarter section of good field pea land will raise, fatten and turn off 300 fat hogs a year and carry over the brood sows, leaving the owner a gross return of about \$4,000 a year, with less than \$1,000 expense. Other products, such as are raised elsewhere in the state by irrigation, also bring large results. Potato culture is especially profitable and the greatest yield of that vegetable ever recorded, 794 bushels to the acre, is credited to a San Luis valley farm. The average yield of potatoes is 200 bushels to the acre. Great things are promised for this valley, as the hog industry is but three years old and has doubled each year since its inauguration.



The Arapahoe Canal in Gorge Near Castlewood Lake.

are to other sections of the United States, this being only the ninth season they have been raised here to any great extent. The pulp from the sugar beet is a great food for sheep and that industry is receiving an immense impetus from the erection of factories throughout irrigated sections.

So it is throughout the state. No matter where one goes he finds the same enthusiasm, the same interest and the same natural wealth. Undoubtedly Colorado has unequaled assets in her mineral and manufacturing resources, but one fact is a certainty—in her agricultural possibilities the state has an asset which cannot be shaken by either financial or political upheaval. There are 2,500,000 acres of land in the state now under irrigation, 2,000,000 acres of which are under cultivation. There are ten times as many arable acres in the commonwealth, which it will take many years to open. The agricultural output of the state for 1906 was \$115,000,000, of which \$12,500,000 was in sugar beets and \$15,000,000 in alfalfa, both of which crops were unknown to the United States twenty years ago. Colorado citizens make a feature of their agricultural products, individual communities celebrating as their crop ripens. Rocky Ford, to the southeast, has its "Melon Day"; Longmont immortalizes its pumpkins in "Pumpkin Pie Day"; Loveland has an annual corn roast; Glenwood Springs a yearly strawberries and cream sociable; and Grand Junction celebrates for its peaches.

What may be done by the careful and conservative use of water can be no better illustrated than has been done on the property of what is now the Denver Suburban Homes & Water Company. The property of the company lies in the southwestern part of Arapahoe and the northern part of Douglas counties, and the company is the owner of more than thirty-five square miles, or some 25,000 acres. The tract slopes gradually in a northeasterly direction, the main ditch, known as the Arapahoe Canal, having a fall of about three feet every mile. At no one place is the width of the tract over seven miles and its length does not exceed twelve miles, extending to the east to Cherry Creek and the north as far as what is known as the "High Line Canal," the latter being the property of a Denver irrigation corporation. The southern boundary of the property is the range which divides the flow of water to the tributaries of the Arkansas River and to the South Platte River. The main reservoir is Castlewood Dam, situated in Douglas County, township 8 south, range 66 west. The dam is fed by the flow of the famous Cherry Creek, the stream where gold was first discovered in Colorado and which brought the rush of fortune seekers to the state in 1859 and 1860. The stream drains a territory twenty miles in length and its flow varies from one cubic foot per second in the dry seasons to many hundreds of cubic feet during the spring and fall floods. There are two other gulches which bring into the lake the water drained from 10,000 acres of rough hill land. The reservoir or Castlewood Lake has a capacity of 229,000,000 cubic feet, or 1,720,000,000 gallons of water. This is equal to about 5,250 acre feet—that is, water sufficient to cover 5,250 acres of ground a foot deep. From Castlewood Lake the water is let into a gorge, which incidentally might well be included in the list of picturesque and beautiful places in the state of Colorado. With its high, rocky walls, covered with a growth of white pine and scrub oak, it presents a view rarely equaled. For a mile and a half down this gorge the water flows in the channel of least resistance, and then near the end of the gorge it is turned into the main ditch by a diverting dam, known as the Arapahoe Canal. Thence it winds its tortuous way around hills, through four pipe lines under ravines, gulches and creeks and several flumes for a distance of

nearly thirty-five miles to Clark Reservoir, on sections 11, 13 and 14, township 6 south, range 67 west, Douglas County. From Clark Reservoir the application of water is directed. One mile above Clark Reservoir is a head-gate, where the water from the main ditch can be diverted to flow into the Springer Ditch and thence into Springer Reservoir in section 19, township 6 south, range 67 west. The Denver Suburban Homes & Water Company has a contract with Mr. John W. Springer, the owner of this reservoir, to furnish water for this lake, so that it can not properly be taken as a part of the property of the company. From Clark Reservoir water is diverted again into the Arapahoe Ditch, and about 200 yards from the reservoir is begun the turning of water into laterals by means of head-gates. From these the water is taken by laterals to the settlers of Clark colony.

It is at this point that the preservation of water is begun. In most colonies the water, after being applied to the land to be irrigated would be turned into a waste ditch or a gulch, going thence into some stream or river. But rather than have this water go to waste, the Denver Suburban Homes Company has built reservoirs which act as catch basins, into which this water flows when it has done its work on certain farms. There are three of these "catch basins," and from these the water is again let out by means of head-gates and laterals to irrigate other farms and tracts. Naturally, there is some little waste, as there must be an end of reservoirs, but it is so insignificant as to amount to very little, the last farmers on the ditch applying practically all that reaches them.

The method employed in the application of water by this company is unique in its way, this being the only company in the world, so far as we know, that has this practice. Results show that the method is a wise one and that by it many thousands of feet of water are saved from waste. The practice is to give consumers water as they need it, and during the day only, no water being run in the ditches at night or on Sundays. The economy of the method can easily be seen. And the practice has demonstrated the fallacy of the theory that between two and four acre feet are needed to mature a crop. The superintendent of irrigation for the company is Mr. B. W. Jones, who has a beautiful home on a slightly hill on section 16, township 5 south, range 67 west. Mr. Jones has been a student of irrigation for many years and is thoroughly versed in all its branches. What has been done in the way of saving of water in Clark colony may best be demonstrated by what Mr. Jones says of the results he has obtained. We quote him:

"According to authority quoted in works on irrigation, the quantity of water required to mature a general crop in Colorado is from two to four acre feet per acre irrigated. Experiments conducted by eminent irrigation engineers give a depth of not less than two and a half acre feet for a general crop. This amount is considerable more than is needed by actual measurements and experience. According to measurements made on this canal over weirs with complete end contractions, using Francis formula, we delivered water into a lateral ditch, covering forty acres of oats, alfalfa, sugar beets and vegetables twenty-seven days during the season of 1905, amounting to a total of sixty-eight one-hundredths acre foot per acre irrigated. Water was delivered from 6 a. m. to 6 p. m. whenever the consumer found that the condition of his crops needed an application of

water. The first application was made May 10, the last September 10, giving the consumer all the water he could handle without waste, regardless of amount he was entitled to.

"In 1906 this same lateral used seventy-six one-hundredths of an acre foot in thirty-one days of irrigation distributed from May 12 to Sept. 1, the increase of quantity being caused by continued dry weather during June and July. The land irrigated is heavy chocolate loam, underlaid by clay, and is rolling prairie, affording perfect drainage, no alkali being present in quantity.

"We deliver water from small reservoirs located conveniently to the land to be irrigated, opening the valves at 5 a. m. and closing at 5 p. m., giving the consumer water during the whole day and thereby stopping the waste which would be caused by allowing the water to run both day and night.

"In one lateral delivering water to fifteen consumers, we found that from April 15 to Nov. 1, a period of 200 days, we delivered water for 120 days, amounting in all to seventy-eight one-hundredths of an acre foot, the quantity delivered ranging from a quarter to three cubic feet per second, giving consumers all the water needed to keep their crops in good condition.

"We find that in laterals delivering water to a number of consumers, it is necessary to run only about one-third the quantity the ditch is entitled to, as not more than one-third of the consumers use water at the same time. Assuming that the average depth of water needed to soak ground thoroughly is one-fifth of an acre foot, and that three to four irrigations are needed during the season, taking four as an average, then at the above rate eight-tenths of an acre foot is required to mature a crop, leaving two-tenths of an acre foot for loss in seepage and evaporation, bringing the depth of water down to an acre foot for each acre irrigated. By close application, and as the consumer learns the proper amount and time for application of water, I think that this duty can be further increased. I will briefly describe the system by which we make this high duty of water possible:

"1st, by reservoirs, storing water during winter months and floods.

"2nd, by running water to subsidiary reservoirs, located near the land to be irrigated, during early spring and late fall, thus avoiding excessive loss from evaporation during the hot summer.

"3rd, by delivering water only during the day time from 6 a. m. to 6 p. m. whenever the consumer finds it necessary for his growing crop.

"4th, by delivering no water on Sundays, during and after a rain, and by having all consumers working to the common end of using as little water as possible to mature their crop."

Mr. Jones has been in the employ of the company about four years, having taken charge in the fall of 1903. When he came there were some twenty-five settlers on the property. Most of these removed during the fall and winter, because through some mismanagement they had not had sufficient water to mature their crops. But three families remained. Today there are sixty families in the colony, all of them prospering. The farms in the colony average only twenty acres and it opens the eyes of the "down-east" farmer when he learns what can be done on these small tracts. The life of the superintendent of irrigation on a property such as this is by no means an easy one and the position re-

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"In King David we have found an apple that promises as near perfection as it is reasonable to expect—quality absolutely best, surpassing Jonathan, Grimes or Spitzenburg; color beautiful as can be imagined—a deep, dark, solid red, a blending of the shades of Jonathan and Arkansas Black of which it is probably a cross. We cannot see how either tree or fruit could be improved; a strong, vigorous spreading grower, large, heavy dark green foliage, a remarkably young and heavy bearer."

One of these King David Apple trees will be sent to you by mail, free, on receipt of \$1.00 for one year's subscription to Irrigation Age. If you are now paid up, you can renew and secure a tree.

Or we will send you one tree for your own subscription and one for each additional neighbor's subscription you may secure and send us, and one tree will also be sent to each such subscriber you secure, you can offer it when soliciting.

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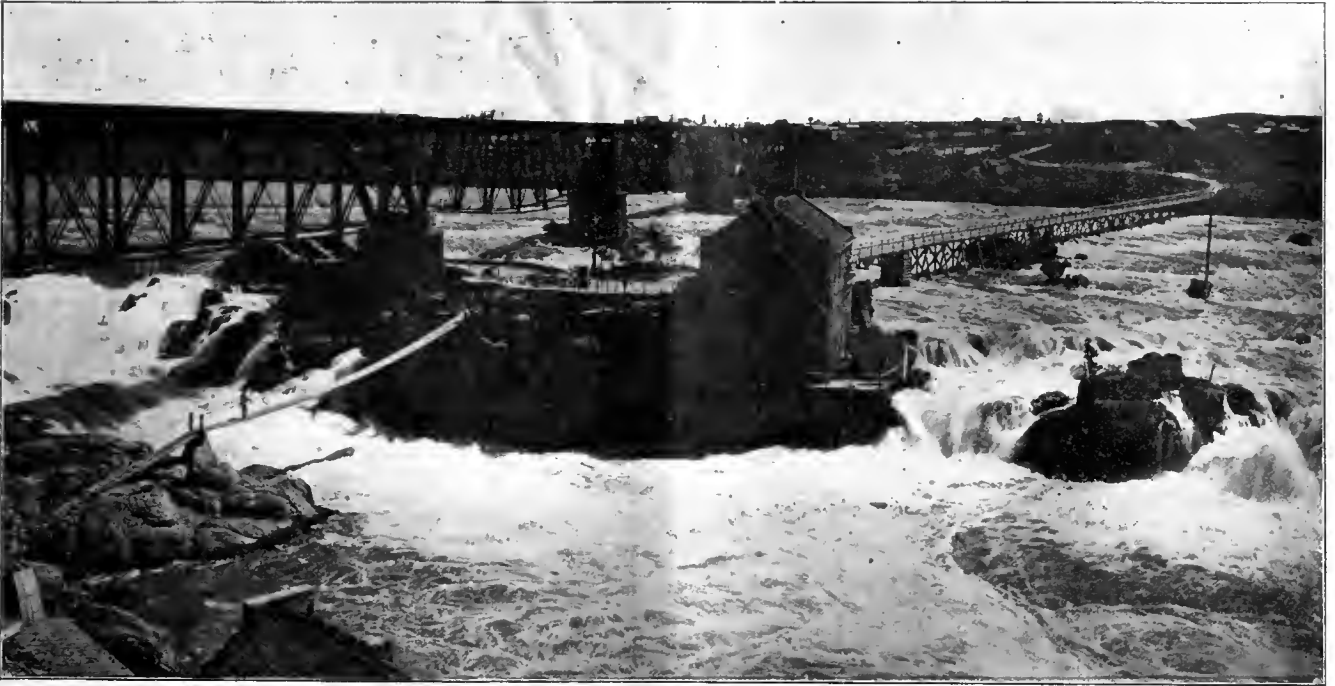
The Irrigation Age

112 Dearborn Street, Chicago

quires a man of intelligence and faithfulness. Mr. Jones is one man in a thousand and it would be difficult to find another who could attain the same results. He says that this proposition he is managing is one of the best in the world—and we can readily see where his judgment is based. The soil is absolutely free from alkali—the bane of the irrigation farmer—and is productive almost beyond belief. The company is contemplating the construction, this fall, of another large reservoir, near the Clark Reservoir and several smaller basins and with added facilities for the construction and application of water the property will be worth many times what it is now selling for.

One of the chief users of water from the Arapahoe Canal is Mr. Rufus Clark, after whom the colony is named. Mr. Clark has made a fortune truck gardening on land to which the Denver Suburban Homes & Water Company now holds the title, having purchased the property last spring. He is known throughout several counties and in Denver as "Potato" Clark, because of the small fortune he amassed in one year in the cultivation of that vegetable. In the October issue we will give some of results attained by Mr. Clark in his gardening of from 125 to 150 acres, and we promise that the figures will astonish the readers of the IRRIGATION AGE.

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1 year, and the Primer of Irrigation



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American Falls is surrounded by immense tracts of productive land, both irrigated and dry farmed, large areas of grazing land, and natural resources and advantages which offer exceptional possibilities and great opportunities for the farmer, the business man and the investor. Located on the main line of a great railway system, an ideal water power at its very door, low freight rates and numerous other advantages make it a logical point for a great manufacturing center.

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Without doubt American Falls offers greater opportunities and possibilities for safe and profitable investments in business and realty than any other point in this prolific and progressive state.

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RESOLUTIONS

(Continued from p. 338.)

That it is the sense of the Fifteenth National Irrigation Congress that the Seventeenth Congress be held at Washington, D. C., when the Congress of the United States is in session, and that a committee of five be appointed by the president to promote the Congress for Washington and report progress to the Sixteenth Congress, at which time it shall finally be determined if a Congress at Washington can safely be undertaken with promise of success; and

That our sincere and hearty thanks be extended to the people of California in general, and to the inhabitants of Sacramento in particular, for their cordial welcome and unflinching courtesy, and for that lavish hospitality under which we have enjoyed not merely the freedom of their State and Capital City, but of their homes.

We extend our thanks to the press for its full and uniformly fair consideration and support.

We thank Governor George E. Chamberlin for the able and impartial manner in which he has presided over our deliberations.

We also express our gratitude to W. A. Beard, chairman of the executive committee, for his intelligent and unceasing labor in making this convention foremost in interest and instructiveness among the sessions of the Irrigation Congress. We also extend our appreciation to all committeemen and city, State and national officials and others, who have contributed to the successful results attained.

CEMENT PIPE TOOLS



Do you want to make money? Here is your chance. Get a set or two of our pipe tools, make up a stock of pipe and do contracting of installing irrigating systems. Your neighbors are wanting something to save water and labor. Here it is. Write for further information and prices. Mention the Irrigation Age. **KELLAR & THOMASON, Covina, California.**

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STANDARD BLACK WROUGHT IRON PIPE

Overhauled, with screwed ends and threaded couplings, suitable for water, gas, oil, etc.

1 inch. Per foot, 4c	2½ inch. Per foot, 14c
1¼ inch. Per foot, 5c	6 inch. Per foot, 42c
1½ inch. Per foot, 6¾c	8 inch. Per foot, 75c
2 inch. Per foot, 9c	

WROUGHT IRON LAP-WELDED CASING.

This Casing is the highest quality pipe manufactured. It only differs from standard pipe in that it is lighter in weight but, being made especially good, it will stand just as high pressure. It is all carefully overhauled and inspected before shipment. Threaded at ends with casing threads, fourteen to the inch. Covered with a preparation of asphaltum and graphite, thus insuring its wearing qualities. Suitable for irrigation purposes, because of its light weight. Freight will be much less than on standard pipe. It is about ¼-inch thickness and is fitted with brand-new casing couplings.

The sizes mentioned below are outside diameter:

1¾ inch. Per foot, 6½c	3¾ inch. Per foot, 16½c
2¾ inch. Per foot, 12c	4¾ inch. Per foot, 20c
3¾ inch. Per foot, 14c	5¾ inch. Per foot, 34c

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1—No. 4 Centrifugal Pump, direct connected to Westinghouse Engine.
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1—No. 5 Belted Centrifugal Pump.
1—16x20x36 Marsh Vacuum Pump.

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We further extend to Professor Ballantyne, the leader, Professor McClellan, the pianist and composer, and to the members of the Ogden Tabernacle choir, our sincere appreciation of their valued participation, which has so largely added to the success of the Congress; and to Hon. Fred J. Kiesel, of Ogden, who was instrumental in bringing this talented organization to Sacramento.

MOUNTAIN HOME, IDAHO

(Continued from p. 340.)

All lands in the vicinity of Mountain Home are irrigated by the one system of storage reservoirs. For three months in the spring all mountain streams are raging torrents and enough waters go to waste each year to irrigate thousands of acres of land. By building these reservoirs in the mountains the water is stored and husbanded until such time as the spring rains cease and is needed for the irrigation. Water from these reservoirs is several degrees warmer than from living streams and crops respond more quickly and do better.

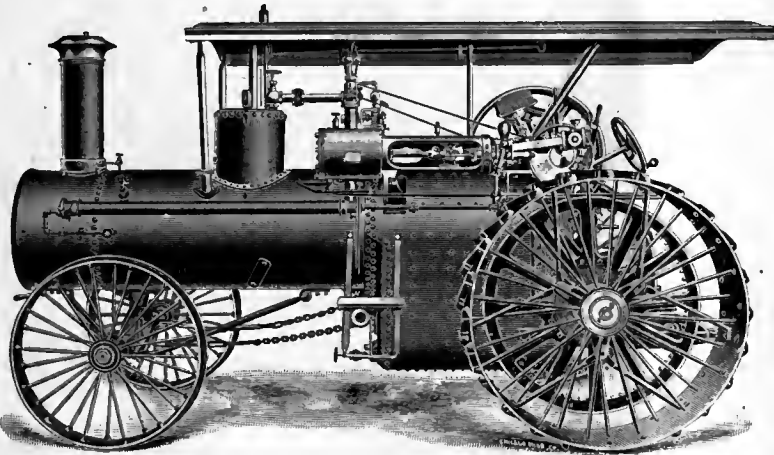
The system of reservoirs forms a chain of separate basins, the first two miles from Mountain Home, the second fifteen miles north, the third twenty-five miles northeast, and the fourth fifty miles northwest of the lands to be irrigated. The first reservoir, two miles from Mountain Home, has been completed at a cost of seventy-five thousand dollars. The dam is one mile in length, sixty feet high and forms a lake six and one-half miles around the contour line. The second reservoir is located at the lower end of Long Tom Basin. The Long Tom reservoir was completed in 1905 to the height of 60 feet, and cost \$80,000.

The next reservoir is that of Little Camas, located at the lower end of Little Camas prairie, and at a junction of Cat and Little Camas Creeks. This reservoir stores and distributes enough water annually to cover

forty thousand acres of land one foot deep. The Little Camas reservoir is beyond the divide, and it is not a tributary of the Snake River, but empties into the Boise instead. To conduct the water from Little Camas reservoir to the lands of Mountain Home required the construction of a connecting canal fourteen miles in length and one and one-half miles of tunnel through the mountain divide. Portions of this canal cost \$20,000 per mile, while the tunnel alone cost over \$80,000. Work on the fourth reservoir has not been completed. This reservoir is known as High Prairie reservoir and is one of the most ideal locations in the West. The basin is five miles in length and an average of two miles in width. A dam 30 feet in height will store enough water in the reservoir to cover 192,000 acres of land to a depth of one foot, enough water after making all deductions to irrigate 64,000 acres of land.

The company had been at work continuously on this irrigation project for nearly six years, and has expended a vast amount of money. Some of the best engineers of the country have examined the project and have approved the plan and specifications which are being followed out by the construction company. This system will be completed next year.

Lands in this vicinity are open to settlement under the Desert Land Act, whereby any American citizen who has not exercised the right of entry out of the homestead or other laws, to the extent of 320 acres, since June 30th, 1890, may enter 320 acres. If the homestead right has been used since June 30th, 1890, then only a quarter section of land can be entered. The price paid the government for desert land is \$1.25 per acre, 25 cents to be paid at the time of entry and the remainder at any time within four years.



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Perpetual water rights to land under completed ditches sells at \$30 per acre. The best land is to be obtained within a radius of from five to ten miles of Mountain Home. Good terms of payment are made for perpetual water rights. A perpetual water right carries with it the right to demand and receive annually, perpetually and continuously during the irrigation season a sufficient amount of water to keep the lands properly irrigated.

Anyone wanting information about Mountain Home or any section of Southern Idaho may secure same by addressing Secretary of Commercial Club, Mountain Home, Idaho.

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Today the great opportunities in farming, in cattle-raising, in timber and in commercial lines are in the country and in the towns along the Pacific Coast extension of the

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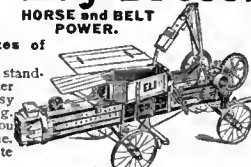
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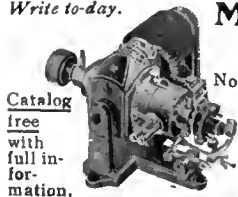
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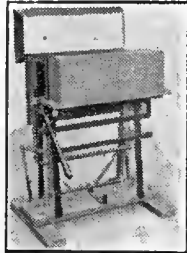
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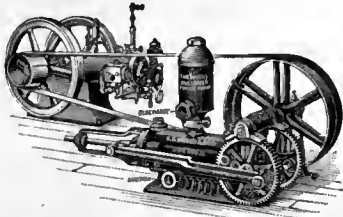
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MYERS POWER PUMPS

WITHOUT AN EQUAL ON THE GLOBE



OPERATING
WITH
GAS ENGINE

FIG. 952

MYERS
BULLDOZER
POWER
PUMP

5" Cylinder

FIG. 800

HORIZONTAL BULLDOZERS, 3" TO 6" CYLINDERS

MYERS
BACK GEARED
WORKING
HEAD

TAPPED FOR
3" PIPE

5, 7½ AND 10"
STROKE

FOR BELT,
WIND OR HAND
POWER

FIG. 1113

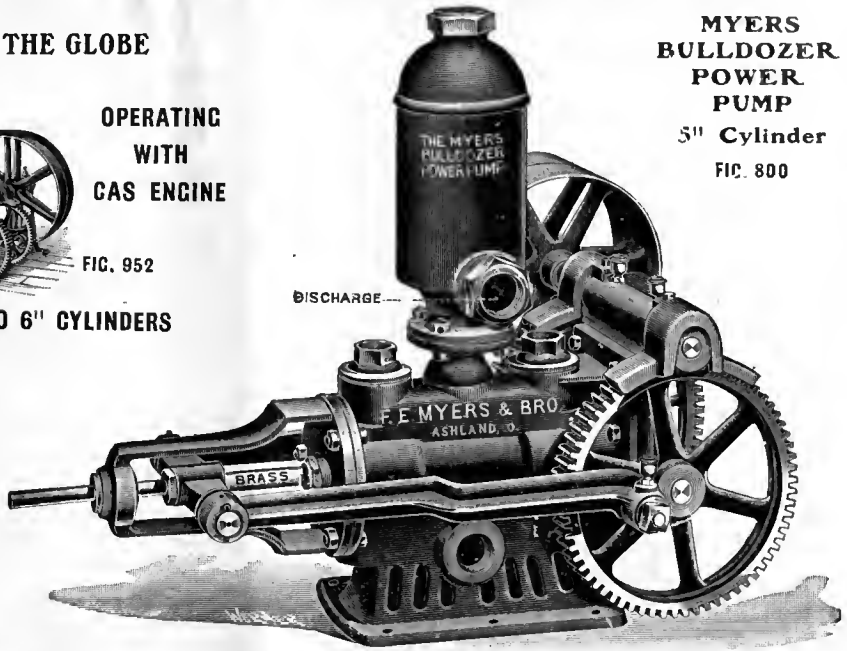


FIG. 1079

BULLDOZER
WORKING
HEAD

BULLDOZER PUMP
6" BRASS LINED
CYLINDER

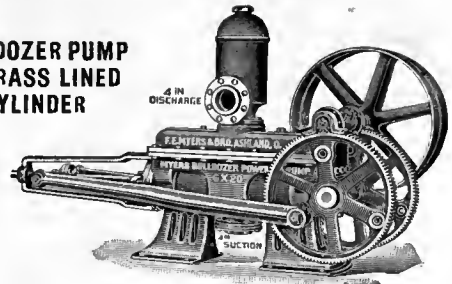
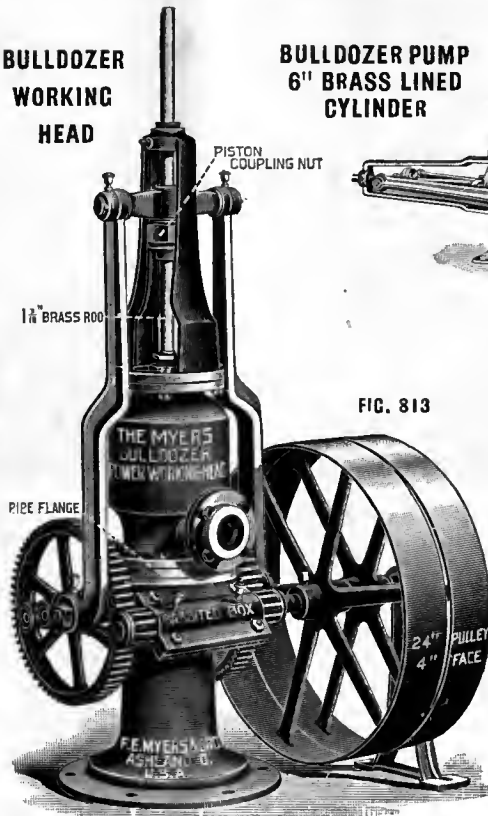


FIG. 813



MYERS BULLDOZER
WORKING HEADS

NO. 359

5", 7½", 10" STROKE
DISCHARGE 2½" OR 3"
SUCTION 2" TO 4"

NO. 364

12", 16", 20" STROKE
REGULARLY FITTED 4"
DISCHARGE
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There are three new towns in this Opening—Milner, Jerome and Wendell. Surveys for an electric railroad reaching all the towns have been made and active construction from Milner and Jerome commenced August 1st, 1907. The contract from Jerome to Wendell will be let later in the season.

Special rates will be given on the O. S. L. to reach Jerome where the opening takes place October 1st. Take O. S. L. R. R. to Shoshone or Twin Falls where stages will make frequent trips to Jerome.

For full information, circulars and printed matter,

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Twin Falls North Side Investment Co., Ltd., MILNER, IDAHO

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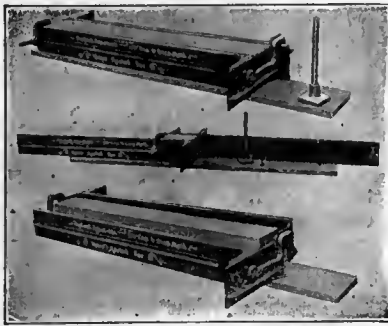
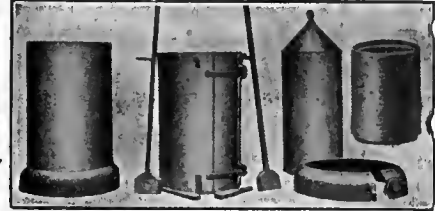
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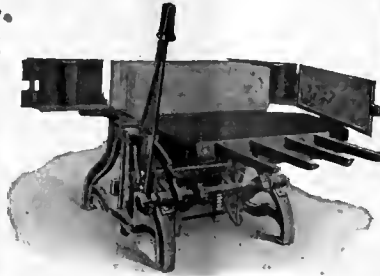
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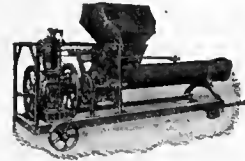


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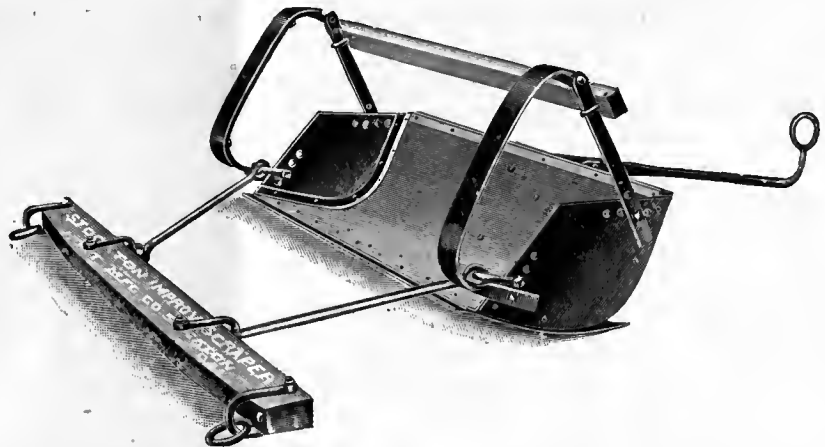
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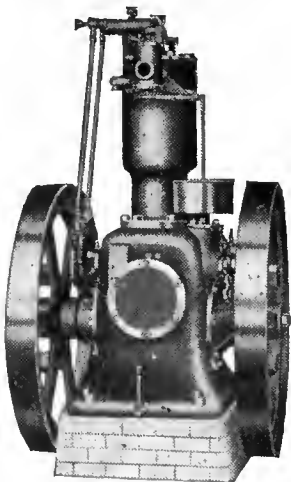
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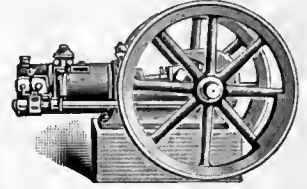
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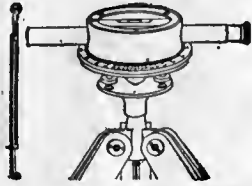
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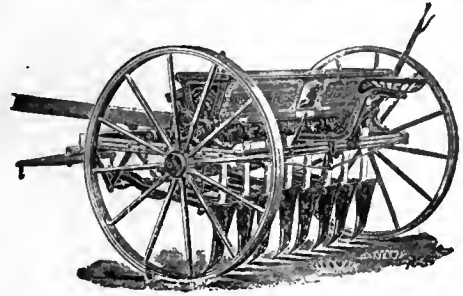
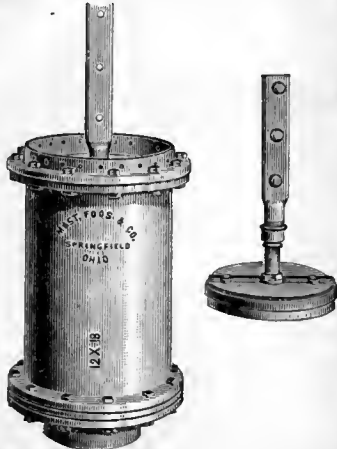
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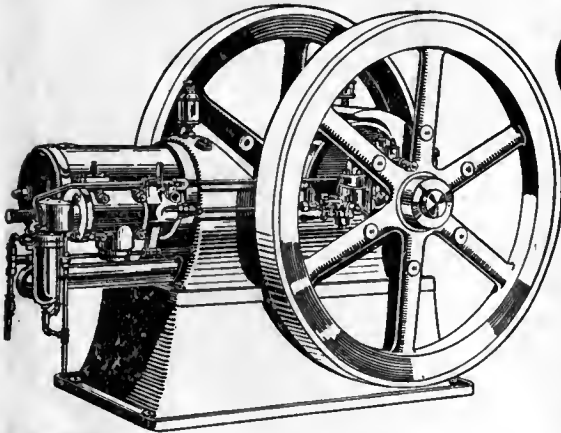
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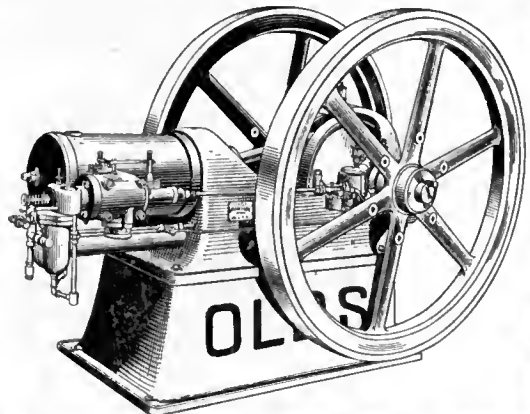
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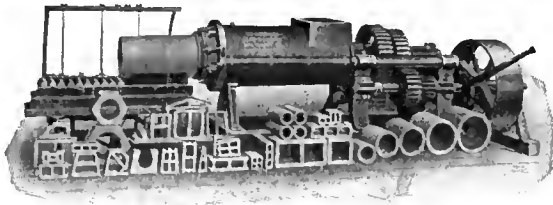
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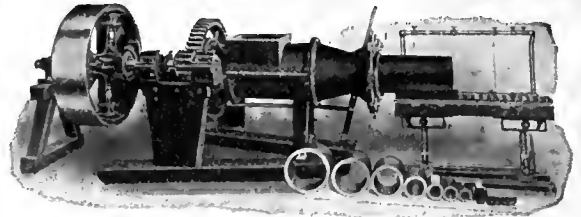
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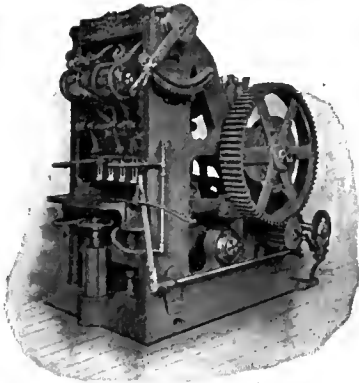




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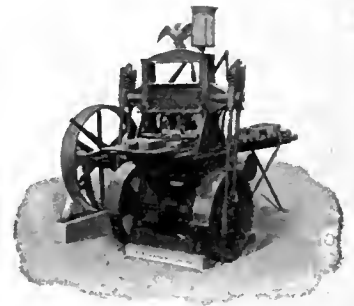
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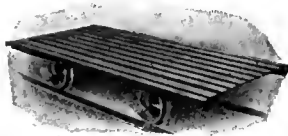
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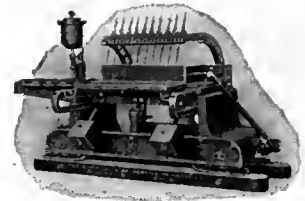
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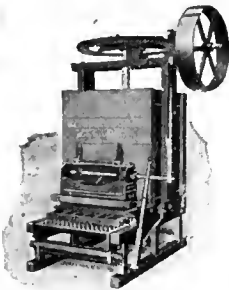
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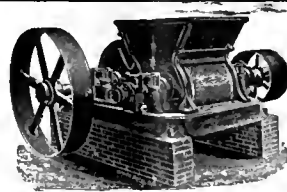
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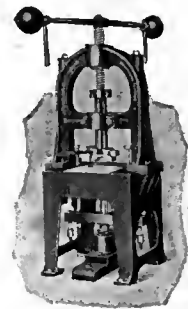
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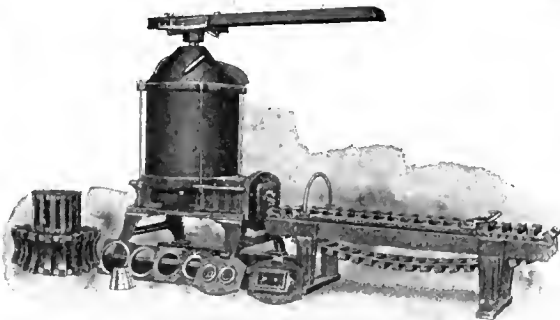
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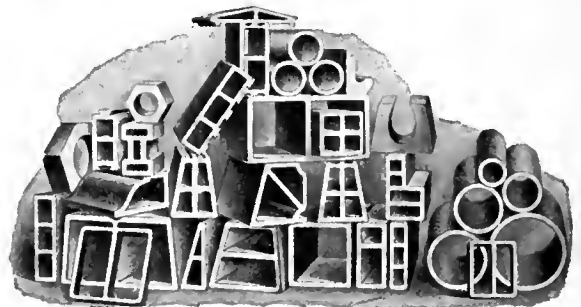
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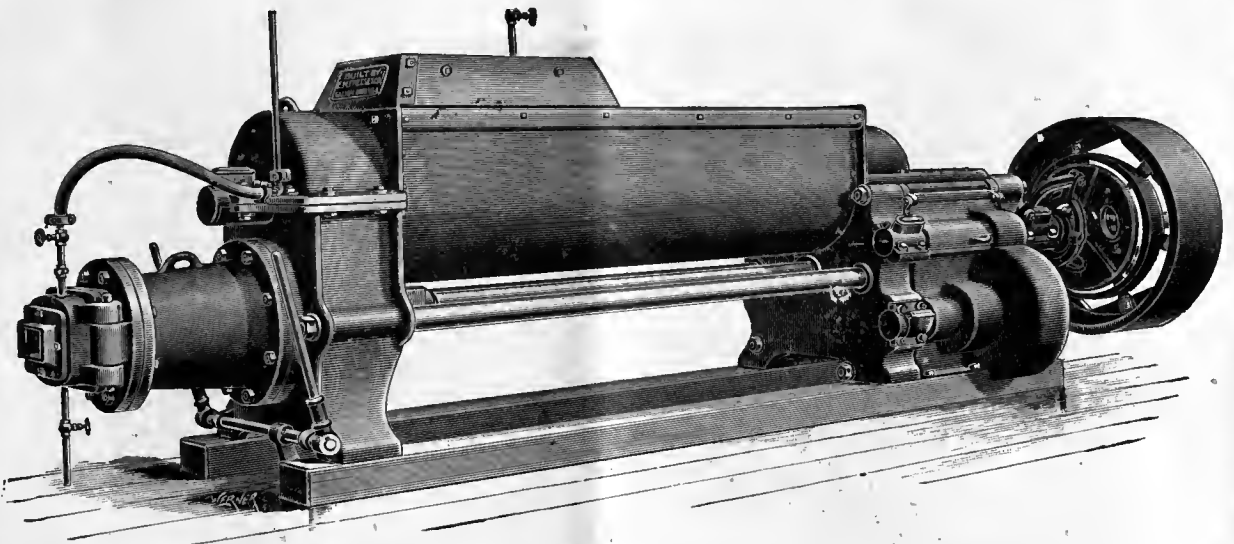
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THE IRRIGATION AGE

VOL. XXII

CHICAGO, OCTOBER, 1907.

No. 12

THE IRRIGATION AGE

With which is Merged

MODERN IRRIGATION
THE IRRIGATION ERA
ARID AMERICA

THE DRAINAGE JOURNAL
MID-WEST
THE FARM HERALD

IRRIGATION AGE COMPANY,
PUBLISHERS,

112 Dearborn Street, CHICAGO

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D. H. ANDERSON, Editor
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In our November issue we will present to our readers an article by Prof. E. Larkin, Director of Lowe Observatory, California. This article will treat of the scientific character of the papers presented at the National Irrigation Congress and will be found highly interesting.

The first opening of land under the Carey act in Colorado occurred September 5, when the Little Snake River valley, in Routt county, was thrown open. The area comprises some 50,000 acres, which will be watered by a canal dug by the Routt County Development Company of Denver. The land itself was sold at fifty cents an acre and the water right went at \$25.00 an acre, insuring the holders of titles one cubic foot of water per second for each eighty acres. A payment of five dollars down was required on the water right, while the balance ran over a term of years at six per cent. Each right includes a share in the Little Snake River Canal system, a canal sixty-five miles long, with a re-inforcing reservoir of 35,000 acre feet capacity. When the water rights are all sold out the canal system will be turned over to the settlers. The altitude of the valley varies from 5,400 to 6,200 feet, and the soil is red, sandy loam. Work on the canal is being rushed and will be pushed to completion before many months. Several Colorado railroads are planning to extend their lines into the district.

Our cousins, the Canadians, who are calling so urgently to us to come and settle in western Canada to grow wheat, and who point us so frequently to the large average per acre which they secure, from 25 to 35 bushels, were doubtless interested to read in last month's *IRRIGATION AGE* of a crop of 58 bushels of wheat per acre raised by a farmer near Fort Collins, Colo.

We believe that the time is not far distant when tile sub-irrigation will be one of the phases of the irrigation problem with which engineers will have to deal. In the more thickly populated sections of the irrigated regions the adoption of tile sub-irrigation seems inevitable. These sections are becoming more generally settled each year, and private enterprise and the Reclamation Service are meeting the demand for additional water made necessary by this influx by the building of reservoirs for conserving the supply of flood water for application in time of need. Notwithstanding this preparation for the future there will doubtless come a season when the number of water users will deplete even the storage water supply. It is to forestall that time that tile sub-irrigation must sooner or later be gotten under way. The process is as yet only in the experimental stage, but even so far as it has gone it has shown that there is a great saving in the amount of water used. And before many years we believe that many of the projects to be constructed will be built something like city water mains, the water being run through pipe.

For each year the value of water in this western country is being better appreciated and the enterprise which constructs a system where there is no loss by seepage or evaporation will be able to draw larger prices for its land.

This Paper. THE IRRIGATION AGE is undertaking a campaign this fall to increase the number of its readers. We have now a circulation of a little over 33,000. To your mind, does that properly represent the great irrigated districts of the West? Hardly. We should have nearer another cypher to that figure—330,000.

This interests you if you are interested in the West. This paper is the only distinctive irrigation journal in the country. It not only goes to western folks, but to people all over the eastern States. It keeps these eastern readers in touch with what is going on in the West—with the wonderful opportunities that are constantly open there. In that capacity it is constantly adding new citizens to your community, and in this manner should interest you.

Heretofore little effort has been put forth toward circulation increase. It has grown naturally. But we realize that in future, as in the past, THE IRRIGATION AGE will be great and influential in exact proportion to the size and character of its circulation. It is our ambition to make it one of the foremost magazines of the nation. Why? Because, first, that is quite a natural aspiration for a publisher; second, is not the country and the enormous interests represented worthy of such a journal? Does it require great imagination for a live westerner to see a wonderful future for the West, when even a small proportion of the present irrigation projects have been completed and the lands have been made to blossom as the rose? And we are not only interested in the fruitful reclaimed regions, but in the whole West as well.

So as a reader of this journal we solicit your continued good will. If the liberal clubbing and premium subscription offers in this issue catch your attention, kindly mention them to several neighbors. Let them also subscribe. If one neighbor of each of our present 33,000 readers should order the paper, our circulation would immediately jump to 66,000!

We hope to enlarge each issue, and give you a more valuable, more interesting magazine each month from now on. We want to develop along the line of a high class magazine, containing complete irrigation news, splendid articles on various western sections, Horticultural and Agricultural departments, and articles and stories of human interest.

How to Colonize.

We are publishing in this issue an article by Prof. Samuel Fortier, Office of Experiment Station, Department of Agriculture, Washington, D. C., delivered before the National Irrigation Congress at Sacramento, California, September 4, 1907. This article will be found highly interesting to those who are giving any thought to colonization of the large areas now being reclaimed under the National Reclamation Act.

The last Congress dealt with a large variety of subjects, but few were closely related to the subject of irrigation, and in the article Professor Fortier suggests that we had better go back as rapidly as possible to a consideration of the vital issues pertaining to irrigation.

From a perusal of the article it would seem that for some time to come our greatest problem will be the successful settlement of the land, for which water has been provided. It will be seen also that about 5,000,000 acres will soon be ready for settlement. The magnitude of this task is only realized when one recalls the fact that it has taken 60 years to reclaim 11,000,000 acres. The problem would not be so serious if the large systems that are nearing completion cost no money to maintain and operate. This large expenditure called for each year will force settlement, but Professor Fortier intimates in his article that he is inclined to think that the number of desirable settlers that the West can obtain in the next few years will fall short of the number required to place all our systems on a paying basis.

In a way, Professor Fortier is in line with suggestions that have been made from time to time in the editorial columns of THE IRRIGATION AGE concerning the advisability of some arrangement or law, whereby a given sum could be used to assist in the colonization of the large areas now being reclaimed. As suggested in a recent issue, it may be found necessary by Congress to pass a law which will allow from \$3.00 to \$5.00 per acre to be applied to the colonization of these lands by desirable citizens from farther East. It is well known that the land holders throughout the western country gladly pay \$5.00 per acre to colonization agents, and it is reasonable to suppose that the men who receive the \$5.00 per acre for colonizing a given tract will be more likely to secure desirable settlers than will the Government under its makeshift system of advertising the opening of new projects. Perhaps the head of the Reclamation Service and his numerous assistants have given thought to this subject and have prepared some remedy. If so, it is time that action was taken and the public let into their confidence.

THE IRRIGATION AGE will be glad to publish suggestions which may be sent in by any of its readers along the lines indicated.

THE GREATEST NEED OF ARID AMERICA.

By Samuel Fortier—Office of Experiment Stations, U. S. Department of Agriculture (Delivered Before the National Irrigation Congress at Sacramento, California, September 4, 1907.)

Opinions will differ as to what constitutes the greatest need of arid America at the present time. The numerous wants of every new, sparsely settled region are not readily supplied. When the region embraces two-fifths of the area of the United States and holds within its confines the destiny of fourteen young commonwealths its needs are multiplied many times. The remedies proposed are as varied as the conditions and obstacles. Better and cheaper transportation is one man's remedy, more capital to develop our resources is another's, while a third is in favor of establishing manufactories. Many favor the further construction of irrigation canals and storage reservoirs and the preservation of the forests as the best means of benefiting the West.

While these and others that might be named are destined to play an important part during the next few years, none is deserving of a first place. In my humble opinion none of these are so important as the establish-



Prof. Samuel Fortier.

ment of prosperous rural homes in the sparsely settled irrigation districts of this country. When one reviews the conditions which exist in the West today he is forced to the conclusion that our greatest need is to obtain a sufficient number of desirable white settlers and to assist them to such an extent that they will be able to overcome the difficulties peculiar to a new farm and to establish happy and prosperous homes.

In the brief time at my disposal I shall try to convince you that the West has reached that stage in its irrigation development when a large number of industrious settlers are an absolute necessity if success is to be attained. I shall endeavor to convince you that the rapid construction of irrigation works during the past

few years is likely to progress far in advance of the actual settlement of the lands reclaimed and that unless settlement follows closely after construction much money will be lost in the maintenance of these works. Since, also, the main object of all irrigation works is to render the soil productive and since the presence and labor of farmers are necessary to accomplish this end, it will be my endeavor to point out ways and means of assisting the farmer in this most important task.

LANDS OPEN FOR SETTLEMENT.

It is sixty years since Americans first began the practice of irrigation. Their efforts in that time have resulted in the settlement and cultivation under irrigation of something like eleven million acres. Of this total about ten million acres are to be found in the arid states and territories. The conversion of so large an area of barren sands into productive farms and orchards and the establishment of the many industries which these fields and orchards foster and maintain has not proceeded with any great degree of regularity. There have been decades when little progress was made and these have been followed by periods of the wildest expansion. In no period of the past has such progress been made in the construction of irrigation works as has followed the passage of the Reclamation Act of 1902. At no other like period in the history of the West has so large an area been thrown open for settlement. This is shown by the following figures:

Two or three weeks ago I sent requests to a large number of state engineers, canal superintendents, land commissioners and others for the purpose of ascertaining with some degree of accuracy the extent of unimproved lands provided with water rights which would be open for settlement in 1908. The most conservative of the estimates received from nine Western States and territories are as follows:

Reclamation projects.....	1,100,000 acres
Carey Act projects	975,000 acres
District organizations	400,000 acres
Private enterprises	1,300,000 acres

Colorado, Montana, Kansas, Nebraska, Oklahoma and Texas are not included in the above estimates. It is, therefore, no exaggeration to state that there will be five million acres ready for the plows of the new settlers before this Congress meets again. This means 100,000 families, number half a million people, and half a million more will be needed to occupy the towns and villages that will be created and to carry on the many industries which five million acres of intensively cultivated land is certain to develop and to foster:

It would not be so difficult to secure a million people if all were permitted to come without reference to means, credentials or color. The indolent and shiftless beings who crowd the unhealthy tenements of eastern cities might be induced to migrate, but only a small percentage of these have strength of either mind or body to become successful farmers. The large majority of this class would retard rather than advance the interests of western communities.

Again, if we were to open our gates to Asia's millions there would be no difficulty in placing a yellow family on every ten-acre tract. But the people of the West, and especially those of the Pacific Coast States, believe these productive plains and valleys bordering on the Pacific, barricaded by mountain fortresses and watched over by the silent peaks of a Whitney, and a Shasta, a Ranier and a Hood, were destined by the Almighty for a white man's country.

It is true the West needs settlers, but its needs are not so great that it can afford to adopt every one who crosses either the Pacific or the Missouri. The opportunities which it has to offer in the way of soil, climate, products and social conditions are such as ought to make the best class of citizens eager to come. It is to this class of citizens that the West is extending the warmest of welcomes. It wants the sons and daughters of the pioneers of the Mississippi Valley who have grown tired of raising corn to try the more interesting and more profitable irrigated agriculture. It stands ready to hand over its dairies to the Norsemen, its sugar beets to the German and its vineyards to the Italians. With one hand towards New England and the other towards the South, it extends an invitation to the children of both Puritan and Cavalier to settle in the West and blend forever into the highest type of civilization what is best in both races.

CONSEQUENCES OF FAILURE TO OBTAIN SETTLERS.

What if the West should fail to obtain a sufficient number of the right kind of settlers? The consequences could not but prove disastrous in direct proportion to the number of farms left tenantless. Were this to happen the states and territories west of the Missouri River would be in a condition similar to the stockholders of a splendidly built hotel, with costly equipment, who are compelled to run it at a loss, because of the small number of paying guests. Like the commodious hotel, the large irrigation system costs nearly as much to maintain and operate for a small number of widely scattered farms as for the entire acreage under it.

Those of my hearers who lived in the West during the latter half of the 80's and the beginning of the 90's know something of the large number of irrigation enterprises which were then projected, of the mad rush to acquire rights in streams and of the millions that corporations hoped to make by the sale of water rights and the collection of water rentals. When the crash came in 1892 and 1893 I was in charge of an irrigation system in one of the Rocky Mountain States. This system was begun in 1889, and in three years \$2,100,000 had been expended on its construction. The plan was to irrigate 200,000 acres by selling water rights at \$10 per acre and collecting an annual rental of \$1 to \$2 per acre. The men who put money in this undertaking lost all the interest and the greater part of the principal. The water supply was abundant, the system was substantially built, but failure resulted in not being able to get enough settlers to cultivate the land and use the water. Ten years after beginning construction only 14,000 acres were irrigated and of the total one-half belonged to the canal company. The maintenance and operation expenses of so large a system could not be reduced beyond a certain limit and this limit was always far in excess of the revenue derived from water rentals.

The record of this enterprise is similar to scores of others that might be given. Probably 95 per cent of

the capital invested in canal enterprises from 1885 to 1895 produced no dividends, and much of it was entirely lost. Many causes contributed to this end, but the three which stand out prominently were the heavy annual expenses in maintaining and operating new systems, the long delay in securing settlers and the inability on the part of many of those who did come to expend considerable money and from one to two years of unprofitable labor in putting desert land in a condition fit to cultivate and irrigate.

While I have no desire to dampen the ardor of this large audience, yet it is a fact that the same causes which wrecked so many irrigation enterprises fifteen years ago are operating today, and unless measures be taken to overcome their effects promising enterprises will result in failures.

Western enthusiasts tell us the irrigation problem is solved, and to confirm this view they point with pride to the construction work that has been done during the past five years. We are told that over seventy-five million dollars have been expended in that time under federal, state, district and private enterprises in providing water supplies. We all rejoice in the accomplishment of so great a task, but a greater task is still to be done. The irrigation problem is only half solved. Statesmen and capitalists alike have failed to realize that no irrigation enterprises can be successful without farmers and that it is the labor of farmers which determines the value of such properties. Corporations and districts may organize for the purpose of utilizing the streams, contractors under the Carey Act may provide water for thousands of acres of sage brush land and Government engineers may erect the finest of structures for the storage and diversion of irrigation water, but all these will prove expensive luxuries without the co-operation of the strong arm, sound judgment and tireless energy of the agricultural classes.

This brings us face to face with the weak feature of every plan yet adopted by the American nation for the reclamation of its arid lands. It also forces upon our attention the great task yet to be accomplished of reclaiming and planting five million acres of worthless desert. Before any harvests can be obtained on this new land it will cost on an average over \$20 per acre. This represents \$100,000,000. Now, neither the Carey Act nor the Reclamation Act provides for any competent supervision in the expenditure of this sum. The preparation of the soil, the construction of ditches, the selection and planting of crops, proper cultivation and irrigation are to be handed over to inexperienced settlers.

Again, the settler is forced to do this work and expend his small savings at a time when he can least afford it. His farm is still a desert. The best crops require from one to five years before yielding any profits. First year alfalfa never made any man rich, small fruits bear the second year, grapes and trees the third year. The heaviest expense comes at a time when there is little or no income. Do you wonder, then, that the weak link in our much boasted schemes of irrigation snaps under the strain, leaving a farm tenantless, a home abandoned?

Perhaps I can convey a clear idea of the assistance which might be given to new and old settlers alike by a brief reference to work recently done in California. Four years ago the California Legislature provided for the joint investigation with several branches of the Federal

Government of the water and timber resources of the State. A part of the investigations was to consist of some of the difficulties with which farmers in irrigated districts have to contend, and was placed in charge of the United States Office of Experiment Stations. It has been my good fortune to have been connected with this work since its inception. The scope of the investigations has included the operation and maintenance of canal systems, the equitable distribution of water among users, the building of farm ditches, the preparation of land to receive water, the prevention of waste, the cost of pumping water, the drainage of irrigated lands, the effect of water on crops and the various influences and conditions which tend to retard or advance the interests of rural communities in irrigated districts.

A part of this work was new, and in its execution mistakes have been made; but the people of California have been indulgent and all classes have been willing to assist whenever an opportunity presented itself. I have not heard a single word of criticism or a doubt expressed as to its value.

HOW SETTLERS ON IRRIGATED FARMS MAY BE ASSISTED.

This attitude on the part of the people of California has led me to offer a few suggestions to this Congress regarding the proper measures to adopt to guard against the failure of irrigation enterprises by bringing timely assistance to those upon whom rests the tremendous responsibility of paying for both land and water, and of making both profitable. Give one of this worthy class from three to five years to get his land in shape, fences built, ditches dug, buildings erected and profitable crops started, and he will be prepared to meet all reasonable obligations. A few years later he may have a large bank account. But place the same burdens on the settler of limited means at a time when he is spending both time and labor on improvements, with little or no income, and the chances are you will crush him.

One of the suggestions I have to offer is that the settler for the first and second years of his occupancy be relieved of all payments on both land and water. Instead, he should obligate himself to improve his holding to the extent of a fixed sum per acre each year. Canal companies that control both land and water and contractors under the Carey Act can afford to grant this concession. On Government projects if the time allowed to pay for a water right cannot well be extended to twelve years there should be adopted a sliding scale of payments.

Another suggestion which I have to present is some measure of relief for the new settler from the burden of taxation. A few Western States levy no taxes on grapes and fruit trees until they bear. This exemption should be extended as far as it is safe and practical to every immature crop and to every Western State and territory.

Communities in newly reclaimed districts can likewise be assisted by the use of sufficient capital to establish such industries as canneries, creameries, etc. These should be organized on the co-operative plan in such a way that the farmers interested will in time become the owners. Poor settlers are not able to start these industries and for lack of them their tomatoes and other vegetables are fed to stock and their dairy products cannot be marketed.

But none of these means of assistance touches the vital part of the irrigation question. That part is sim-

ply this: Five million acres will soon be ready for settlement. An outlay of over \$100,000,000 is required before homes can be established and crops marketed. Who will supervise the expenditure of this vast sum so that it may be put to the best possible use? If it is right and proper to employ the best engineering talent to design and supervise irrigation structures, the same necessity exists to employ men of equal skill to supervise that part which belongs to the agricultural side of irrigation. A teamster cannot bring his load to market if one horse drops by the wayside. In every irrigation undertaking the farmer is the off-horse, and no venture of that kind can succeed unless he does his part.

If this view be correct, fully a thousand skilled men could be profitably employed under the more recently built irrigation systems. These men should be familiar with all the details of farm work and of irrigated culture and possess sufficient engineering and scientific knowledge to enable them to direct and supervise the work of converting a desert into a highly productive irrigated farm. Canal companies, irrigation districts, State and federal governments should share in the expense of maintaining this force.

I leave to abler men the task of formulating plans for the most efficient organization of this force. What I particularly desire and advocate is the enlistment of every useful agency in support of the home-builder. These agencies may work independently of each other or they may work in co-operation. Canal companies, for example, may employ with profit to their shareholders skilled men to direct the labors of inexperienced settlers. This kind of assistance has been given under Carey Act projects in Idaho and its value has been fully shown. The conversion of five-dollar grazing lands into one hundred-dollar alfalfa land and five hundred-dollar orchards is of vital interest to every western commonwealth and each can afford liberal appropriations to help those who produce such changes. Reliance must also be placed on Western States and territories to maintain in the highest state of efficiency the irrigation work of western Experiment Stations. The small sum which is annually appropriated by Congress for this purpose is not enough to maintain a dozen lines of investigation, and too frequently the funds which should be given to this basic industry are devoted to less important subjects.

Dr. Mead has spoken of the irrigation work of the Department of Agriculture. As a member of that staff, I may be permitted to state that the field has always been so large and the problems so numerous that we have not been able to cover more than a small part of the total irrigated area. The demands of the old settlers under irrigation have taxed to the utmost the energies of our small force, and now a new difficulty is presented. The new as well as the old settlers are clamoring for advice and assistance. Instead of 11,000,000 acres to look after, there will soon be 17,000,000, and we have neither the means nor the men to meet this demand.

One word in conclusion. In directing your attention to what seems to me to be the greatest need of arid America I have been obliged to present the dark side of the picture. I hasten to assure you this course has not been taken in order to discourage settlers, but rather to aid them. I believe so thoroughly in irrigation and in

(Concluded on page 379.)

A GREAT IMPROVEMENT IN FLUME CONSTRUCTION.

In the great strides that are being made throughout the world in the construction of power and irrigation canals, it is probable that no improvement has been done more to facilitate this work than the Maginnis Clamp Joint or Splice, which has made it possible to substitute steel for wood in flume construction. The Maginnis Galvanized Steel Flume has passed the experimental stage and is now recommended and used by all engineers and canal builders who have had experience with it, or who have seen it used.

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has now been in use two years, and is in every way as perfect as when first erected. It has remained dry for seven months of each year, exposed to the sun and wind without the least injury. This flume will continue to do this work, carrying the water required during the irrigation season, and remaining dry and exposed to all climatic conditions during the remainder of the year, without care and expense, and will last as long as the substructure will stand. The first steel flume was put in by this company in 1904 and proved so satisfactory that the one here shown was erected by the same company in 1906, and this year a third flume has been erected for them with a 14-foot perimeter, which shows their feeling toward steel flumes.

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The Property of the Denver Suburban Homes and Water Company

More about the property south of Denver. Some of the results obtained by "Potato" Clark. Improvements and enlargement of the water supply system being planned.

(Continued from September issue.)

At the time of the great Chicago fire, in 1873, Mr. Rufus Clark of Denver was engaged in the cultivation of potatoes in Colorado. His property lay south of the city of Denver, near what is now Overland Park, one of the large athletic grounds of the capital city, and now part of the city itself. Mr. Clark had had a good season, which, combined with a thorough and scientific knowledge of agriculture, had produced an immense crop of potatoes. When the government came to the aid of the fire-stricken city it became necessary for the au-

agriculture. One fall he had an excellent yield of watermelons. At the time watermelons were decided luxuries in that part of the country, and Mr. Clark, with an innate keen business sense, saw an opportunity of making large profits from his harvest. So, rather than take it to the few stores then existing, he sold his melons in a unique way. He would drive his wagon down Fifteenth street to the corner of one of the best patronized cross streets and at auction would sell his melons. Not only were the miners anxious to obtain the fruit for the sake



View of Castlewood Lake, Showing Company House.

thorities in charge to look to the West for many of the supplies. Mr. Clark's immense crop of potatoes was brought to their notice, and they asked him to set a price on the entire production. Mr. Clark made an offer and it was accepted by the government. The price was \$35,000—truly an enormous sum for one season's yield. And that is how Mr. Clark obtained the sobriquet of "Potato" Clark—a name by which he is known throughout the State of Colorado.

Another incident of Mr. Clark's experience in tilling the soil is well worthy of mention. When Denver was a gold camp he was not one of the many who were attracted by the lure of precious metal. He stuck to

of the fruit itself, but it really became a fad—this buying of watermelons. A man who could not purchase one was as much an alien in the social circles of the embryo city as would have been a drummer for toilet soap. In the parlance of today people "went wild" over "Potato" Clark's watermelons and the prices the fruit brought were correspondingly high. The medium of exchange in those days was gold dust, and some of the melons went to the highest bidder for ten dollars' worth of the precious metal.

Mr. Clark was at one time the owner of practically all the land now owned by the Denver Suburban Homes & Water Company, having obtained title to it through

purchase from the Union Pacific Railway and the United States government. He is an old man now—what most of us would call old, although he considers that he is in the prime of his career—having passed the four-score mark. He is unusually active for a man of his years and is even now making extensive plans for future work. This is his last year at agriculture in Clark colony—which, by the way, is named after him—the property having been purchased by the Denver Suburban Homes & Water Company, but he has other property and recently remarked that in ten years, with good care and intensive cultivation, he believed he could make that land (now unbroken prairie) as productive as the property he has just sold in Clark colony.

But all this is not to the point. I started out to tell of Mr. Clark's achievements in raising successful and prodigious crops on his Clark colony land. A few years ago he had 120 acres under cultivation in cabbages, turnips and onions. The net profit on this crop was \$11,000. Another season the yield brought \$13,000. Cabbages have never failed to realize at least \$300 an acre, and the profit from other crops have been proportionate. Mr. Clark raises what the Middle Western farmer calls "garden truck" exclusively—that is, cabbages, onions, turnips, beets, carrots and the like and does not attempt the cultivation of hay, grain or fruits. He finds a market for everything in Denver, some thirteen or fourteen miles distant from his Clark colony property. Cabbage especially does well on the land, the heads being sound and large. The particular section that Mr. Clark has been cultivating the past few years has been surveyed and platted into five and ten-acre tracts, which have been readily sold to prospective settlers at \$250 an acre, and by next year it is expected that twenty or more homes will be erected.

The fact that Mr. Clark does not raise fruit does not mean that the soil is not adapted to its cultivation. One mile south of the Clark "cabbage patch," as it is dubbed, is a twenty-acre ranch owned by a Mr. Blinn, who has devoted much of it to the raising of small fruit. This season in Colorado, as elsewhere, has not been a good one for fruit, late frosts killing the buds and preventing the development of fruit of all kinds. Mr. Blinn did not uncover his strawberries until late, and as a consequence had a good yield of that luscious fruit. He estimates that an acre and a half netted him over \$400, while an acre of raspberries did equally well. Tree fruit, such as pears, apples, cherries and peaches, are not extensively raised, although farmers have within the past two years set out many trees of these varieties, and it is not unlikely that within a few years Clark colony will be one of the noted fruit growing sections of Colorado.

Sugar beets are not raised to any great extent south of Denver, and I know of no instances of any being cultivated in Clark colony. The reason of this is not because they cannot be raised, but rather because the farms are too small to permit turning over the land for such a purpose. And, then, sugar beets are largely used to replenish the soil—a process which has not yet become necessary there. One thing that I saw rather opened my eyes and that was several rows of tobacco growing as luxuriantly and as large as it does in southern Wisconsin. It was probably for domestic use only, as there was no large quantity. I mention it simply to show the fertility of the soil.

One of the most interesting features of construction on the line of the Arapahoe canal are the pipe lines. These are of wood and outlast the ordinary wooden flume many years. The leakage from them amounts to almost nothing, especially the new ones. The pipes are less expensive in the long run and perform infinitely better service. The process of construction is tedious and hard, but it saves labor for repairs later on. The receiving end of the pipe is generally placed a few feet higher than the discharging end. The diameter of the pipe varies from eighteen inches to two feet. The lumber used is inch plank and every foot is an iron band tightened by a nut. A trench is dug down the bank of the washout and up the other side, forming a huge semi-



View of Ditch in Gorge Near Castlewood Lake.

circle; the pipes are laid in it, and then are covered with soil. After the water once gets into the pipes it remains there, whether or not water is running in the ditch, thus preventing the alternate shrinking and contraction of the timbers which so lessens the period of usefulness of a flume. The illustration in this article shows the construction of a pipe line at Scott's the past summer, replacing a flume which had been washed out. There are six pipe lines on the main line of the Arapahoe canal.

The canal itself is in excellent condition at the present time. It was completed in 1891 and is truly a fine tribute to the surveyors. Most of the distance between Castlewood Dam and Clark reservoir it runs through a

species of adobe soil that does not wash. The banks are in as good shape now as they ever were. Superintendent Jones states that he has seen water in a flood time going over the bank of the ditch two feet deep and all the bridges and culverts in the vicinity were taken out by the flood. Yet when the water subsided the bank was as sound and large as it had been before the overflow. There is but little water lost by seepage after it is once fairly started, the bottom being covered by a deposit of slime and weeds, which forms while wet a "non-conducting" cover for the ditch bottom and sides. Of course, there is the usual amount of water lost by evaporation, but even that is a comparatively small amount. It is estimated that when the water is running freely between the dam and the reservoir that the total loss by seepage and evaporation in the whole distance of thirty-five miles is less than ten per cent.

The Denver Suburban Homes & Water Company is contemplating the construction of another large reservoir near Clark reservoir in order to enlarge its storage capacity and has planned extensive improvements on other reservoirs. Already men are at work deepening and enlarging the reservoir directly back of Mr. Jones' home, on section sixteen, and when this work is completed the crew will be set at work on the other reser-



One of the Flumes on Main Canal.

voirs. It is also planned to replace one or more of the flumes upon which the effects of the weather are beginning to be seen, with pipe. Later in the season some 250 feet of the receiving end of what is known as the Noonan pipe line, the longest on the canal, will be renewed.

There is no doubt but what the project under the superior management of Mr. Jones has a successful future before it. The soil is as fertile and productive as any to be found in the State. I traveled over the entire project thoroughly several times and nowhere was there to be seen the least trace of alkali, and there is little danger of developing it by over-irrigation. It is a well known fact that newly-broken land upon which sagebrush has been growing takes longer by two years to reach as high a state of cultivation as does land on which cactus alone grows. That is to say, land growing cactus alone will produce as much the first year after reclamation as will land growing sagebrush the third year after it has been broken and cultivated. The reason for this is that sagebrush takes from the soil the elements needed for raising crops, and the land must be replenished before it reaches a high state of cultivation. Cactus does not have this impoverishing effect. There is no sagebrush on Clark colony land, nor on any of the land along the canal.

Of course, there are a few men farming in Clark colony on forty and eighty-acre tracts who are not making it a profitable industry. But most of them are the kind who would not make a success of agriculture anywhere—the men who do not plow deep enough and whose theory and working ideal is that crops should grow by irrigation alone, and consequently they do not cultivate.



Showing Construction of Pipe Line.

But the man who goes at it scientifically and conscientiously can undoubtedly "make good" on five or ten acres. Unfortunately this year there was a shortage of water owing to the fact that repairs were made on the dam last fall, and while the work was being done it was necessary to allow the water to flow through without storing it. Then followed a "dry" winter, with little snow, and there was insufficient water came down to fill the lake. This was the first year in the four that Mr. Jones has had charge of the property that a shortage has occurred, and it is really almost a miracle what he has



Where Cherry Creek Enters Castlewood Lake.

been able to do by careful application of what little water there was. Every farmer in the colony is able to get water by eight o'clock in the morning during the irrigation season, and it runs for him if he wishes it for a period of ten hours. As can be imagined, this system requires a whole lot of attention. Mr. Jones starts out to open the headgates at 3:30 every morning. He travels twenty miles or more before breakfast and then starts on the same trip again, for the failings of the human race in general, especially the itching to get something for nothing, or even more of something than one

is entitled to, induces certain wayward brethren in the colony to put boards in the checks to force a greater flow of water into their laterals. The headgates are locked so that they cannot be opened farther than they are set, but even with locked headgates it is necessary to watch the ditches to see that the farmers at the end of the laterals are not robbed of their fair supply. It is usually ten or eleven o'clock at night when Mr. Jones returns from his last round of closing headgates, so it can be seen that his life is truly the strenuous one. The company employs four ditch riders along the whole



Cabbage Field.

water way, the three above Clark reservoir making a daily round to see that flumes, pipes and ditch are in good condition. The man at the dam attends to the opening and closing of the valves from Castlewood Lake.

It is expected that within a year the Denver City Tramway Company will complete an extension of its line from University Park to Clark colony, a distance of five miles. When this line is in running order the property of the Denver Suburban Homes & Water Company will be one of the most valuable in the State of Colorado.

FRUIT VARIETIES.

ANNOUNCEMENT.

We wish to add under this head a department in our paper devoted to the discussion of varieties of fruits, as to what are best for commercial purposes, what are best for any particular use, which are earliest and which latest varieties, and while as a general rule one should be slow to "give up old friends for the new," we will be glad to take up the history of new or rare varieties of any kinds of fruit. In this department as in all others, to assure its success, we must have the co-operation of our readers. To this end we invite questions, opinions, etc., relative to the subject, which communications we will be very glad to publish.

An Excellent Winter Apple.

About two years ago I bought some choice fruit trees from Stark Brothers' Nurseries and Orchards Company. Among others I ordered their now pretty well known Delicious apple. The time of year was March and some samples of the Delicious apple were sent, which, of course, had been kept through the winter. The condition of these apples was perfect and the fruit was very large, well shaped and excellently flavored. I became an advocate of the Delicious apple at once.

This variety is being pretty widely planted and seems to succeed anywhere. The Central States is its original home.

I found them in British Columbia; they are in Washington and all through the West. Delicious is destined to become a great commercial sort, being a winter apple, and a splendid keeper. Stark Brothers say of it:

"Introduced by us more than ten years ago and during that time we have never received a single adverse report either on tree or fruit, although planted from Maine to the Pacific coast. Originated in Central Iowa, in black prairie soil, where only the most rugged, hardy trees will stand. Probably a seedling of Bellflower which it somewhat resembles in shape, but immeasurably superior in quality, color, hardness and bearing. Size, large to very large; skin, yellow striped or almost covered with dark brilliant red; flesh, very tender, crisp, juicy, with an ideal delicious flavor—very little acidity, yet not a 'sweet apple.' Tree, a strong, upright grower, hardy and a heavy yielder. Hangs well, keeps well, bruises dry up instead of rotting. For four seasons we have held the fruit until June in cold storage, and each time Delicious has kept better than Ben Davis and does not deteriorate and lose flavor late in spring."

Stark Brothers have sent us a long list of testimonials from admirers of the Delicious apple.

Fall Planting.

Fall planting of fruit trees is very generally advised by authorities, for districts in the Central States. On arid land, if irrigation is stopped and the ground may dry out, there is danger in fall planting.

If trees are planted in the fall, the roots get "set" and the tree is ready to commence growing just as soon as spring opens up. It has almost as good a start as trees planted the preceding spring.

RECLAMATION SERVICE NOTES.

North Platte Bids Received.

The board of consulting engineers of the reclamation service recently convened at Mitchell, Neb., to open bids for building structures in connection with the Interstate canal, North Platte irrigation project, Wyoming-Nebraska, report that eleven bids were received, the lowest of which were as follows:

Schedule 3, construction of siphon, culverts and sluiceway, \$81,455, and Schedule 2, construction of lateral headworks, \$9,398, Byal & Co., of Mitchell, Neb.

Schedule 4, steel truss highway bridges, \$16,915, the Omaha Bridge Company, of Omaha, Neb.

Also Schedule 5, wooden highway bridges, \$11,112.

Schedule 6, structural and reinforcing steel, \$6,475, the Expanded Metal and Corrugated Bar Company, of St. Louis.

Schedule 7, lifting devices, gates, etc., \$9,059, Colorado Gray Iron Foundry Company, of Denver.

The secretary of the interior has therefore awarded contracts as above, and authorized the reclamation service engineers to construct Schedule 3, lateral drops and other structures, by force account. This action was taken on account of the desirability of completing the work at an early date in order to deliver water during the season of 1908.

Yakima Project Progressing.

Reports from the engineers in the field indicate that the work being prosecuted under the different sections of the Yakima irrigation project, Washington, is progressing very satisfactorily. Keechelus dam is now holding water in Keechelus Lake to its full height. Kachess dam is storing water in Kachess lake to the same extent as has been customary in the past, while under the control of the Cascade Canal Company. Preparations are being made to complete the Clealum dam. Excavation on the main Tieton canal is progressing rapidly, and the portals to Trail creek, Tieton and North Fork tunnels have been opened ready for commencing tunneling with power. The power canal is completed and it is expected that the power house will be finished in July. As the work on the distribution system progressed it became apparent to the engineers that the total acreage under the project could be increased to 30,000 acres. Preparations are being made for the resumption of work on Sunnyside dam. The delivery of water under the Sunnyside canal has been reported to be more satisfactory than during any previous similar period in the history of the canal.

NOTES ABOUT MAYWOOD COLONY, CORNING, CALIFORNIA

(Special Correspondence)

About 12,000 acres of this colony have been set to trees, the first planting having been done in 1894. The leading varieties planted at Maywood are the peach, prune, pear, almond, olive, apricot, fig, grape, orange and lemon. All of these varieties are growing and maturing to perfection at Maywood. Of olives something like 4,000 acres are set and in ten years' time they promise to be the leader at Maywood. At present peaches, prunes and almonds are in the lead as revenue producers. No place in California produces better grapes than Maywood, and colonists should give more attention to this variety. Strange as it may seem to those in the East, it is, nevertheless, a fact that oranges here at Maywood, and throughout the Sacramento Valley, ripen fully a month earlier than they do at Riverside, Redlands, Los Angeles and other places in Southern California. The Smyrna Fig, the genuine fig of commerce, is being largely planted here, and promises to be one of the best payers.

One of California's leading nurseries is located at Maywood Colony. All trees for colony planting are bought from this home nursery, insuring fresh, vigorous and acclimated trees. This nursery furnishes trees for several other colonies in the Sacramento and San Joaquin valleys. W. H. Samson, of Corning, the proprietor, will be glad to mail you a catalogue of varieties with prices.

At Maywood the tree planting season runs through January, February and March. The rule is to plant trees 22 feet apart each way, making 90 trees to the acre, or 900 on a 10-acre lot. Grape vines are set 10 feet apart, making 435 to the acre. All orchards, both old and young, are thoroughly cultivated during April, May and June of every year; then laid by until next



Peaches by the Wagonload, Maywood Colony, Corning, Cal.

cultivation season. During April, May and June the Colony orchards are plowed—sometimes twice plowed—harrowed, disced, dragged and hoed until the top six or eight inches of the soil is thoroughly pulverized and all grass and weeds killed out. The soil, in this condition, prevents summer evaporation of winter's moisture, and the trees grow and yield fruit without irrigation.

On the colony are a number of experienced and re-

liable persons who plant and tend trees for absentees. The names of these colonists I will give upon application. I give the name of the person living nearest the lot to be planted and cared for. The average cost of having an orchard planted is \$40 per acre, which price includes the preparation of the soil, the trees, their planting and care of them during the year of planting. After the first year the regular charge for properly pruning and cultivating an orchard is \$12.50 per acre.

None but the best are planted at Maywood. Time and experience have shown the varieties which do best in this soil and climate, and which sell the most readily



Sweeping View Over a Section of Maywood Colony, Corning, Cal.

and at the best prices. The best varieties of peaches for this place are the Muir, Elberta and Phillips Cling. The Bartlett is the favorite pear. The Petite, or French prune, is the variety grown here. Of almonds, the I X L, Nonpareil and Drake's Seedling are the most dependable and profitable. Of olives, the Mission, Manzanillo, Nevadillo and Sevillano are the best varieties. The Tokay, Cornichon, Muscat and Thompson's Seedless are the standard grapes of this community. Of the fig, none but the genuine Smyrna should be planted. The Washington Navel, or seedless orange, is the most popular, and matures to unusual perfection here at Maywood. Of lemons, the Eureka, Lisbon and Villa Franca do the best here.

The olive, prune and pear yield paying crops six years from planting. They bear more or less fruit in their fourth and fifth years, but cannot be depended upon to pay a profit, after the cost of cultivation. The almond, apricot and peach return paying crops when four years old. The orange and lemon bear at four years from planting. Grapes, if rooted vines are planted, yield some grapes in their second year and pay a profit at three and four years of age.

The trees at Maywood are practically free from all tree pests. This is attributable to the climate. Here there is not a trace of moss, or scale on the fruit trees. The 90 days of dry atmosphere during July, August and September make impossible most growth, or scale life. Very little spraying is done here. Bartlett pears are sprayed once a year and peach trees only occasion-

ally. The orange groves of Maywood have never had to be sprayed or fumigated.

It has been said by sportsmen of much experience that "in no other place in the United States is there an equal variety of game and fish in so small an area as in Tehama county." In the nearby mountains—only one day's drive—deer abound; an occasional bear is found; grouse are plentiful and mountain trout are so numerous that a common day's catch runs from 100 to 300. On the plains, or in the valley, are the goose lands—places where both land and air are alive with geese. Along the river, creeks, lagoons and sloughs ducks of the several varieties are found in abundance. In the foothills and along the river quail fly in clouds, flocks of 500 or more are not uncommon. In the several mountain streams of this county which flow into the Sacramento river, mountain, or Rainbow trout abound. Two hours' drive from Maywood takes one to good trout fishing. In the Sacramento River, which borders Maywood for seven miles, sturgeon are caught, weighing from 100 to 400 pounds. The river is full of salmon weighing from 20 to 50 pounds. Catfish are so thick and so easily caught that a fellow gets tired of baiting his hook. Carp, bass and other fish are caught in the river. At Maywood there are several fish camps where salmon are seined, by the ton, and shipped to the salmon



Hotel Maywood, Corning, Cal., Where Visitors Are Entertained, Opposite office of Company and across street from Southern Pacific Ry. depot.

canneries. These fishermen also ship thousands of pounds of salmon to Portland, where they are processed and shipped East as Columbia River salmon.

The United States government maintains the largest salmon hatchery in the country a few miles up the river from Maywood. The object of this hatchery is to increase the salmon stock of the Sacramento River, as well as to ship salmon eggs to all parts of the United States.

Those who have acquired land in Maywood Colony, and those who contemplate the purchase of property in this settlement, can keep track of local doings and development by subscribing to THE IRRIGATION AGE. This paper faithfully reflects conditions as they here exist.

We are interested particularly in Maywood Colony, as we are in every such colony throughout the Great West. Each month we publish news or helpful items reported to us by subscribers regarding these various districts. We especially invite each individual reader to contrib-



Tomato Vines as They Grow at Maywood Colony, Corning, Cal. Mr. Woodson, Proprietor, May Be Seen in the Illustration.

ute occasional letters to THE IRRIGATION AGE, since in this issue we are adding departments on "Fruit Growing" and "General Farming." When you meet with a problem that you cannot solve, state it to us and read your published inquiry later, together with answer—answer, perhaps, by some other reader. When you have discovered something new, write about it for THE IRRIGATION AGE.

Land Plats on File.

The following township plats of lands which will be placed under irrigation at the opening of the season of 1908 under the North Platte project in Wyoming and Nebraska, have been approved by the secretary of the interior and placed on file in the local land office at Alliance, Nebraska, and in Cheyenne, Wyo.:

Tps. 23 and 24 N., R. 56 W., Nebraska.

Tps. 23, 24 and 25 N., R. 57 W., Nebraska.

Tps. 23, 24 and 25 N., R. 58 W., Nebraska.

Fractional Section T. 25 N., R. 57 W. Nebraska (shown on plat of T. 25 N., R. 58 W.).

Tps. 24 and 25 N., R. 60 W., Wyoming.

The farm units are shown on these plats, the area of each representing the acreage which, in the opinion of the secretary of the interior, may be reasonably required for the support of a family on the lands in question, and varying from forty to eighty acres. The limit for which water right application may be made for land in private ownership shall be 160 acres for each land owner. The charges per acre of irrigable land under this project will be as follows: For building the irrigation system, \$35 per acre, payable, in not less than five nor more than ten annual installments, each not less than \$3.50 per acre; for operation and maintenance—for the irrigation season of 1908 and until further notice—40 cents per acre. The first installment of said charges for all irrigable areas shown in the township plats whether or not water right application is made therefor or water used thereon, shall be due and payable on or before December 1, 1908, at the proper local land office, the total payment for 1908 being not less than \$3.90 per acre. The building and maintenance charges for subsequent years shall be due and payable at the same place on or before December 1 of each year.

UNDERGROUND WATERS FOR IRRIGATION.

Successful Use of It in San Joaquin Valley for Purposes of Irrigation as Well as for Stock and Household Use.

The raising of underground water for irrigation purposes is receiving marked attention in the San Joaquin Valley. As is the case in most parts of Colorado, the water from the natural streams has already been pretty well appropriated by the irrigating canals: yet there still remain immense areas of fertile soil that are without water. The San Joaquin valley is fully 300 miles in length and 80 miles in width; so it may readily be seen that it would be impossible to irrigate its entire extent with the water derived from the surface streams.

But beneath the entire length and breadth of the valley there appears to be one immense body of water, or underground lake. This body of water can be reached by boring from 18 to 150 feet below the surface, and when once reached the supply of water is inexhaustible. This body of water may be drawn upon at will for household purposes, the watering of live stock, for irrigation, or in fact for whatever use for which it may be needed. As far as irrigation is concerned, it may be used to tide over a shortage of ditch water incident to a drouth or as an independent source of water supply.

And it is gratifying to observe that the people of the valley are waking up to the value of this great subterranean water supply. The enormous productiveness of the soil of the San Joaquin valley when once it can be watered sufficiently has been fully demonstrated. The soil will also produce a great variety of crops, both native to the temperate and semi-tropic zones. Therefore, the question of irrigation once settled, the yield of crops, both in quantity and variety, is but a question of soil and crop management.

In order that the conditions may be made plain to the reader it may be stated briefly that the San Joaquin valley is level and land locked, being bordered on the east by the lofty Sierra Nevada range and on the west by the coast range. At the southern extremity of the valley these ranges join, while at the northern extremity there is but a comparatively narrow opening outward to the bay of San Francisco. In fact, it is a geological theory that the valley was once the bed of an ancient inland sea; and such in fact seems to have been the case, judging from the nature of the soil, which appears to be nothing less than sea sand, or a nice admixture of sand and silt. This soil is very deep, sometimes reaching a depth of 300 feet. This gives the soil inexhaustible resources in the way of fertility and capacity for cultivation.

The surrounding mountain ranges appear not only to furnish a water supply for the numerous streams that pour down from their gulches, but to continuously replenish the great underground lake underlying the surface of the valley. The water supply of the Sierra Nevadas is especially abundant, as the snowfall in their higher altitudes is very heavy. It would seem, therefore, that the San Joaquin valley, taking both its surface and its underground water supply together in addition to its regular rainfall, were well provided with sources from which moisture could be derived. In the southern part the rainfall is light, being only a little over five inches per year on an average. The rainfall increases as the northern extremity is approached. This usually suffices to keep the great mountain and valley ranges, where immense numbers of sheep, cattle and

horses continually feed, in a green and growing condition. Then, with the combined surface and underground supplies of irrigation water, the large and increasing areas of citrous fruits, as well as common fruits and common farm products, could be irrigated, as well as immense fields of alfalfa for live stock and dairy uses.

The pumping of irrigation water in the San Joaquin valley is at present receiving a strong impulse. The discovery of extensive oil fields in Kern County is tending to simplify the pumping problem. Crude petroleum may be obtained at Bakersfield as low as 20 cents per barrel; so that gasoline engines with crude oil generators promise to play an important part in the new movement.

A good example of present day pumping plants in the San Joaquin valley may be seen in that on the ranch of Mr. A. L. Sayre at Maderia, Fresno County. The ranch contains 804 acres. Four hundred acres are down to alfalfa; 225 in vines, and the balance in grain. Mr. Sayre originally installed his pumping plant to secure a constant supply of good fresh water for his dairy herd, numbering from 100 to 125 head of cows. But the plant worked so well that he employs it for the pumping of irrigation water, and he declares that his ranch produces annually three times as much as it would if irrigated by ditch water alone.

In installing his plant, Mr. Sayre dug a pit twenty-five by seventy-five feet, and down to within two or three feet of the underground body of water. In this pit he sunk two wells and operates them with a ten-inch centrifugal pump run by a sixty horsepower engine standing on the bank of the pit. The engine is run by gasoline with a crude oil generator. The oil used is produced in the Coalinga fields, is of 32 degrees gravity, and costs about \$5 per day. He has two engineers who work in two shifts and keep the engine running night and day. Thus it costs about \$9 each twenty-four hours to run the plant, and from eight to twenty acres of ground can be thoroughly flooded in that time, according to the character of the soil.

Mr. Sayre says that the supply of water is evidently inexhaustible. The strata from which the water is raised lies about 110 feet below the surface of the earth and the pump throws from 4,000 to 4,500 gallons per minute. The two wells stand about twenty-two feet apart.

This plant is run throughout the year, and would be ample to irrigate the entire ranch if need be.

H. A. CRAFTS.

WITH OUR ADVERTISERS.

HOW TO SELECT A STOVE OR RANGE.

To select a perfect Stove or Range: First, examine carefully a large assortment of styles until you find one that pleases you. Second: Remember that all stoves and ranges may look very much alike, but there is a vast difference in their wearing and service qualities. Third: To make sure that the stove or range you do purchase is one that will wear for years and give absolutely satisfactory service, buy direct from the manufacturer and have it shipped direct from his factory. Fourth: Don't pay two prices for a stove or range. Buy direct from the factory of a reliable firm, a factory with millions behind it, and then their guarantee means something. Fifth: If any of our readers want to purchase a stove or range during the coming season a word of suggestion will be sufficient. Write direct to the Hoosier Stove Co., Factory 117, State Street, Marion, Ind.

The Hoosier Stove Co. make a very high grade line of stoves and ranges and sell them direct to the user at a big saving to you, saving all dealers' and jobbers' big profits. We take pleasure in recommending the Hoosier Stove Co., their stoves and ranges, and their methods. They will send you a stove or range backed by a Million Dollar Guarantee, and you will be the judge, for you are in no way obligated to any stove or range they send you. WRITE THE HOOSIER STOVE CO. for their SPECIAL FREE TRIAL OFFER. The most liberal offer ever made by a manufacturer.

Reclamation Service News

An extension of sixty days' time has been granted to Mr. S. R. H. Robinson, of St. Louis, Mo., for the completion of his contract to construct the diverting dam and structures of the main supply canal of the Belle Fourche irrigation project in South Dakota. According to the terms of the original contract this work was to have been completed July 1, 1907, but an unusually severe flood occurred in May, washing out a considerable part of the contractor's plant and temporary works. The high water following this flood made it impossible for the contractor to replace the works thus destroyed.

A contract has been entered into between John T. Whistler on behalf of the United States and the Portland Wire and Iron Works, of Portland, Ore., whereby the latter company agrees to furnish not less than 22,000 nor more than 28,000 pounds of steel fabric to be used in the construction of concrete pipes for the Umatilla irrigation project in Oregon. The contract expires September 15 and will amount to between twelve and fifteen hundred dollars.

Under date of March 14, 1906, the secretary of the interior authorized the leasing for temporary use of lands withdrawn under the Act of June 17, 1902 (32 Stat., 388), until such lands should be needed for the purposes of the project for which withdrawal is made. The reclamation service has accordingly leased 51,840 acres for grazing purposes which were withdrawn in connection with the Strawberry Valley irrigation project in Utah. The lands are leased until December 31, 1907, to Messrs. James W. Clyde, James S. Murdock, Davis Smith, Joseph R. Murdock and Albert Smith, all of Heber City, Utah, at the rate of \$10,408 per annum, with the privilege of renewing the lease from year to year at the same rate until the lands are required for irrigation purposes.

The secretary of the interior has executed contract with the New Jersey Foundry and Machine Company, of New York City, whereby the latter agrees to furnish f. o. b. cars at Manassquan, N. J., complete for erection, all the metal work for two sixty-foot steel span highway bridges for the Shoshone irrigation project in Wyoming. The contract amounts to \$1,330.

Authority has been granted to the engineer in charge of the Umatilla irrigation project, Oregon, to construct a wasteway on the storage feed canal, about three-fourths of a mile below the town of Echo. The point at which this structure will be built controls the operation of the canal throughout a section about four miles long where the canal very closely parallels the O. R. & N. railroad. This section has been considered as threatening the safety of the railroad, owing to its close proximity, its location on the steep slope directly above the tracts, and also to the fact that the Furnish ditch, which has not been built on such substantial lines as the Government work, lies immediately above the project canal throughout most of this distance. The estimated cost of the wasteway is \$3,750, and it is proposed to build it by fall so as to be in readiness for operation next spring.

An extension of time from June 10 to October 20, 1907, has been granted to the General Electric Company, of Schenectady, N. Y., in which to furnish electrical apparatus in connection with the Williston irrigation project in North Dakota. The delay in filling this contract was caused by changes in the specifications by the Government engineers.

The government has purchased the pumping plant and right of way for five miles of canal and laterals of the Colorado Valley Pumping and Irrigating Company, of Yuma, Arizona, for use in connection with the main Yuma irrigation project. Until the project is completed and the canal system is replaced by the government system, the pumping plant will be used to supply the present settlers with water. The price paid is \$6,000.

An extension of time of two months has been granted to Mr. John W. Douglas, a local contractor, for completing his contract for grading a portion of the main canal, Okanogan irrigation project of Washington. The unusual condition of the labor market has made it impossible for the contractor to complete the work according to agreement, and the contract will now expire on October 1, instead of August 1.

The secretary of the interior has executed contract with H. T. Adams, of Belle Fourche, S. D., for the construction and completion of Section 2, Schedule 1, of the laterals under the Belle Fourche irrigation project. The work consists of 9.6 miles of ditch, and involves the excavation of 54,950 cubic yards of material. The contract amounts to \$15,287.50 and calls for the completion of the work by April 1, 1908.

The development of conditions under the Umatilla irrigation project, Oregon, having reached a point where it has been ascertained that certain lands are no longer essential in connection with the project, more than 62,000 acres of land have been restored to the public domain. These lands will be subject to settlement on such date and after such notice by publication as the secretary of the interior may prescribe, and shall be subject to entry, filing or selection upon the expiration of thirty days from such date.

The total advance in the Gunnison tunnel of the Uncompahgre irrigation project in Colorado during the month of July was 362 feet. The entire excavation now amounts to 20,496 feet, or more than two-thirds of the total length. Another vein of water has been encountered in drilling, this time in the east end. The flow, however, has abated so that at present the total discharge into the tunnel amounts to only 300,000 gallons in twenty-four hours. In the west end the material in the heading has changed six times, the rock encountered being alternately hard and soft, and of such character that progress without protective timbering is dangerous.

An extension of time for thirty days has been granted to Messrs. Orman & Crook, of Pueblo, Colo., for the completion of their contract to construct a portion of the north canal of the Belle Fourche irrigation project in South Dakota. The unusually rainy weather which rendered the ground unfit for working during May, June and July made it impossible for the contractors to complete the work according to the terms of the original contract.

The supervising engineer in charge of the Klamath irrigation project in Oregon and California reports that the main canal was successfully filled with water early in June and 3,000 acres were irrigated, 160 acres being new land. Under the Adams system 2,700 acres of land are receiving water, and additional new land will be served as fast as contracts made for the season can be entered into and approved. This is the first time that water has been furnished by the government system under the Klamath project.

The following described lands under the Sun River irrigation project of Montana have been reserved for townsite purposes:

Townsite of Simms: N. E. $\frac{1}{4}$ Sec. 13, T. 20 N., R. 3 W., Montana Meridian.

Townsite of Fort Shaw: N. W. $\frac{1}{4}$ Sec. 12, T. 20 N., R. 2 W., Montana Meridian.

The secretary of the interior has executed contract with A. Y. Bayne & Co., of Minneapolis, Minn., for the construction and completion of three steel highway bridges in connection with the Lower Yellowstone irrigation project, North Dakota, Montana. The bridges will be located at the following points: War Dance Conlee, Yakey's, and Pettigrove's. The contract amounts to \$7,026.

The secretary of the interior has executed the following contracts in connection with the earthwork on the distribution system for the North Platte irrigation project, Nebraska-Wyoming: About fifteen miles of laterals to the Burke Construction Company, of Mitchell, Neb., involving the excavation of approximately 128,000 cubic yards of material, \$30,159; nineteen miles of laterals to Detrick, Rush & Hoth, of Bayard, Neb., involving 96,100 cubic yards of excavation, \$16,793.50; about forty miles of laterals to Marcus E. Getter, of Mitchell, Neb., involving 230,100 cubic yards of excavation, \$37,626.

SHALL WE RAISE WOOD OR FRUIT IN THE ORCHARD?

Clean culture in the orchard, supplemented by cover crops during the latter part of the season, is coming into more general use. The effect of the clean culture is to render the soil nitrogen available more rapidly than the mineral ingredients. Hence the tendency of trees to make too much growth of wood and foliage and to come into bearing late. Where leguminous crops are used for cover this effect is even more marked. The growth of legumes or weeds at the time the fruit is making its most rapid growth deprives the tree of needed minerals at the most critical time.

The whole tendency of the methods of orchard management most frequently advocated in both arid and humid regions is to furnish nitrogen in excess of the proper amounts of minerals. Ordinary fruit trees require plant food in the following proportions:

Nitrogen	100
Phosphoric acid	27
Potash	114

Different kinds of fruit require about the same proportions, but require different quantities per acre.

The peach requires the most, more than double the amount required by pears and plums. The apple and quinces require about two-thirds as much as peaches.

To supply the plant food for an acre of apples requires 51 pounds of nitrogen, 14 pounds phosphoric acid, and 55 pounds potash. Most of the nitrogen is, and should be, derived from crops plowed under. If the foliage of the trees is not of good color a dressing of 100 to 200 pounds per acre of nitrate of soda will restore it.

Owing to the fact that orcharding is continuous cropping of the most radical class, it is necessary to not only furnish plant food, but to furnish the right kinds at the right time. This can not be done by farmyard manure alone, for it carries too much nitrogen in proportion to its minerals and the minerals in manure are too slowly available.

Hence in the most successful and most profitable orchard work large quantities of phosphoric acid and potash are used. Usually more phosphoric acid is used than the trees actually take up. But until the ground is well supplied with phosphates it is well to use a small excess, so that there may be plenty ready at hand during the best part of the growing season. One hundred pounds of acid phosphate, or 55 pounds of steamed bone would furnish the phosphoric acid for an acre of apples. Double these amounts are generally used, especially on clays where the soil supply of phosphoric acid is very limited.

The soil's content of potash varies widely, but under the usual conditions of producing orchards there are few cases where the very small amount of really available soil potash is not pretty well used up before the trees should be in full bearing. One hundred and ten pounds of muriate of potash or of sulphate of potash will supply the potash for an acre for one year.

While there is doubtless much difference between varieties in the matter of intermittent yielding, experience has shown that proper feeding of orchards will give annual crops, and while the crops in off years may not be as great as in fat years, the increased price in the off year is such as to make the properly fed and tended orchard a source of steady annual income.

There are always a lot of people who think it is not necessary to fertilize any crop. We are not now considering the necessity of the case, but whether it will pay.

Trees need a good supply of available food during a comparatively small part of the year. By using the right amounts and right kinds we may expect better fruit on trees that come into bearing earlier, bear more steadily and live longer. If we expect to get the most profit out of the outlay for irrigation, cultivation and spraying, we must feed the trees. You can't get the most work out of a man by tickling his toes and giving him shower baths. He needs some food, and so does a tree.

H. A. WESTON.

Send \$2.50 for The Irrigation Age
1 year, and the Primer of Irrigation

The Home

BEAUTIFYING HOME WITH FLOWERS.

Nothing is more desirable than to have one's home made attractive with the freely offered lavishness of Nature. Ornamental trees and flowers are provided for us, and we who are ourselves masters of the supply of moisture required by our plants should surely take advantage of nature's gifts and make our home surroundings delightful. The following clipping on fall flowers should be helpful:

Keeping Up the Garden This Fall.

"Plenty of fall-flowering plants should be in every garden. There can be no doubt about that. And there are plenty of them, too, ready to meet winter face to face and not to yield until he actually annihilates them with his icy breath. Yet they are not very much in evidence in the average garden, possibly because they are not so well known as they deserve to be.

"First on the list, I think, I should place the Japanese windflower, or anemone—*Anemone Japonica*—in several varieties. Their exquisite beauty would distinguish them at any season of the year. They begin to blossom in August, and are not therefore, strictly speaking, only fall bloomers, but summer and fall, which is better yet. They continue until severe frosts cut them down. Their colors are extremely delicate and yet clear, ranging from rosy red to purest white. Probably the best selection would comprise *Anemone Japonica*, *Anemone Japonica*, variety *Alba*, and *Anemone Japonica*, variety *Queen Charlotte*. The usual height of the plants is about two feet. They should always be massed, whether planted in a border by themselves or in front of shrubbery. Fifty of them are not too many to plant together for the best effect."—From "The Best Plants for Fall Flowering," by Ina G. Tabor, in the *September Circle*.

The Marriage License.

You got back, massa, from de town?
You fetch my ba'yage license down?
Dem license read for Sal and me?
Dat's a pity, massa, 'caze you see,
Since you been gone I change my min'
And conclude I'll marry Adeline—
Des you take dem license and change de name—
And lemme ma'y on 'em all de same.
You can't do dat? Cost me two dollars mo'?
Oh, no, sah, massa! No, sah, no!
Des leave de name dat's writ dar, Sal's,
'Caze dar ain't two dollars diffince 'twixt dem gals.
—Martha Young, in *The Circle*.

Fruit as a Food and Medicine.—By Dr. J. P. H. Brown, Before Georgia Horticultural Society.

The Creator in His wonderful economy always constructs with a purpose. He has distributed fruits all over the earth, and has caused them to mature at a season when the solid and carbonaceous foods are not needed by the body. The latter, when taken during the warm season, only clog and obstruct the vital machinery, resulting in disease; whereas, the juicy, stimulating properties of fruits keep the vital forces properly balanced and regulated.

Probably the most generally diffused fruit is the apple. According to chemical analysis, this fruit has 18 per cent solid matter and 80 per cent water, while milk has only 13 per cent solid matter, and oysters the same. Cabbage, the great stand-by of the laboring man, has only 8 per cent solid matter and 92 per cent water. Pears have about the same amount of solid matter as apples. Peaches have 20 per cent solid matter and 80 per cent water; while pork has only 24 per cent solid matter. We see, therefore, that fruits are richer food than milk or oysters, and approximate that of pork. Yet the laboring man thinks that he must have his bacon and that he cannot work without it.

AMERICANS FOR AMERICA.

Settlers for the West.

Where did you come from? Did you come from some good old homestead back in Indiana, or Ohio? Are you one of the Hoosiers who, in the prime of young manhood answered the call of the Great West, and have devoted the energy to which you are heir, as an American more than any other nationality under the sun, to the development of that locality in which you chose to carve out your new domicile?

We have all read stories, love stories and other kinds, of young men who have gone West, first from the New England States to the Middle Western States, and in the story we usually find them having reached middle age and become successful men, men of affairs, and perhaps leading in the political life of the new States to which they have emigrated.

It is but a short time since Indiana was thus settled, so short a time that the writer's own grandfather was one of the new settlers who took up wild land in Indiana, only 69 years ago, or in 1838. In coming west he landed at Fort Dearborn on the southern shores of Lake Michigan, a locality where now stands Chicago, one of the greatest cities in the world. This settler, being a New Yorker, passed over the land which Chicago now occupies, because it was so wet and low, and traveled by foot and horseback down into Miami County, Indiana.

The sons of these settlers who bought wild lands in Indiana in the 30's are now, many of them, in States further west and have there carried on the same development of our country which their own fathers accomplished in the Middle States.

But I am digressing. The idea I really want to bring out in this article is, that there is a vast population of pure Americans that can still be drawn on for peopling the new irrigated districts in the West, and the cause which has brought this subject to my attention is the frequent agitation in the various parts of the West to secure *foreign* immigration. These calls for immigrants from any country under the sun, merely as an endeavor to get our great West thickly populated without delay, seem slightly premature to me. It is hardly of vital importance that there be not a foot of unoccupied land left west of the Mississippi River by the end of this year or next year, for unless America degenerates and President Roosevelt's preachings on anti-race suicide are unheeded, our own nation of 80,000,000 people will have a posterity of fully equal numbers, and we hope much greater, and they would not be greatly inconvenienced nor displeased to have some opportunities left for them somewhere within the boundary of their native country. I do not by any means mean to say, my dear reader, that I think your community should be held back for the benefit of posterity, but I do think that in "booming" it, and in your efforts to secure new citizens, you should call first the people from the thickly populated districts of our own eastern States. There are many people who would scarcely be missed should they leave the villages in which they now quietly live, and come to your locality, and still they might prove very desirable citizens.

The writer certainly has none of the anti-foreign feelings which characterize some countries less highly civilized than America; indeed, I reflect that originally

all Americans came from across the water, and that we are all, more or less, English, Irish, Scotch, German, etc., and we can use and welcome still all of those people who will emigrate to our shores. But from purely patriotic instincts, somehow, for years I have felt that the opportunities for homes, for free farm lands, and for wealth to be had in the mining and lumbering districts of the great West have not been properly presented to the peoples of the thousands of country crossroads, villages, towns and cities of our Middle West and Eastern States. And certainly it seems to me, if there are still districts calling for settlers to come and make themselves homes, and take up the rich lands, or to earn the high wages which, as a rule, are paid for labor in the West, no people have a better right to know these things and to answer the call than Americans of the above-mentioned Eastern States. For, inevitably, the time will come, unless the world ends too soon, when America will be fairly thickly populated, and the era of free or cheap lands will come to an end. Should not, then, Americans of the present day have the first opportunities in the West?

I do not think that these assertions will meet with one single dissenter. Therefore, I will proceed to give my reasons for thinking that there are still plenty of American communities to draw upon for settlers in the West. Fifty-seven thousand Americans, principally from the Middle States, went to Canada in the summer of 1906 to take up free wheat land in that great new country. Is there any western irrigation farmer or fruit grower who thinks that they will find better opportunities and better conditions in western Canada than they would in his locality? If so, he is a "knocker" and should move back east. Why, then, did these Americans from the Central States, who were willing to emigrate, go to western Canada instead of our own Western States? The answer is, purely and simply because the energetic publicity managers of the Western Canada immigration movement have been very active in the past few years and have presented their opportunities to American farmers. That was all that was necessary. The Americans went, they saw, and they stayed.

Do you know what the Canadian people think of the settlers that have been coming from the American Central States? I know, for I have spent some time touring the whole of western Canada, and I met both the native Canadian people and the new settlers from the States. Many Canadian public men, and those influential in developing western Canada, prefer American settlers even to their own fellow subjects to the British crown, Englishmen, Irishmen or Scotchmen. They say that the Americans are the most energetic and that they get immediately busy on their new land, and, having experience as practical farmers, the communities in which they settle are, in a very brief time, prosperous and up to date localities. Indeed, western Canada owes its development in no small measure to the enterprise and capital of Americans. You meet them everywhere, in business, publishers of papers, real estate men, and farmers. There are so many Americans in western Canada that one scarcely realizes he is out of his own native land.

Recently in an exchange from Arizona I read an editorial, suggesting that an attempt be made to secure the discontented wine growers of southern France for settlers on the irrigated lands in a certain district in

(Concluded on page 379)

ORIGIN OF OUR CULTIVATED STRAWBERRIES.

It appears then that the strawberries now found in our markets have been developed mainly from the wild strawberry of South America. About 1834 Chas. M. Hovey of Massachusetts crossed the wild strawberry of that state with the Chilean strawberry. The aim of this work was to combine the superior excellence in flavor of the wild berry with the large size of the South American variety. The Chilean strawberry (*Fragaria Chilensis*) extends over an immense area, following the backbone of the two American continents from the southern part of South America northward to Alaska. From Prof. L. H. Bailey's investigations it appears that our present strawberries show very little trace of this early work and are direct descendants of the Chilean species. No exact record has been kept of the work during the past seventy years in originating new strawberries in America. We have depended mainly upon chance seedlings and upon indiscriminate sowing of the fruit of the largest and best berries. It is claimed that some of our later western varieties have western native blood in them and hence are better adapted to the sun and air of the western prairies. This is especially true of the commercial varieties developed in recent years in Illinois and eastern Iowa.

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Homedale, Idaho, Aug. 11, 1907.

Bostrom-Brady Mfg Co.,
Atlanta, Ga.

Gentlemen:—I am agreeably surprised by the quality of your Farm Level. I shall recommend it to all my friends desiring a cheap and serviceable level.

Yours very truly,
(Signed) L. D. COWAN.

(This letter was received by Bostrom-Brady Mfg. Co. and forwarded to us. It speaks for itself.)



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If you only knew how to create for yourself a permanent income for life, would you not set aside a few dollars each year for the next five or six years?

Then maybe you would like to know how?

Take the culture of nut trees, for instance, and start with a very small investment—say only \$30 or \$40 a year. This amount will purchase and set out an acre of the paper-shell variety of pecan trees—twenty to the acre. The care and cultivation of these trees will cost very little and the trees will not interfere with other farming operations on the same land. In from six to ten years from the setting out, each tree should yield at least twenty pounds of nuts, that is four hundred pounds to the acre, and at only fifteen cents per pound (the best varieties are now selling at fifty and seventy-five cents), this means a net income for life of \$60 on each acre.

Doesn't This Interest You?

But, perhaps you will ask, can the pecan be grown successfully in my locality? We can tell you if you will state where you live. There are some sections of this country in which the pecan does not thrive; but there is hardly any portion of the United States where some one of the many varieties of nut trees cannot be grown successfully.

If you care to know more about nut growing for profit, let us send you **FREE** a three month's subscription to the

American Fruit and Nut Journal,

which is authority on the culture of all varieties of fruits and nuts.

Or, send us fifty cents for a year's subscription to the Journal and we will give you (**ABSOLUTELY FREE**) a year's subscription to your choice of any fifty cent publication in America.

Think It Over

But don't delay too long, for both of the offers are limited and there may not be enough free subscriptions to go around among the late comers.

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We built our enormous business by always giving our Customers Absolute Satisfaction.

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STANDARD BLACK WROUGHT IRON PIPE

Overhauled, with screwed ends and threaded couplings, suitable for water, gas, oil, etc.

1 inch. Per foot, 4c	2½ inch. Per foot, 14c
1¼ inch. Per foot, 5c	6 inch. Per foot, 42c
1½ inch. Per foot, 6¾c	8 inch. Per foot, 75c
2 inch. Per foot, 9c	

WROUGHT IRON LAP-WELDED CASING.

This Casing is the highest quality pipe manufactured. It only differs from standard pipe in that it is lighter in weight but, being made especially good, it will stand just as high pressure. It is all carefully overhauled and inspected before shipment. Threaded at ends with casing threads, fourteen to the inch. Covered with a preparation of asphaltum and graphite, thus insuring its wearing qualities. Suitable for irrigation purposes, because of its light weight. Freight will be much less than on standard pipe. It is about ¼-inch thickness and is fitted with brand-new casing couplings.

The sizes mentioned below are outside diameter:

1¾ inch. Per foot, 6½c	3¾ inch. Per foot, 16½c
2¾ inch. Per foot, 12c	4¾ inch. Per foot, 20c
3¾ inch. Per foot, 14c	5¾ inch. Per foot, 34c

CENTRIFUGAL PUMPS.

1—No. 4 Centrifugal Pump, direct connected to Westinghouse Engine.

1—No. 6 Centrifugal Pump (belted).

1—No. 5 Belted Centrifugal Pump.

1—16x20x36 Marsh Vacuum Pump.

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Chicago House Wrecking Co.
35th and Iron Streets, CHICAGO

(Concluded from page 376.)

that State. From other localities we read of the agitation for securing immigrants from various foreign countries.

I repeat the question with which I started out. Where did you come from? Are you a native American or a naturalized American? It is immaterial, I assure you, so far as my personal interests are concerned; but if you, reader, came from the Eastern States, since you are now acquainted with the great opportunities in the West, since you are an enthusiast on the Western country, why not acquaint your cousins and neighbors back at the old home, of the opportunities in the West?

Doubtless there will still be no dissenter to these suggestions. There will, however, be many questioners asking me if I have discovered some new plan for stimulating the tide of emigration toward "the land of the setting sun." No, I have not. It is an old plan that I have. It is simply systematic publicity to be secured in the Middle, Eastern and Western States, and I would like to receive personal replies to this article, with suggestions for the accomplishment of this publicity or indicating a willingness to undertake it, and I will endeavor to return a suggestion to each commercial body or enterprising citizen who addresses me personally as above suggested. Write . . .

F. J. WRIGHT,
Care IRRIGATION AGE.

"PEDIGREE STRAWBERRY" PLANTS

There has been considerable interest aroused in recent years in so-called pedigree strawberry plants. The claim was made that in a plantation of any one variety could be found plants superior in productiveness and other desirable qualities to the rest of the plants in the plantation. This claim, then, means that bud-variation occurs in the strawberry and that we should depend upon getting new varieties in this manner as well as by raising them from seed. Careful experiments in a number of places do not appear to have borne out these claims. As tested at this station the pedigree plants did not show their superiority over the same varieties from other sources which had been taken from a bed set the year before and consequently had not exhausted themselves by bearing. However, the possibility of bud-variation is not denied. It is certainly true that for starting a new plantation preference should be given to plants taken from a bed set the year previously, and not from an old bed that has become exhausted or lowered in vitality by being unduly crowded or exhausted from repeated heavy crops of fruit. The best nurserymen now observe this rule of sending out plants from new beds and have found that raising plants is a work, separate from that of raising fruit. A veteran fruit-grower in Wisconsin grew the old Wilson strawberry for forty years and kept the stock vigorous and productive long after other growers had discarded the variety because it had "run out" with them by being allowed to run wild in old beds, where they had to contend against weeds. To this extent, then, we may say there is something in pedigree strawberries. And no one should be discouraged from selecting some vigorous and desirable plant in his plantation and raising more plants from it. The possibility of bud-variation in the strawberry is not denied, but that it rarely occurs should not be forgotten.

HISTORICAL NOTES ON WILD AMERICAN STRAWBERRIES.

Wild strawberries are among the most abundant of American fruits. There are so many varieties in the various parts of the continent that the botanists have not yet agreed as to their proper naming and classification. From time to time the wild strawberries were transferred to the gardens of the early settlers in the eastern United States. This work of improving the wild strawberry of New England was begun at least one hundred years ago, although incomplete early records make it impossible to determine the date of the first experiment in this line. Suffice it to say, that the early settlers coming from Europe were pleased with the American native representatives of the strawberry and their cultivation gradually spread, when the wild supply began to lessen. William Wood* in "New England Prospect," published in 1635,

*"Evolution of Our Native Fruits," page 426, L. H. Bailey. wrote: "There is, likewise, growing all manner of Hearbes for meate and medicin, and that not onely in planted Gardens, but in the woods, without either the art or helpe of man. . . . There is, likewise, Strawberries in abundance, verie large ones, some being two inches about; one may gather halfe a bushell in a forenoone." In 1643 Roger Williams wrote: "This berry (strawberry) is the wonder of all the fruits growing naturally in those parts; it is of itself excellent, so that one of the chieftest doctors of England was wont to say that God could have made, but never did, a better berry. . . . In some parts, where the natives have planted, I have many times seen as many as would fill a good ship within a few miles' compass. The Indians bruise them in a mortar and mixed them with meale and make strawberry bread." It appears that strawberry bread was commonly used by the Indians, showing the former abundance of the wild strawberry in

New England. Professor Bailey adds that "The advent of the Chilian strawberry in European and American gardens, and its phenomenally rapid amelioration, obscured the native species, however, and the latter are now practically out of cultivation. Now and then some evidence of native blood can be seen in an early variety, but the influence of our field strawberry in the improvement of the garden varieties has evidently been very small.

(Concluded from page 365.)

the advantages of irrigated agriculture that I would not feel certain that in no other part of the United States attempt to cultivate land outside of the arid region. I can the staple products of the soil be so cheaply grown. In no other part of the country is the soil so rich, the climate so agreeable and so well adapted to the outdoor occupations of men. It is because of this abiding faith that I so earnestly desire the success of all irrigation enterprises. The strong features of these need no words of praise from me; it is the weak features which cause us to fear, and since a chain is no stronger than its weakest link, I urge upon you as the representatives of the people of the West to come to the rescue and change a possible defeat into a glorious victory.

In all the great battles of the history of the world the wise general has reserved a part of his force to use at critical periods in support of the weakest positions. In this great battle against aridity which is now being waged the weakest position is to be found on the firing line amid the thickest of the fight, among that great army of toilers who are striving to conquer with water the Great American Desert.

TO OPPORTUNITY.

So, then, hast thou knocked once upon my door,
And, having passed by, will return no more?
Or will yet come, still unannounced, that call,
Which if unheard means a farewell to all
My future greatness? What a stake is there!
How will I know, how make myself aware,
Lest I accept some lesser destiny,
Or I refuse, not recognizing Thee,
My hopes too great, Real Opportunity?

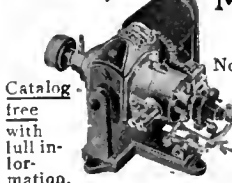
Nay, Opportunity, I challenge Thee!
I am not bound and will not hide, nor flee,
Neither Thy knock, nor after Thee if lost;
For I believe thy claim is false and most
Preposterous. It teaches men
To wait for thou to thrust success on them.

Not unlike captive lions which while young
Look past their prisons with ambitious eyes,
As though expecting soon to stride among
Their present captors, till hope slowly dies,
Since each new day does merely disappoint,
And sullen then they live—so they who wait
For opportunity to them anon,
Or think success a sudden gift of Fate.

Not once, but many times knocks at thy door
The *unfateful* hand—repeats o'er and o'er,
'Tis nothing strange, train not a watchful ear,
Thinking if lost thou ne'er again wilt hear,
It is an answer, coming constantly
To thy good plan, to thy diplomacy
Of yesterday. Plan on, my friend, and let
Thy great ambition build thine own success,
With hope and pluck and courteous, good address,
Ne'er giving up, nor thy good cheer abet,
And be not cheated by the thought that Fate
Smiles not on thee, that Opportunity
Has passed thy door; nay, rather take
A great, exultant joy that Destiny
Lies in thy hand and mine, will what we may,
That little's lost, if not all won, today.

F. J. W.

Write to-day.



Motsinger Auto Sparker

starts and runs
Gas Engines without Batteries.

No other machine can do it successfully for lack of original patents owned by us. No twist motion in our drive. No belt or switch necessary. No batteries whatever, for make and break or jump-spark. Water and dust-proof. Fully guaranteed.
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KING DAVID APPLE F-R-E-E

Are you a lover of fruit? Are you a fruit grower? Do you not take great pleasure in testing out new varieties? If so you will be interested in our **FREE GIFT** of a one year old tree of the splendid **KING DAVID** apple. We have secured a limited supply of these trees from a great nursery and since we publish a paper devoted partly to fruit culture we think it a most appropriate present to give to readers of our Journal.

How To Secure a Tree

If you plant one of these trees you would not part with it when it comes into bearing for \$25, no, not for more than that. Even to home owners who are not fruit growers, a bearing King David apple tree will be a source of pleasure, a supply of fine, beautiful eating apples, and of profit for a lifetime. We will mail a one year tree to you and guarantee good healthy trees for the price of one year's subscription to the **IRRIGATION AGE**.

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Irrigation Age—one year with one King David Apple tree..... **\$1.00**

Special

You may make the above offer to your neighbors, same prices, including tree, and we will send you one additional tree for each neighbor's subscription you secure and send in. This offer will enable you to secure several trees.

The King David apple originated in Arkansas 13 years ago. In quality it is absolutely **BEST**. Color, beautiful as can be imagined, a deep, dark, solid red. A large apple, late variety, excellent keeper; tree, a vigorous, spreading grower. All in all, King David promises as near perfection as it is reasonable to expect. Is there any reason why you should not have this splendid apple tree growing on your place? Is it not a rare gift? Write us today, and secure a tree.

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Send your paper _____ years and as per your offer send

me _____ King David Apple trees this (Fall) (Spring).

R. F. D. _____

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Kimball, Nebraska

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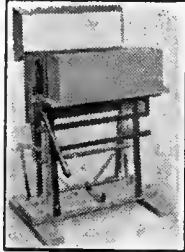
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All blocks made with face down, and length to 24 inches. Will also make hollow blocks if so desired. **THE SIMPLEX** can be operated by one man or more.

It is light, strong and the most rapid machine on the market. **THE PRICE IS RIGHT. Send for Catalogue D.**

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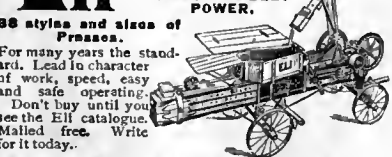
Do you want to make money? Here is your chance. Get a set or two of our pipe tools, make up a stock of pipe and do contracting of installing irrigating systems. Your neighbors are wanting something to save water and labor. Here it is. Write for further information and prices. Mention The Irrigation Age. **KELLAR & THOMASON, Covina, California.**

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Maywood Colony is located in the upper end of the beautiful Sacramento Valley, in Tehama County. Corning, the depot and postoffice for the colony, is 110 miles north of Sacramento.

For literature relating to land in this settlement, write to

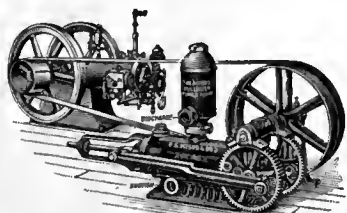
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Proprietor of Maywood Colony

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MYERS POWER PUMPS

WITHOUT AN EQUAL ON THE GLOBE



OPERATING WITH GAS ENGINE

FIG. 952

HORIZONTAL BULLDOZERS, 3" TO 6" CYLINDERS

MYERS BACK GEARED WORKING HEAD

TAPPED FOR 3" PIPE

5, 7 1/2 AND 10" STROKE

FOR BELT, WIND OR HAND POWER

FIG. 1113



2 1/2" DISCHARGE

BULLDOZER WORKING HEAD

1 1/2" BRASS ROD

PIPE FLANGE

ROBOTTED BOX

THE MYERS BULLDOZER POWER WORKING HEAD

PISTON COUPLING NUT

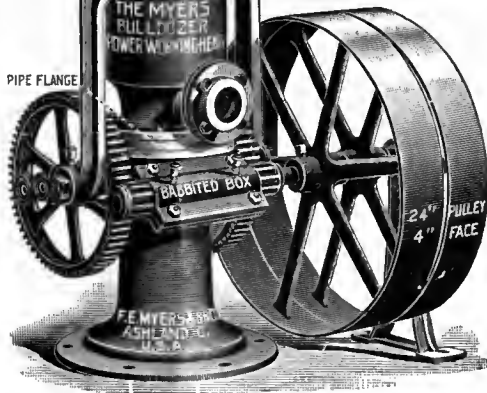


FIG. 813

BULLDOZER PUMP 6" BRASS LINED CYLINDER

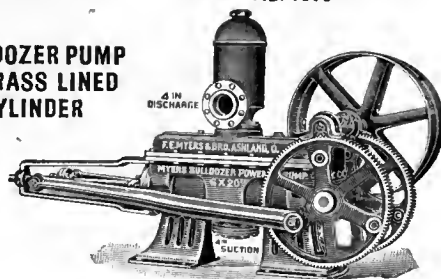


FIG. 1079

MYERS BULLDOZER POWER PUMP

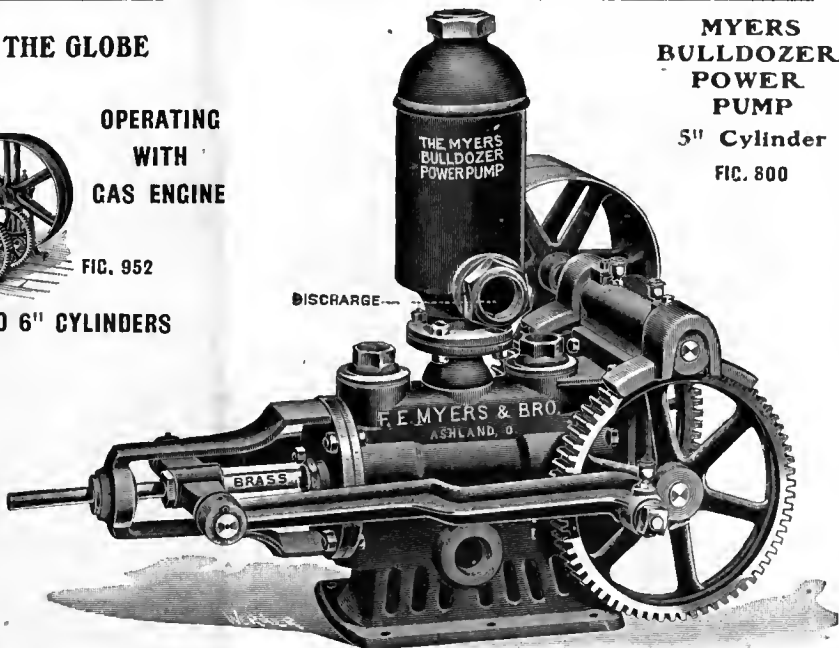
5" Cylinder

FIG. 800

DISCHARGE

F. E. MYERS & BRO. ASHLAND, O.

BRASS



MYERS BULLDOZER WORKING HEADS

NO. 359

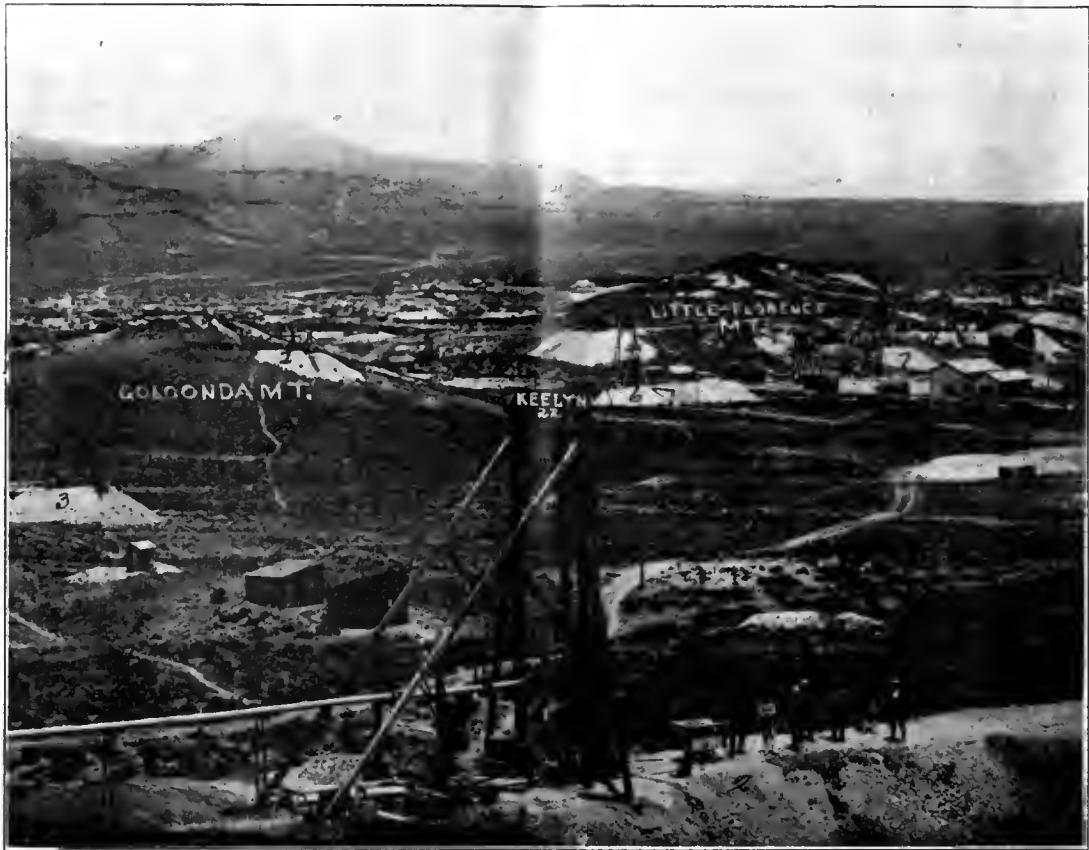
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SUCTION 2" TO 4"

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REGULARLY FITTED 4"
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VIEW OF A PART OF GOLDFIELD MINING DISTRICT. LITTLE FLORENCE MINE ON THE RIGHT, GOLCONDA ON THE LEFT.

80 Per Cent a Month on the Original Investment of 25 Cents a Share LITTLE-FLORENCE Has Paid Three 10 Per Cent Dividends

The Nevada Mine-Owners' Association exclusively promoted this property in October last year.

A Sister Mine to "LITTLE-FLORENCE," The Goldfield Golconda Mining Co.

First Allotment of Treasury Stock at 35 Cents per Share.

CAPITAL STOCK, \$1,000,000.

PAR VALUE, \$1.00.

TREASURY STOCK, \$400,000.

This company owns a lease on the next hill about 2,000 feet south of Little-Florence. This hill is absolutely identical with the Little-Florence mountain, both these mountains stand almost alone in distinct range between Columbia Mountain and the Red Hills in the heart of the Goldfield district.

Mr. James E. Keelyn, the man who selected "Little-Florence" and to whom her great success is due, also selected this ground; he makes this statement:

"It is my firm belief that I will repeat the success of Little-Florence on the Golconda."

Major Stanton, one of the leading mining engineers of the west, asserts with Mr. Keelyn that this lease is the best prospect

of any nonshipping property in Goldfield. There is a 200 foot shaft down and one of the best machinery equipments in the camp is in operation at this time.

The Nevada Mine Owners' Association is authorized to dispose of the Treasury Stock to develop the property.

The first allotment of stock being subscribed for and underwritten at 35 cents a share as long as the allotment lasts. Payable one-fifth down and one-fifth for four consecutive months, or 5 per cent discount for cash.

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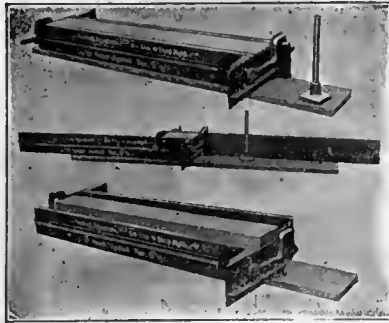
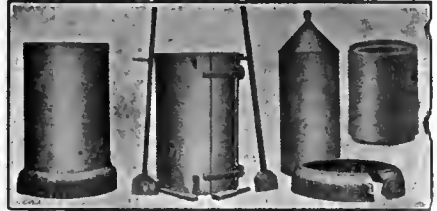
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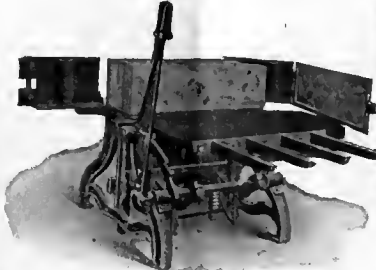
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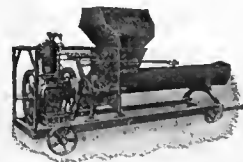


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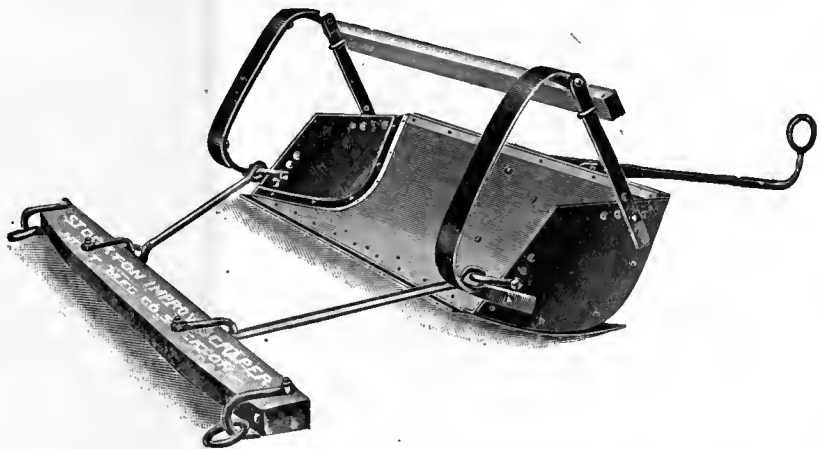
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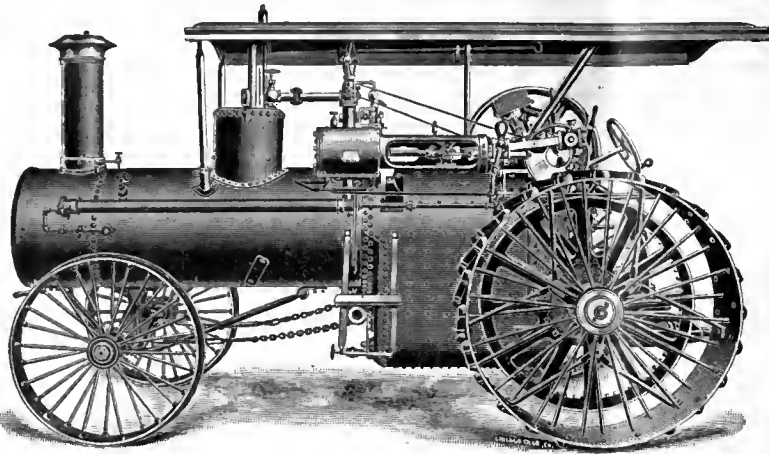
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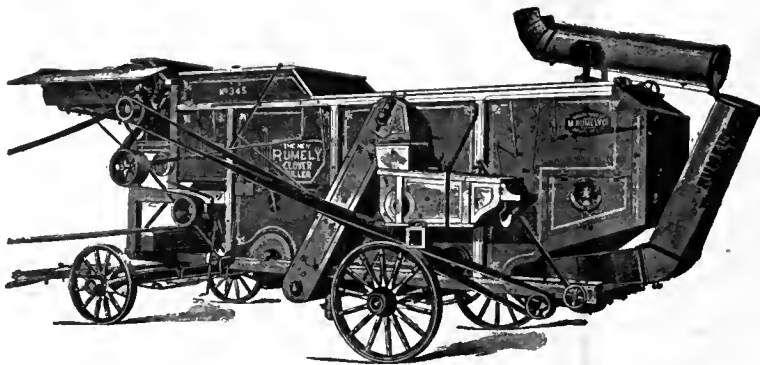
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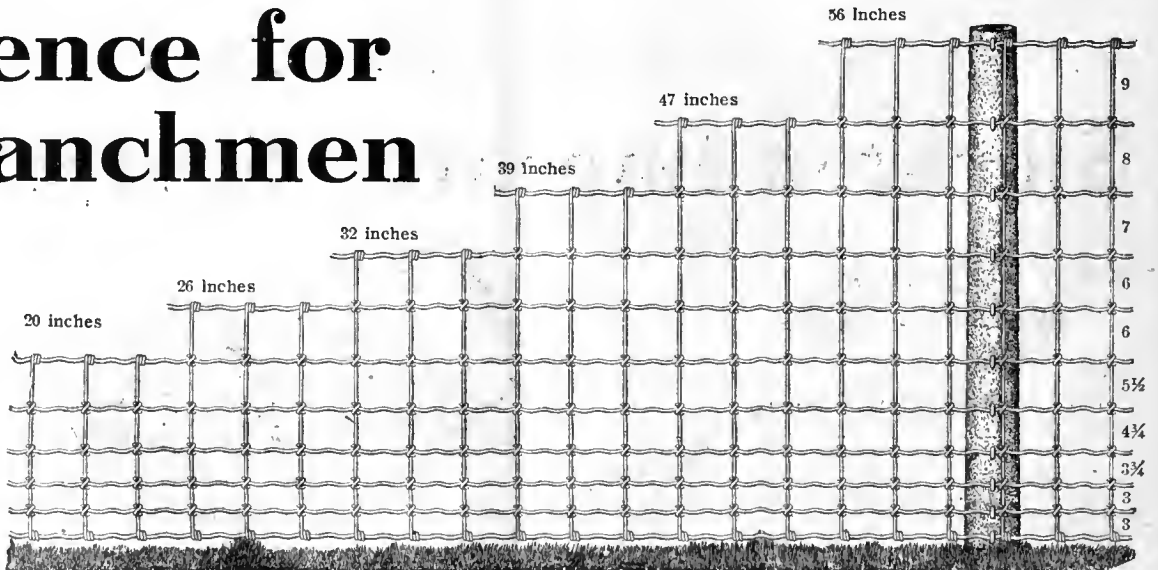
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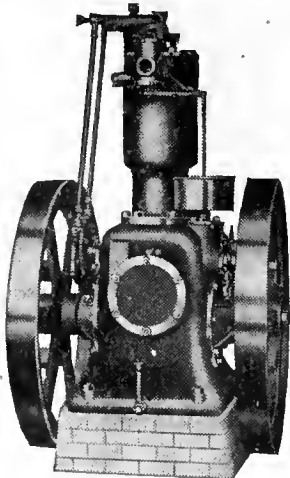
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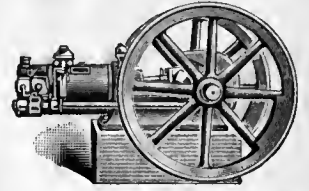
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