

IRRIGATION MAKES DESERT BEAR FRUIT



ITH contracts let by the state for the irrigation of 27,000 acres of arid land under the Carey act, with \$2,750,000 from Oregon in the Government reclamation fund, and with Government engineers making surveys of several measurements of the water supply available in many large tracts and streams, the prospect is bright that dry Oregon will soon become fertile and be peopled with prosperous farmers and orchardists. While the larger enterprises

man, finding ten acres of irrigated fruit land enough to occupy his energies and make him a comfortable living, is content with that much. Therefore the people live close together and not at intervals of a mile or two, as they do in an unirrigated country. Thus they escape the dreary isolation of farm life under other conditions and enjoy the pleasures of neighborliness which a town affords while living in the country. They have their schools and churches close at hand and can hitch up their teams and drive a mile or two to the depot with their produce in the cool of the evening.

Thus it is that irrigated land has found occupants and irrigation bonds have found buyers, and each successful enterprise of the kind makes the next easier to carry through. Private enterprise, aided by the

Umatilla and Morrow Counties, in Malheur County and in Harney County. In all these projects the summer flow of the streams has been practically all appropriated and any further reclamation will involve the construction of more or less costly dams for retaining the flood waters of winter and early spring.

An idea of the cost of these dams is best illustrated by the estimates on the big dam proposed for the Nicaragua Canal. Including controlling works and spillways, these were for \$3,000,000 to \$5,000,000, according to design, the final estimate adopted being for \$4,500,000.

The best interests of the country demand, and the reclamation service itself requires that the cost of construction must not exceed the value of the enterprise when completed.

The largest project under consideration may not exceed 50,000 acres of land. When the value of such land, with water, but otherwise unimproved, is considered, it is readily seen that much study and the most thorough investigation is required of the reclamation service.

The irrigable land, as well as all reservoir sites and canal lines, are being gone over and carefully mapped, showing all differences of elevation at most ten feet, and in some cases, where the ground is very flat, of as little as two and one-half feet. This is generally done with a plane table, an instrument especially adapted to developing topography of large areas, and for this reason not generally used except by the Government. In very flat countries it is often very difficult to see long distances over the sagebrush, and illustrations are shown of instrument men occupying tops of houses and wind-pump towers to obtain clear sights.

Probably the most important of all the investigations is that to obtain the amount of water available, the discharge of the various streams during the different months of the year.

The absolute necessity for such information is nicely illustrated by a well-known irrigation system in Southern California.

A stream throughout the year is as follows: A gage-rope is fixed at some convenient point in the river and an observer employed to read and record the daily variations of the water. The amount of water passing at different stages indicated on the gage-rope is determined by the use of a current meter. Cables are erected across the stream, and the hydrographer moves across in a suspended car, holding the current meter at various measured positions in the water. The instrument automatically indicates the velocity of the water, and from this the discharge is estimated. Some 20 of these stations are being maintained at present. An illustration is shown of a station across the Umatilla River, near its mouth, with the hydrographer in the car.

JOHN T. WHISTLER, Engineer, U. S. Geological Survey, Pendleton, Or., Dec. 15.

WORK UNDER CAREY ACT.

Several Companies Are Building Large Irrigation Plants in Oregon.

While a member of the United States Senate, from the State of Wyoming, the Hon. Joseph M. Carey introduced a bill in Congress which became a law and has since been known as the "Carey Act." This was the 18th of August, 1894. In short, the act provides that the United States, through the Department of the Interior, will convey to any state one million acres of desert land, provided the state would place water upon the land. The land was to be sold by the state to actual settlers only and not in larger tracts than 160 acres.

In the session of 1901 the Oregon Legislature passed a law taking advantage of the provisions of the Carey act. In the annual report of the State Land Board, for the period ending September 30, 1902, there were five contracts which the state had executed, for the reclamation of over 230,000 acres of land. At that time there were 16 applications on file for contracts.

On November 22, 1902 there had been 20 applications in this state for contracts under the Carey act.

The first contract made by the State of Oregon with any private company for the irrigation of public land under this act was with the Portland Company to irrigate 5738 acres in the Harney Valley, the water to be obtained from wells.

The wells have been sunk and water has been found, this constituting the first year's work. The cost is limited to \$10 an acre and the annual charge is to be \$1.50 an acre.

Valley, in Crook County, with water taken by gravity from the Deschutes River. It has built a sawmill with which the timbers for a large flume were sawed and a mile and a half of flume has been built. This is the heaviest part of the work, for the three or four miles of ditch to be dug in order to reach the land is only light work. This contract provides for an expenditure of \$346,557 in construction and for an annual charge of 75 cents an acre.

The Columbia Southern Irrigation Company has made great progress with its contract to water 27,000 acres, about 35 miles west of Prineville, from the Tule River, a tributary of the Deschutes. It has constructed 13 miles of main ditch and 23 miles of laterals, irrigating about 10,000 acres of the tract. This work is just finished and the land is partly settled with people who are clearing it ready for cultivation.

Another tract of 8,000 acres in the Deschutes Valley, in the Walker Basin, about 50 miles south of the Pilot Butte Com-

became a law June 17, 1902, and has to some extent superseded work of the Carey law since that date.

A. KING WILSON, Portland, December 17.

IRRIGATION BY FLOODING.

Method Which is Used Where Water is Abundant.

TO SUCCESSFULLY irrigate by flooding, special care must be taken in placing the land in condition before seeding. The field must first be leveled to a uniform slope or grade. The lay of the land will determine where the head ditch or lateral should be placed. This determined, give the land a uniform slope in the direction in which the water is to flow. In leveling, the Fresno scraper is the best tool for taking down the higher points and filling the depressions. This work

mined, and the ditches completed to carry the water to the land, check-rows should be thrown up with an ordinary plow to contain the water within definite limits. If now the water is turned on, any inequalities of surface can be detected before the seed is planted. The ideal irrigator will have his land laid out and ditches constructed so as not to run water over 100 yards before taking up in a second ditch and again distributing. Water can thus be used over and over and none allowed to go to waste.

Evil of Too Much Water.

It is not uncommon to see, however, fields of alfalfa where the water is flooded over a 40-acre tract with no intervening ditch. Where this is done, portions of the field usually get too much water, while others do not get enough. A sufficiently large head of water should be used to cover and saturate the ground quickly, and provision should always be made for carrying off the surplus water, not allowing it to stand for any length of time on

GOVERNMENT IRRIGATION FUND.

Sums placed to the credit of the reclamation fund from the sales of public land and fees and commissions in the several states and territories during the fiscal years 1901, 1902 and approximate estimate for 1903 under the National Irrigation Act:

State and Territory.	1901	1902	1903	Aggregate.
Arizona	\$42,596.16	\$39,187.25	\$42,321.35	\$124,104.76
California	\$35,000.40	\$35,000.40	\$35,000.40	\$105,001.20
Colorado	\$54,839.38	\$74,105.17	\$10,072.44	\$138,977.45
Idaho	\$90,545.26	\$90,545.26	\$90,545.26	\$271,635.78
Kansas	\$20,158.73	\$5,946.94	\$5,946.94	\$32,051.61
Montana	\$67,842.21	\$66,035.49	\$62,188.41	\$196,066.11
Nebraska	\$12,224.94	\$12,224.94	\$12,224.94	\$36,674.82
Nevada	\$12,224.94	\$12,224.94	\$12,224.94	\$36,674.82
New Mexico	\$73,203.06	\$72,004.69	\$150,127.70	\$295,335.45
North Dakota	\$47,474.96	\$122,843.20	\$2,556,541.20	\$2,726,860.36
Oklahoma	\$70,464.59	\$68,333.44	\$18,096.57	\$156,894.60
Oregon	\$54,839.38	\$46,572.44	\$184,729.53	\$286,141.35
South Dakota	\$13,274.20	\$39,000.00	\$46,582.26	\$98,856.46
Utah	\$8,412.00	\$4,408.23	\$7,519.66	\$20,339.89
Washington	\$27,130.95	\$38,907.22	\$1,093,900.42	\$1,159,938.59
Wyoming	\$24,939.59	\$17,772.24	\$73,955.94	\$116,667.77
Total	\$1,144,821.91	\$1,456,530.53	\$3,461,495.90	\$5,062,848.34
*Estimated.				

are left to the Government and the state, many smaller ones, some of them of considerable magnitude, have been and are being carried out by private enterprise on land owned by those who make the improvement.

General interest in the subject of irrigation is evinced by the large and enthusiastic attendance at the recent convention of the State Irrigation Association at Pendleton, and by the action of the Legislature in ordering the State Land Board to appoint a commission to revise and codify the irrigation laws. This commission was recently appointed and consists of Henry E. Ankeny, Sterling, C. W. Mallett, Ontario, T. G. Hallett, Pendleton; Ezra Snow, Portland, and H. V. Gates, Hillsboro.

Irrigation enterprises have had to live down a large amount of prejudice among capitalists, due to blundering, extravagance and bad judgment in selecting the tracts and doing the work. When the first enterprises of this kind were launched ten to fifteen years ago, few people in the Eastern and Middle States knew anything about irrigation methods or their magical effects on seemingly worthless land. Promoters took to the East glittering stories of the great fertility of the soil with water on it. They sold bonds on these representations and constructed immense plants to water hundreds of thousands of acres. Often mismanagement caused the funds to run short before the water reached the land and receiverships and foreclosures followed. In other cases, the same results followed from under-estimates of cost. In those cases where the water was put on the land there was found to be little or no market for it, for the land remained vacant. The promoters had assumed that as soon as the water was ready to turn through the lateral ditches, farmers would stampede eagerly to the improved tracts. They therefore neglected to provide the settlers who would apply the water to the land in raising crops and paying water rental. Thus interest on the bonds was not forthcoming and irrigation bonds got a bad name.

Since then there has been a campaign of education throughout the land. Great amounts of literature have been distributed, containing pictures of hops, fruit and vegetables grown on irrigated land. Many of the products of such land have been shipped through the country as specimens of what the so-called desert will do when given water. Tens of thousands of homeseekers have come West to see and be convinced of the wonderful possibilities of irrigation and have gone home to tell the story to their neighbors. A President who knows the West intimately from long residence has secured the passage of the National Irrigation Act by telling in his message what irrigation will do, and the action of Congress has helped to conquer the proverbial timidity of capital.

The new settlers who have poured out from the East and Middle West during the last few years have, many of them, bought irrigated land and paid a revenue to the companies which has enabled them to pay interest on their bonds. This has restored the confidence of the Eastern investor and he is again willing to buy irrigation bonds, but only when he knows what provision has been made to put not only water but settlers on the land. He has learned that a farmer can make as much money in a year on a ten-acre tract of irrigated land as on a 320-acre tract of wheat land. Mortgage companies have learned that irrigated land is worth \$40 an acre, and they therefore consider such land with the water as good security as any farm land in any part of the Northwest. They realize that, as the farmer is not dependent on the natural rainfall, he is more certain of a crop, and therefore his ability to meet his obligation is so much greater. There is one irrigated orchard of trees bearing the finest variety of apples for which the owner recently refused \$3000 an acre.

Settlers are occupying irrigated land because they need not watch the sky to learn whether they will have a crop. Each

Carey act, is carrying through the enterprises of moderate dimensions, leaving those which involve millions to the Government.

WORK OF GOVERNMENT.

Making Preliminary Surveys and Measuring the Streams.

THE Federal Government, through the reclamation service, has been pursuing investigations during the past season, to 200,000 acres of now valueless land in

The method of obtaining the discharge

pany's tract, is to be irrigated by the Oregon Development Company, composed of St. Paul capitalists, at a cost of \$12,000.

The contract, which calls for an annual charge of 75 cents an acre, has not yet been approved by the Interior Department, so that construction has not begun.

Another contract made by the state with the Harney Valley Improvement Company to irrigate 8,334 acres in the Harney Valley from the Silves River, is in the same position. The cost is placed at \$441.84 and the maintenance charge at 60 cents an acre.

The National act, commonly known as the "Newland act," was approved and

can be done with a slip scraper, but it is much slower. Follow the scraper work with a leveler, which will move the dirt from the high places and deposit it in the smaller depressions. The leveler is usually a home-made affair which any farmer can construct. It consists of an oblong frame of two-inch timber, braced to keep it rigid, and with a scraper blade, worked by a lever, arranged on the inside. The longer the frame the better work it will do. The best frame the writer has seen was arranged with wheels to facilitate turning, the entire frame being raised and balanced on the wheels.

How to Use the Water.

When the land has been brought to a proper grade, as nearly as can be deter-

mined. Standing water on a field will soon ruin it, especially if the weather is hot.

Where the irrigator has an abundance of water, there is usually a tendency to use too much, to the detriment not only of his crop, but of his land. An excess of water is sure sooner or later to bring the alkali, with which all arid land is filled, to the surface, and the only remedy is the expensive one of drainage.

Speaking of drainage, provision should always be made for carrying off waste water, and the more thoroughly this is done the longer will the land remain free from alkali. Hay lands and fields used for pasture are the ones that can be irrigated by flooding to the best advantage, although the writer has seen fields of grain irrigated in this way.

Ontario, Dec. 1. F. W. METCALF.

LAW OF IRRIGATION.

First User of Water Has First Right in the West.

Pendleton, Or., prepared a bill which was introduced in the Legislature by the Hon. J. H. Riley, and it became a law. Mr. Cox gave considerable time to the preparation of this bill, and had considerable experience in irrigation litigation. It provides, among other things, that the use of water for irrigation is a public use; that corporations are authorized to condemn land for reservoirs, ditches, etc., for the posting of notices at the point of diversion and later a recording of said notice at the county seat; regulations in regard to the doctrine of appropriation as applicable in the Western States; that the flow of a stream may be condemned for proper purposes; how work shall progress after notice is posted, and how the right may be lost by abandonment.

The doctrine of appropriation of water from streams is peculiar to the Western States, and owes its origin to the necessities of the arid region. The doctrine is that the unappropriated waters of natural streams shall be subject to appropriation for irrigation and other useful purposes. To constitute a valid appropriation of water, there must be an actual diversion of the water with the intent to apply it to some beneficial use, followed by an actual application of it to that use within a reasonable time.

In the light of the present decisions of our Supreme Court, it can reach no conclusion based upon reason, logic or common sense other than that the one who first applies water to a beneficial use shall have the first right in law, in short, the doctrine of appropriation. This doctrine in its entirety has been adopted in only seven states and territories of the United States. Undoubtedly new questions will arise which will require decisions of the courts, and from the fact that the doctrine of riparian rights has been taught for so long, and that nearly all our judges and lawyers were prepared in schools of the East, it may be some time before this doctrine is fully established and perfectly understood.

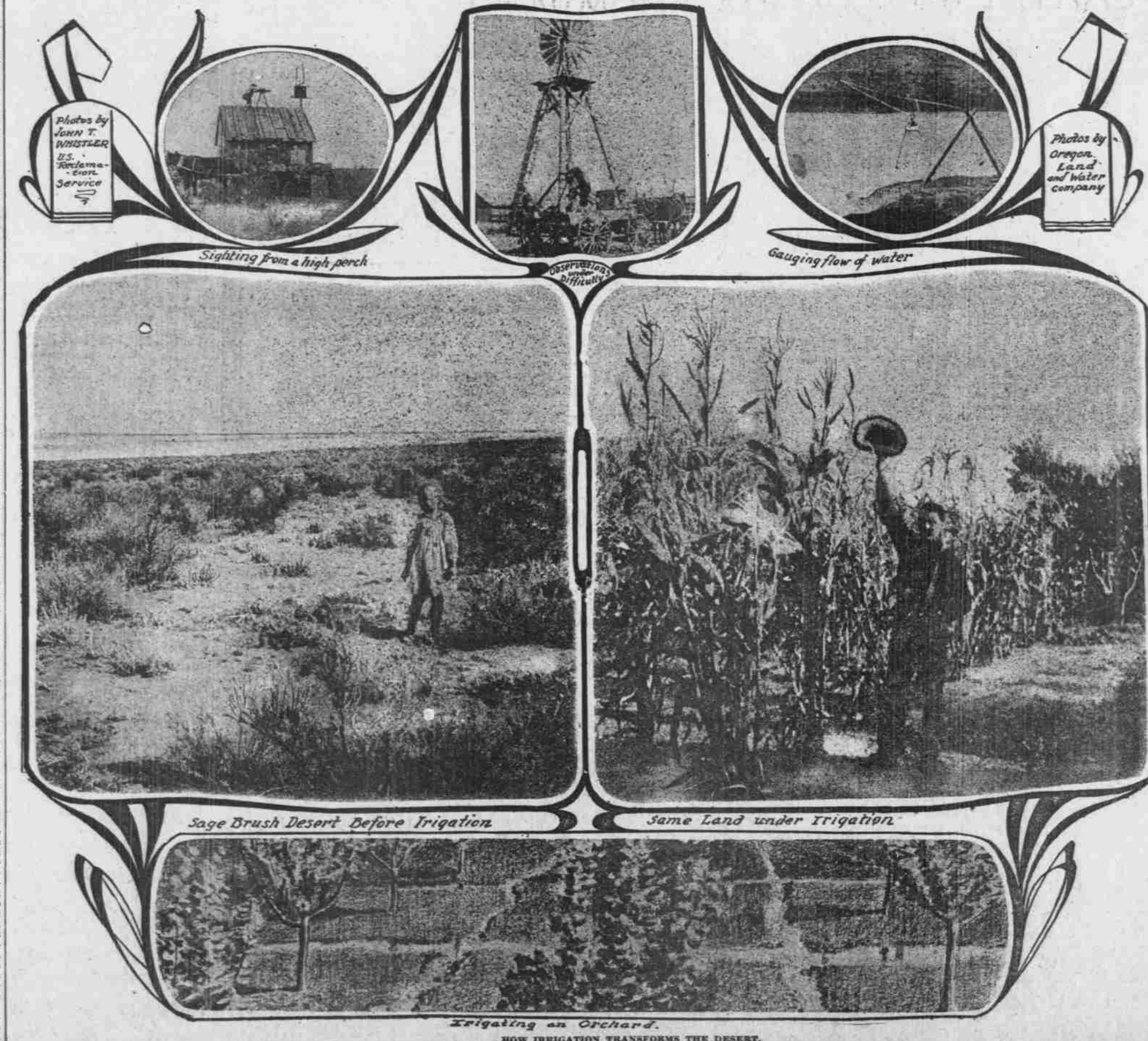
At the present time we have a very full law on the doctrine of appropriation of water, and, as far as I can see, nothing more is desired in the way of legislation intended to affect riparian rights. In my opinion, any constitutional amendment or legislative act on this subject would be void.

I would change the unit of measure from a miner's inch to a cubic foot per second. I would provide that the notice of appropriation should be recorded at the county seat and at the Statehouse in Salem; otherwise it should be void. I would create by law the office of State Engineer, whose duties should be executive, not judicial, as in many states.

There has been a great deal of development in the State of California under the Wright, or district, act. Large amounts of bonds have been sold. Oregon passed substantially the California law in 1895, but no district has even been organized in this state.

When there is insufficient water, preference is given to domestic use, then agriculture, and lastly manufacturing. Ditches are declared to be real estate. Breaking or injuring a ditch or polluting the waters of a stream is a crime. There are over 60 decisions in the Supreme Court of Oregon on the questions involving the use of water. Many questions have been definitely settled, and in all probability will never be changed. The state, by these laws, is encouraging development along this line, and the people generally are in favor of irrigation. I feel satisfied that we can anticipate nothing but favorable legislation and just decisions.

Portland, Dec. 14. A. KING WILSON.



Irrigating an Orchard.

HOW IRRIGATION TRANSFORMS THE DESERT.