

A NEW HOME IN THE ARID BELT.

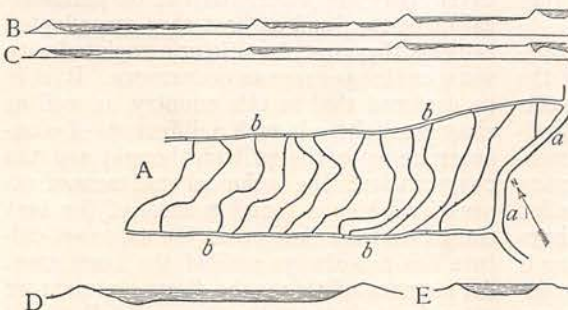
WAYS AND MEANS IN ARID AMERICA.

THE best crop ever grown on the trans-Mississippi plains sprung from wheat which perished ungathered in the parching winds of a rainless summer; and the most valuable grist ever ground in that locality came from a mill projected, but never built. To explain this paradox is to record the most dramatic incident of an evolutionary process which revealed the extraordinary possibilities of an apparently worthless region, and established industrial forms, unique in Anglo-Saxon experience, as the foundation of economic life in half a continent.

The summer of 1878 was a phenomenal season throughout the strip of prairie country lying between the region of assured rainfall and the foot-hills of the Rocky Mountains. The rains were abundant and well distributed, justifying the hopes of interested prophets who had long predicted that the rain-belt would move westward with population. The tide of settlement still pressed eagerly upon the open lands of Kansas and her sister States in the broad Mississippi basin. Nothing but the alluring promise of regular crops in the hitherto debatable ground of the western counties was needed to induce the rapid division of the old stock range into thousands of quarter-section farms, each with its

home and its mortgage. This promise was supplied by the rainy season of 1878, and settlers came in swarms. It was the halcyon day of the town promoter and the builder of paper railroads. Under the strange spell of the «boom,» born of the fleet of prairie-schooners which glided in from the East, and magnified by the exhilarating influence of Western air and sunshine, impossible undertakings were inaugurated in every direction. Agriculture was to be the foundation of a new civilization which had driven first the buffalo, and later the steer, before its irresistible advance. The spirit of the people was well illustrated by the earnest appeal of an impecunious enthusiast who declared, at a meeting of his townsmen called to consider the urgent necessity of providing a new outlet for the anticipated fruits of the soil: «I will guarantee to build that railroad myself—if I can only raise money enough to file the articles of incorporation!»

In Finney County, near the western border of Kansas, thousands of acres were planted to wheat, and it seemed the sanest of projects to build a grist-mill to grind the crop. This was undertaken near the Arkansas River by enterprising merchants in the neighboring community of Garden City; but the new institution began and ended with a mill-race. Before the building and machinery were required, the wheat crop had surrendered to dry air and hot winds. The semi-arid character of the great plains west of the hundredth meridian, long known to stockmen and Indians, but denied by greedy land agents and discredited by eager and hopeful settlers, had again asserted itself with unmistakable emphasis. Not an acre of the crop was harvested. The prairie-schooners set sail and steered for other parts. Towns dwindled to mere hamlets. All the nebulous industrial, educational, and railroad projects suddenly descended



DRAWN BY D. B. KEELER. FROM REPORT OF THE SENATE COMMITTEE ON THE IRRIGATION AND RECLAMATION OF ARID LANDS.

METHOD OF IRRIGATION BY FLOODING.

A, plan showing the marking off of lands into plots or «checks» by ridges thrown up along the contour lines; a, main canal; b, distributing ditches; B, section of two-foot contour checks; C, section of one-foot contour checks; D, cross-section of canal; E, cross-section of ditch.

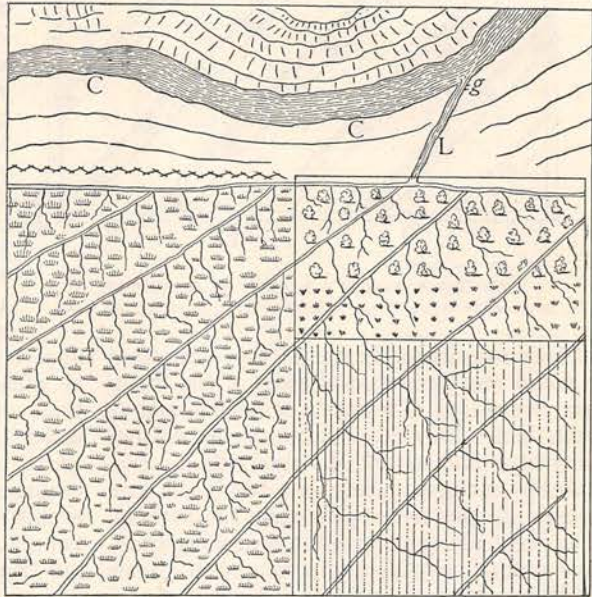
from the sublime to the ridiculous. And yet the blighted seed was destined to bear another and far more fateful crop, and the forgotten mill-race on the banks of the Arkansas to grind a grist that would prove historic.

RISE OF IRRIGATION ON THE PLAINS.

A FEW settlers remained to rake amid the ashes of their ruined hopes. Among them was a man who had learned the methods of irrigation while living in California and Colorado. It happened that his land adjoined the abandoned mill-race, and he readily obtained the right to turn the water upon a part of his farm. The result, though not surprising to the practised irrigator, was a revelation to his thoroughly disheartened neighbors.

The soil which had produced nothing in the previous summer responded to the new method of cultivation with enormous crops of all varieties of products. In quality they surpassed anything previously grown in that region. As these facts became known a new hope arose, like a star in the night, against the dark background of past discouragements. The Garden City « experiment » became the Mecca of students of irrigation throughout the wide region devastated by the drought. The ruined crop of the previous year, and the useless mill-race, gave birth to an influence which in fifteen years has assumed far-reaching proportions. This influence, by revealing the need of irrigation in a territory which had hitherto depended entirely upon the rainfall, extended the known limits of arid America hundreds of miles to the eastward and more than one thousand miles north and south, thus adding to the empire of irrigation all the western portions of the Dakotas, Nebraska, Kansas, Oklahoma, and Texas, together with eastern Colorado. In this vast district it has begun to revolutionize both the industrial and social life of the people. It has compelled the attention of legislatures, created new laws and administrative systems in several States, wrung a few meager appropriations from Congress, and set on foot various industrial and educational undertakings. The problems of the semi-arid region are peculiarly its own, differing materially from those of the desert States west of the Continental Divide. The

movement which has wrought these momentous changes alike in public sentiment and in methods of industry has found its warmest championship in Kansas, where it has been reduced to perfect organization through the instrumentality of press and platform. Throughout the semi-arid region, but particularly in Kansas, there are effective State, county, and township associations urging the adoption of irrigation as the price of prosperity, and extending, by means of conventions and



DRAWN BY D. B. KEELER.

FROM TRANSACTIONS OF DENVER SOCIETY OF CIVIL ENGINEERS, 1886.

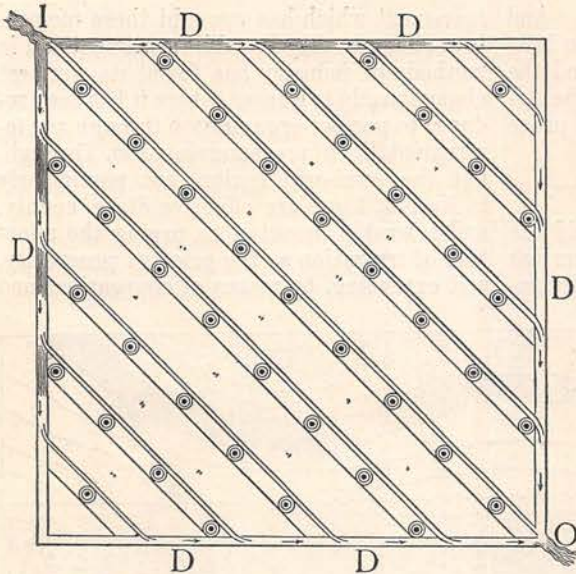
METHOD OF IRRIGATION BY DIAGONAL FURROWS.

C, C, main canal; L, lateral canal; g, gate; = plow furrows.

popular literature, the common knowledge of its practical aspects.

HARNESSING THE WIND.

THE original mill-race was quickly extended and enlarged to the proportions of an irrigation canal. Foreign capital was enlisted, and other irrigation works were constructed along the Arkansas. But this river takes its rise in Colorado, and in that State enterprise was busy with the diversion of its waters. In the absence of any regulation of interstate streams by national authority, the Colorado irrigators absorbed all the water flowing during the irrigation season, leaving the canals of western Kansas as dry as her prairies. The investment of an English company in extensive works costing upward of a million dollars was practically destroyed by this unexpected turn of affairs. There were several similar losses

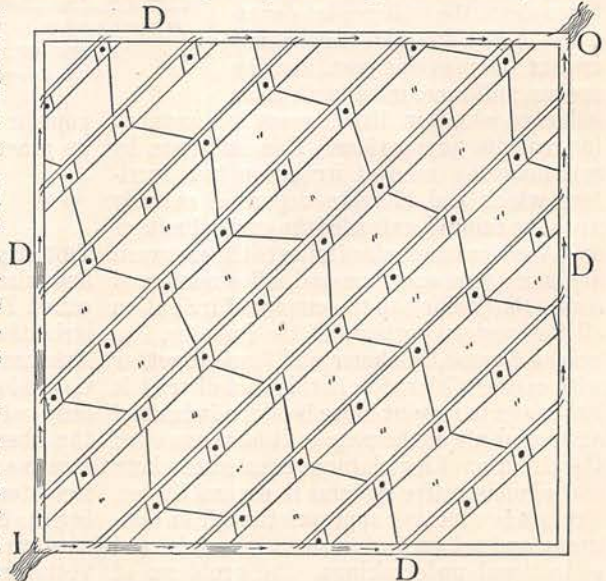


DRAWN BY D. S. KEELER.
 PROFESSOR BLOUNT'S METHOD OF IRRIGATION.
 ⊙ tree with encircling furrows; I, inlet; O, outlet; D, ditches; = furrows.

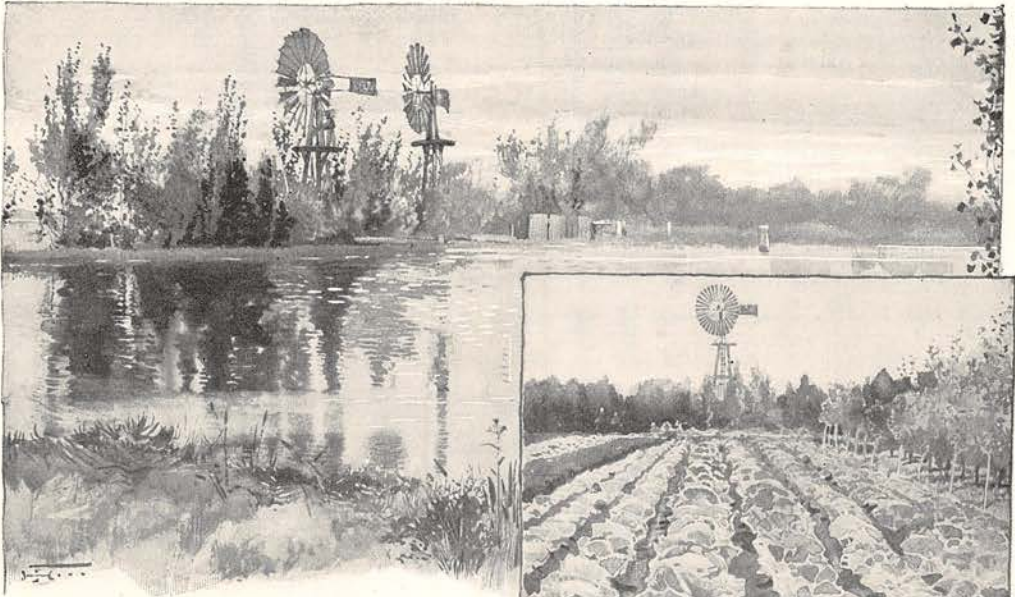
uniform eastward slope of the plains is seven feet to the mile. The indefatigable Kansas wind keeps the mills in active operation, and the reservoirs are always full of water, which is drawn off as it is required for purposes of irrigation. These small individual pump-plants have certain advantages over the canal systems which prevail elsewhere. The irrigator has no entangling alliances with companies or cooperative associations, and is able to manage the water-supply without deferring to the convenience of others or yielding obedience to rules and regulations essential to the orderly administration of systems which supply large numbers of consumers. The original cost of such a plant, exclusive of the farmer's own labor in constructing his reservoirs and ditches, is two hundred dollars, and the plant suffices for ten acres. The farmer thus pays twenty dollars per acre for a perpetual guaranty of sufficient "rain" to produce bountiful crops; but to this cost must be added two dollars per acre as the annual price of maintaining the system. Farming under these conditions is limited to small areas, and intensive methods of cultivation become imperative. The result has been the evolution of a multitude of five-, ten-, and twenty-acre farms, each surrounded by its tall fringe of protecting cottonwoods, which

of less magnitude. It was at this stage that a noted wag remarked of some of the Western rivers that "they are a mile wide and an inch thick—they have a large circulation, but very little influence." The observation is justified by surface appearances, but it is a case where all does not appear upon the surface. The great plains receive the enormous drainage of the Rocky Mountain watershed. Some of it goes to waste in floods and some is lost in evaporation, but vast quantities of water go into the ground and largely follow the gravelly courses of the streams. In the Dakotas and in Texas these earth waters seek the surface in great artesian outpourings. When the Kansas irrigators found themselves deprived of their surface supplies they sought the underflow, and in the process of finding and utilizing it developed an entirely unique and very promising mode of irrigation. Here at last they approach the final solution of their problem.

The new experiment, like the former one, was first made at Garden City, within sight of the historic mill-race. It was found that in the Arkansas valley water could be obtained by shallow wells ranging in depth from eight to twenty feet. This is raised by hundreds of windmills into hundreds of small reservoirs constructed at the highest point of each farm. The



DRAWN BY D. S. KEELER.
 NEW MEXICO METHOD OF FURROW IRRIGATION.
 ◇ tree with surrounding furrows; = furrows from ditches; I, inlet; O, outlet; D, ditches.



PUMPS AND RESERVOIR, GARDEN CITY, KANSAS.

inclose grounds variously planted to orchard, field, and garden. These methods present a closer parallel to European agriculture than anything else found in this country, while the numerous windmills suggest comparison with Holland. Nowhere are there sharper contrasts than that which is presented by these green and fruitful farms gleaming like islands of verdure upon the brown bosom of the far-stretching plains which have been seared by the hot breath of rainless winds. The uses of the artificial reservoirs are not limited to irrigation; they are usually stocked with fish, which multiply with surprising rapidity and enable the farmer to include this item of home produce in his bill of fare every day in the year. These fish are very tame, and in some cases are actually trained to respond to the ringing of the dinner-bell, coming in scurrying shoals to fight for crumbs of bread thrown upon the water. The reservoirs also yield a profitable crop of ice in winter.

The windmill irrigation plant is mostly confined to Kansas, from whose necessities it grew. It is impossible at present to define its limitations. Its most enthusiastic friends assert that it is applicable to the broad uplands as well as to the river-bottoms, and Kansas has recently provided a State commission and an appropriation to make a thorough test of this possibility. The measure of the water-supply is the measure of valuable agricultural land in the semi-arid region. In



DRAWN BY HARRY FENN.

FROM A PHOTOGRAPH.

CABBAGE FIELD, GARDEN CITY, KANSAS.

Dakota water is obtained from wide artesian basins, while Nebraska is reasonably supplied with surface streams; but everywhere throughout this region the underground waters will be brought up by pumping-plants when this can be economically done. Thousands of settlers who have faced starvation in many a dry year await with deep interest the full development of these possibilities. Their interest is shared by thousands of investors in Eastern States and foreign countries, who own mortgage debentures issued upon these dry farms. The aggregate sum of these mortgages is tens of millions of dollars. In 1890 only fifteen hundred farms were irrigated in this district, but the results of the movement have been chiefly developed during the last five years. The next national census will reveal an enormous increase of the industry on the plains.

The development of this source of supply,

however, important and interesting as it is, does not in the least abate the demand for national action looking to the wise regulation of interstate streams. The salvation of great investments, and the extension of the irrigable area to the rich upland prairies, which cannot be economically irrigated by wells, demand that the flood-waters of such rivers shall be conserved and equitably divided between States to which they naturally belong. This matter will involve one of the larger problems of the near future. But while irrigation in the semi-arid region possesses strong elements of

was repressed as scarcely better than a traitorous «libel» on the country. Irrigation, at first thought, seems like a somewhat sorry expedient to remedy the shortcomings of the weather clerk, and is quite generally regarded as a crude Western device of merely local interest. These impressions completely reverse the facts of the matter. Irrigation is a perfectly natural and familiar process. The man who waters his plat of grass, and the woman who waters her dooryard pansies, are irrigators in a rude and humble way. The citizen who grumbles at the sight of withered lawns



DRAWN BY HARRY FENN.

A SMALL FARM IN THE SEMI-ARID REGION.

FROM A PHOTOGRAPH.

dramatic interest, it is not there that the real industrial life of arid America can best be studied.

THE ART OF MANAGING «THE RAIN.»

IRRIGATION as a practicable art is generally misunderstood in localities where it is never applied. Even in parts of the West where it is sorely needed the prejudice against it was formerly so strong that its advocacy

in a public park during a dry summer years for irrigation without knowing it. The Western farmer who has learned to irrigate thinks it would be quite as illogical for him to leave the watering of his potato-patch to the caprice of the clouds as for the housewife to defer her wash-day until she could catch rain-water in her tubs. A generation which has harnessed the lightning should see nothing incongruous in the ancient process of storing the rain and distributing it to meet



DRAWN BY MARY HALLOCK FOOTE.

ALFALFA, A WONDERFUL FORAGE-PLANT.

the varying needs of plants which nourish human life.

But although irrigation is both ancient and universal, the Anglo-Saxon never dealt with it in a large way until the last half-century, when he found it to be the indispensable condition of settlement in large portions of western America, Australia, and South Africa. Through all the centuries of the past the art has been the exclusive possession of Indian, Latin, and Mongolian races. Its earliest modern traces in this country are found in the small gardens of the mission fathers of southern California. They brought the method from Mexico and taught it to the Indians. But the real cradle of American irrigation as a practicable industry is Utah. A treasured historical painting in Salt Lake City shows the pioneers of 1847 in the act of turning the waters of the mountain stream now known as City Creek upon the alkaline desert. This picture commemorates the opening scene in the new industrial drama of arid America.

In the hands of the Indians and Mexicans of the Southwest irrigation was a stagnant art, but the white population has studied it with the same enthusiasm which it bestows upon electricity and new mining processes. The lower races merely knew that if crops were expected to grow on dry land they must be

artificially watered. They proceeded to pour on the water by the rudest method. The Anglo-Saxon demanded to know why crops required water, and how and when it could best be supplied to meet their diverse needs. He has sought this knowledge through the medium of agricultural colleges, experimental farms, and neighborhood associations. He has thus approached by gradual steps true scientific methods, which are producing results unknown before in any part of the world.

The earliest method of irrigation is known as "flooding," and is generally applied by means of shallow basins. A plot of ground near the river or ditch from which water is to be drawn is inclosed by low embankments called checks. These checks are multiplied until the whole field is covered. The water is then drawn into the highest basin, permitted to stand until the ground is thoroughly soaked, and then drawn off by a small gate into the next basin. This process is repeated until the entire field is irrigated. This is the system practised on the Nile, where the basins sometimes cover several square miles each, while in the West they are often no more than four hundred feet square. There is both a crude and a skilful way to accomplish the operation of flooding, and there is a wide difference in the results obtained by the two



DRAWN BY HARRY FENN.
LAKE McMILLAN.

FROM A PHOTOGRAPH.
LAKE McMILLAN, SHOWING THE PECOS VALLEY DAM.

methods. The Indian and Mexican irrigators, in their ignorance and laziness, seldom attempt to grade the surface of the ground. They permit water to remain in stagnant pools where there are depressions, while high places stand out as dusty islands for generations. All except very sandy soils bake in the hot sunshine after being flooded, and the crude way to remedy the matter is to turn on more water. Water in excess is an injury, and both the soil and the crops resent this method of treatment. The skilful irrigator grades the soil to an even slope of about one inch to every hundred inches, filling depressions and leveling high places. He «rushes» the water over the plot as rapidly as possible, and when the ground has dried sufficiently cultivates the soil thoroughly, thus allowing the air to penetrate it. The best irrigators have abandoned the check system altogether,

and have invented better methods of flooding the crops. Cereals and grasses must always be irrigated by flooding, but the check system seems likely to remain only in the land of Spanish speech and tradition where it was born. In Colorado wheat and grass are generally irrigated by a system of shallow plow-furrows run diagonally across a field. The water is turned from these upon the ground, and permitted to spread out into a hundred small rills, following the contour of the land. Some farmers bestow great pains upon this method, and succeed in wetting the ground very thoroughly. Another method of flooding fields is now much used in connection with alfalfa, a wonderful forage-plant extensively cultivated throughout the arid region. This produces three crops a year in the North and six crops in the South, and is not only eaten by stock, but by poultry and swine. To find

the best method of watering this valuable crop has been the object of careful study and experiment in the West. It is now accomplished by means of shallow indentations or creases which are not as large as furrows, but accomplish the same purpose. These are made by a simple implement at intervals of about twelve inches. They effect a very thorough and even wetting of the ground.

THE HIGHEST TYPE OF IRRIGATION.

THE scientific side of irrigation is to be studied rather in connection with the culture of fruit and vegetables than with field crops. It is here that the English-speaking irrigators of the West have produced their best results. California has accomplished more than any other locality, but nothing was learned even there until the man from the North had sup-

frequently to the injury rather than the benefit of crops. But in southern California water is gold, and is sought for in mountain tunnels and in the beds of streams. A thing so dearly obtained is not to be carelessly wasted before it reaches the place of use. Hence steep and narrow ditches, cemented on the bottom, or steel pipes and wooden flumes are employed.

This precious water is applied to the soil by means of small furrows run between the trees or rows of vegetables. The ground has first been evenly graded on the face of each slope. The aim of the skilful irrigator is to allow the water to saturate the ground evenly in each direction, so as to reach the roots of the tree or plant. The stream is small, and creeps slowly down the furrow to the end of the orchard, where any surplus is absorbed by a strip of alfalfa, which acts like a sponge. The land is kept thoroughly cultivated, and



DRAWN BY HARRY FENN.

FROM A PHOTOGRAPH.

HOME-BUILDING IN THE PECOS VALLEY: THREE NEW SETTLERS ALONG THE CANAL.

planted the Spanish irrigator. The ideal climatic conditions of southern California attracted both wealth and intelligence into its irrigation industry. Scarcity of water and high land values operated to promote the study of ideal methods. Where water is abundant it is carried in open ditches, and little thought is given to the items of seepage through the soil and loss by evaporation. Under such conditions water is lavishly used,

in the best orchards no weed or spear of grass is ever seen; the water is too costly to waste in the nourishment of weeds. Moreover, it is desired to leave the soil open to the action of air and sunshine. Nowhere in the world is so much care given to the aëration of the soil as in the irrigated orchards and gardens of the West. Too much water reduces the temperature of the soil, sometimes develops hard-pan, and more frequently brings alkali to the sur-

face. For these reasons modern science has enforced the economical use of water, reversing the crude Mexican custom of prodigal wastefulness. The success of the furrow method depends somewhat upon the texture of the soil, and there are places where it cannot be used at all. Such localities are not considered favorable for fruit-culture.

Of late years in California the application of water by furrows has been brought to a marvelous degree of perfection. What is known as the «Redlands system» is the best type of irrigation methods known in the world. Under this system a small wooden

less skies, with a system of controlling the moisture as effective as this, may be said to have mastered the forces of nature. The quality of the fruit has improved immensely since the California methods were perfected. Every fruit-grower realizes that the profit in his business comes mostly from the first grade of fruit. Scientific irrigation makes it possible for him largely to increase the percentage of the best fruit, and the difference which this makes in the earning capacity of his acres is surprising.

Other methods of furrow irrigation have been devised which are scarcely less perfect



FROM A PHOTOGRAPH.

A SHADY ROAD, NEAR ROSWELL, PECOS VALLEY.

flume or box is placed at the head of the orchard. An opening is made opposite each furrow, and through this the water flows in the desired quantity, being operated by a small gate or slide. The aperture regulates the flow of water accurately, and the system is so simple that, after it is once adjusted, a child can operate it. The farmer who grows his crops on a fertile soil, under almost cloud-

than those used in the California orange districts. One of the best of these is the result of the labors and experiments of Professor A. E. Blount of the Agricultural College at Las Cruces, New Mexico, and is illustrated in an accompanying diagram. In this case the water is carried in small open ditches, and the furrows are extended in circles around each tree, but the water is never allowed to touch



the bark. This method is perhaps better adapted to the general needs of the arid region than the more expensive plan of the Californians. It is interesting to note that the modern New Mexico method was developed in the midst of Indian and Spanish settlements, which still pursue the methods of antiquity without the slightest abatement of any of their evils.

The full significance of the industrial customs of arid America can be seen only upon comparison with the familiar agricultural methods of Eastern States. Under the old conditions no attempt is made even to study the relation of moisture to plant life. Such study would be wasted, since the watering of trees is left entirely to nature. Rains come or do not come, according as the season is wet or dry. There are years of drought and years of flood. Of the many differences between the agriculture of the irrigated and the rain-belt regions, two of the most important may be noted. Of these the most conspicuous is the difference which results in the size of the farm unit. Even in regions where the rainfall is most reliable and abundant the farmer knows he must reckon with an element of uncertainty. The result is that he operates a large farm in order to reduce the chances of complete failure. Statistics show a tendency in the Middle States to the enlargement of the farm unit. On the other hand, experience is constantly diminishing the average size of the farm in the arid region. The crops are not only absolutely sure, but from two to four times as large per acre as where the de-



DRAWN BY HARRY FENN. FROM A PHOTOGRAPH.
FAT CATTLE IN AN ALFALFA FIELD, PECOS VALLEY.

pendence is on the rainfall. The second important difference is seen in the quality of products. Interesting comparisons were made at the World's Fair in 1893 between certain kinds of apples raised during the same year in the Hudson River valley of New York and the Snake River valley of Idaho. The published conclusions of eminent pomologists, notably of Professor Bailey of Cornell University, showed that the same apple grew twice as large on irrigated Western lands as it did in the East. In the matter of flavor and appearance the irrigated apple also excelled. It is very likely that the difference was not entirely due to the artificial application of water, but that considerable credit should be given to the intensive methods of cultivation inseparably associated with irrigation and with the very small farm unit which it induces.

It is undeniably true that it costs more labor and money to prepare a given amount of land for cultivation by irrigation than it costs elsewhere. There is also the cost of water right and a perpetual charge for maintenance. But the advantages far outweigh the added expense and labor.

THE LABORER'S REWARD.

THE first object of industry is to get a living, which is represented by food, shelter, and clothing. Beyond the living lies the hope of a competence. The millions engaged in the industries of Eastern cities and towns, from which the life of the new West has been largely recruited, are mostly employed under the wage system, and between seventy and eighty per cent. of them live in rented houses. In a measure their means of livelihood is beyond their control, since it may be affected by economic, financial, and political disturbances with which they have nothing to do. Fully seventy per cent. of the wage received by the average working man and woman is expended for actual living necessities. It is in comparison with the industrial life of urban communities in the East that the men who labor with their hands in the irrigated fields of the West should be studied.

The Western laborer is his own employer. He is also his own landlord. These two facts constitute ideal independence; but there is also a practical side in his case. From his ten or twenty acres, insured against failure by flood or drought, first by aridity and then by irrigation, he can systematically produce almost every item of food which his family consumes. The laborer who works for another expends the greater portion of his wage for these essentials. The laborer who works for himself is surer to have his table supplied; and, moreover, he may enjoy far more variety, and of a better quality. Consider an actual bill of fare which is neither very simple nor very elaborate:

Black Bean Soup.

Salmon with Egg Sauce.

Roast Turkey with Dressing, Giblet Sauce.
Onions, Squash, Celery, and Baked Potatoes.
Currant Jelly.

Cucumber and Tomato Salad. Cheese.

Biscuit Glacé.

Sponge Cake.

Watermelon.

Coffee.

Western rivers and lakes abound in fish which can be had without cost; salmon are abundant in the streams of the Pacific coast. This list could be almost indefinitely extended and varied, and yet it would be found that nothing which is required for the most generous table, except tea, coffee, and spices, need be sought outside of the small republic ruled by the sovereign irrigator. The Mormon

farmers of Utah owe their prosperity to this system of individual independence. Their present leader, President Wilfred Woodruff, has lived for forty-eight years upon a twenty-acre farm conducted on just these lines. His acre and a quarter of wheat goes to the toll mill and comes back in the shape of flour. His five acres of alfalfa supports the horses and Jersey cows, and contributes to the support of poultry and swine. The vegetable gardens and orchards complete the list of productions necessary to good family living. And there is no year when prices are so low that the surplus of the farm cannot be exchanged at the store for such articles of clothing as are required, while in average years there is a comfortable surplus, with something to be credited to the savings account. It may be said that the same results are yielded by the agricultural industry elsewhere, and there is a measure of truth in the statement; but it cannot be done with equal certainty nor upon an equal area without irrigation.

ASSOCIATIVE INDUSTRIES.

IN the industrial life of arid America there is abundant evidence of a strong tendency to seek progress along associative lines. This tendency is first observed in the manner of building and managing canals. The most important works in Colorado, Utah, and Arizona were built by the common labor of settlers, and managed as coöperative institutions. This statement is measurably true of all other localities, since the «farmers' ditch» is everywhere in evidence. But more important than this is the trend of irrigation legislation in the same direction. The California District Law was designed to bring all works, old as well as new, into this class. The actual operation of the law has been attended by failures and disappointments, but nevertheless the legislation has been practically duplicated in several other States. Where public lands were opened to settlement under the congressional grant of 1894, giving each of the States one million acres upon condition that they be reclaimed, the same condition of public ownership of works was imposed.

The next important development of the associative tendency is seen in the recent wide extension of fruit exchanges. These grew out of the abuses of the commission system in California. There were times when producers not only received no return from a consignment of fruit, but were also invited to pay the freight. As the consumer on the other side of the continent had apparently failed to re-



DRAWN BY MARY HALLOCK FOOTE.

A PIAZZA SCENE IN ARID AMERICA.

ceive the benefit of this handsome reduction in the first cost of the product, the producers formed associations and took the business into their own hands. These exchanges provide funds for necessary advances upon the crops; gather, cure, and store the fruit; and send out their agents to deal with jobbers. In a word, they have created a machinery of their own to take the place of the commission system. The new plan seems destined, in time, to have the field to itself. Creameries are operated in the same way, and one community of Nevada farmers has gone to the length of maintaining its own store in San Francisco and selling its product direct to consumers at retail.

One of the most interesting associative colonies was that of Anaheim, known as the

«mother colony,» in southern California. This was founded by a party of German mechanics in San Francisco. They united their small savings, sent out a committee to select a location, and, when they had found it, despatched the first group of colonists to build the canal. When this was accomplished the land was laid out in small farms, with a village in the center, and variously planted to garden, orchard, and field crops. While the original party developed the colony, their associates continued to work at their trades in San Francisco, applying their savings to the colony fund. At the end of two years the village lots and farms were distributed by lot, each colonist then becoming an individual proprietor. The plan was entirely successful, and demonstrated the possibility of uniting the



DRAWN BY ORSON LOWELL. FROM A PHOTOGRAPH.
FRESNO RAISIN INDUSTRY.

capital of a considerable number of individuals in an undertaking to which no one of them was equal alone. The famous colony of Riverside developed its water-supply in much the same way.

A still more striking evidence of the dominance of the associative idea among the settlers of irrigated lands is seen in the plan of a colony which settled in southern Idaho as recently as 1894. These colonists had observed that the mining-camps of that region were littered with tin cans, the labels of which bore evidence of the prosperity of distant industries. They also learned that the condensed milk used in that locality came from New Jersey, the creamery butter from Minnesota, the starch from Maine, and the bacon principally from Chicago. As the raw materials of these products are all easily grown in Idaho, the colonists determined to provide the simple industrial plants required to manufacture the raw material into marketable form. They added to the price of their

land ten dollars per acre, and thereby raised a capital of \$50,000, which was somewhat increased by the sale of business property in the village. This capital provided a creamery, cannery, fruit-evaporator, starch-factory, pork-packing establishment, and cold-storage plant. Taken in connection with their diversified farms, these little industries constituted, in an industrial sense, a symmetrical community.

THE ACHIEVEMENTS OF IRRIGATION.

To state the number of millions of acres now under water in the West conveys but the vaguest idea of the real significance of irrigation achievement. It suggests, rather, the incident of an Eastern visitor who, upon being told that a certain valuable tract of land was «all under water» (by which «under irrigation» was meant), anxiously inquired whether there was no means by which the water could be drawn off. In 1890, according to the census figures, not far from a quarter of a million people were getting their living directly from irrigated land, while the total population of the region was between four and five millions. A brief sketch of what has been

done in several widely separated localities will furnish a good idea of the nature of the achievements of the past few years.

One of the most forbidding deserts in the United States was that which formerly flanked the course of the Rio Pecos on the border of the Staked Plains, in the extreme southeastern quarter of New Mexico. Six years ago this region was a good type of the wildest barbarism of the frontier. Its brown herbage furnished scanty pasturage for lean range stock, and its remoteness from civilization invited the presence of the most reckless class of outlaws. But into this forsaken valley, a few years since, went daring enterprise, with its faith and its millions. The flood waters of the Pecos were impounded in great reservoirs and led by a thousand miles of distributors over the parched soil. A railroad was extended up the valley from the Texas Pacific line, first ninety miles, then two hundred miles, then a long distance farther northward, until it met other valuable connections. In the heart of the valley towns were founded, and churches, school-houses, and business blocks erected, while upon the heights above the river handsome private residences sprung up like magic. After the canals and the railroad came settlers, and gradually the desert gave place to the deep green of alfalfa fields, to orchards, and to gardens. Perhaps there is no other instance in the world where so great a transformation was ever effected in so brief a space of time.

Irrigation is the explanation, but irrigation was backed by the most generous and daring investment. Five million dollars were expended in five years, and the potentiality of irrigation when applied to arid soil was relied upon to return it with increase. In this instance the savagery of the desert did not yield to the gentle influences of civilization without a struggle. Unexpected problems were encountered, but the people of the valley are now able to make marvelous exhibits of the various products of the soil at their annual fairs. The irrigated Pecos valley already presents a wonderful contrast to the barren wilderness which it succeeded.

Nevada has the least population of all the States in the Union, and is the only one west of the Alleghanies which has ever shown a record of decreasing population. It is appropriately called the "Sage-brush State," but few who have crossed it in summer have forgotten three green and beautiful pictures which they beheld from the car window. The train comes out of a whirl of alkaline dust to pause for a few minutes at Humboldt. Here are gushing fountains, green fields where cattle stand knee-deep in grass, tall trees which whisper in the summer breeze, and the fragrance of blooming flowers. Humboldt is nothing but a railroad station set in the midst of a few acres of cultivated ground and watered from a convenient spring, but it is none the less an effective example of the success of irrigation. The picture is repeated



DRAWN BY MARY HALLOCK FOOTE.

A CHANGE OF BASE.

on a larger scale at Lovelock, where several hundred acres are in cultivation; and when the Truckee meadows in western Nevada are reached, the industry is seen to assume important proportions. But one must leave the main line of the Central Pacific to see the most striking results of irrigation in this State, which is at once so small and so great. The Carson River flows through a long valley nestling between the shoulders of the Sierra. The work of reclamation began there with the influx to California in 1849, and the industry then established has long outlived the stirring times which gave it birth. The old trail through the mountains is grass-grown, and the melancholy taverns by the roadside are gray and decrepit, but the Carson valley still smiles with its crops of grass and grain. Even the passing of Virginia City's glory and the decline of silver-mining have not visibly affected the fortunes of these thrifty German farmers, who now find their chief profit in cattle and dairy products. There are few more beautiful agricultural valleys than this.

On the other side of the Sierra lies the great central valley of California—the valley of the San Joaquin. This is not the California of the tourist and health-seeker, nor of the ideal irrigation methods which have been described. Nevertheless it was the scene of a most dramatic industrial evolution under the influence of irrigation. Until comparatively recent years this great valley was considered fit only for cattle and the production of light crops of wheat in certain favored localities. It was a woman who discovered that the soil and climate were suited to the production of raisins equal to those of Spain. Then, with incredible swiftness, the rivers were turned upon the land, the range divided into thousands of small farms, and the lowing of cattle gave place to the voices of men. Fresno County was the scene of the greatest activity, and its population increased with phenomenal rapidity. An interesting phase of this evolution in the San Joaquin valley was the division of great private estates, one of which contained 400,000 acres, into multitudes of small farms. California awoke to the real significance of the new movement when the census of 1890 revealed the fact that the entire gain in its agricultural population stood to the credit of irrigating counties. The water-supply of this greatest of Western valleys has been made forever secure by the wise forest reservations accomplished under the administration of President Harrison (a policy elsewhere continued by President

Cleveland); for it is in the forests of the Sierra that the winter snowfall is stored against the needs of scorching summers. The influence of these beneficent reservations, when fully developed by an effective administrative policy (of which there is now most pressing need), will extend to the remotest generation.

The evidences of the triumph of irrigation might be multiplied by reference to the history of a hundred valleys of arid America. There is a wide difference between the agriculture, and especially the horticulture, of the Salt River valley of Arizona and of the Yellowstone valley of Montana. The one produces oranges, figs, and pomegranates, and the other only the hardiest fruits. The same conditions influence the size of the farm and the methods of applying water, but the fact remains that without irrigation neither Arizona nor Montana would have any agriculture worthy of the name, while with irrigation both support prosperous farming populations which may be vastly multiplied. Striking differences of conditions are sometimes observed within the limits of a single State. Such is the case in Colorado. The eastern slope partakes of the nature of the great plains. Farms are comparatively large and principally devoted to the production of hay and grain, hogs and cattle. The western slope has a different soil and climate, and has developed in recent years a remarkable fruit industry on ten-acre farms. At the town of Grand Junction, where the Grand River meets the Gunnison in the heart of a mighty desert, ten thousand people gather upon a festival day in each September and celebrate the triumph of their industry. This festival is called «Peach Day.» In like manner Rocky Ford and Greeley, on the eastern side of the mountains, celebrate respectively «Melon Day» and «Potato Day.» On these occasions the representative product of the neighborhood is freely distributed to the multitude. Idaho and Washington have also gained largely by irrigation in the last few years, and are in the full tide of interesting colonial developments. There the small farm rules, and prunes, peaches, apples, and hops are the favorite crops; but the greatest of these is the prune.

In Wyoming irrigation struggled for some years with an obstacle more formidable than aridity. This was the organized stock interest which flourished on the public lands, wastefully using the public streams to produce crops of natural hay and to water great herds of cattle. While many of the leaders of this industry were of liberal and progressive mind, and freely conceded that they had neither a



DRAWN BY MARY HALLOCK FOOTE.

«PEACH DAY.»

moral nor a legal right to stand in the way of progress, an aggressive and troublesome minority insisted that cattle were worth more than men to Wyoming. The final conflict came in the «Rustlers' War» of 1892, with its ignominious and crushing defeat of the cattle-men and their hired outlaws from Texas. With that fiasco the barriers of opposition fell once and for all, and the irrigation sentiment has since dominated the State. Reclamation and settlement in Wyoming and similar localities elsewhere have never really menaced the stock industry, but have rather indicated the necessity of its reorganization upon a more democratic basis. There will be more cattle in the aggregate, but distributed among a multitude of small owners living in the irrigated valleys. There they will raise the diversified products essential to their support, and great crops of winter fodder for cattle, while the adjacent uplands will serve for summer pasture. This process has begun, and it results in the elevation of the character of the men and of their industry alike.

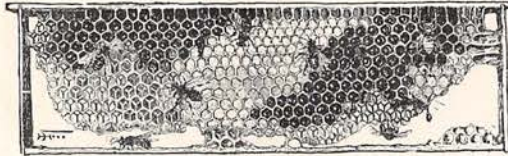
THE REPUBLIC OF IRRIGATION.

THE essence of the industrial life of arid America is its democracy. It is founded upon

the economic independence of the family unit. It reverses the percentages of landownership and tenantry which prevail among the industrial workers of great cities and factory towns. Within its own territory, at least, it tends largely to abolish the wage-earning system and to develop a great class of people who work directly for themselves. This body of self-employers receive all the fruit of their labor. They take it from the soil and consume it upon their tables, or receive it in payment for their surplus products, or it is deposited to their credit in the enhanced values accruing to their property—a bank that never breaks.

As this class rises in numerical importance with the inevitable expansion of the national population, it will project new and potent influences into American politics, industry, and society. The tendency of these influences is already clearly apparent. They contend for a higher standard of living for average people. They seek it in a more general landownership, in the industrial independence of communities, in commercial association, in social brotherhood. These aspirations, though born of the new environment of arid America, closely conform to the growing spirit of the age.

William E. Smythe.



VANDERDECKEN.

THERE, beyond the Cape of Storms,
Where the breaker's voice of thunder
Roars when ships are rent asunder,
Through a fog of ghostly forms,—

Writhing furies, flying far,
Tempest-tossed and tempest-driven,
Mist of sea and light of heaven
Mingled in eternal war,—

Sailing always without gain,
Leagues on leagues, as sailors reckon,
Flies the undying Vanderdecken,
Toiling, powerless to attain.

When the austral tempests rave,
And the sea-god's mighty sledges
Pound the ragged rocks and ledges,
Safe he rides the crested wave.

Vainly waits the hidden reef:
Borne by Odin, the undaunted,
Over boiling seas enchanted,
Ever sails this man of grief.

Swifter than the swallow's flight
Down the arching seas he plunges,
Where th' antarctic fog expunges
All things from the chart of sight.