AGRICULTURE.

A GLIMPSE AT ITS PAST, PRESENT AND FUTURE.

BY PRESIDENT J. M. SMITH.

Mr. President, Ladies and Gentlemen:

When Adam and Eve were driven forth from the Garden of Eden, they were followed with denunciations, among which were these words: “Cursed is the ground for thy sake; in sorrow shall thou eat of it all the days of thy life; thorns also and thistles shall it bring forth to thee; and thou shalt eat the herb of the field. In the sweat of thy brow shalt thou eat bread, till thou return unto the ground; for out of it thou was taken; dust thou art and unto dust thou shalt return.”

Whatever opinions we may entertain as to the conditions of the earth previous to the utterance of these words, there seems to be no doubt of the fact that since that time the earth has steadily refused to support any large number of her population with any degree of comfort, except by cultivating the soil.

Another fact may here be stated, viz.: That the history of the world shows that nations have become civilized, prosperous and wealthy just as the agricultural conditions of these nations have been prosperous or depressed.

It follows almost as a matter of course that such must have been the case in the past, and such must still continue to be the case in the future; from the fact that the first great imperative wants of any people are plenty of food and clothing. It is useless to look for or expect any permanent advances in the fine arts until these two great wants are supplied; and the supply promises to be both plenty and permanent. The facts are that the people have neither the time nor the disposition to devote themselves to other things until such is the case.
In the preceding remarks I refer, of course, to civilized nations, and not to the savage tribes of the world, who live from day to day without thought or care for the morrow, nor to those semi-barbarous and nomadic nations, like the Huns, Goths and Vandals, whose civilization has only and ever been obtained at the expense and destruction of those more civilized and enlightened than themselves.

Now, while bearing these facts in mind, let us look back at the past, and, if possible, take a brief glance at the agriculture of the more favored of the ancient nations.

Before proceeding, let me say further that in nearly all of ancient nations, the manual labor was principally performed by slaves, and that, too, with but very few or none of our modern improvements. Hence, whenever the lords of the soil became embarrased during their almost continuous wars, the agriculture of the country was almost the first interest to suffer, or would perhaps be entirely destroyed for the time being. Hence the origin of the saying: "War, pestilence and famine." And the famines of those days were sometimes things tearful even to contemplate.

Amid the earliest records of profane history, Egypt bursts upon our astonished gaze in all the glory of a high civilization. Some of her monuments, as well as some of her temples were even then crumbling with age; but there they stood, and there they stand to-day, silently pointing back to the glory of their ancient days. And what is still more remarkable, all around them, and in fact all of the then known world was enveloped in darkness and barbarism. The restless sons of Ishmael wandered then, as now, from place to place without a settled home or habitation. What, then, was the secret of this high state of civilization? It was merely this: Ancient Egypt was simply the valley of the Nile, one of the most fertile spots upon the surface of the earth; and in addition to that the regular annual overflow of the river enriched the soil to such an extent that artificial fertilizing seemed entirely unnecessary. The agriculture of Egypt was mainly under the direction of the Government. In fact, there are
some reasons for believing that, during at least a large portion of her history, the whole title to the land was centered in the reigning monarch. But, be this as it may, the Government spent almost incredible sums of money in digging canals and making artificial reservoirs for the purpose of irrigation. Indeed, so extensive were their works for this purpose that Herodotus, the ancient historian, considers one of them, Lake Mæris, the noblest and most wonderful of all the works, even in that land of wonders.

Let us bear in mind that rain was almost unknown in Egypt; hence the absolute necessity of irrigation. The land usually produced one good annual crop, merely from the annual overflow; but where artificial watering was introduced and followed up, three annual crops were the product of that wondrous land. We have no reason to believe that their cultivation of the soil was superior to that in practice in civilized nations to-day; but, learning the necessity of irrigation at a very early day, they followed it up and brought it to a degree of perfection that has never been equaled in the history of our race. And what was the result? Egypt was a long, narrow strip of territory, variously estimated to contain from 12,000 to 18,000 square miles, or perhaps one-fourth as much territory as is contained in the State of Wisconsin. What the population really was is not definitely known. Yet it is certain that it ran into tens of millions. It was the boast of Thebes that although she contained one hundred gates, she could send out 10,000 fighting men from each gate. Nor was this all. After feeding the millions of her own land, Egypt was still the granary of the then known world. The agricultural resources seem to have been watched with zealous interest for many hundred years after her people had ceased to build either pyramids or temples, or even to repair those that were falling into decay. For more than 2,000 years was this interest protected and encouraged; and so perfect and permanent had the improvements been made that for generations after the death of Cleopatra, who was the last of the native rulers and at whose death Egypt became a Roman province,
they still boasted that even their captors were obliged to come to them for bread. We have no means of knowing how extensive the crops actually were, or their yield per acre; but the fact that the other nations, and almost all of the large cities of the known world, turned with eager gaze to this garden spot of the earth for a large share of their bread, proves conclusively that Egyptian agriculture was early brought to and for a long time maintained in a very high and prosperous condition.

If we turn from Egypt to other ancient nations, we find nothing at all comparable to her in agricultural prosperity. There is but little doubt that the plains of the Euphrates around Babylon were once in a high state of cultivation, and that it was done by means of irrigation, although we have but little information with regard to it. In short, after leaving Egypt, there is very little in ancient agriculture to attract our attention until we reach Roman history.

The ancient Greeks excelled in the cultivation of the grape and some other fruits, but they never were famous for the production of grain; and, being much devoted to commerce, they exchanged other articles for grain at a cheaper rate than they could produce it from their naturally thin soil and hilly country.

The land of Palestine once supported an immense population, although their agricultural implements, as well as their mode of cultivation, were of an exceedingly primitive and simple character. The first account that I have found of any regular, systematic mode of cultivation as we now understand it, is given by Cato, who died 150 years before Christ.

At that time a large farming system was fully established in Italy. A rotation of crops was fairly understood, also plowing under green crops for manure as well as summer fallowing. For a long time agriculture was the favorite pursuit of the wealthy and aristocratic class of Romans. The labor was entirely performed by slaves. Slavery existed in its most terrible form. It included not only all the evils of modern
slavery, but in addition, the life of the slave was simply at the mercy of the master, without any reservation whatever; and then slaves were so cheap that the loss of one or of a dozen was no object, the price of a slave in the market often being but little more than the price of a sheep or a goat.

Thus we see that although the system of Roman agriculture seemed to combine much of what is now deemed good practical cultivation, still it contained a system of slavery so horrible, that we shudder as we contemplate its results. The larger portion of the country was originally cut up into small farms, and cultivated principally by the owners of the land; but after the introduction of slavery and slave labor upon farms, the more wealthy owners gradually absorbed the smaller farms, and the landed estates finally fell into the hands of comparatively a few of the more wealthy of the Roman citizens. For a long time land was plenty and cheap throughout Italy; but the system by which it was produced, assisted very much in bringing on the final overthrow and destruction of that immense empire. The Emperor Claudius, during his reign, mitigated somewhat the horrors of slavery. This was well for the slaves, though it was too late to save the masters, who had previous to this time become so enervated by idleness and luxury, and debauched by crimes and immoralities, that the empire became an easy prey to the savage hordes of Huns and Goths and Vandals, as well as other barbarous tribes from the north of Europe, who swept down over Italy like avenging demons, and hurled the science of Roman agriculture, as well as the other arts and sciences of the empire, into one common ruin.

In this overwhelming destruction, slavery in the form it had long existed was destroyed.

In its place a system of feudalism grew up, and speedily spread itself over the entire continent of Europe. This was in fact a modified form of slavery, the feudal lords being the proprietors of the soil, and their serfs or subjects being the laborers by whom the soil was cultivated, the pay in almost
every case being simply a meager supply of the plainest of food and clothing, merely sufficient to sustain them in working condition, and a cheap hut or hovel to protect them from the cold and storms.

In addition to their labors, the serfs were obliged to perform military duty whenever their haughty lords commanded. The agricultural condition of Europe was in a most wretched condition. Such was the situation at the beginning of the eighth century; and from that time down to the middle of the fourteenth century, the history of Europe is one of ignorance, bigotry, superstition and barbarous inhumanity.

It is needless to follow the science of agriculture through those dark ages. As a science, it ceased to exist. A meagre subsistence was all that was expected, or obtained, by the cultivators of the soil; and the comforts and luxuries of life, as we understand them to-day, were utterly unknown to them.

During the last half of the fourteenth century, there seemed to be a little improvement, at least in some places.

Strange as it may seem, the fact is, that we know but little of the agricultural condition of modern Europe until within the last one hundred and fifty years; and that little is not at all calculated to make us proud of our ancestors.

We have a description of the British Islands as they were about the commencement of the seventeenth century by Macaulay. It is the fullest and most perfect that I have been able to find. He, in his History of England, says:

"According to a computation made in 1696 the whole quantity of wheat, rye, oats, barley and beans then annually grown in the kingdom, was less than ten millions of quarters, or eighty millions of bushels. The wheat crop was estimated at less than two millions of quarters."

This estimate will make the grain crop of the United Kingdom but a trifle more than the grain crop of Wisconsin for 1872, the wheat crop being not any more than the same crop in Wisconsin for the year 1870. The population at this time is believed to have been not less than 12,000,000.
Wheat was only grown upon the strongest clay and was consumed by those in easy circumstance."

The rotation of crops was very imperfectly understood.

But very few kinds of vegetables were then grown. Turnips, at present one of the most valuable of their crops, were just being introduced. The potato, as an article of food for the masses, was unknown.

Wages were generally fixed by law, and ranged from four to six shillings per week,—the laborer to furnish his own board.

In 1661, the justices of Chelmsford fixed the wages at six shillings per week in winter, and seven in summer. This is said to have been the highest renumerations paid in the Kingdom for agricultural labor between the time of the Restoration and the Revolution.

At this time the price of wheat is given at seventy shillings per quarter, or $2.12 per bushel. Meat was cheaper, comparatively, but it was estimated that only one-half of the laborers could taste of meat oftener than twice a week, and the balance, at most, not oftener than once a week, if at all.

Gregory King who is considered good authority, estimated that more than one-fifth of the entire population were more or less dependent upon public charity for help.

At the present, in ordinary times it is estimated that one in thirty receive more or less aid in this manner.

The great majority of the nation lived almost entirely upon rye, oats and barley. Clothing of nearly or quite all kinds was higher then than now. Such articles as tea, coffee, sugar, &c., were of course entirely beyond their reach.

It is estimated that the annual yield per acre of the different crops was less than one-half of what it is at present.

Such was the condition of the most free, independent and enlightened nation of Europe, less than two hundred years ago. Now, let us come down to the time when agriculture began to take its place among the sciences, and efforts began to be made to place it in a condition of prosperity. The first
Agricultural Society of which I find a notice was organized in Scotland, in 1723. It had only a short existence, as did some others that were started soon after. The first permanent one was the Highland Society of Scotland.

Its first annual meeting was held in 1784, and was incorporated by Royal Charter in 1787. It is still not only living, but is with one exception probably the most useful association of its kind upon the British Islands.

The Royal Agricultural Society, of England, was established in May, 1838, and then consisted of four hundred and sixty-six members. In twenty years, its membership had increased to more than ten thousand. It is still in successful operation, and bids fair to be still more useful in the future than it has been in the past.

The first Agricultural Society in this country was the Philadelphia Society for promoting Agriculture, established in 1785. A few others followed previous to 1800. There was one in my native country, I think as early as 1810, at which premiums were awarded for the best workmanship at different kinds of farm labor. My now aged father took the first premium, (a silver cup) for doing the best plowing,—it was sometime between 1810, and 1820.

Agricultural Societies are now permanently established, and generally well supported throughout the civilized portion of the agricultural world.

They have been, and still are, the means of great good in bringing farmers and communities together, in encouraging the backward to some improvement, and stimulating those more advanced to still farther progress in exchanging ideas, and in many other ways that I cannot now stop to mention. The first school, or college that I find devoted to agriculture was started at Hofeyl in Switzerland, in 1806, by Fellenburg. This seems to have had a success from the start. In thirty years, no less than three thousand pupils had been trained in agricultural knowledge, and made, as is believed, more useful to themselves and the world than they otherwise could have
become. Since that time, many other schools have sprung up in different parts of Europe.

In France, Prussia, and Russia, they are supported by the general governments.

In other portions of Europe they exist, supported by various methods. I need not stop to more than mention the Agricultural Colleges in our own country; one of them in each State, where it is to be hoped that they will prove to be permanent blessings to the whole country.

Agricultural papers seem to be a peculiarly American institution. I believe they are not numerous outside of our own country.

The first successful agricultural paper of which I have any knowledge, was started in Albany, New York, about 1830, by Judge Buel. There had been two or three started previous to this, though I believe none of them were successful.

Judge Buel's paper was called the *Cultivator*, was issued monthly, and was not more than one-quarter as large as the Chicago *Evening Journal*. The price was fifty cents per year. Such was the birth of American agricultural journalism. To-day, it is undoubtedly the best means of educating the masses of farmers that exist in the world. Some of our papers are edited with great skill and ability, and are as firmly established as any of the great papers of our country.

Thus have I glanced in the briefest manner possible at the past. But who would exchange it for the present, or for the bright prospects of the future? Remember, too, that in the views given, I have selected only the most favored nations of the past. If we compare the most favored days of the past with the present, what do we see? The great masses of the cultivators of the soil, ever and always bowed down beneath a load of ignorance, bigotry, superstition and crime. For them there was no bright to-morrow ever to dawn. No change of administration ever ameliorated their condition. The fall of one dynasty and the rise of another found them still toiling and suffering. From the hovel to the field, from the field to
the hovel; with no education, no hope for the future, no Sabbath, no rest until they sunk down by the way with their eyes closed in death, and were buried from sight and forgotten. Thus the uncounted and countless millions of the tillers of the soil, in the ages and centuries of the past, have lived and died; with none to hear or heed their sad and bitter cries, except Him who hears the ravens cry, and notes the sparrow’s fall.

How is it with us to-day? Suppose that we take a section of our country, commencing at the mouth of the Ohio river, and take a district of territory on each side of the Mississippi, two hundred miles in width, and extend it six hundred miles north. This would give us a territory of two hundred and forty thousand square miles.

A territory somewhat larger than France, Belgium and Holland, combined.

As to fertility of soil and capabilities of raising bread and meat for the support of mankind, its healthful climate, and in short, its combined advantages, we may safely say that there is not another spot of its size upon the face of the earth that equals it. The men who labor and cultivate this soil are, in almost every instance, the owners of the soil which they cultivate. But whether a man owns the land or not, he is equally as free as the owner.

He calls no man master. He bows in reverence to none except his God.

We claim to be citizens of the most free and independent nation upon the earth.

If the members of our legislature displease us, we leave them at home and send others in their places; if a Governor does not satisfy the majority of the people of any state, he is quietly left at his home and another man elevated to his place; if a member of either house of Congress votes, or otherwise conducts himself in any manner unsatisfactory to his constituents, they have no hesitation about restoring him to private life, and sending another whom they suppose will be more obedient to their will. All this is done quietly, and without
disorder or disturbance of any kind. The people are literally their own masters, and the law makers are their servants.

Again. In all that goes to make up the ordinary comforts of everyday life, we are the most wealthy people upon the earth. This may seem a strange statement to some present, and I do not mean to say that we have more gold and silver than any other people; but, gentlemen, did it ever occur to you that the West and Northwest is the only territory of any size in the world, where the masses of the people can afford to have wheat bread and butter and meat, as the main article of their daily food? And yet, such is the fact; that no nation, either ancient or modern has ever before been able to provide the above named articles in sufficient quantity, and at prices to place them within the reach of the laboring classes, as articles of daily food. Our stock, of all kinds, is almost incomparably in advance of that of any age previous to this century.

In short, the last quarter of a century has almost completely revolutionized the science of agriculture. It is doubtless evident to all that the next twenty-five years are to be marked with still greater changes, and that they are to be in favor of the cultivator of the soil, provided he is wide-awake and takes his place in the steady march of improvements as they come along. The dull, ignorant plodder who refuses to do otherwise than as his fathers did and believes that they knew it all, will be utterly forsaken and forgotten. No, perhaps not quite forgotten: he will serve for us to look back to and see the advances that we have made. I run no risk of hurting the feelings of any of this class, as they never attend conventions; neither do they ever take papers and read the account of conventions, or of any other agricultural proceedings.

Great as have been the improvements made in stock within the last twenty-five years, the next twenty-five will doubtless see an advance of which we but little dream to-day. We have to-day some specimens of different kinds of stock in the Northwest that can scarcely be excelled upon this Continent,
or upon the globe. This improved stock of the different kinds is doubtless to become generally distributed throughout the Northwest. In our own State we have noble men leading the way. Such men as Murray, Williams, Ludington, Stilson, Stoddard, Hazen, Sherman, Bryant, and many others who might be named, deserve the thanks of all the friends of improvement in our State, as well as their hearty co-operation.

In improving the fertility of the soil, our people are not as far advanced as is desirable; but they are very fast being awakened to the fact that the soil must be improved; and when they once come to this conclusion, they will not be long in finding a way to make the improvements.

In this connection let me mention the result of one of the experiments of Mr. J. B. Lawes, of Rothamsted, England. It is well known that he has been carrying on a series of experiments for many years, and it seems to me that the results which he gives of his experiments upon his wheat fields alone ought to be worth millions of dollars, not only to his own people, but to the farmers of this state as well. The following is the result of the last ten years' experiments upon his wheat fields:

One field being sown continuously with wheat, with no manure whatever, has averaged twelve and one-half bushels per acre for the ten years. This, it will be noticed, varies but little from the average of our own State. Another field, upon which barn-yard manure was used during the same length of time, averaged thirty-five and one-fourth bushels per acre. Three other fields, upon which artificial fertilizers of different kinds were used, averaged, respectively, thirty-two and one-eight, thirty-seven and five-eighths, and forty bushels per acre.

Now, gentlemen, here are practical results, and if Mr. J. B. Lawes, of Rothamsted, can obtain them, I believe that Eli Stilson, of Wisconsin, can. And, if Stilson can do it, there are many other men in the State who can do it; for, as able a farmer as I think Mr. Stilson to be, I by no means believe that he monopolizes the farming abilities of our State.
These results show that the largest average was made by artificial manures entirely; thus showing that you are by no means dependent upon the barn-yard for fertilizers for the farm.

We have just entered upon the last quarter of the nineteenth century; and, if I retain my life and health until its close, I shall expect to see vast improvements made, not only in the cultivation of wheat but in the fertility of the soil, and in the quantity and quality of nearly or quite all of our crops. I shall see the noble specimens of different breeds of stock, now held by comparatively few, scattered far and wide throughout all of our State. I shall see the great mass of our farmers much better educated than most of us are to-day. I shall still see some who, like balky mules, refuse to take one step in advance, until they are compelled to do so by a force that it is impossible to resist. But these will be the small minority, and they will grow less and less as the years advance. I shall see homes made more comfortable and pleasant than they are to-day. Farmer’s sons will not be so anxious to forsake the farm for a clerkship or a law-office as heretofore. The books, the papers, the music and the comforts of a farmer’s home will be much more pleasant to them than the home of strangers. Fewer of them, after having borne their parents to their silent homes, will return to the old homestead and sadly say: “This old place is all run down and run out, and will not support us in comfort, and we must leave it for other business or other homes.” But they will rather say: “Father has made this a pleasant home; he has kept the farm improving for years and has so taught us that we can go on with improvements and make it still more pleasant as well as more profitable than he was able to do; and so we shall stay and make the old homestead our abiding place and our home.” There will be fewer pale-faced, care-worn wives and mothers seen upon the farms, toiling from early morn till late bed-time, until the daughter, warned by the mother’s ceaseless toil and labors, declares that she will never marry a farmer. I shall see the profession of the farmer
elevated far above what it has been in the past or is now, and not only financially but socially, morally and intellectually. The aged man, as he retires from the battle of life, may look back upon the years not with sadness or regret, but thinking that he has done something for the elevation and comfort of his race. The young man may look forward to the profession full well assured that he is in possession of a business that, if intelligently and industriously pursued, will lead him not only to a competence in his old age, but to the front rank of usefulness, as well as of distinction among his fellow-men.

Then ensued the following

**DISCUSSION.**

Mr. J. P. Roe:

A paper so interesting furnishes us a very profitable theme. If I understood rightly and from my own reading, if my memory be correct, the agricultural wealth and prosperity of the inhabitants of that region termed in scripture Mesopotamia, lying between the Tigris and the Euphrates, lying in the valley of the Nile, arises mainly from irrigation. Also that of the Ganges from irrigation. That of the great population in Mexico, previous to the conquest, from irrigation, and it seems of more and more moment that the great problem of the northwest that we have to solve is irrigation.

I should like to hear something advanced on this floor. I think our President has experience and views of his own, that might be of great interest, bearing upon this subject.

Mr. J. M. Smith:

I will state one fact. A meadow in my native neighborhood is irrigated by a spring brook. There are about five acres in the small meadow, irrigated by a spring brook that rises within a quarter of a mile of it on the higher ground and enters it on the highest point of the meadow in a way so that it can be spread over the entire surface of the meadow. It is a spring that flows perhaps at the rate of eight or ten barrels a minute. Ever since I can recollect that meadow has been irrigated in that way, but I do not think I ever knew it to yield less than two tons to the acre, and it seems extravagant, but I
think it has nearer averaged three tons to the acre than two tons. Last summer I spent a few days in my native place. I asked my father if he knew how long that meadow had been irrigated in that way. He owned it when I was born. He said no, he did not. He is now eighty-five years old. He said it had been irrigated in that way and mowed in that way ever since he could remember. How much longer he couldn't tell. It is certain that piece of ground has yielded for not less than seventy-five years. It has never been plowed. It has been mowed and then pastured closely every fall. I think the only manure, the only fertilizer that has ever been applied to it is supplied from that spring run. Pure spring water. It is the most remarkable example of irrigation that I have ever seen. It has never failed a crop. My father said he had no recollection of it ever failing to yield a large crop of hay.

Mr. E. H. Benton:

There is one fact that I understand of the laws governing this growth of grass upon that meadow in connection with the fertility of that water. That is, that the water is not absolutely free from fertilizing material, when you come to find out the truth it is charged with a good deal. Water is the principal vehicle — the only vehicle by which any nutriment is conveyed to vegetable life as the gentlemen all understand. Now you have the secret of that meadow. Water is charged with fertilizing matter whenever air comes in contact with it. You can get pure water only by distillation.

When water comes in contact with the atmosphere, rain water or spring water, it is more or less charged with fertilizing material and you will be astonished to know how rapidly it accumulates. You set a glass of water in the sick room of a person sick with the typhoid fever, and you would be astonished to see it. You can see it with the naked eye. It is charged with fertilizing material, the effluvias escaping from the body of the sick person in the room, thus showing the necessity of complete ventilation for healthy persons, a constant change of air. The air is constantly being charged with fer-
tilizing material in the shape of gases and water is greedy for it—constantly takes it up. That is your whole scheme of irrigation. That was not pure water. It was pure in one sense. It looked pure. That is all.

Mr. P. S. Bennett:

All that is doubtless true but there are several points about this that seems to have a good deal of interest. I am very glad it is before us. Here is one question that I would like to have a little light upon. Now it seems that this water was fresh from a spring, of course it was cold, it had no fertilizing matter in it except what it brought from the earth, what it contained in itself, and what little it had absorbed in its journey, from the atmosphere.

That is all clear enough, but now, is it probable that that water was as beneficial to that meadow as if it had been from a more continuous stream, and if so, is it probable that cold water fresh from the earth is as beneficial to other vegetation as it would be to grass. For instance, suppose on the garden of our President, or of any one here that is in that kind of business, cold water could be applied by artificial processes instead of water of a warmer temperature and longer in contact with the atmosphere, would it be as beneficial to the plants of that garden?

Mr. J. M. Smith:

In reply to that I would say that it would depend somewhat on the plants we use it on. Grass does not require as much heat to bring it to perfection as some of our other crops. Cold water will answer and the same grass flourish nicely when the same water put on melon vines or cucumber vines would ruin the crop entirely. I knew a friend, a man who was gardening some years ago. During the drought he watered his cucumbers with water almost as cold as cold well water. He ruined his crop entirely by putting on such cold water. The water chilled them, while the same water put on some other crop would help it. It would have been per-
fectly healthy for grass, whereas it chilled the more tender plants, or the plants more inclined to be tropics.

We may take it as a general rule that with plants whose native place is in a warmer climate than where we cultivate them, coming from a tropical climate, it is scarcely ever safe to use water that is very cold.

On the other hand a plant that is a northern plant will bear colder. That is a general rule in watering plants of all kinds.

Mr. E. H. Benton:

That is a valuable suggestion in regard to the temperature of the water. Nature has adjusted this thing all right, and gives water, my observation shows me, of about the same temperature as the atmosphere. I keep a meteorological record, I catch rain water and test the temperature of the water and I find the temperature of the water, after a shower, higher than that of the air. I have seen it five degrees higher. The atmosphere is suddenly cooled after a discharge of electricity. After a thunder shower the atmosphere is suddenly cooled. In such cases, especially where the rain fall is sudden you will find the rain water of a higher temperature than the atmosphere. You see there the whole point. If a man is going to irrigate, his first consideration should be that the temperature of the water should be adapted to that of the plants which he grows. That is common sense. If nature grows plants in a cold climate, the water is of the temperature of the atmosphere in a warm climate the temperature is similar. That is a general proposition, that everything else being equal, the man that gets the most water filtered through his soil will raise the largest crops, according to the amount of air he can get to them. There must be sunshine and air to bring up plant life.

Mr. J. P. Roe:

I think it will meet the views of the convention and confer a favor upon us, if Mr. Smith would briefly outline for us his plans on his own premises for irrigation. We want to get at
the most cheap, the most economical and best plan of irrigation within our reach. He has a plan, I believe, of his own.

Mr. J. M. Smith:

Gentlemen, I have spent some time and some money in irrigation. A few years since, I bought a force pump. I arranged my grounds, when I first commenced working where I am now, with a view eventually, of irrigating my whole ground, and in all the improvements I have made, I have kept that object in view.

A few years since, I bought a force pump that was capable of throwing about twenty barrels of water an hour. I had some three hundred feet of hose. I used that somewhat extensively last summer; kept it running for three or four weeks—I think nearly four weeks. It cost me about five dollars a day to run it. Well, I found that although it was so expensive, it paid handsomely.

I spent some four thousand dollars in cultivating thirteen acres of ground, and I think no money I spent paid me any better than the money I spent in irrigation, in watering my crops. That was so insufficient as compared with the real need, that I am now arranging a plan by which I think I can permanently irrigate my whole grounds. That is, I have water, and it is very convenient and of abundant supply.

I am building a scaffold, upon which I shall have a tank which will hold from six hundred to eight hundred barrels; the tank will be perhaps twenty to twenty-five feet above the surface of the ground, in other words, high enough to give me all the head I will need. From this tank I propose putting in tubes under ground. They will be made of cedar posts, from seven to eight inches diameter; bore them and put them together. They will be laid in the same way that the gas mains are, and those will be connected with this tank by gas fixtures running down into them and take the water into the tubes, and then I propose every hundred feet, to have a passage and a stopcock to the main tube, to which I can attach my hose, and after they are arranged, one man would be all that was
necessary. I propose to use about an inch and a half hose allowing the pressure we have, it would allow thirty or forty barrels to pass through the hose per hour.

Two men will put on a great deal of water. With this hose, and the stopcocks in the underground tube within reach, you can take the hose off of one and put it on another. I can water, I think, any portion of my ground.

I am not through with it yet. I have men to work at it. It will cost me from six hundred to seven hundred dollars.

Mr. P. S. Bennett:
How are you going to get your water in that tank?

Mr. J. M. Smith:
I propose to get it in by a wind mill and a force pump attached to it. A lifting pump I suppose will do it, but a force pump will cost but a very little more. I think it is perhaps, the safest.

Mr. E. H. Benton:
Your subsoil is so porous you cannot fail to get rid of any of this superfluous water.

Mr. J. M. Smith:
I do not propose to put on enough so as to have to carry any off. My soil is porous, the subsoil is also porous. In fact after you get down two or three feet, it is pure sand.

I am satisfied with irrigation from what I have seen and from what I have read. My reading has been somewhat extensive on that subject, and I am perfectly satisfied that farmers, when they can irrigate without too much expense, will find it not only valuable but exceedingly profitable. If I had a large farm, if I had water, I would irrigate it then I would apply manure too.

The best way of applying manure is in a liquid form. No plant can use food except in a liquid or gaseous form, hence if we can apply the manure in that form the better they can use it, and consequently the better and surer will be the crop. No doubt those who live twenty-five or forty years hence will say we were very imperfect in our system of manuring at this time. I think the best system of manuring, when it can be
obtained, is by water. Irrigation and liquid manure is the best. I have no doubt of that, where water is available and can be procured without too much expense. I propose to experiment the coming season with liquid manure. When I get the tank finished, I propose to operate with phosphates, guano and bonedust.

I can fill the tank with manure and then apply the water, and experiment in that way.

Mr. E. H. Benton:

There are two problems that settle this matter of irrigation and underdraining. These methods of agriculture in common practice, are unobtainable until the population crowds the production. Now in these United States, production crowds population; in other words, production has advanced threefold while population has made an advance of one-fold. That is, production has increased at a ratio of three times that of population. While that state of things exist, there will be only remotely here and there a man in the vicinity of a city, that will adopt underdraining and irrigation.

Irrigation and all these problems are settled by the laws applicable to political economy. While agriculture has to compete with more than any other occupation in the world, it will not go into these methods which need brain work and capital invested in such a manner, that the results will not be readily and quickly realized.

You will find this eternal law the world over. You find the farmers contiguous to a large population will irrigate. You will find it in the territory of Colorado in one colony, and I think in another. They have practically worked out this problem of irrigation, because it was a necessity.

Of course necessity knows no law, therefore it violates no law of political economy. They cannot raise any crops without irrigation. I understand around the city of Salt Lake, irrigation is a systematic method.

Mr. J. M. Smith:

Do you propose to us to wait until starving before we go into improvement?
Mr. E. H. Benton:
I have told you that people do not do it until they are obliged to do it. Thee is once in a while a man that is a missionary, away ahead of the work, and I would say God speed to every one of them. I say we ordinary farmers, who occupy land where water is not accessible, must use a little head work to get some other means of helping ourselves to that prosperity that you have obtained. You have water within a few feet of the surface. Where I live we have water only after digging one hundred and thirty feet or more.

I propose in my paper to give some ideas on that subject.

I say I do not want to necessitate you to starve before trying anything. That is a general law that people do not work unless necessity compels them to do so. There are few men that work for the fun of it. Once in a while one.

When the thing is reversed in this country as it is in Europe; when the population crowds production, then you will find all these problems of irrigation and underdraining carried out successfully. It would be perfect folly for me to try it where I am. Any kind of machinery by which I could get water on my farm at present, would be a perfect impossibility, but if I was surrounded by a large city, it would be then another problem altogether.

Mr. J. P. Roe:
We have already spread over our land or farms the wind mill. It has been provided to our hand as the agent in this question. The artesian well, the wind mill, we have on the streams, lakes and on the farms. The facilities for conducting water to central points, the elevated tank and the windmill.

While we are sleeping at night, taking our comfort, enjoying these creature comforts, the wind gives the motive power, which costs nothing and is doing the work for us.