Watering the Fairways

Address Delivered by William P. Brooks, Minikahda Club, Minneapolis, at the Annual Meeting of the Green Section, January 4, 1923

Mr. Chairman and Gentlemen: I want to pay a tribute to and to thank Dr. Piper and his associates for the splendid work which they have been doing and especially as it affects us in the northwestern part of the United States. Ours is a new country; most of the courses are new.

There has developed recently a great interest in golf. I think there are 22 golf courses in the cities of St. Paul and Minneapolis today, and two-thirds of them have been built and organized within the last few years.

Now I hesitate to appear before an audience like this, of men so skilled and experienced in matters connected with the care of golf courses, but we in the northwest have been suffering in the last three or four years from extreme drought, with which I hear some of you gentlemen living near New Jersey and the seaboard have not been affected.

With us, the past season has been the fourth consecutive season of excessive drought. The records of the Weather Bureau show that in the area of which Minneapolis is the center, the rainfall for four years has been over five inches per year below normal. In the spring, when the rains were abundant, our fairways were in fine condition. As the summer heat came, however, the fairways dried up and the higher ridges became brown and burned hard.

In 1922 we conducted some experiments in breaking up or aerating by various methods the surface of the soil on these dry hard ridges. We tried a disk, but we found that an ordinary disk, with the blades set as nearly vertical as possible, would work all right on the higher ground, but as we dropped down into a hollow it would tear or mutilate the sod. We then tried a spiked harrow with the spikes set at an angle, but no matter how great the angle of the spikes, even though they were set in the line of the cut, this machine also tore the sod. "We then built a spiked roller on the principle of the spiked rollers which were used on the putting greens and with which you are familiar. This spiked roller was made out of cement poured into a cylinder of sheet iron punctured with holes at the proper places so that spikes would protrude. The spikes were quarter-inch iron boat-spikes 4 inches long with chisel-points. The points were put in line with the direction in which the machine would be hauled. This machine worked very satisfactorily. It broke up the surface of the ground thoroughly. On certain portions of the fairway we put the machine over once, on other portions twice, and on other portions three times, running it once north and south, and another time east and west, and crossing the cuts. This broke up the soil. Our theory was that when the rains came, with the soil broken up on the

(Continued on Page 9)

Watering in the 20s–

(Continued from Page 7)

surface, every drop of water would penetrate the soil and the plants would get the full benefit of the rain. It worked all right in the fall and it worked all right in the spring, but when the drought came we found that in those areas which had been thoroughly spiked, the weeds, dandelion, and the knot-grass grew and crept in more rapidly than in the areas that had not been spiked.

We have been cutting our course for 25 years. A great many members of the club vitally interested in the course felt that we had depleted the soil by constant cutting of the grass, and that our remedy lay in fertilizing. Therefore in the fall of 1922 we spent a large sum of money in top-dressing. We hauled in hundreds of loads of good rotted manure, and spread it all over the course, and seeded. The results appeared in the late fall. The grass came up, and in the spring we were very much pleased. But again when the drought came, this fine, tender new grass turned brown and faded away, not as badly as if it had not been fertilized, but still we lost that good growth of grass.

We then made up our minds, and it-seemed to me a simple proposition – that what we ought to have was water. Our soil is good, the majority of the soil is very suitable for raising good grasses, but "we needed water. In the latter part of April of this year (1923) I decided to try an experiment. I staked out a circular area 50 feet in diameter and selected the worst piece of fairway that we had on the entire course. It was on a high ridge with rather poor soil; it was infested with dandelions and it had areas of knot-grass, that red-stemmed wiry weed with which you are probably familiar, so very prevalent but in the western part of the country. In that area were also what we call fairy rings, a fungus of the nature of a toadstool, which grows in a circle or crescent and kills the grass and apparently depletes the soil so that nothing will grow on it; there is a complete change in the chemical nature of the soil; what it is I do not know. This area, as I say, was about as poor a piece of fairway as we could select. In the center of that fairway I drove an inch-square peg, level with the surface and divided the circle into four sectors - north, south, east and west. Where those lines touched the outside of the circle I drove another peg. We then divided each one of those sectors into halves, and drew a line, and drove a peg. We marked all those lines with a tennis marker with white lines, so that the marks were perfectly plain on the surface of the ground.

On the 1st day of May 23, we started a rotary sprinkler. That sprinkler was placed on the center peg, and the greenkeeper had orders to run that sprinkler eyery morning from seven until eight o'clock, irrespective of the weather, rain or shine. Before we started sprinkling, we seeded this area. In one quarter we sowed redtop; in the next quarter, bluegrass; in the next quarter, red fescue and in the last quarter, a mixture of 40 per cent bluegrass and 60 per cent redtop. Then in each one of these quarters, which was divided in half, we sowed the seed in different densities; that is, in half of the quarter where the redtop was we sowed at the rate of about 100 pounds to the acre, and in the other half at the rate of 200 pounds to the acre, which, of course, is intensive seeding. Then we started watering. Our fairways had already commenced to dry up in the latter part of April, when this watering was started, and by the end of May the results had become very

(Continued on Page 11)

Watering in the 20s–

(Continued from Page 9)

apparent. The new seed had begun to show, and the old grass that was in there was green and healthy, and that little circle stood out from the rest of the fairway as though it had been painted with a brush.

Along the last of May and early in June the rains came, and then the rest of the fairway began to revive; and before long, when the benefit of the rains began to be felt, the surrounding fairway greened up, but it did not have as fine an appearance as the experimental area. During all this time, the area was cut with a power mower, passing over the area at the same time the surrounding fairway was cut, so that so far as the cutting was concerned it had exactly the same treatment as the rest of the fairway. Then in the middle of July the rains stopped and the drought came on, and we kept up the watering, and this piece of ground kept getting better and better; and day by day, as we watched it, and especially early in the morning when the dew was on the grass, we could see this new grass coming up everywhere – as the greenkeeper said, "as thick as the hair on a dog's back." The little fine grass grew up and mingled with the knot-grass; it grew up through the areas where the dandelions were, and apparently was driving the dandelions out. The fairy rings began to show life, and they filled up, and by the 1st day of September we had as fine a piece of fairway as you gentlemen, who are all accustomed to the very best of golf courses, would want to play over.

The lie of the ball was practically perfect. And this fall, just before the snow came, we went on to it as a temporary green. And I want to tell you gentlemen that it was a pretty fair western green at that, right in the fairway.

Now this is not hearsay; it is something I have seen and something I know. I know that if we give that land water and seed we can maintain that fairway. Now the question which you gentlemen have in your minds is, of course, how can you accomplish this result over a fairway of 18 holes? A little experimental area of that kind is certainly simple. I do not, by any means, propose to have you infer for a moment that what we did was a new invention. I have played golf in California, as a great many of you have, and I have seen their irrigation out there; I have seen the apparatus which has been in use for a great many years at the Midwick Golf Club; I have seen the apparatus at the Los Angeles Country Club; I have seen the system of irrigation which Mr. Frank Woodward has installed near Denver, which is an open system with strictly an irrigation flow. With us it was a question of how we could best develop some plan along the lines of the California clubs, and perhaps improve on them, and which would not be prohibitive in the way of expense.

Now I want to say that, first of all, if you are going to sprinkle your fairways, it goes without saying you must have an adequate water supply.

We are fortunate in having a beautiful lake right on the border of our course, with unlimited soft water, and we have a powerful duplex punip, and a very, large storage tank, with a 4-inch main running out through the center of our course, with laterals reducing first to 3 inches and then to 2 1/2 inches, and at every putting green a 2 1/2 inch outlet. The methods of irrigation which I have mentioned seemed to us too expensive to operate, and not convenient. The California system consists of a pipe long enough to reach across the fairway, supported on pulleys, such as you have on shafting in a machine shop, with the hub bored out so that the pipe turns loosely on the pulley, and with holes bored in the top of the pipe; and by pushing the pipe up the fairway it sprays water on each side. At one time we tried the rotary system, which has been in use at some clubs—movable rotary sprinklers in gangs of two or three. At one time we bought one of those large rotaries, such as they use on the Common in Boston, and we used that in front of the putting greens to keep the approaches in good order; but that stream of water was too heavy; the drops were too large; it threw too much water, and it washed out the roots in the grass, although it did help to keep the approaches green. Now the system which we have developed is very simple. First of all, we laid a pipe parallel with the fairway, and we went to the nearest supply pipe, whatever it might be: 2 1/2, 3, or 4 inch, and we ran a lateral along the side of the fairway of l 1/2-inch pipe, and in that pipe we placed a hose outlet every 250 feet. We buried that pipe about 8 or 10 inches below the ground. Of course, in our country our frost goes very deep, and our entire water system is practically on the surface, so that our pipes can be shut off and can be drained easily before they freeze. We had 1 1/2-inch hose outlets every 250 feet. Then we took two units of 11/2-inch pipe, each 54 feet long. We mounted those units on a carriage made of flat iron, and that carriage had on each end of the frame a caster-wheel, a wheel about as large as the wheel on an ordinary wheelbarrow, with a flange on the wheel rounded so that it would not mark the course in the fairway. These two sections of pipe, each 54 feet long, were connected in the center by a piece of high-grade 1 1/2-inch hose. Each one was carried on three carriages, and each carriage had two caster-wheels on the end. Now by a "caster-wheel" I mean a wheel which will revolve and go in any direction in which you want it to go, just as you move your dining-room table or your bureau. If you wish to push this pipe in a particular direction the wheels will automatically turn and run in that direction. If you wish to draw the machine endwise, to take it from one fairway to another, a couple of men can take a rope, or you can take a little tractor and hitch on to one end, and the wheels whirl right around and the machine moves lengthwise. The boys working on the course call this machine "the sea serpent." As I say, these two sections are connected by a piece of 1 1/2-inch hose, in a U-shape, with a 45 degree ell running into the end of each pipe. That makes it flexible. If there is a hill here and a hollow there, the machine accommodates itself to the contour of the ground. If you are moving up the fairway and the fairway is 60 yards wide at that point, and as you approach the putting green it narrows to 30 yards, you can do one of two things; you can have one section across the fairway, and the other at an angle, or you can move up in a V, whichever seems the most convenient, so that the machine does not reach out into the rough. Each machine is equipped with 150 feet of 1 1/2-inch hose. On each one of these sections are two risers of 5/8-inch pipe, with a rotary nozzle at the top of the riser, the riser being about four feet high, and these rotaries revolving on the top of that riser, so that on the two sections there are four rotaries, and when in action one stream of water from No. 1 laps over so that there is no gap between No. 1 and No. 2, or between No. 2 and No. 3; so that the entire area covered by the machine is thoroughly wet.

Now, when we are ready to operate, we go to an outlet and we put 150 feet of 1 1/2-inch hose on it and lead it down to the end of the pipe and screw it on and turn on the water. The rotaries begin to revolve, and you wet an area of 180 feet–about 60 yards. It will cover more if the wind is not blowing to disturb it; but absolutely under all conditions it will wet

(Continued on Page 12)

Watering in the 20s –

(Continued from Page 11)

60 yards in width by about 60 or 75 feet in length. After experimenting we found it would take about four machines of this kind to handle our course. On every golf course there are certain short holes where the fairway is of no consequence. We have four short holes where it is not practical or necessary to water the fairway. That leaves us 14 holes, and we found that four machines would satisfactorily take care of those 14 holes. We start a machine, and one man tends the four machines. The rig is very light and one man can push it; just roll it up the fairway, right up a hill. He turns on the water and lets his machine stand there and run for 40 or 45 minutes; or if it is a very dry spot he will let it run for an hour while he goes and tends the next machine; and when he has made his rounds he comes back and shuts off the water and moves his machine up to the next area that is dry.

We found that we would have to water the fairways in the daytime at present. We expect to water at night next year. A night crew waters the putting greens 8 hours every night. We found that we would have to increase our pumping capacity a little in order to carry all the fairway sprinklers and the putting green sprinklers at night; but that is a minor matter. We find the mechanics have figured out a method by which we can increase our pumping capacity this spring, so that we will do both the putting green watering and the fairway watering at night.We run 12 rotaries at night on the putting greens. We water 9 putting greens on Monday and 9 on Tuesday, so that every putting green is watered every other night for six nights in the week. We do not water on Sundays unless it is very dry. Those 9 putting green rotaries, together with 3 which we keep running on the tees on the dry places, are all regular night equipment. There are 4 rotaries on each one of those "sea serpents," so that the amount of water which is used by the 4 machines is a little more than you would use in watering 18 greens at night. Each rotary is just a riser with an arm and two outlets, a T-rotary. We figure these 4 machines will water the entire fairway once a week, which will be sufficient. That is what we have done.

One of the practical difficulties that we havc found in building this machine, as a great many of you men who are mechanics would know, was to make it light and at the same time rigid. On the first machine with which we experimented the pipe broke or bent and we had a great deal of trouble, so that we devised a scheme of trussing.

These machines can be built for not to exceed $200 apiece; and we bought the pipe and put in the side line, including the labor, for $1,800. You could equip a course which was already supplied with an adequate water system somewhere from $2,500 to $3,000, including the machines.

1949

USGA JOURNAL

LET'S SAVE WATER

Note on "Ion Exchange Process for Brackish Waters" (World Wide Chemistry), Chemical and Engineering News, Vol. 27, No. 45, Nov. 7, 1949.

"The world is becoming increasingly aware of shortages of a raw material once thought inexhaustible, i.e., freshwater. There are a number of regions, such as Los Angeles, Cal.; Perth, Australia; Johannesburg, South Africa, and Tel Aviv, Israel, where large population densities combined with small annual rainfall give rise to situations where the future economic development is limited by the fresh-water supply." The article describes several possible methods and costs of demineralization of brackish water and states, "although the maximum present-day water cost for very highly valued crops is 30 cents per 1,000 gallons, a more reasonable maximum figure for moderate-scale agricultural uses is 10 cents per 1,000 gallons."

Notes on we're Running Out of Water" by Pat Frank, *This Week Magazine*, p. 5, Nov. 6, 1949.

This article points up the alarming water shortage in a dramatic way. Scientists say that 1957 is the critical date when action will have to be taken if new sources of fresh water are not found.

The article stresses the possibilities of tapping the oceans for fresh water and says that the Department of the Interior has asked Congress for 50 million dollars to find a way to obtain fresh water from the sea. The author says, "Hundreds of thousands of acres of irrigated lands are being kept in production only through serious over - pumping of the existing water supply ..."The water levels of the reservoirs that feed Louisville and Indianapolis have dropped 40 and 50 feet, respectively.

"But the most critical areas are the great, expanding metropolitan districts of the nation where the population is jumping, constantly stepping up the use of water."

(Continued on Page 13)