31—When ball goes out of bounds, caddie should inform player at once in a loud tone so that he may hear distinctly.
32—Only one caddie should be on the green at one time.
33—Never walk or stand on any line of putt.
34—Go around the line of putt.
35—Always face the player making a stroke on the green.
36—Caddies must always stand well away from the cup.
37—Hold the flag with either the right or left hand, standing off to one side so that your shadow will fall away from the hole and the line of putt.
38—After removing flag from the hole, keep the flag end down on the green and well away from the line of putt.
39—Be careful of the turf around the cup in replacing flag, use both hands.
40—Never touch a player's ball until told to do so, except when you are sure it is out of bounds.
41—No caddie is compelled to start out in a rainstorm.

RULES FOR CADDIE PROCEDURE
1—When a caddie is assigned to a player, he will first inquire, "Have you a score card and pencil? Have you any balls you wish washed?"
2—He will then count the clubs in the player's bag and say, "Mr. Brown, you have five iron and three wooden clubs," stating how many clubs are in player's bag.
3—If there is a local rule on any hole, he will call it to the attention of the player before the player reaches the tee.
4—On a twosome or a foursome there should be a caddie on each side of the fairway.
5—If the player's shot be out of bounds, he shall immediately call, "Out of bounds," being sure the player has understood him.
6—The first thing to impress on a caddie's mind is the need of team-work with his brother caddie.
7—In a twosome or a foursome if a player should hook or slice a ball which lands in the caddie's vicinity, even if it is not the player for whom he is caddying, he should signal to the brother caddie that the ball had been located and permit his brother caddie to help with other player's ball.
8—The caddie for the player whose ball is first on the green shall flag the hole. The other caddie or caddies shall hand their players their putters, one collect the bag of the boy who is flagging the hole,
and proceed to the next tee, which eliminates the caddies either kneeling at the green or standing about the green which is often annoying to players.

9—On a long hole, the caddies should leave their players' drivers on the tee and proceed up the fairway and shall watch the ball of the caddie who has flagged the last hole. The caddie who flagged the previous hole will collect and distribute the putters after the tee shot.

10—Balls should be washed when necessary without player having to ask for same.

11—When a caddie stands by the ball waiting for player to make a second shot, he shall stand the bag on the ground and hold it in both hands in front of him so that player may take whichever club he desires to use. If the bag is on the ground directly in front of the caddie and held with two hands, he will not be leaning on the bag, which is apt to injure the clubs.

12—Caddies should not offer suggestions to players.

13—in playing eighteen holes, the caddie at the ninth hole should again count his clubs and be sure they are intact.

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**Evanston's Fairway Watering Operating Data**

*By PAUL E. GREEN*

SOME months ago the writer described in GOLFDOM the construction of the Evanston Golf club's fairway sprinkling system. This system has been in operation since the middle of May, 1928. Close observation has been kept over the operations and it is believed that some of the information which has been gained will be of interest to other clubs.

Evanston's system consists of 16,000 feet of pipe ranging in size from six inches to two inches in diameter. It was scientifically designed by an engineering firm on the basis of the amount of water which would be required. This resulted in the construction of a system over eighteen holes of fairways at a cost of $17,500.00. The water is purchased from the village of Niles Center, Illinois, and may be reinforced by the club's existing deep well pumping system in case of emergencies such as inadequate amount of water from the village or reduced pressure. There are

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51 sprinkling connections or hydrants, set at ground elevation along the edge of the fairways.

The pressure of the sprinkling hydrants has been 77 pounds and has averaged about 50 pounds at the sprinkling nozzles operating at the end of 100 feet of hose. At times the pressure, however, has dropped to as low as 30 pounds at which time the club's own pumping station would swing into operation and the pressure would then be raised to about 55 pounds. At 55 pounds the nozzle pressure would be about 30 pounds, and while this is not the best pressure, still very good results were obtained.

Normally 12 sprinklers covering three fairways were in operation at one time. The amount of hose used was 1200 feet or an average of 100 feet per sprinkler. It should be noted that the hose system is used at Evanston for two reasons: first, it was cheaper; and second, it did not tear up the course to install. The cost of operation, it is believed, is not in excess of the California or spray system, and the results are equally good.

Nineteen twenty-eight has been a peculiar season in this district. There was practically no rain from the first of April until the middle of June, at which time a seven inch deficiency in rainfall, as shown by the weather bureau, had accumulated. The sprinkling system began functioning on May 20th and was used continuously, sprinkling at nights until about the 15th of June when torrential rains set in and lasted for nearly two months. The sprinklers were used only a few times during this period. From August 15th to October 1st they were used intermittently part of the time during the day and some of the time at night.

One extra man was required to operate the system. He was assisted from time to time by the regular greens sprinkler man who works at nights. These two men had no difficulty at all in shifting the hose or sprinklers and in giving each and every fairway when sprinkled a thorough drenching.

Improves Clay Soil Fairways

Much of Evanston's soil is a very hard close packed clay and a large amount of water was used. The course was sprinkled forty-one times during the period between May 20th and October 1st. Of the 18 holes,
A Playground for the Golf Club

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It would seem, therefore, that in the Chicago district at least with a course built on poor soil that the average yearly operating cost should not exceed $2000.00, and that with better soil with less area in fairways than Evanston has this amount could be considerably reduced.

Audubon Tells Details of Fairway Conditioning

INTERESTING details of fairway conditioning practice followed at the Audubon Country club, Louisville, Ky., are revealed in a letter written by A. G. Chapman, Audubon's green-chairman, to M. H. Godby of Christchurch, N. Z., who wrote Mr. Chapman as a follow-up on a green Section Bulletin's story on the Louisville experiment.

Mr. Chapman tells of the method and results:

“For what it is worth to you, I am glad to advise that we have been using the spiked roller on all of our fairways for two seasons with satisfactory results. However, our number four and number fourteen fairways were so heavy with clay that the ordinary fertilizer treatment (consisting of nitrogen which we put on in the form of sulphate of ammonia; phosphoric acid (we used acid phosphate) and potash that we got from tobacco dust) did them very little good. The other and better fairways responded to the spiked roller and fertilizer treatment fine. We now have much more of the better grass (principally Blue grass) and less of the weeds and undesirable grass.

“On numbers four and fourteen, which baked into the concrete condition every summer, the spiked roller has helped them but we are now going to put on some old stable manure that has been screened. The process will be to roll the surface twice with the spiked roller and then put on about six tons of screened manure per acre and then run the spiked roller over them twice more. With this treatment and light seeding in the spring of the year we believe we are going to change these two fairways into first class sod.

“I have had a number of experts look at these two fairways and the information that appealed to me most was the conclusion by several that the trouble was lack of humus in the soil. The spiked roller going over them every fall will cause the dead grass on the surface to run
into these holes and when it finally decays will place the humus two or three inches below the surface. This is a rather slow process and we are aiming to hurry it up by using stable manure in addition to the grass cuttings that would naturally go into the holes after rolling.

"There are people in this country that perhaps have forgotten more than I know about a golf course, but the spiked roller which costs about $100 and takes a man with a tractor about two and a half days to go over all of the fairways, and considering the cost, speaking frankly, I cannot understand why it is not done by every good golf course in the country. It certainly puts the humus below the surface of the ground (that is most desirable) and it has a tendency to take out divot holes and rough spots in the fairway, materially improving the sod.

"We have read very little, if anything, about the use of acid phosphate but this fertilizer, it seems to us, has increased the root growth and makes the grass stand up under a drought much better. It is available and inexpensive up here and we would certainly recommend the use of the spiked roller and phosphoric acid in some form in the fall and spiked rolling and nitrogen in some form in the spring. As stated before if you will add to this a little stable manure on poorer spots and perhaps get some kind of a fertilizer with a little potash in it, we are quite sure that you will see a decided improvement in your fairways.

"If the chemicals referred to are not available we believe a liberal use of manure with the spiked roller will cure the concrete condition, keeping in mind the grub prevention, if you are troubled with such things down there, and some check on the weed growth.
Here's a practical club tip. Brentwood, in the Los Angeles district, issues a calendar to remind its members of scheduled club events.

“Scotty” McLaren Figures Mower Mileage

“SCOTTY” McLaren, service chief for Toro, has turned out to be the demon statistician. “Scotty” dopes out the average fairway mower season cutting mileage as 1778.7 on a 6,500 yard course, excluding rough. He reckons the average putting green mower mileage on an 18-hole course as 920.3 each when three mowers are used, and 690.2 miles each when four mowers are used.

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SOIL'S PART
IN CAUSING AND CORRECTING
SICK TURF

IN the matter of turf, golfers are getting more exacting each day. In July and August, when the heaviest golfing traffic occurs, the grass is least able to withstand the strain to which it is subjected. The conditions and troubles of the past season vividly brought home this fact. The heaviest damage was done in the southern sector reaching from Washington to St. Louis but the north was by no means unaffected, as volumes of testimony indicate. In my observation this was the worst season ever experienced; my findings have been confirmed by veterans who say it was the worst they ever have experienced.

A correct diagnosis of any turf disease is the first essential. Often this is exceedingly difficult. One case that came to my attention during the past year was that of where shade was confidently diagnosed as the cause for a poor green but when it was pointed out that part of the green (not actual putting surface) was unaffected by the disease, further investigation revealed that the grass on the green had been sown on a one-inch layer of humus superimposed upon a five-inch layer of beach sand. When the green was disced and reseeded, a healthy growth was obtained. Lack of plant food and not acidity also was revealed as the diagnosis of another condition that came to my attention where five tons of limestone to the acre had been prescribed but fortunately not applied.

In one case an abundance of weeds on a green was thought to be due to the large content of lime in that top-dressing, but in reality the weed infestation was actually the result of numerous weed seeds in the top-dressing mixture. The simple solution in this case was the elimination of these weed seeds in the top-dressing.

If the variety of grass is suitable then the matter of soil is naturally the controlling factor. A green is not only a place to grow grass, it must hold approach shots, withstand heavy traffic and preserve uniform putting texture, not only on the particular green mentioned, but in comparison with all other greens on your courses.

Soil Functions
Soil is not just so much dirt; humus content is its distinguishing feature, because its organic matter is essential for bacterial activity. Due to the presence of micro-organisms the soil is constantly changing and plant food is released as the bacteria utilizes the organic matter. Soil supplies the plant with the water and oxygen required by the roots. These apparently constitute the functions of the soil. It is important to understand the characteristics of ideal soil, the most important characteristics being texture and structure. These indirectly affect all other soil processes. Texture is the size of the soil grains. Structure is the grouping of the individual particles.

Drainage
Proper drainage is essential to proper soil condition. Adequate drainage means the removal of excess moisture which restricts air supply and depresses desirable bacterial activity. A further essential in soil is the presence of organic matter to supply energy to the bacteria. The next point to be considered is the matter of soil reaction, which is the degree of acidity. Aside from any effect it may have on turf growth we know that acidity retards the activity of the bacteria which release plant food. Acid soils usually are somewhat more compact and tend to revert to a puddled condition.

Plant Food
Soil never contains enough plant food to supply soil demands for an entire season so it is necessary to make conditions suitable for the constant release of this feeding from insoluble reserves.

The sorrows of 1928 showed the importance of a correct physical condition of soil due to this year's excessive rainfall. Sandy loam soil is the ideal soil and a light soil is preferable to a heavy one.

*Digest of address at N. A. G. A. convention.
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