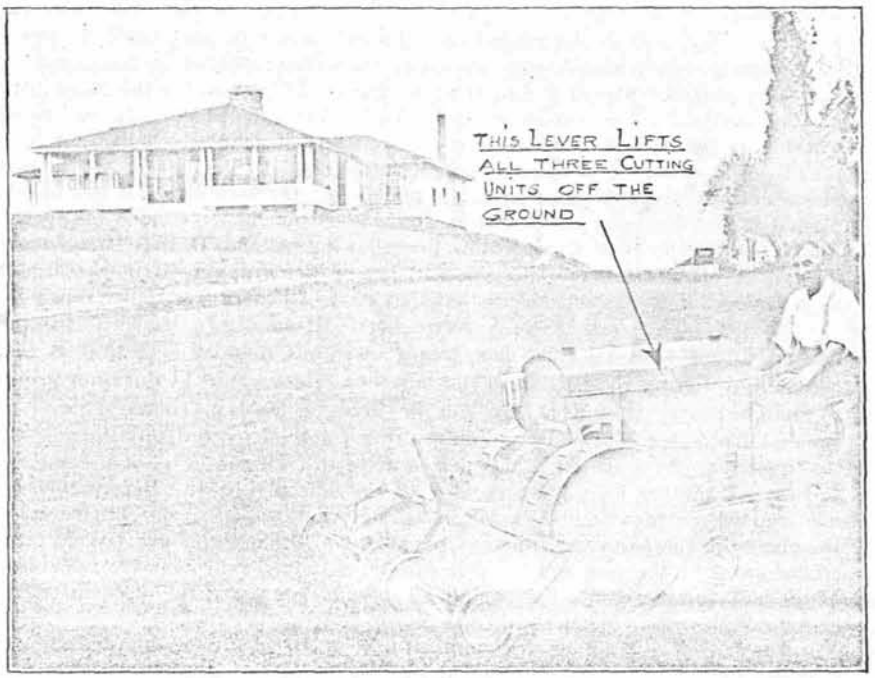

Power mower and three curting units, with lifting device which may be operated while the machine is in motion and which raises the cutting units off the ground, a desirable feature when going over rough ground, roadways, or obstructions.

QUESTIONS AND ANSWERS

All questions sent to the Green Committee will be answered as promptly as possible in a letter to the writer. The more interesting of these questions, with concise answers, will appear in this column each month. If your experience leads you to disagree with any answer given in this column, it is your privilege and duty to write to the Green Committee. While most of the answers are of general application, please bear in mind that each recommendation is intended specifically for the locality designated at the end of the question.

1. **Constructing and renovating turf on putting greens; value of spiked roller and disking machines.**—Our greens were built in 1911 and 1912, but owing to the fact that we did not install a water system until 1922 the greens have gotten into a deplorable condition. They will ultimately have to be rebuilt. It is our plan this year to rebuild three of the greens and renovate the remaining fifteen.

In renovating a green we expect to proceed as follows: (1) Sweep the green with a willow brush; (2) cut the grass as closely as possible; (3) roll and cross-roll with a spiked roller; (4) rake and cross-rake with a fine-toothed iron rake; (5) seed by means of a wheelbarrow seeder to a mixture composed

of 50 per cent Chewings fescue and 50 per cent superfine redtop, applying the seed at the rate of 5½ pounds per 1,000 square feet, crossing and recrossing the ground in all directions with the seeder until this amount has been applied; (6) top-dress lightly with screened top soil; (7) rake lightly with a fine-toothed wooden rake to cover the seed and distribute the top-dressing evenly; (8) roll; (9) water by hand, using a spray nozzle.

Our plan for constructing a green is as follows: (1) Plow, disk, and harrow; (2) remove the top-soil and place it to one side; (3) grade up the green to conform with the plan; (4) replace the top soil, screening the last inch through a quarter-inch screen; (5) fallow to get weed seeds to germinate, raking as the weeds appear; (6) seed by means of a wheelbarrow seeder to a mixture of 50 per cent mixed bents and 50 per cent superfine redtop, at the rate of 10 pounds per 1,000 square feet; (7) rake lightly with a fine-toothed wooden rake to cover the seed; (8) roll; (9) water by hand, using a spray nozzle.

Our soil varies from a medium clay loam to a heavy black loam. During the past four years the greens have been top-dressed many times with top soil, rotted manure, and sand. In the fall of 1921 a chemical fertilizer composed of bone meal, nitrate of soda, and superphosphate was applied. We found last year that this had the effect of a hothouse treatment, stimulating the growth of the grass too early, with the result that an early frost killed off the grass on portions of some of the greens.

Our reason for using fescue in renovating the fifteen greens is the fact that it is much cheaper than bent seed. Indeed, we are advised by a seed house to use fescue throughout, as the quality of the bent seed on the market is unsatisfactory. (Alberta.)

As your method of renovation will destroy all the vegetation on the greens, we would suggest that you make use of an ordinary farm disk harrow and a team to do the work, as in this manner it can be done in only a small fraction of the time it would take to do the work with hand-spiked rollers, and the results will be just as satisfactory in the end. We would first put on some well-rotted stable manure, if it can be had, and if not some light woods-earth, which will tend to loosen up the hard soil now on the greens; this should be worked thoroughly into the soil, and can be done most satisfactorily with a disk harrow, as outlined above. The usual procedure is to use a team and harrow and go round and round the green until it is thoroughly pulverized. It has been our experience that spiked rollers and disking machines are of no value in connection with established turf; we have tested these machines and in all of our experiments they did more damage than good. With regard to seed for your greens neither Chewings fescue nor redtop gives satisfactory results for putting greens in this country. They germinate well, and in the seedling stage give promise of excellent turf, but in the great majority of the cases the grass either disappears about the middle of the summer or becomes coarse and unsatisfactory. We would advise you by all means to get some bent, if possible. It is true that the bent seed now on the market is poor, but we have never seen any bent seed that had the true bent in it which we would not take in preference to anything else for putting green purposes. There is no other turf grass that is anywhere nearly as good under the conditions existing in Canada and the northern part of the United States. Your suggestions for seeding are perfectly satisfactory. Now that your water system

is installed we have one suggestion to make, and that is, not to overdo the watering.

2. Vegetative propagation of bent grasses.—We have learned that eighteen greens were planted vegetatively in New York state by the following method: The greens were prepared ready for planting and then ditches were run diagonally across the greens three inches deep and four inches apart. In the bottom of these ditches was sown Chewings fescue, a light layer of soil was put on top of this, then creeping bent stolons were laid in the trench and covered with from two to two and a half inches of soil, and then the greens were sown with redtop. This is a different method from the one we understand you recommend for the vegetative planting of greens. As we expect to plant some greens this coming year, will you kindly advise us as to which is the proper method? (Pennsylvania.)

The vegetative planting of turf grasses is rather new, and it is not at all strange that there should be many differences in opinion as to how it should be done. In fact, it is highly desirable that there be experiments conducted to find just the best way of getting a first-class turf. We have ourselves experimented with this method since 1916, but, of course, have not exhausted all of the possibilities. The method of planting which you describe must be looked upon purely as an experiment, and it would be unfair to condemn it until it has been tried out to see if it gives satisfactory turf or not. We can not help but think, however, that there may be some things in the method which will not give the creeping bent a fair chance. First of all, we can see nothing to be gained by using seed of redtop and red fescue with creeping bent; on the contrary, it puts an added burden on the creeping bent, which will have to crowd those grasses off the green before first-class turf will result. It has been our experience that it slows up the spreading of creeping bent very materially to have other grasses growing in competition with it. As creeping bent planted by the vegetative method will make turf suitable for putting in less time than has ever been done by seed, we can see no advantage whatever in using seed with it. The experience of a public golf course in this vicinity is to the point. Some of the greens on this course were the first to be planted by the vegetative method. They were hit by the brown-patch fungus, but there was no remedy then known to control the trouble. The first year they were infested with the fungus they recovered in the fall and were in perfect condition during the winter and spring months of 1921. They were again hit by the fungus that year, and as there was a change of management in the control of the course, the greens, instead of being allowed to recover naturally (as they would have done in the fall), were forked to pieces, raked over, and seeded to redtop and red fescue. Fortunately the creeping bent plants were not killed, and they came on again in the spring of 1922 and crowded the redtop and fescue into patches. One of the greens, especially, has come back into very good creeping bent turf, but not as good as it was in the two preceding years. We believe this green, however, will eventually be all creeping bent. As the result of the experience on that course, of seven new greens which were planted this past fall, six of them were planted by the vegetative method without the use of any seed; the seventh green would have been planted vegetatively had there been enough stolons to do so. We have experimented with the row method of planting. In fact, it was the

first method used, but we discarded it, first, because it was slower in giving perfect turf than the method we now advise using, and second, there was a row effect which persisted for some little time after the ground was completely covered with turf.

3. Reseeding bent greens; use of redtop in reseeding.—We have a fair stand of grass on our putting greens, but the turf still needs to be improved. Would you advise reseeding in the spring or fall? Would you use only Colonial bent and creeping bent, or would you add redtop? In reseeding, would you mix the seed with compost? We have already broadcasted our greens with a fine quality of mushroom soil. I may say that the new greens before seeding were constructed with a layer of about six or eight inches of mushroom soil to which some sand was added. (New Jersey.)

We have not obtained very satisfactory results from reseeding either in the spring or fall, but prefer fall, if it is to be done. However, we have suggested to many clubs that have had reseeding in mind, to do so, and if some good is derived it will really be worth while. The seed should be mixed with compost or good loam, as compost or loam makes a much better medium for germination than would be the case if either of these were absent. A mixture of Colonial bent and creeping bent is entirely satisfactory, and if redtop is included no serious harm is done. Redtop, however, while it persists, is considerably coarser than the bents and to this extent is undesirable. As for reseeding, we are inclined to think that, whether it is to be done on greens or fairways, redtop is quite as desirable as the bents, provided there is already a fair bent turf. The redtop seedlings that develop as the result of reseeding usually do not last long, if they come at all, but they make a very good putting surface, and when they give way the bents are in a position to occupy the area they have occupied. For reseeding thin greens three pounds of recleaned redtop to 1,000 square feet is an ample quantity, if it is well mixed with compost. Compost should be added so that it is approximately one-quarter of an inch in thickness. Redtop is likewise equally as good to use in reseeding fairways; in fact, it is probably preferable to the other grasses because of its cheapness and the quickness with which the seed germinates and the seedings start. Of course, it is not usually feasible to employ the same methods in reseeding fairways that are advised for putting greens, and it is rarely practicable to do more than scatter the seed on the soil and roll afterward when the ground is sufficiently dry. As for mushroom soil, we would not think of advising its use in layers six or eight inches thick. Mushroom soil is an excellent form of organic matter, especially for use in compost piles, but it should be mixed with clay and sand or loam and not used in any considerable quantity alone.

4. Bent greens in Kansas.—Please let me know what your opinion is of creeping bent. Is it subject to brown-patch? Is it best to sow it with other grass seed, and if so, what kind? (Kansas.)

The bents are by all odds the best turf grasses for putting greens in the north with which we have had any experience. German mixed bent gives excellent results, and so does Rhode Island bent (harvested in New England) and Colonial bent (harvested in New Zealand). There is, however, much inferior seed on the market sold as bent, and if you buy any it

should first be submitted for examination. We do not advise mixing bent with other seed, if you can get enough seed of bent grass to do a straight seeding with it. There is no other grass that benefits the bents at all when mixed with it, although sometimes, due to the scarcity and high price of bent seed, it is advantageous to mix it half and half with redtop; eventually the bent will crowd the redtop out. The bents are subject to brown-patch. but we have found this trouble fairly easy to control with dry Bordeaux powder dusted on the greens. The Bordeaux should not be used until the brown-patch appears. There is, however, another disease which makes small brown spots one to two inches in diameter in bent turf, but which has not been controllable with Bordeaux, and as yet we have found no remedy for it; it usually does not injure the grass for play, but it does make it somewhat unsightly.

5. Converting into bent turf greens formerly seeded to a mixture.—We are sending you a sample of special bent seed which was sold to us as a mixture of the highest grade of bent grasses. Please advise whether or not you consider the quality of this mixture best suited to our purpose for reseeding greens formerly seeded with putting green mixture which contained very little bent grass. (Pennsylvania.)

The sample of seed you send is 44 per cent redtop, 37 per cent red fescue, 9 per cent Rhode Island bent, and 10 per cent inert matter. This is a very inferior mixture for planting on putting greens. To improve your greens which were originally seeded with a mixture containing very little bent grass, the best seeding plan is to seed on top of the turf about August 15 with good bent seed and top-dress the green after the seeding. The bent grasses are very aggressive under putting green conditions and eventually crowd out most of the other grasses so that you get approximately a pure bent green. Spring seeding is not nearly so satisfactory, and on the whole we doubt whether it is worth while.

6. Rate of seeding bent grass; seed mixture for greens under Kansas conditions.—We are planting greens this spring of about 3,600 square feet. What rate of seeding bent grass would you advise for our greens? (Kansas.)

We advise seeding bent at the rate of three to five pounds per 1,000 square feet of area. With first-class seed the minimum rate is ample, while with the ordinary seed obtained at the present time, which has a great deal of chaff in it, it is safer to use five pounds per 1,000 square feet. We are inclined to believe that for spring seeding under your conditions it probably would be safer to mix the bent with some bluegrass and redtop. If it had been thoroughly demonstrated that bent was the grass for your locality we would not advise this, as there is nothing better than bent, but to be on the safe side you might make a mixture of about 50 per cent bent, 40 per cent bluegrass, and 10 per cent redtop. As soon as your seed arrives, put some of it in a box of soil where it can be kept moist, and test it for germination.

7. Converting redtop and Poa annua turf into bent turf by vegetative plantings.—We would like your advice as to the advisability of planting bent runners in rows in a *Poa annua* green. We understand that if bent runners are planted in a redtop green the bent will crowd the redtop out in a very short time. *Poa annua*, however, seems to be more persistent than redtop and we are wondering if it would be possible to try to change a green from *Poa annua* to bent. (Pennsylvania.)

Our experiments in putting creeping bent runners in old redtop turf have been very satisfactory, but further experiments are necessary before we can make a definite recommendation with regard to the advisability of such planting. *Poa annua* is likely to invade any turf to some extent. It is a short-lived annual; that is, it sprouts from seed and matures in the course of a few weeks and then dies. If, however, it does not crowd out the bent, we do not see that it can do any particular harm. In early spring *Poa annua* is usually an asset to a putting green.

8. Renovating bent greens.—Last September our greens were seeded with South German mixed bent. Will it be necessary to seed again this coming fall? Method used: Each green was gone over in one direction with a putting-green cultivator, the seed then sown with a wheelbarrow seeder, and this followed by a light rolling. When finished in one direction the greens were gone over again in a cross direction. (New York.)

When once a fair stand of South German mixed bent is obtained there is very little to be gained by reseeding. If there are spaces more or less bare, seeding will do some good, but if these spaces are small, patching will be better. A thin stand of creeping bent can be thickened up by good treatment much more rapidly than by any other method. By good treatment we mean fertilizing, watering, etc., but using no additional seed. Seedlings really have little chance to develop in competition with the turf already established.

9. Redtop-bent mixture for seeding new greens.—Would you advise the mixing of redtop seed with bent seed in planting new greens? (New York.)

Our experience with bent and redtop is favorable to the mixture. While one would not get the first year or two the fine turf that is obtainable from bent alone, our experience has been that the bent will eventually replace the redtop.

10. Treatment of heavy clay soil; value of spiked roller.—The soil of our greens is a heavy clay which in summer dries out fast and becomes very hard. As the work on the greens when under construction was rushed, it happened that sufficient sand and rotted manure was not used in this clay soil to make it satisfactory for the purpose. We intend, therefore, to top-dress the greens with sand and humus, and have thought that in order to work this top-dressing into the soil to a depth of one or two inches, the use of a spiked roller would be advantageous. Do you think that a spiked roller disturbs or damages the roots? (Missouri.)

Top-dressing with sand will prove very helpful to your greens. There is no objection to mixing humus in with the sand, if by humus you do not mean the commercial peat called humus; that we regard as practically worthless. We believe you will get satisfactory results by liberally and frequently top-dressing with sand, and at the same time continuing your regular top-dressings with compost. The sand may be applied at any time of the year and as often as desired, until you get a sufficient surface layer of the sand or sandy soil. Our present opinion is that the spiked roller will not do any good, and in midsummer it may do harm. As a matter of fact, you do not want to get the sand down into the soil, as it will go down fast enough. What you want is a surface layer of sand or sandy loam which will promptly absorb the water and thus prevent the clay beneath from puddling and later baking.