

ated. Experimental plots which have received the same fertilizer treatment continuously for more than half a century, show that lateral movement is negligible, certainly not more than several inches. The reason is evident when the mechanism of plant food movement in the soil is considered. The soil water is the vehicle for the carriage of dissolved materials, and since water movement is almost wholly vertical there can be little lateral movement of soluble plant food.

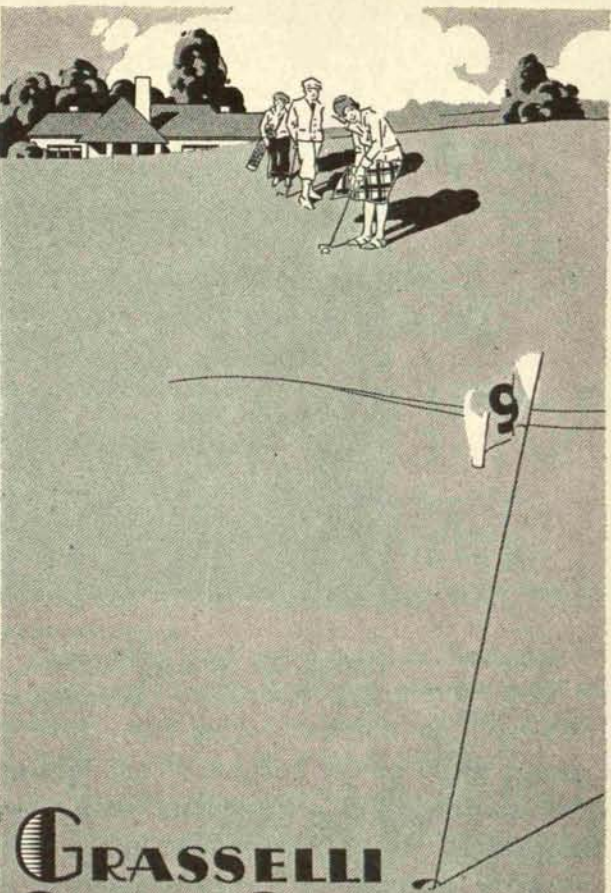
Uniform application depends primarily upon the mechanical condition of the fertilizer and the method of application, although the rate has some effect for obviously it is far easier to apply one ton to an acre than one hundred pounds.

Progressive farmers recognize the modern manure spreader as more than a labor saving device. The shredding and tearing of the larger lumps results in much more even distribution than is possible by hand. It is never possible to apply a coarse lumpy fertilizer as uniformly as one consisting of fine particles only. The smaller the individual particles the larger the number in a given quantity and hence the better chance of obtaining even distribution. Some fertilizers tend to absorb moisture from the air and become lumpy. When in such condition they should be ground before attempting their use. A discarded feed grinder is advisable for this purpose.

It is extremely difficult to apply fertilizers uniformly by hand, and also impractical to cover extensive fairway areas by this means. When strong arm methods are resorted to on small areas it is best to divide the fertilizer into two equal quantities and apply one portion while walking in one direction and the other while walking in a direction at right angles to the first. Thus areas failing to receive fertilizer the first time usually are covered subsequently.

Fertilizer Spreader is a Necessity

THE common lime and fertilizer spreader reproduced herewith is ordinarily used for fairway fertilization. The hopper holds about five hundred pounds of fertilizer and can be set to apply from about four hundred to four thousand pounds per acre. The fertilizer flows out through slots, spaced about



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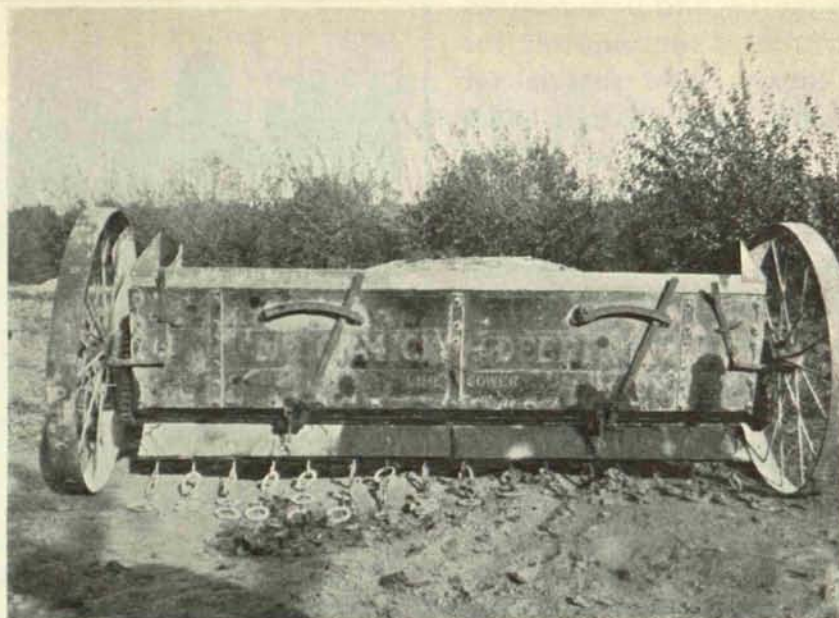
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This is the ordinary low-slung type, lime and fertilizer distributor. Note grain seeder chains suspended from drop board to insure more uniform distribution

six inches apart in the bottom of the hopper. It hits a sloping spreader board and then drops to the ground. While the spreader board tends to improve distribution, unfortunately it is not altogether effective. Its shortcomings are

frequently evident some days after applying the fertilizer. Burned strips appear about six inches apart if injury results from soluble constituents, or darker green strips due to localized fertilizer applications.

Some greenkeepers have overcome this successfully by staggering nails placing them close together on the spreader board. Colonel Goetz of the Algonquin Club at Saint Louis devised a better method. He procured grain seeder chains from a local implement dealer. Each consisted of three rings linked together with short chain. They were attached to the spreader board, one directly below each outlet spout, making it necessary to use sixteen chains. The chains were fastened to the upper outside edge of the board so that the first ring fell just below the lower edge of the board, and the two bottom rings rested on the ground. The chains were attached to the outside edge of the board so as to be drawn up against the board when the distributor moved forward. The two rings on the ground causes the suspended rings to move sidewise and effectively spread the fertilizer as it drops off the spreader board. The method of attaching the chains can be worked out by inspection of the accompanying illustration.

This method possesses distinct advantages and is superior to dragging mats behind the

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distributor. After the fertilizer reaches the ground it is almost impossible to spread it effectively. Furthermore, the two rings dragging on the ground brush off any soluble fertilizer adhering to the blades of grass and minimize the danger of burning.

Tractor drivers must be cautioned to overlap the distance from the center of the wheel to the edge of the hopper or streaks of poorer turf will result due to the absence of fertilizing prior to seeding.

It is almost impossible to apply less than four hundred pounds of fertilizer to the acre. In such cases the fertilizer should be mixed with dry sand, cottonseed meal, activated sludge or some other suitable material to give the desired bulk. Soluble materials such as sulphate of ammonia should never be applied when there is dew on the grass, because burning almost invariably results.

Spilling fertilizer when filling the hopper should not be tolerated for killed areas almost invariably result. The danger can be avoided by placing the fertilizer in the rough alongside the fairway.

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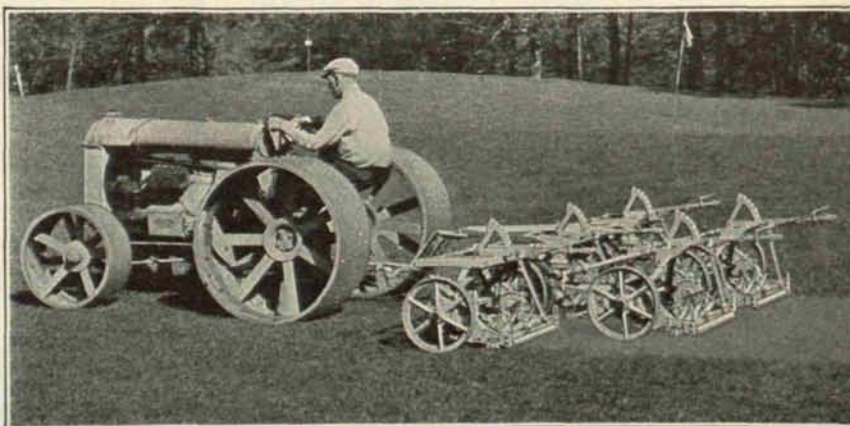
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JOE VALENTINE

Sodding a Putting Green

How a famous Philadelphia greenkeeper worked out this important problem successfully

By JOSEPH VALENTINE, *Greenkeeper
Merion Cricket Club, Philadelphia, Pa.*

BEFORE cutting sods, make sure that they are moist enough. We use two boards—one 10" wide and another 12" wide. We follow the edge of the board so the men can cut them straight, with the edge knives. To lift them we use the American sod lifter.

The sods should be placed in the frame 12" x 14" and one inch thick, and should be trimmed with an old scythe blade, so as to get an even thickness. Before these sods are laid, we make sure that the surface of the green is perfectly solid, and to get a satisfactory surface the soil should be raked and rolled five or six times.

As soon as the surface of the green is sodded, we have the men pack them down with the back of a shovel, roll them with a roller that

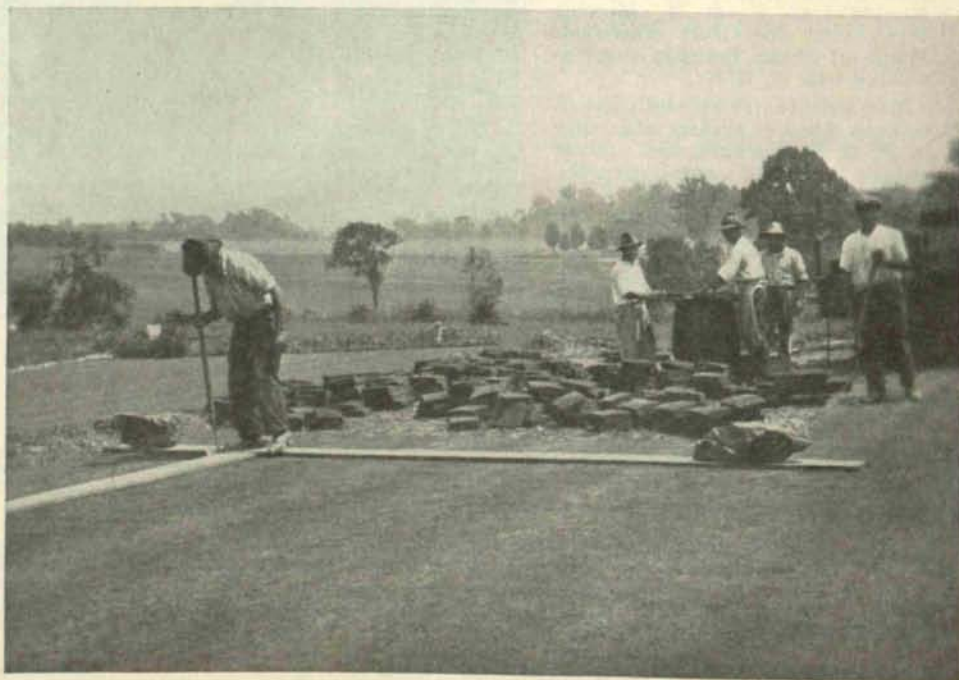
weighs about 400 pounds, and then put on them a rather heavy top-dressing. We work the top-dressing in with the back of wooden rakes and then water them.

After this work, the green ought to be fit to play on a few days after the completion of the job.

My main recommendation is to get the surface of the soil as perfect as possible so that the sods, after they are laid, will not show any depressions.

Another important point which I want to emphasize is that, if you are going to rebuild a green and save the turf, never pile the sods, but spread them out; they will not get heated, and will recuperate quickly if there is any sickness, and will keep for an indefinite time.

JOE VALENTINE AND
HIS CREW SODDING A
PUTTING GREEN AT
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Stolons Versus Seeds

A Comparison of Cost and Quality

By E. S. GARNER, *Agrostologist*
Rhode Island Agricultural Experimental Station

EDITOR'S NOTE—While we do not agree entirely with some of the statements made by the author of this article we are publishing it just as it is written. This is in line with the policy of the NATIONAL GREENKEEPER to permit as far as possible free expression of opinion on the part of those qualified to write on greenkeeping subjects. We want our readers to feel free to send us any opinions they may have based upon practical experience which disagree with any article published in the NATIONAL GREENKEEPER.

ONE of the most interesting questions connected with bent grass is that of seed versus stolons. In order to make the question itself as clear as possible I am dividing it into three parts, as follows:

1. Will seed or stolons ultimately produce the better results?
2. Which will cost the less (a) to plant? (b) to maintain?
3. Having decided what would be the best to use, where can it be obtained?

3. Having decided what would be the best to use, where can it be obtained?

In answer to the first question it may be said right away that generalization is only possible to a very slight extent. All stolons will not produce better results than all seed, and all seed is not better than all stolons. Each kind should be finally judged upon its individual merits.


Stolons Develop Identical Strains

IN A few respects, however, the results obtained from stolons may be compared with those from seed (collectively so-called.) There are several advantages in using stolons. Perhaps the most important is that, having used a particular strain on a green and seen the sort of turf which it produces, one may be absolutely certain of obtaining identical results by using that strain again. With seed, especially bent seed, there is always a risk that it will not produce consistent results. It may be true to name, so far as species and variety are concerned, but it is very seldom of one strain and there is, of course, a wide difference between the strains of bent grass.

Probably the nearest approach to uniformity in seed has been reached by the use of non-stoloniferous species, such as redtop and Rhode Island bent. Seed growers, both in the East and in the West, have put on the market seed that produces very fairly uniform turf, but I have not seen any that possessed the absolute homogeneity that is obtained by using stolons.

The Rhode Island Agricultural Experiment Station is now conducting a series of experiments as a result of which seed of "creeping bent," velvet bent and *maritima* will be produced from selected strains of each. Whether this seed will produce turf identical with that from which the seed is obtained is problematical. If it does, the main advantage of using stolons will have been overcome.

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There are, however, other points, about stolons in general which will always be in their favor. One is that in using stolons, one can depend on a certain measure of success if they are given any attention at all. They will ultimately take possession of the ground, in spite of poor preparation and treatment, but seeding grass is always delicate and is more liable to suffer loss. Once stolons are rooted (within, say, two weeks from the time of planting) the little plants are mature and they will withstand washing due to heavy rains, or trampling, far better than will seedling grass. Weeding may be undertaken earlier than is advisable with a seeded lawn.

On the other hand, it is not by any means certain that a stolon green, because it is uniform, is uniformly good. Some of them are uniformly bad. The same name has not infrequently been given to different strains and different names to the same strains. It is always better, if possible, to start with a small piece of sod and propagate your own. Where there is not the time to do this and it has to be bought it is very advisable to purchase material that has been grown from one of the strains developed by the United States Golf Association Green Section at Arlington Farm. The Metropolitan, Washington and Virginia are the best of these—apart from the creeping velvet bents which are now being developed. I personally prefer the Metropolitan strain to any other and there has been no confusion at any time as to which strain the name applies to.

Stolon Greens Need More Dressing

ALL of the "creeping bents" just mentioned seem to require more dressing than is necessary on a seeded green, but provided they get it, and are prevented from becoming spongy, soft and slow, they will produce as excellent putting surfaces as can be obtained.

As to the relative costs, it is certainly true to say that the amount necessary to bring a lawn or a green to maturity will vary considerably whichever method be used. As a generalized guess I would say that the cost of using stolons is 10 per cent higher, on the average, than the cost of seeding. No doubt in some cases it costs twice as much to plant and raise one green

from stolons as another one from seed; but it should not, and there are times when we have to re-seed due to losses which would not have occurred if stolons had been used.

It seems time that someone made a study of the relative costs, for though there would no doubt be a wide range of difference as between the high and low cost of each method it might be seen that the means were not so far apart. Or it might be found that the average cost of a stolon lawn was 100 per cent higher than the average of a seeded one. But whatever might be the result of the statistics I do not believe that the cheaper method would be the more economical if the results were in any respect inferior.

Best Is Always Cheapest

THE same is true of maintenance. Stolons may cost more as regards mowing and dressing, but as a rule they cost considerably less in weeding. Whatever difference there may be it is not sufficient to justify one in using anything but the very best. Seed may be both better and cheaper, generally speaking, and if you think so and know of something that

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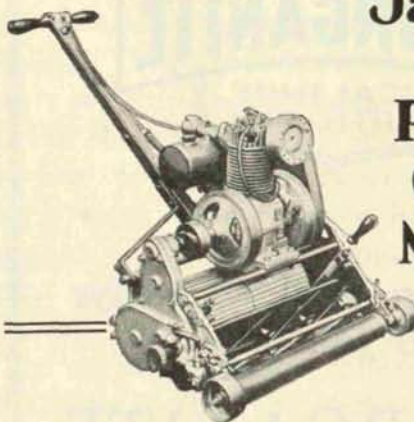
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Jacobsen Putting Green Mowers are gear driven and have separate clutch control of traction and cutting unit. They travel on their own power with or without revolving the reel. All major castings are made of aeroplane aluminum and the light weight is perfectly balanced over the large aluminum traction roller. The mower exerts no more pressure on the green than a man's foot. The traction roller is divided at the center and equipped with an auto-type differential which permits easy turning without scuffing the green.

The Jacobsen Power Putting Green Mower produces a finer cut than any push-type mower. It is speedy, efficient and will not scalp the undulating green.

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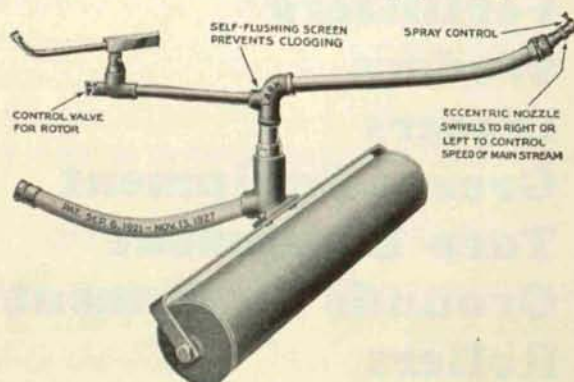
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beats anything you ever saw, well! Don't bother to read this article!

As regards the sources from which stolons should be obtained, the U. S. G. A. Green Section would send any greenkeeper a square foot of sod, from which a small piece of turf could be grown. A sample of stolons of the same name, bought from any of the numerous dealers, could be compared with this turf and if it did not prove better one could always try another dealer. On the whole there is less likelihood of getting misnamed stolons than there is of getting misnamed seed.

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Spring Rolling—When and How

A composite opinion by well-known greenkeepers

Editors' Note: In response to a questionnaire on Spring rolling of fairways we print herewith four replies from widely separated districts, viz., New York, Columbus, O., Chicago and Toronto. Several others were received but limitation of space precludes their publication.

By ROBERT J. HAYES, Greenkeeper Pelham Country Club, Pelham Manor, N. Y.

ABOUT Spring rolling, I would say that there cannot possibly be any definite date given for first rolling, but of course it certainly ought to be done just as soon as ever suitable weather and turf conditions arrive.

The correct time is after the frost has left the ground, and the ground has begun to dry. As a fairly good way to test the ground for rolling, I recommend pressing the turf heavily with the foot, and if real wetness shows around

the shoe, conditions are not yet dry enough for rolling. The ground is ready for rolling when only moisture, not wetness, shows on the shoe.

For the first rolling, a straight roller should be used, to level places raised by the frost, and such spots as may have been inadequately graded. (The springy condition of the turf that prevails, you know, at the opening of Spring, makes it really possible to do this). The weight of this first roller ought to be from 2000 lbs. to 3000 lbs., depending on its length—that is, on whether it is 5 or 6 sections.

A second rolling is desirable, this time with a flexible gang roller, which more readily than the type of roller used in the first rolling, fits into the contour of the ground and ensures every spot, low and high, being rolled. Each unit in this gang roller should weigh about 500 lbs.

By JOHN MACGREGOR, Greenkeeper Chicago Golf Club, Wheaton, Ill.

WHEN to roll is really up to the greenkeeper. There is no set time. In some localities it is done sooner than in others.

I have found the best time to roll is immediately after the frost is out of the ground because then the ground dries very rapidly. By walking over the turf one can readily tell if it is right for rolling, that is, when there is no water seeping around the shoes when one walks. It will be found the time allotted is about eight days; after that time the soil has become dry, then the roller does no good.

Rolling when too wet bakes or seals the surface of the soil and excludes the air which is absolutely necessary to plant growth. Rolling when too dry does no good at all as the roller does not leave an impression. When this happens rolling may as well be discontinued.

I think every one knows why rolling is done, but perhaps I had better state why—it is to press the roots of the grass back into the soil from where the frost has pushed it, not to iron out bumps and high spots.

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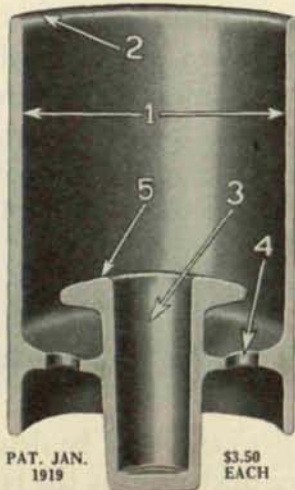
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As to weight of rollers, a gang of three rollers weighing about 600 lbs. each is sufficiently heavy.

Greens and tees can usually be rolled sooner than fairways. A roller weighing from 250 lbs. to 300 lbs. is heavy enough for this purpose. Greens and tees I roll both ways; the reason for this is a green roller is in two sections and when rolling it will be found that small strips have been left owing to the opening between sections.

The same judgment should be used as to the proper time to roll as on the fairways.

By GEORGE SARGENT, *Pro-greenkeeper Scioto Country Club, Columbus, Ohio*

PRIMARILY, rolling grass in the spring-time is done to press into the soil the roots of the grass which have been partly raised out of the ground by heaving and thawing during the late winter.

Secondly, it serves to smooth out the inequalities of the surface of the fairways and so gives the player a much better chance to get a good lie than he would have if the fairways were cuppy.

A great deal of care must be exercised on the time to roll the fairways. If the soil should be rolled whilst too wet, a packed soil would be the result; this would prove disastrous to the grass during hot weather, as air cannot penetrate to the roots of the grass should the soil become packed. To get the best results, rolling should be done when the soil is reasonably soft; so that the roots of the grass can be pressed into the ground, and not crushed onto a hard surface such as would be the case if the soil were dry and hard.

The best time to roll is immediately after the wet, soggy condition has passed, and the soil is in what might be termed a mealy condition; that is, soft, but not wet. Ordinarily this condition does not last more than a few days and the greenkeeper should be on the lookout for it, and seize the opportunity with both feet. If at all possible it is advisable to have two rolling outfits ready so that an eighteen-hole course for instance could be gone over in three or four days.

The weight of the roller can better be determined by the greenkeeper in charge, as the tex-