

about 10 minutes with a spray pump, the nozzle being turned back into the liquid. When thoroughly emulsified the preparation will have the consistency of thick cream, and the oil will not separate. Danger of injuring plants is great if the mixture is not well and thoroughly made. For a 7½ per cent emulsion add 25 gallons of water to the above stock solution and mix thoroughly. It is desirable to use soft water both for the stock and for diluting, but where this is not obtainable the water should be softened by adding lye or sal-soda. A much better emulsion, apparently more effective and more easily made, is prepared by the use of fusel-oil. It is prepared by dissolving 3½ pounds of fish-oil soap in enough water to make a gallon, adding 1 quart of fusel-oil and then 2 gallons of kerosene. When this is churned thoroughly and emulsified, add 25 gallons of water, to make approximately a 7½ per cent emulsion. After application the emulsion should be washed into the soil by sprinkling copiously with water. Water washes the emulsion from the grass and prevents burning and at the same time permits the insecticide to penetrate more thoroughly into the soil. For small areas an ordinary sprinkling can may be used in applying the emulsion, but for larger areas the use of a force pump will save time and labor, a wide sprinkling-can type of nozzle or "rose" being used, so that the lawn can be uniformly drenched in the shortest possible time.

The Lawn-Mower and Its Care

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Much has been written about golf-course construction by well-known architects and engineers telling how deep the subsoil should be and how much top-soil, top-dressing, fertilizer, and humus should be used. The grass expert has written of the kinds of seeds that are best adapted to the various requirements of the course. But very little has ever been told about the tool that is most important and without which the links would be impossible—namely, the lawn-mower.

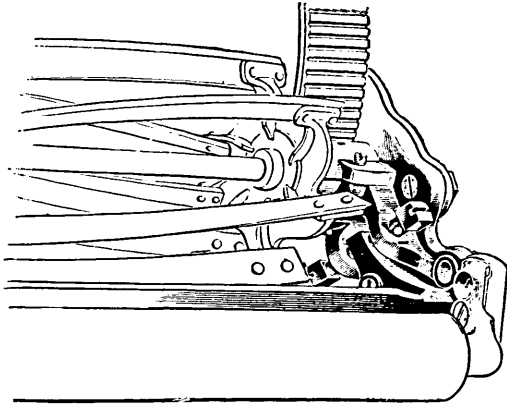
There are many styles and kinds of lawn-mowers, and, like grass seed, certain varieties are best suited for the greens, certain kinds for the fairways, and others for the tees, approaches, and rough. Different manufacturers employ unlike methods of construction, and various styles made in the same factory are built differently; therefore it is difficult to give any suggestion as to the care of mowers to secure the best results at a minimum cost, except in a general way.

The mower best suited for most greens is of the type that has the seven knives and ball-bearings and can be set to cut as closely as 3/16 inch. This is the general type used on probably two-thirds of the golf courses in this country and on many in England and Scotland.

All mowers when they leave the factory should be properly adjusted for cutting, making it necessary only for the ground-man to attach the handle and to *oil all bearings*. It should always be borne in mind that a lawn-mower is a machine, and like all other machines it requires oil and attention. Do not use a heavy-engine or automobile oil that will gum, but a medium-light household oil, and use it frequently, for it does not last long when the machine is run in the hot sun. Should the bearings become gummed by the use of inferior or heavy oil, pour kerosene into them. It

is well to give the man pushing the mower an oil can, but never a screw-driver or a wrench, unless he knows how to use it. The ground-keeper himself or a man with some mechanical ability should look after the adjustments of all mowers and be responsible for their upkeep.

It is an easy matter to adjust the blades if one knows how. Constant use gradually wears the blades, and they must be adjusted or brought more closely together to take up the wear. The blades should be set so that they are true with the bottom knife and then turned over and the two



corresponding square-head screws underneath the machine should be tightened; these screws press against the ends of the knife-bar and bring the knife edge closer to the cylinder. When set, the cylinder will revolve freely without binding. The machine should cut a piece of ordinary newspaper cleanly and without tearing. Do not attempt to tighten the one set of screws before the others are loosened, as this is liable to break the side casting, but whenever one

screw is loosened the corresponding screw on either the upper or lower side must be tightened to the same extent. Do not use too much pressure with a wrench on the square-head screws, as this is also liable to snap off the castings.

If kept properly adjusted, it should not be necessary to grind the blades during the season. Provision is made on certain well-known machines for a crank to be screwed into the left end of the cylinder shaft to turn the cylinder backwards. In conditioning a machine the lower blade should be set close, to bind the cylinder slightly. Then a paste of emery powder (about No. 120) and machine-oil should be spread rather freely on the lower knife before revolving the cylinder backwards. A few minutes only of this operation should suffice to sharpen the blades, after which the paste should be wiped off and the blades adjusted for cutting. Never attempt to sharpen the blades of a lawn-mower with a file, as it simply can not be done. The proper way is to bevel-grind them on a stone, under a jet of cold water, and then "top" them on an emery wheel, which gives them a lasting edge.*

The ball-bearings have their own special adjustments. It is a very simple operation to adjust them. The adjusting screws for the blades and cones have nothing to do with regulating the height of the cut. The roller back of the knives does this. Loosening the bolts holding the roller brack-

* There are at least two good grinders made for shop use, and to those interested the names and addresses of the makers will be given upon application.—
EDITORS.

ets and then raising the brackets, with the roller, permits the mower to cut more closely, while lowering the roller increases the height of the cut.

After making an adjustment of any kind be sure to tighten the bolts or screws. In fact, all bolts and screws should be looked after occasionally to see that they are kept tight.

There is a type of putting-green mower which is quite popular with some greenkeepers, known as the roller-mower. The driving mechanism is in the two iron rollers, or drums, back of the knives, as in the ordinary horse-mower, and the front is supported by two caster wheels and a wooden roller. These are adjustable for the height of cut. In this mower the adjustment of the blades is different, as the lower knife is bolted rigidly to the frame while the revolving cylinder rests on floating bearings or on pivots, and the entire housing is regulated by a cap-screw which moves the bearings up and down. The roller-mower is generally preferred on a green that is sharply undulating, as there is less likelihood of clipping into the mounds.

A direction-sheet with illustrations explaining in detail the methods of adjustment together with a list of the various parts with factory numbers should be packed in the box with every mower and should be preserved carefully for future reference.

Care should be taken to order repair parts accurately, and by factory number where possible. It means quicker service, and frequently it avoids correspondence and consequently loss of time. The parts are right side, or left side, as you push the mower.

At the end of the season the mower should not be put aside until the next spring but it should be sent to the factory for a general overhauling provided the club is not equipped with a grinder or other facilities for doing such work.

If the club has the equipment, the repair work should be done at once, or at least the repair parts should be ordered at once instead of waiting until the grass is about ready to be cut the following year. In the early spring all lawn-mower factories are usually rushed with work of all kinds, and there is the possibility of delay in shipment at that time. It entails no more effort on the part of the greenkeeper to send his mowers to the factory or order his repairs in the fall, and it might save him and the committee many an anxious moment in waiting for them when the grass is growing in the spring. New equipment, for the same reasons, should also be ordered early instead of holding off until time to use it. Lawn-mower prices are always made in the early fall for the following season; so nothing is to be gained by delaying the purchase. It is advisable, especially if the factory is some distance away, to have on hand a small supply of extra parts in case of a breakdown in midseason. Such parts as extra gears, pawls, lower blades, and set-screws do not involve a heavy investment, and they are mighty handy to have around when needed.

Some clubs utilize the old greens mowers for cutting the tees and approaches. This is all right if the laborers do not object. The greens mowers are constructed for close cutting, with seven blades in the cylinder, and when put to any other use they push much harder than the four or five-knife mowers for mowing the ordinary lawn. The grass is permitted to grow as long on the tees as on the well-kept lawn, and as it need not be cut as smoothly as on the putting-green the five-knife mower is preferable since it is easier to push. It is poor economy to try to save a few

dollars on the purchase price of a lawn-mower, whether for the greens, tees, or fairways, but real economy to buy the best that is made.

Until a few years ago the fairways were cut with the ordinary horse-drawn lawn-mower, with a cutting width of 38 or 40 inches, and the rough was cut with the field mower. The heavy motor mower was tried and discarded because it was thought that its weight was injurious to the turf and also because of its complicated mechanism and cost of operation and upkeep. The up-to-date fairway mower, likewise the most economical, is the threesome, pulled by tractor or horse. This consists of three mower units, each 30-inch cut, so arranged under a frame to cut a swath of 7 feet and 2 inches in width, and is operated by one man.

The tractor is rapidly replacing the horse on the fairways. It can travel five to seven miles an hour, or twice as fast as the walking horse, and some of the manufacturers have an arrangement for hooking up five units to secure a cutting swath of 11 feet and 8 inches. The economy of this outfit is apparent, as it will cut an entire course in a fraction of the time it formerly took with the horse mower. Such a mower can also be used in the rough by adjusting the height of the cut to the desired length of grass, usually about three inches. This is done by lowering the roller brackets, which naturally raises the rear of the mower and the cut.

As the chairman of the green committee usually receives credit for the condition of the course, good or bad, so also he is responsible for the mowing equipment of the club, and his interest in such affairs should not die out with the grass when the mowers are discarded for the winter season, but on the contrary he should take account of stock, have old mowers sent to the factory or shop for repair, and place orders for new equipment needed the following spring.

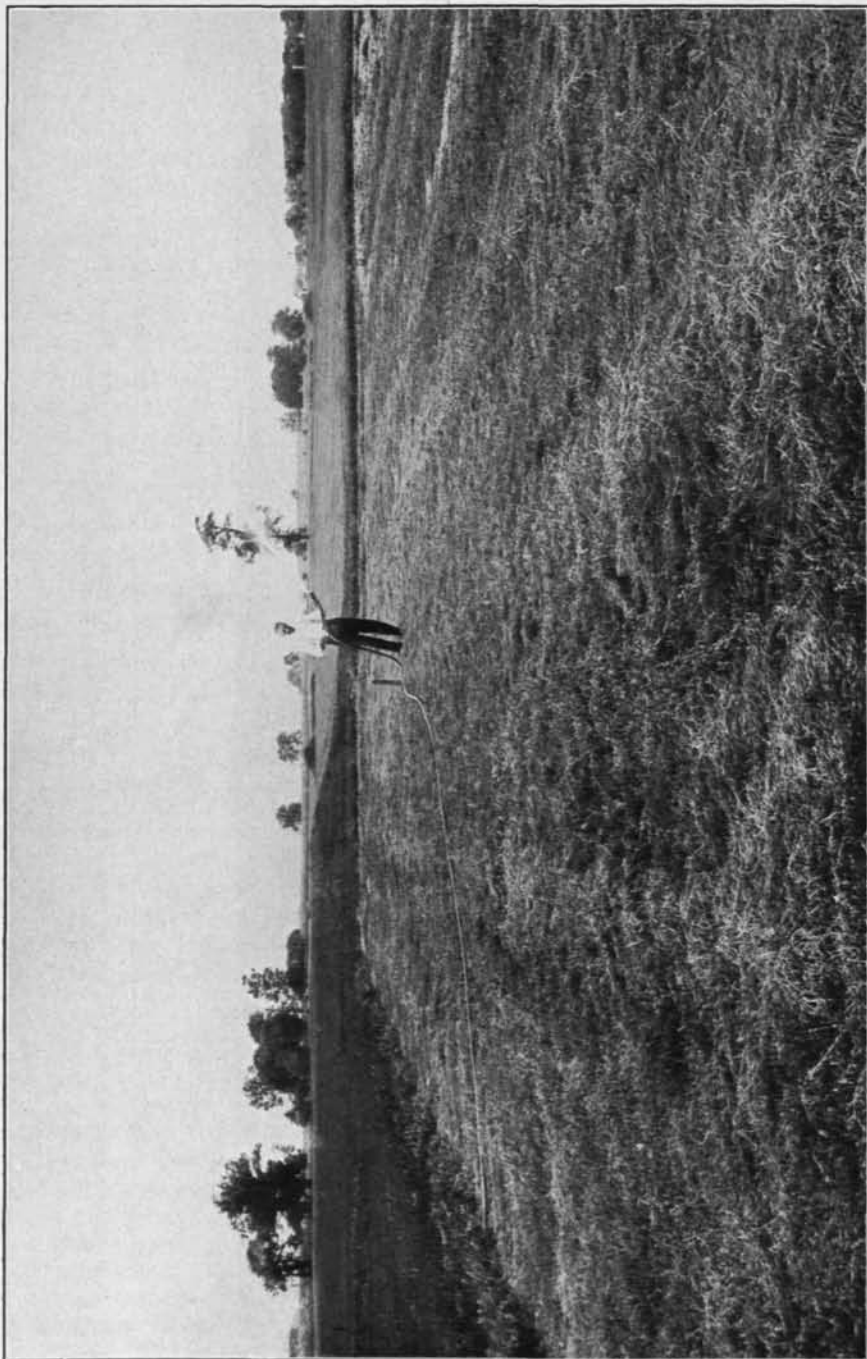
Golf is deservedly growing in popularity in this country and is consuming a vast amount of material, among which are lawn-mowers. In former years the special golf mower was a side line with the factory, but now it is a main line, and it will probably surprise some readers to learn that many thousands of the popular brand of greens mowers are annually exported to Great Britain, where the game originated.

REMOVAL OF GRASS CUTTINGS

Nothing is quite so nasty near an otherwise perfect green as the usual pile of grass clippings. They become rotten and malodorous, and while we sympathize with the poor golfer who steps into the slimy mess, we think the greenkeeper deserves criticism. Incidentally such grass heaps are breeding places for many insects. Why not require clippings from greens to be emptied in burlap sacks which can be hauled away to use in a compost pile? This involves very little extra labor and is worth while in every way.

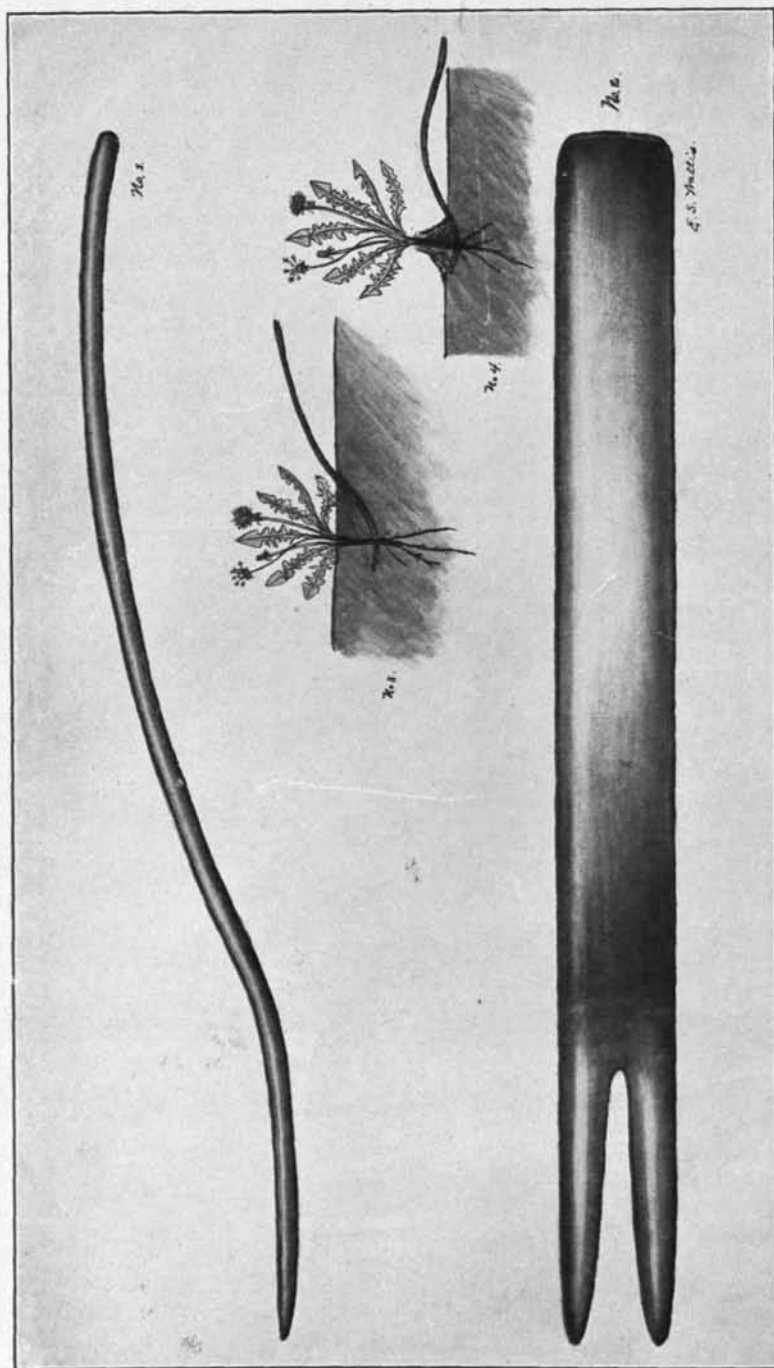
DEPENDABLE REPORTS FROM SEED HOUSES

The Committee notes with approval the growing tendency of seed houses to give exact facts concerning the condition, purity, and germination of seeds offered for sale. We are in receipt of one letter from a seed house which sets forth the facts respecting its seeds with commendable frankness, and we believe the time is not far distant when all seed houses will realize that it is to their advantage to inform customers fully and candidly.



A FINE CREEPING-BENT NURSERY

Creeping bent in the turf nursery of the Moorestown Field Club, near Camden, N. J., grown under the direction of Judge E. B. Leaming. The bent runners were planted in September, 1920, in rows 6 feet apart, and the photograph here shown was taken in August, 1921. Note that the runners have completely covered the interspaces; they doubtless would have done so had the rows been 8 feet apart.



A dandelion hand-weeder that works very satisfactorily; made of spring steel. Full size, 12 inches long by $\frac{1}{4}$ inches wide.—George M. Mashek, Escanaba Golf Club, Escanaba, Mich.