The Ninth Green, Hollywood Golf Club, Deal, N. J. PHOTO—LEVICK
where the Women's National Championship was held in 1921. Stumpp & Walter Co.'s Grass Seed and Fertilizers have been used exclusively, and their advice followed, for the past seven years

Golf Turf
of High Quality

GRASS *for* GOLF COURSES, TENNIS COURTS
POLO FIELDS *and* FINE LAWNS

HOW TO PRODUCE IT AND HOW TO TAKE CARE OF IT

Stumpp & Walter Co

30 and 32 Barclay Street **New York City**

Our 25th Anniversary

TWENTY-FIVE YEARS ago our business began. As we look back to the early days we cannot but realize the great advances that have been made in Agriculture and Horticulture in this great country of ours; nor can we help but feel a personal pride in the share that we have been able to take in this progressive movement. One way in which progress has been evident is the increasing insistence on the part of purchasers of grass seeds for definite standards of purity and germination, a point that for years has been a dominant factor in our business.

It is of interest that this twenty-five year period coincides largely with the growth in popularity of athletic sports calling for fine grass. How great has been the improvement in the quality of turf during that period, and how marked have been the changes in the methods used to produce and maintain it are matters of common observance. In this interval we fear that the obstacles in the way of good greenkeeping have increased: more now are we concerned than our predecessors were about construction difficulties, the scarcity of manure, the attacks of insect enemies and grass diseases.

It is by way of assisting in regard to these difficulties that we publish this book, and our hope is that it will be found helpful by those into whose hands it falls.

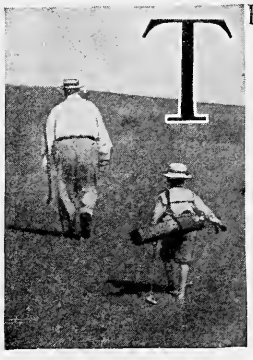
Stumpp & Walter Co

30 and 32 Barclay Street **New York City**

GEORGE G. STUMPP, *President*
JULIAN H. WALTER, *Treasurer*

THOMAS F. KEARNEY, *Asst. Treas.*
WILLIAM A. SPERLING, *Secretary*

THE MODERN PLAYGROUND



THE appearance of a well-kept and well-established turf, such as gladdens the heart of the beholder, is living testimony of the unremitting care and hard work of the greenkeeper. For whatever purpose turf is needed, the utmost perfection in varying directions is called for. For putting-greens extreme uniformity and fineness are demanded; for golf fairways resistance to drought is usually an important characteristic; for tennis courts recuperation after localized hard wear; for polo fields toughness and maximum depth of root; for house lawns velvet-like texture and rich color. A turf can only be brought into a state approaching perfection, and maintained there, by making suitable the soil; sowing fine grass seeds in the proper varieties and of the utmost purity; cutting the grass just at the right time; rolling it only when the soil is fit; top-dressing from time to time to replace plant-foods which are continually being taken up from the soil by the plants and ever seeping away from the soil in the drainage water; detecting at the earliest moment the presence of harmful insects and grass diseases; and taking the necessary steps promptly to eradicate weeds as they appear. All this means that the greenkeeper has to be on the alert early and late seven days a week. It means, also, that he is entitled to all possible help from those to whom he is responsible.

TO THE GREEN COMMITTEE

"GOLF TURF" is offered in response to many requests on the part of customers who ask for a book giving briefly and in simple language the fundamentals of greenkeeping. We hope it may assist in the solution of your problems. To produce and to maintain fine turf is a wide subject which cannot adequately be put into book form; it is skilled work, requiring the attention of a practical greenkeeper who has had years of experience. This effort on our part will in no way enable you to dispense with the services of a greenkeeper; on the contrary, it is felt that we may bring you into closer touch with the problems that your greenkeeper encounters, and—it may be—enable you the more readily to appreciate his difficulties and his efforts when he produces for you a fine turf.

TO THE GREENKEEPER

THAT the following remarks may be of interest is our hope. Our aim has been to put into words, for the benefit of your club members, your side of the story; we cannot claim that "Golf Turf" will instruct you or give you information which you have not already absorbed through the years and in the hard school of experience. It may be, however, that the notes which you will find tabulated here and there throughout the book may sometimes assist you, and may induce you to keep the book for ready reference.

Stumpp & Walter Co

The Building of a New Course

Constructing one of the greens at the Nassau Country Club, L. I. Stumpp & Walter Co.'s seeds were used on this course

Frequently the golf architect's work is completed when he has delivered his plans and blue prints and has staked out the greens and tees. Very often it is up to the committee to engage a contractor to carry out the architect's plans. Hence, it is of interest to consider a golf course from the beginning, taking the period when the architect leaves and when the contractor arrives, to commence our story.

The contractor will be provided with the necessary teams or tractors, scoops, plows, scrapers, harrows, etc. Also it will probably be necessary for him to have men and materials for removing stumps and rocks. The most satisfactory results in course construction are obtained when the architect superintends personally the construction work, or employs a competent constructor to represent him. Failing this, the contractor must be provided with very minute plans, drawn strictly to scale, and showing clearly all grading work, the location, shape, height, and contours of the greens, with the accurate location of the traps.

The most important point in all construction work is to *conserve all the top-soil*—do not permit grading or plowing to bury this most important material. The first thing after the fairways are located is, assuming that the time will permit, to sow a cover-crop: field peas if in early spring, cowpeas or soybeans in summer; rye and vetch if in the fall and to stand through the winter. The seeds for the cover-crop having been sown, the land harrowed and rolled, the fairways may be left while attention is given to the greens.

The top-soil should be removed from these and the greens built in accordance with the ideas of the designer. It is usual to use subsoil or "fill" for constructing the foundation of the greens, but we have observed the best results where the rough has been skinned for top-soil and this top-soil used in the building of the green to a depth of several feet where necessary. Then, the original top-soil may be spread evenly over the green, and on this from 5 to 10 tons of mushroom soil, humus, or rotted manure should be spread; then if the soil of the course is of a medium to heavy nature, 10 cubic yards of sand should be added, and the whole forked, harrowed, or scuffled until the earth comprising the green to a depth of 6 inches is an even mixture. About 150 pounds per green of a good chemical fertilizer, such as Stumpp & Walter Co.'s Emerald Grass Fertilizer, may be dusted upon the surface, and the soil then thoroughly raked to bring it into that fine condition necessary for a suitable seed-bed.

A good idea. The architect has fashioned a small model of the new green out of the adjacent soil, enabling Constructor Bryce of the Brookville Club, L. I., to follow closely his ideas. Stumpp & Walter Co.'s seeds were used on this course.

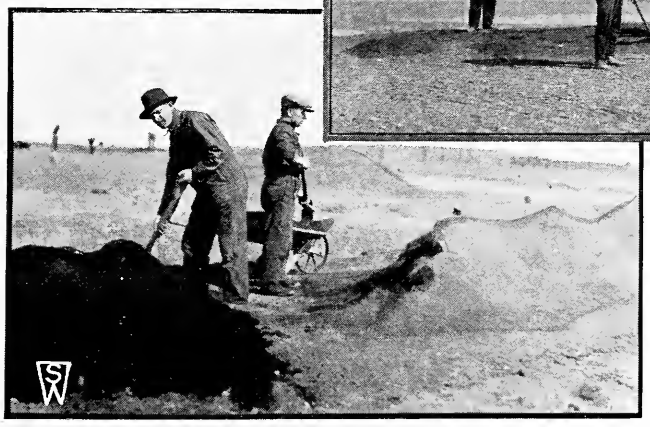
Many constructors at this point remove the top inch, inch and a half, or two inches of soil and pass it through a ¼-inch rotary screen, then returning the screened soil to the surface of the green. This is actually profitable because it tends to produce finer turf more quickly. Another very profitable use for screened soil is to cover slightly newly sown seed by means of hand-sieves or riddles; in this method it is best to place boards alongside the green and to move these gradually across the green as the covering proceeds—the men walk on the boards rather than on the green while using the riddles. Roll when the work is completed.

In any case, care must be exercised to remove all sticks, stones, and other debris. It is a great advantage if, at this point, it is possible to "fallow" the finally prepared green to give weed seeds an opportunity to germinate. As they appear, the soil should be raked to destroy them; and this process may be continued up to the time it is necessary to sow seeds.

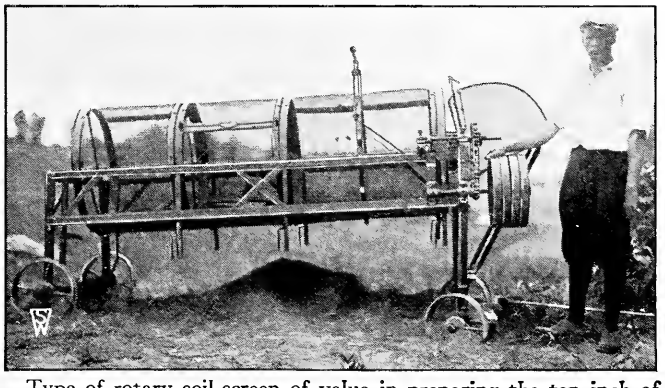
The soil being prepared, and made as weed-free as possible the next thing is to select suitable seed and to sow it. For an average-size green, say 25 yards by 20 yards, on medium to heavy soil it is usual to sow from 30 to 60 pounds of pure "Mixed Bents" (Creeping Bent); on lighter land it is usual to sow 100 pounds or more per green of pure Chewing's Red Fescue of strong vitality, reduced slightly if the seeding is scheduled for the fall; at that time the new crop seed of Chewing's Fescue, showing a high germination, is usually

Applying the fertilizer and preparing and spreading the final inch of screened soil on a putting-green at Brookville.

Note that the rake is reversed for best results when spreading



available. Rather than seeding with only one variety, we prefer the use of mixed seeds, and on average-sized greens on medium to heavy land we recommend 75 to 100 pounds of our Special Putting-Green Bent Formula, and on lighter land the same quantity of Standard Putting-Green Mixture. An established green from a mixture of varieties gives a good turf quickly, one that is more uniform through the year and is less likely to suffer badly from extremes of climate or from attacks of fungous disease. The use of mixtures as against separate varieties has the practical support of many years' experience.



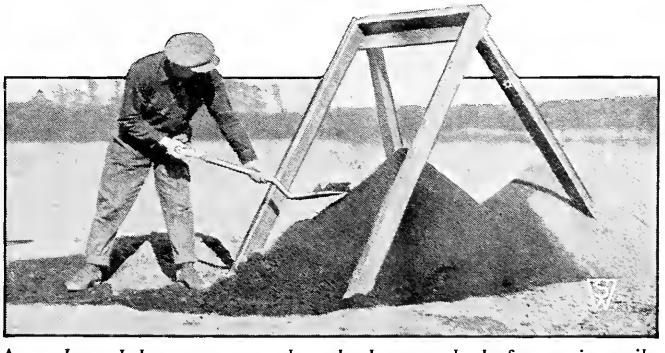
Type of rotary soil-screen of value in preparing the top inch of soil—the germinating layer—for putting-greens. Will screen up to 5 cubic yards per hour; cost is $145, f.o.b. New York.

With present values, to sow a putting-green with straight "Mixed Bents" (Creeping Bent) costs for seed about $100; with straight Red Fescue, about $75; with our Special Putting-Green Bent Formula about $60; and with our Standard Putting-Green Mixture, about $50; so the club's appropriation may have some bearing upon the question.

It is best to sow putting-greens by hand, selecting a day when there is little wind and when the soil is dry. The sower should bend his back well, and he should be a man selected for his careful methods and interest in the job. After scattering the seed, a very light raking to place it *just* under the surface is necessary, and a rolling with a light roller completes the work. Better omit raking, and roll only, if there is any possibility of burying the seed.

By this time the fairways will be ready for attention. The growing cover-crop will be plowed under, so adjusting the plow that the land is thoroughly inverted and the plants covered, but taking care that, with this borne in mind, the plowing is as shallow as possible. Frequently it will be found that one or more lengths of heavy chain attached to the rear of the plow will assist in turning the green plants under. If there is any doubt as to the ability of the soil to carry a turf—the growth of the cover-crop is a very good indication of this, varying degrees of fertility in the soil showing in the luxuriant growth or otherwise of the cover-crop plants—rotted manure or mushroom soil should be spread over the plowed land at the rate of twenty tons per acre. A disc may then be run over the land, but with the plates so adjusted that they cut down into the soil but do not invert it. The disc will then be followed by a smoothing-harrow, run across the necessary number of times to bring the land into fine "tilth." Prior to the last harrowing, 750 pounds per acre of Fairway Fertilizer may be applied; more to those areas which the poorer growth of the cover crop indicates are in need of additional fertilization.

Fairway seed is best sown by means of a wheelbarrow seeder, and a suitable one is listed on page 43. This should be followed by a bush-harrow, an easily made arrangement of branches and twigs held together with light lumber—two or three pieces of 2- by 4-inch boards would be suitable, but arranged so that the lumber does not come into contact with

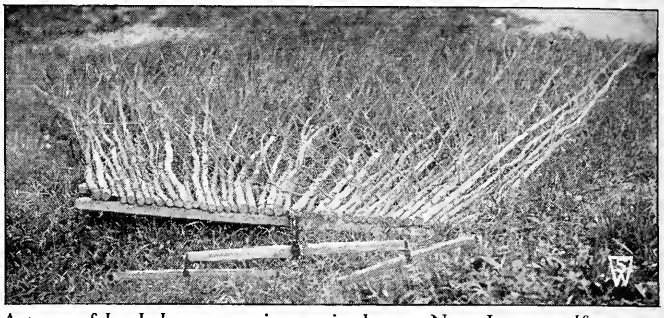


A much-used, but now somewhat obsolete, method of screening soil. Screens cost $8.50 and $9.50 each (two sizes)

the soil. A medium-weight horse roller drawn over the land completes the seeding. We advise using 200 pounds of seed per acre.

The seeding of tees is carried out on the same general principles as seeding greens, except that a coarser, harder-wearing type of grass is sown. To take care of this we offer a Special Mixture of Grass Seeds for Tees. Allow 1 pound to each 200 square feet.

If the foregoing recommendations are followed closely, one should obtain, as nearly as possible, 100 per cent success. Thin patches here and there, and even occasional bare places may occur on the newly seeded land; these should be watched for, and a light top-dressing with mixed seed and soil will take care of most of them. If any particularly stubborn patches are met with, the soil should be removed from them to a depth of 3 inches, fresh soil introduced and the area again top-dressed.



A type of bush harrow as improvised on a New Jersey golf course. Birch branches are used

The After-Care of Newly Seeded Areas

When young grass is an inch high it is a good plan to encourage it by dusting over it lightly some Stumpp & Walter Co.'s Fertilizing Meal. The effect of this is to stimulate the young plants at just the period when they benefit most. Use the material at the rate of 200 pounds per average size green, or on larger areas at the rate of 2,000 pounds per acre.

It is a mistake to delay cutting young grass. Just as soon as it is 1½ inches long, a well-adjusted, well-oiled and thoroughly sharp lawn mower should be run over it. The machine should be so adjusted that at first it no more than "tops" the grass; in two or three days it should be cut again, but with the machine adjusted a shade lower, and in this manner the grass should gradually be brought down to the required height.

Young grass is greatly benefited by frequent rollings with *light* rollers, taking care always that it is rolled only when the land is in a dry condition.

The Renovation of Putting-Greens

The usual procedure in the case of a green that has not carried well over the winter, or one that is worn after a season's hard wear, is as follows:

(1) Cut the grass as closely as your machines will cut it.

(2) Rake the green thoroughly in several directions. This opens up the soil, aërates it, tears out a good deal of the clover and other weeds, and generally cleans the turf. Iron rakes are used, and preferably those the teeth of which have been specially sharpened. We furnish a rake of this description at $1.50 each, up (see page 38). The ultimate success of the work depends very largely upon the thoroughness with which this raking is undertaken, and it may be understood that—within reason—the worse the green looks after this raking the better it will eventually be.

In construction work a deal of stump-pulling is often necessary; above shows the type of stump that the "K" hand stump-pulling outfit took care of at Canoebrook, N. J. Stumpp & Walter Co.'s seeds were used on this course.

(3) Apply 2 cubic yards of screened compost to a green 25 yards by 20 yards, mixed with 100 pounds of a good chemical dressing, such as Stumpp & Walter Co.'s Emerald Grass Fertilizer. This is assuming that the club is in possession of a compost heap, as suggested on page 24. If compost is not available, use the above quantity of sharp sand or of screened top-soil obtained from a source that is known to be comparatively free of weed seeds. The Emerald Grass Fertilizer should be mixed with the sand or top-soil.

(4) Rub this mixture into the turf with the backs of rakes.

(5) Sow from 20 to 50 pounds per green of suitable grass seeds.

(6) Rake the turf lightly to cover the seed that has just been sown, and roll.

Approximate cost per green for materials, $35.

Very often we find greens that feel very hard to the feet; frequently they stand on soil of a tenacious character, and often their condition is due to excessive rolling, or rolling when the soil was too wet. We describe such a green as "hide-bound."

To correct this condition, the above mixture of compost and fertilizer may be used, but an even better scheme is to substitute for the compost two bales of prepared Golf Fiber, mix with it the fertilizer, and apply to the green and to the approach; then run a *spike roller* over the turf in several directions until the soil is well perforated, and use brushes or rakes to distribute to and fro the mixture until it has finally

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BEST ON EARTH

Stumpp & Walter Co.

SEED AND BULB GROWERS
AND IMPORTERS

30-32 BARCLAY STREET,
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WILLIAM A. SPERLING, SECRETARY
THOMAS KEARNEY, ASS'T. TREAS

AGENTS FOR
ÉTABLISSEMENT
STUMPP & WALTER CO.
SOCIÉTÉ ANONYME.
25 RUE ROYALE
PARIS

TO THE READER

We invite your criticisms of "Golf Turf" and we would appreciate all suggestions you can offer towards making future editions of increased service to our golfing friends.

If "Golf Turf" interests you it will interest your associates. May we ask you to favor us with the addresses of your friends to whom you would like us to mail a copy? Please enter in the space below.

NAME	POST OFFICE	STATE

Use reverse side for additional names.

disappeared down the perforations. For exceptionally severe cases of "hide-bound" greens, lift the sod with hand-forks—we offer them specially prepared for this work at $3 each. The method is to insert the fork about 4 inches deep and to bear down upon it until the sod is seen to lift about an inch; the fork is then withdrawn and reinserted 4 inches back and again 4 inches deep, bearing upon it as before. This is, of course, a big job, but not so big as it looks; a good man should easily hand-fork a green in a day.

After hand-forking it is necessary that the green be brushed thoroughly, so that the prepared Golf Fibre and fertilizer is well worked in; then it must be rolled and made as "true" as it was before in order that the lawn mowers do not injure the turf.

Renovating Fairways

On a typical fairway that needs attention, methods such as the following are usually attended by successful results, though it should be remembered that circumstances may cause modifications:

(1) During April, May, August, or September cut the grass as closely as possible.

(2) Apply the following per acre:

10 loads or more of mushroom soil and 500 pounds of Stumpp & Walter Co.'s Fair-Green Fertilizer.

(3) Harrow and cross-harrow, using a machine of the sharp-tooth type.

(4) Sow per acre 50 to 100 pounds of Stumpp & Walter Co.'s Fair-Green Mixture of Seeds, regulating the quantity of seed to the quality of the turf already there. In other words, use 50 pounds per acre where the turf is good and the full 100 pounds per acre where the turf is thin and poor.

(5) Drag over the fairways a bush harrow, as described on page 4.

(6) Roll.

Approximate cost of materials per acre, $135.

MODIFICATIONS: On a soil already supplied with an excess of humic material, ten loads or more of sand or of sandy soil should be substituted for the mushroom soil. Again, on a soil showing signs of acidity, the above process may be carried out, generally using sand instead of mushroom soil, and preceding the whole dressing by one of pulverized limestone. Use from 1,000 to 3,000 pounds per acre of pulverized limestone and allow two weeks to elapse after applying the limestone and before commencing to renovate. The usual indications of a soil's need for an application of limestone are discussed in a later section. We also draw attention to the information given in tabular form between pages 24 and 25.

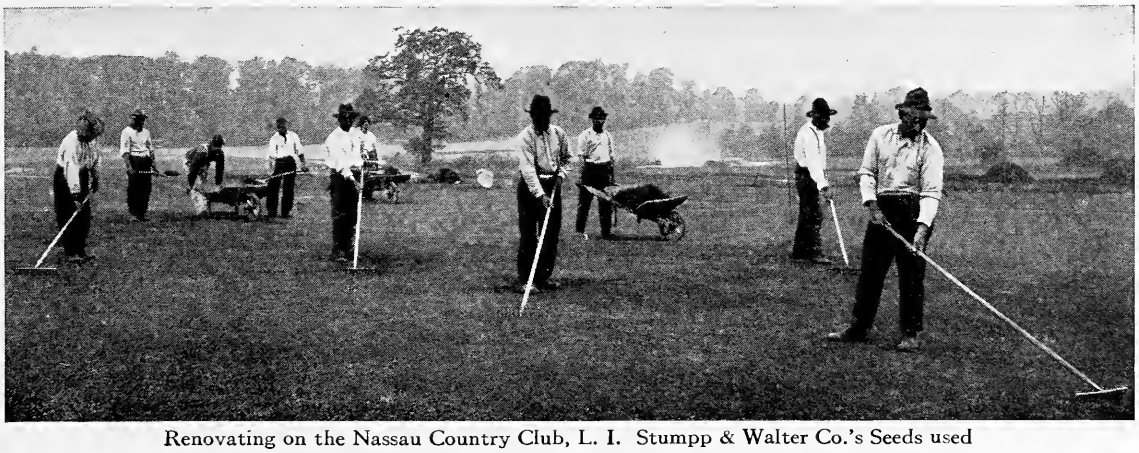
Renovating Tees

The renovation of tees may well be carried out along the same lines as that of greens: as a matter of fact, it is a simple matter, when mixing top-dressing materials for the greens to prepare an extra load to use on the adjacent tee.

Tees are often neglected, but it should be remembered that they need even more care than greens, because the wear is so much greater and frequently there is no provision made for watering them.

Tees should be inspected at the end of each day's play by the greens staff, and all divots should be filled with screened soil; then spread a ¼-inch layer of mixed soil and Stumpp & Walter Co.'s Divot Formula seeds, using 2½ pounds of the seeds to a pailful of soil. This mixture is a double formula one; it consists, first of all, of fine, strong-wearing, permanent grasses, and then, secondly, of plants not grasses, but the quickest-growing subjects of a temporary nature that we know. These plants do not last—they disappear in a week or so under cutting—but they convert divots into plant-covered spots, similar in color to the surrounding turf, in two to three days, and when the grasses are established the temporary plants disappear.

A turf nursery, specially sown down with grass seeds suitable for tees, is of great value. When the grass on a particular section is damaged to the extent that it is bare, cut out the turfs and re-sod, changing the teeing marks to another section of the tee to enable the patched portion to heal. It is a great advantage to have tees sufficiently large to take care of this: the modern tendency in course-designing is to provide for large tees. We offer seeds for tees on page 9.



Renovating on the Nassau Country Club, L. I. Stumpp & Walter Co.'s Seeds used

The Grasses Used on Lawns in the Northern United States

There need be no mystery in the question of varieties of grass suitable for fine turf. It is unfortunate that the few plants which are suitable for forming a turf possess very high-sounding botanical names. Further, the several botanists who have given the matter attention in the past have found it necessary to rename varieties, thus adding to the difficulties. Is there anything more likely to make confusion worse confounded than to find that the fine-leaved variety of Sheep's Fescue, for example, has among other scientific names the following: *Festuca ovina angustifolia, Festuca capillata, Festuca tenuifolia?* There is little excuse and little need for a golfer to worry about botanical names, but in order that the reader may have them for reference we include them in the tabulated notes on the following pages. We always suggest that the common English name is preferable.

Of those grasses suitable for the formation of the best turf in the northern states, a rough division may be made into sorts which possess fine but flat leaves and those with fine but needle-shaped leaves. The flat-leaved grasses include the Bents, the Blue Grasses, the Rye Grasses, and some of the Fescues. The needle-shaped varieties comprise most of the Fescues.

The Bents

In the order of their fineness and their value for lawn courses, the Bents may be listed as follows:

Velvet Bent, Carpet Bent, Creeping Bent, Rhode Island Bent, Colonial Bent or Brown-Top, and Red-Top.

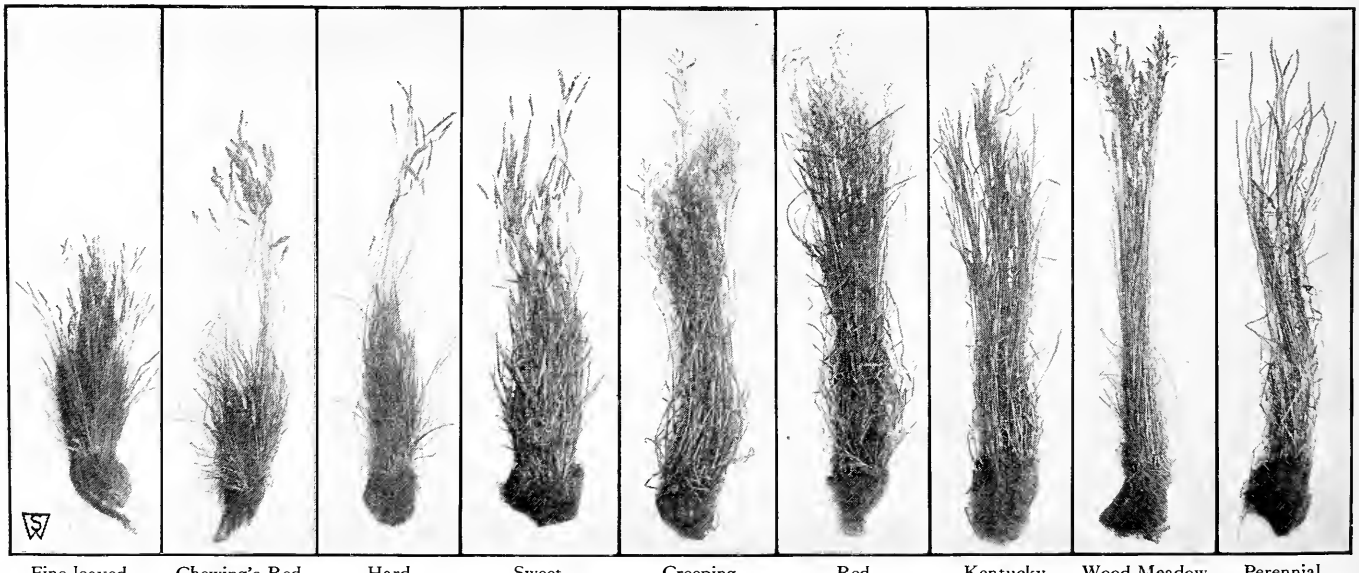
Velvet Bent. This comprises a very desirable portion of the best samples of seed sold under the name of "Creeping Bent." It is not procurable alone, but always in mixture with Creeping Bent, Rhode Island Bent, and Red-Top.

Carpet Bent. This is also contained in "Creeping Bent" and, as its name implies, it furnishes a fine carpet-like turf when established on a putting-green. Velvet Bent and Carpet Bent are of a beautiful fresh green color and they creep but slowly. It is not possible to segregate the seeds of these two varieties, and they are only obtainable as components of "Creeping Bent."

Creeping Bent. As known commercially, seeds of this would be more correctly labeled "Mixed Bents." Creeping Bent is a name that has been given, for a number of years, to a *mixture* of Bents collected in limited quantities in a few districts in southern Germany. It consists of true Creeping Bent combined with Rhode Island Bent, Carpet Bent, Velvet Bent, and Red Top. "Mixed Bents," when established give a turf of wonderful fineness on almost all soils. They are used very largely for putting-greens, both alone and in mixture with other grasses, particularly Red Fescue. There is but one thing which limits their use, and that is their cost. Were it not for their very high price, they would be suitable also for fair-greens and general lawns.

Rhode Island Bent. A variety which is found growing in a few isolated sections in New England. It is almost as fine as Velvet Bent, but it does not creep. As collected at the present time, we find it quite impossible to obtain it in any reasonable degree of purity or with anything but very moderate vitality. Fortunately, exactly the same plant, botanically, is produced commercially in other parts of the world, and is offered by us under the name of "Colonial Bent."

Colonial Bent. This is the Rhode Island Bent of New England, but is collected elsewhere, and has a far higher purity and a much greater germinating power than native Rhode Island Bent. It produces a turf of wonderful fineness, and for putting-greens and fine lawns there is but one grass which is better, and that is Creeping Bent. A description of Rhode Island Bent, and its authoritative identification with Colonial Bent will be found in Bulletin No. 692 of the U. S. Department of Agriculture entitled "The Agricultural Species of Bent Grasses."



Fine-leaved Sheep's Fescue | Chewing's Red Fescue | Hard Fescue | Sweet Vernal | Creeping Bent | Red Top | Kentucky Blue Grass | Wood Meadow Grass | Perennial Rye Grass

SOME GRASS FLOWER-HEADS AS GROWN ON THE STUMPP & WALTER TRIAL GROUNDS

Red-Top. One of the best-known and largest-used grasses in America today. It is very valuable as an ingredient in most lawn mixtures on account chiefly of its very quick growth, and it may be used liberally, because it is one of the least expensive grasses we have. When Creeping Bent, and Colonial Bent are obtainable, and when a club's appropriation will permit of their purchase, we do not recommend Red-Top for putting-green mixtures in excessive quantity. But when these imported varieties cannot be used, Red-Top of a superfine grade is the only grass to take their place. Putting-greens need a comparatively small quantity of seed, and the imported Bents are urged instead of Red-Top where possible; the ultimate result in satisfaction will far outweigh the slight additional cost where Creeping Bent or Colonial Bent is used.

In our opinion the Bents are best sown in conjunction with other types. All the Bents or Agrostis varieties are at their "peak" just as the summer begins to wane, a point which it is well to take into consideration if maximum results are preferred, as they generally are, during the whole season. This is one of the reasons why we generally do not recommend a seeding to be made with only one kind of grass. Another reason is that the conditions of temperature, of rainfall, and of soil vary from year to year. Some conditions are more favorable to certain varieties of grass than others. It is, therefore, always an *insurance* if a *mixture* containing several varieties of seed be sown.

The Blue Grasses

Kentucky Blue Grass. Another of the most satisfactory grasses and very widely used for all lawn purposes in the northeastern states. Very desirable as a golf fairway grass, particularly on medium to heavy soils that have been limed or which stand on a limestone foundation. Kentucky Blue is of fine color but it is somewhat slow to germinate. It is not, however, considered suitable for putting-greens, except, perhaps, in those sections of the country where the soil is particularly favorable.

Annual Meadow Grass (*Poa annua*). A widely distributed weed grass frequently found in putting-greens. It is a dwarf plant, readily distinguishable on account of its light green color and the fact that it may be found in flower practically during the entire season. To eradicate it when in small patches, use a hole-cutter to take out the patches and replace them with good turf. When firmly established it is a good plan to withhold any dressings of lime or fertilizer containing lime, such as bone meal; to fertilize every few weeks during the growing season with Stumpp & Walter Co.'s Anti-Clover manure, sheep manure, sulphate of ammonia, nitrate of soda, or other materials which will have the effect of making the soil slightly acid. Seed of the Annual Meadow Grass is not obtainable.

Canadian Blue Grass. Somewhat similar to Kentucky Blue Grass but is of a less pleasing color. It is a trifle coarser, and is generally regarded as a cheaper substitute for Kentucky Blue Grass.

Rough-stalked Meadow Grass. A desirable ingredient in mixtures, both for fairways and putting-greens *under shade.*

We are prepared to advise personally with you on your turf difficulties, a service which has been a feature of our business for the past ten years

The Fescues

Red Fescue. This grass is procured both from Europe and Australasia, the latter being known commercially as "Chewing's Fescue." It makes a delightful mat-like turf of a pleasing deep green, almost brownish green, color. The leaves are very fine, needle-like, and bristly. Red Fescue makes excellent putting-greens, fairways, and lawns, suits almost all soils, including those of a light and sandy nature, and does remarkably well in shade. Experience seems to show that Chewing's New Zealand seed is preferable for golf-courses, to that of European origin. Red Fescue loses its vitality very quickly, and samples germinating over 50 per cent in the spring are rare. The new season's crop usually arrives from New Zealand during July; this "Newcrop" seed should be specified in all fall seedings, when a good germination and, in consequence, a good "catch" will be assured.

Hard Fescue, Sheep's Fescue, Fine-leaved Fescue, and **Various-leaved Fescue.** These are suitable for golf courses, especially on the fairway. Various-leaved Fescue has both needle-like and flattened leaves, while all the others have needle-like foliage. All have a tendency to "tussock" and give "cuppy" lies in consequence, and they should therefore be sown only in conjunction with other grasses. All are ideal as a covering for bunkers.

English Rye Grass (Pacey's) and Meadow Fescue are sometimes included in mixtures for fairways and for lawns where *quick results* are essential. They are a trifle coarse but they are not permanent: they generously disappear after the slower Fescues and Bents are established.

Following are grasses in commerce which generally are unsuitable for fine turf in the northern states unless perhaps for the "rough." Some are considered useless for any purpose by the Department of Agriculture at Washington (those marked*).

Timothy
Orchard Grass
Tall Oat Grass
Foxtail
Sweet Vernal
*Crested Dog's-tail
ItalianRyeGrass (Used largely for winter greens in the South)
Tall Fescue
*Wood Meadow Grass

No. 3 Green, Corry Country Club.
Stumpp & Walter Co.'s Seeds used

Seed Samples

We prepare samples in glass vials for permanent reference of those grasses which are in general demand for golf-course purposes. It will be a pleasure to send one of these sets to the chairman of your green committee on request.

The Stumpp & Walter Position

We do not design golf courses. Our policy is to **sell** the choicest, cleanest seeds it is possible to produce, and we offer them at moderate prices with a knowledge of the purpose for which they are intended, and to **give** the best and most complete service we can.

Our Advisory Service

Inspection. An experienced representative, with both practical and scientific training, in coöperation with the chairman of your green committee and your greenkeeper, makes a careful survey and record of your turf conditions. Usually we can make this survey without cost to you, though it may be necessary to arrange beforehand a nominal fee to cover travelling cost.

Recommendations. We later specify, in a detailed written report, the correct practice that should be followed.

Checking. Following the acceptance of our recommendations, we make a periodical inspection to satisfy you that the work is being carried out satisfactorily.

Advice by Mail. It is our practice to give the most complete attention to queries which reach us by mail, and we welcome correspondence.

Our Construction Staff

We are prepared to furnish the services of expert foremen to assist your own staff in construction and renovation projects, on a weekly salary basis. Details on request.

NOTE.—Our efforts are confined to the production of turf and to the carrying out of your golf architect's structural plans—we do not design courses.

On the greens at New Saranac Inn, a delightful eighteen-hole course in the heart of the Adirondack Mountains. Stumpp & Walter Co.'s seeds used.

Crops Recommended for Green Manuring

Seeds broadcasted thickly and the crop plowed under the land, there to decay and add humic material and fertilizing elements to it.

	Quantity when sown alone		Price subject to market change			
For early spring seeding before frosts are entirely over.	100 sq. yds.	Acre		Lb.	10 lbs.	100 lbs.
***Spring Vetch**	2 lbs.	100 lbs.		$0 15	$1 25	$10 00
			Qt.	Pk.	Bus.	10 bus.
***Canada Field-Peas**	2 qts.	3 bus.	$0 20	$1 15	$4 00	$35 00
Spring Rye	1½ qts.	2 bus.	20	1 00	3 50	32 50
For seeding after settled warm weather has commenced. Frost kills these varieties.						
***Soy Beans, Mammoth Yellow**	1½ qts.	2 bus.	30	1 00	3 75	36 50
***Soy Beans, Ito San**	1½ qts.	2 bus.	20	1 15	3 50	32 50
***Cowpeas, New Era**	1½ qts.	2 bus.	25	1 00	3 75	36 50
***Cowpeas, Whippoorwill**	1½ qts.	2 bus.	25	1 25	4 00	37 50
Japanese Buckwheat	3 qts.	4 bus.	20	75	2 50	22 50
For seeding during the summer and fall. These stand frost; they are frequently sown to remain until the spring, to be plowed under then.						
Winter Rye	1½ qts.	2 bus.	20	1 00	3 50	32 50
Winter Wheat	1½ qts.	2 bus.	20	1 00	3 50	32 50
				Lb.	10 lbs.	100 lbs.
***Winter** or **Hairy Vetch**	2 lbs.	100 lbs.		$0 25	$2 25	$20 00

It is desirable to sow combinations of the above. When mixed together the stated quantities per acre should be reduced in proportion.

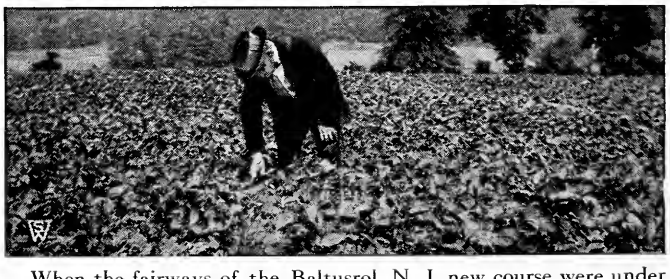
Varieties marked * are legumes, and are of additional value on account of the nitrates which are added to the soil by the colonies of bacteria found in the nodules on the roots of leguminous plants.

1923 Supply of Grass Seeds

Again we have a period when values of many commodities show a recession, when with regret we have to announce an increase in price of many varieties of choice grass seeds. The conditions of the last few years are unprecedented, and may be laid to a variety of causes.

In spite of difficult conditions we are again in a position to offer choice samples of remarkably high purity and of the strongest vitality; these represent real values, the purchase of which is true economy. In a period of scarcity it is necessary to exercise the greatest caution in regard to seed quality.

We are prepared to advise personally with you on your turf difficulties, a service which has been a feature of our business for ten years



When the fairways of the Baltusrol, N. J. new course were under preparation, soy beans were sown for a plow-in crop. Stumpp & Walter Co.'s seeds were sown on this course.

Grass Seed Mixtures

Shipped charges prepaid when cash accompanies order

FOR GOLF

	Weight per bushel lbs.	Lb.	5 lbs.	25 lbs.	100 lbs
SPECIAL PUTTING-GREEN BENT FORMULA. Recommended for well-prepared, rich soils. Mixed Bent, containing Velvet Bent and Carpet Bent, formerly widely sold under the name of "Creeping Bent," is exceedingly scarce and high-priced. It is sometimes desirable to sow a mixture containing an increased proportion of this grass.	25	$0 90	$4 25	$20 00	$75 00
STANDARD PUTTING-GREEN MIXTURE. Recommended for light, dry soils. This is composed of Mixed Bent (genuine German Creeping Bent) fancy recleaned Red Top, and Chewing's New Zealand Red Fescue—all of high purity and strong vitality. The formula we use is a thoroughly proved one, well balanced and absolutely reliable.	25	75	3 50	16 00	60 00
FAIR-GREEN MIXTURE. The variety of Grass that grows naturally on the particular soil should form the basis of a Fair-Green formula. For limited seedings, our standard formula is good, and we know it will give satisfaction; it is well balanced, and the Grasses of which it is composed will give an even, tough, and lasting turf. **Superfine Quality.**	25	55	2 50	11 75	45 00
Fine Quality	20	40	1 75	8 00	30 00
SPECIAL MIXTURE FOR TEES. Our formula includes only those varieties which will stand rough usage and recuperate quickly after excessive wear	25	60	2 75	12 75	50 00
SPECIAL "ROUGH" FORMULA. Consists of the taller-growing hardy perennial grasses in combination with gorse, yarrow, and other plants suitable for the purpose and least likely to give serious trouble as weeds should their seed be carried by the wind and other agencies on to your greens or fairways	22	50	2 25	10 00	35 00
MIXED FESCUES FOR BUNKERS. A mixture of Red, Hard, Dwarf, Fine-leaved, Various-leaved, and Tall Fescues. Excellent for mounds, bunkers, and exposed sand	22	90	4 25	20 00	75 00
SPECIAL DIVOT FORMULA. Always keep a bag in stock. A mixture consisting of (*a*) seeds of fine, strong wearing, *permanent* grasses suitable for fairways and tees, with (*b*) seeds of the quickest growing plants we know that are of a *temporary* nature. The temporary plants grow immediately, and in a day or two you cannot locate the divot; in the course of a few weeks, with cutting, the temporary plants disappear, leaving the permanent grasses, now established, in full possession of the soil	25	60	2 75	12 75	50 00
SPECIAL MIXTURE OF GRASS SEEDS FOR HOT, DRY SOILS. Recommended chiefly for sowing in the fall to renovate both greens and fairways that have suffered from the effects of summer heat and drought	22	1 00	4 75	23 00	90 00

FOR POLO

HURLINGHAM FORMULA. For fine, uniform, hard-wearing, and quickly recuperating turf we find that the formula of grass seeds as long used at the famous English field at Hurlingham gives the utmost satisfaction in this country. The grasses used are of the best superfine quality, of the highest purity and strongest vitality	25	60	2 75	12 75	50 00

FOR TENNIS

	Weight per bushel lbs.	Qt.	4 qts.	8 qts.	Bus.	10 bus.
FOR TENNIS. West Side Formula. The turf required for lawn tennis must be firm and yet elastic, and composed of grasses which can be mowed close and kept exceedingly dwarf. This mixture is composed of the best-known, fine-leaved, deep-rooting grasses, properly proportioned so as to give an even playing surface throughout the year	25	$0 50	$1 75	$3 25	$12 00	$115 00

FOR LAWNS

STAIGREEN. The best lawn seed on earth—for carpet-like turf. The varieties are carefully proportioned so that they will succeed one another in brightness of foliage, with the result that the lawn, even in its first year, will have a bright, rich green color from early spring until covered by snow	25	Lb. $0 60	5 lbs. $2 75	25 lbs. $12 00	100 lbs. $47 50	. . .
SHADY PLACE LAWN SEED. By using the correct seed varieties it is generally not at all difficult to obtain a good turf under trees. In particularly stubborn cases, where the shade is very dense, it is desirable to add lime every fall, dig lightly every spring, apply Pulverized Sheep Manure, rake and sow Shady Place Lawn Seed	20	Qt. $0 50	4 qts. $1 75	8 qts. $3 25	Bus. $12 00	115 00
SOUTHERN LAWN SEED. From central Virginia south the ordinary northern grasses will not thrive permanently, and good results are not likely to follow the use of the customary mixtures. As a result of an intimate knowledge of southern conditions we offer a special formula which we find is highly satisfactory. We advise that two seedings be made, one in spring and one in fall.	20	45	1 50	2 50	9 50	90 00
SEASHORE LAWN SEED. The varieties of which this mixture is composed are selected for their deep rooting qualities, resistance to salt spray and high winds. Recommended for situations on the ocean front where difficulty has been experienced in getting a lawn with the usual grass seeds	22	40	1 25	2 25	8 50	80 00
TERRACE SOD LAWN SEED. For Terraces, Hillsides and Embankments. A special mixture of grasses best suited for sowing on terraces and side-hills, and produces a rich, green turf throughout the season	20	50	1 75	3 25	12 00	115 00
HIGH-GRADE LAWN SEED. For parks and other large areas. The grasses of which it is composed are well selected, clean, and of high vitality. We recommend this mixture for those cases where low initial cost is of more importance than extreme fineness of turf	22	40	1 25	2 25	7 50	70 00

QUANTITY OF SEEDS TO ORDER

Golf: Putting-green 100 lbs., fairway 200 lbs. per acre, average tee 25 lbs.
Polo: 200 lbs. per acre.
Tennis: 1 to 2 bushels per court.
House lawns: 1 lb. per 400 square feet or 100 lbs. per acre; 2 qts. per 400 square feet or 4 bushels per acre.
If turf is needed in shortest possible time, multiply by 2. When repairing turf, divide by 2. One pound of seed measures approximately 1⅓ quarts; one quart weighs about ¾ pound.

GRASS SEEDS

OF KNOWN PURITY AND PROVED VITALITY

The Grass Seed problem, whether applied to the golf course or lawn, is one that can be rightly solved only when the grower fully takes into consideration four essential details: SEED, SOIL, LOCATION, and CLIMATE. Our Mixtures, as offered on page 9, are prepared with a thorough knowledge of the grasses indigenous to most soils within 1,000 miles of New York. Advice regarding mixtures for special locations freely given on request. We will gladly furnish certificates showing the purity and vitality of any of the following varieties:

GENERAL LIST OF GRASSES

*The "Ligule" is a small membranous lip found on the inside of the leaf at a point where the leaf and stem part company. If a grass shoot be cut across with a knife, the leaves will be found folded flat with some varieties and rolled in others. The ligule and the manner of folding are important means whereby varieties may be distinguished.

†Indicates desirability of using mixtures rather that one variety for turf. ‡Dwarf habit indicates suitability of a variety for turf.

Variety	Description* Enables you to distinguish varieties in your turf	Period of Maximum Development †	Use	Soil Suitable	Height Ins. if Uncut ‡	Weight Per Bushel	Price Lb.	Price 10 lbs.	Price 100 lbs.
AGROSTIS VARIETIES OR BENTS									
Creeping Bent (*Agrostis species;* Fiorin; Mixed Bents).	"Creeping Bent," a name used for many years for seed collected in Central Europe; and consisting of a mixture of *A. vulgaris, A. canina, A. palustris.*	Early fall	Makes velvet-like, thick, beautiful, soft putting-greens and lawns; used largely in conjunction with Red Fescue.	All; especially moist land.	12				
			Superfine Quality			24	$3 00	$27 50	$250 00
			Fine Quality			16	2 75	25 00	225 00
Colonial Bent (*A. tenuis; A. vulgaris; A. canina;* Rhode Island Bent).	Blades very narrow, flat. Slightly creeping. Forms a brownish green velvety turf. Leaves are rolled in the bud.	Early fall	Splendid for putting-greens and fine lawns. Identical with Rhode Island Bent.	All soils.					
			Superfine Quality		18	24	2 75	25 00	225 00
			Fine Quality		18	18	2 50	22 50	200 00
Red Top (*A. palustris; A. alba*).	Leaf-blades narrow, becoming very narrow with turf cultivation; plants slightly creeping. The young leaves are rolled in the bud. Prominent ligule.	Early fall	Valuable for fair-greens and tees, but Creeping and Colonial Bent being finer and more permanent are recommended for putting-greens. Splendid for hay and pasture fields.	All soils.	18				
			Superfine Quality			36	40	3 75	35 00
			Recleaned Quality			32	35	3 25	30 00
			Ordinary Good Commercial Quality (unhulled)			18	25	2 25	20 00
POA VARIETIES OR MEADOW GRASSES									
Canadian Blue Grass (*Poa compressa*).	Leaf-blades narrow, flat; plants slightly creeping; stems flattened; color gray-green.	Early summer	Valuable for tees and fairways; not much used for greens, Kentucky Blue Grass being more recommended. Good bottom grass.	All; clays and those with lime.	12	18	$0 40	$3 50	$32 50
Kentucky Blue Grass (*P. pratensis;* June Grass).	Leaf-blades very narrow, flat; plants slightly creeping. Deep vivid green. More effective the second year than the first. Ligule short and thick. The young leaves are folded in the bud.	Early summer	Ideal ingredient in fairway mixtures; frequently used for putting-greens. Largely employed for lawns; makes the best, sweetest, and most nutritious pasture.	All; particularly those containing lime.	12				
			Superfine Quality			27	65	6 50	55 00
			Fine Quality			21	50	4 50	40 00
Rough-stalked Meadow Grass (*P. trivialis*).	Leaf-blades narrow, flat; plants not creeping. The young leaves are folded in the bud. Lower surfaces of leaves glossy.	Early summer	Suited for putting-greens, fairways or lawns under trees. Quite the best grass for shaded situations. Makes an exquisite turf.	All soils, including sandy.	12	26	1 00	9 00	80 00
Wood Meadow Grass (*P. nemoralis*).	Leaf blades narrow, flat. Medium dark green. The young leaves folded in the bud. Leaf joints black.	Late spring	Of limited use in America; cannot be traced as permanently adapted to our climatic conditions.	All of medium texture.	12	20	1 25	12 00	110 00
FESTUCA VARIETIES OR FESCUES									
Hard Fescue (*Festuca duriuscula*).	Leaves wire-like and stiff, not flat; plants tend to grow in tufts.	Late spring	Must be carefully balanced when in golf mixtures, otherwise may give "cuppy" lies.	Sandy, thin, dry soils	12	20	$0 55	$5 25	$50 00
Red Fescue (*F. rubra;* Creeping Fescue). **Chewing's, N. Z.**	Leaves wire-like and stiff, not flat; plants have a tendency to creep, but frequently form tufts. Base of shoot reddish.	Summer	Excellent for putting-greens, tees, and fairways; also hay- and pasture-fields. Gives fair results under trees. Sometimes attacked by fungus.	Satisfactory on dry, poor land.	12	27	85	8 00	75 00
Red Fescue, European.					12	27	85	8 00	70 00

GENERAL LIST OF GRASSES, continued

Variety	Description* Enables you to distinguish varieties in your turf	Period of Maximum Development†	Use	Soil Suitable	Height Ins. if Uncut ‡	Weight Per Bushel	Price Lb.	Price 10 lbs.	Price 100 lbs.
FESTUCA VARIETIES OR FESCUES, continued									
Sheep's Fescue (*F. ovina;* English Fescue.)	Leaves wire-like and stiff, not flat. Ligule reduced to short ears.	Late spring	Occasionally used on putting-greens, although the fine-leaved variety is preferable. Excellent for fairways and tees.	Any except wet land.	12	16	$0 60	$5 50	$52 50
Fine-leaved Sheep's Fescue (*F. ovina angustifolia; F. capillata; F. tenuifolia*).	Leaves wire-like and stiff, not flat; very fine. Color a beautiful dark green.	Late spring	Used on putting-greens and tees. Gives fair results where situation is shaded.	Any dry soil.	12	22	1 20	11 00	100 00
Various - leaved Fescue (*F. heterophylla*).	Bottom leaves are bristly; upper leaves flat. Fine dark green. Plants of a tufted habit, though slightly creeping.	Late spring	Used to a limited extent on tees and fairways; also of value as an ingredient in hay and pasture mixtures.	Light soils, rich in humus.	15	15	1 15	10 00	90 00
Meadow Fescue (*F. pratensis*).	Leaves very broad and flat. Base of leaf-sheaths red. The young leaves are rolled in the bud.	Summer	Useful to the golfer only for the "rough." Gives an abundance of fodder as a hay or pasture grass.	Any soil unless water-logged.	36	27	30	2 50	22 50
Tall Fescue (*F. elatior*).	Leaves medium broad and flat.	Summer	Of interest to the golfer for bunkers or the "rough." Excellent for hay and pasture.	Any.	48	22	45	4 25	40 00
LOLIUM VARIETIES OR RYE GRASSES									
English Rye Grass (*L. perenne*).	Leaves narrow and flat, smooth and shining; leaf-bases red. Usually lives three years. The young leaves are folded in the bud.	Summer	A rapid grower and of value as a "nurse grass" under some conditions; particularly useful where a fairway is needed quickly; valuable for hay and pasture.	Medium soil well supplied with moisture.	24	28	$0 30	$2 50	$22 00
Pacey's Perennial Rye Grass (*L. perenne Pacey*).	A smaller - seeded, finer - leaved, smaller plant than the above.	Summer	Superior to the above for turf purpose; claimed to be more resistant to cold.	As above.	24	30	30	2 75	24 00
Italian Rye Grass (*L. Italicum; L. multiflorum*).	An annual grass with a tendency to grow in tufts; tall; broad, flat leaves. Biennial. Base of sheaths red. The young leaves are rolled in the bud.	Early summer	In the North occasionally valuable as a "nurse grass." Being hardy and quick, it protects more delicate slower sorts; disappears after one year. In the South makes excellent winter turf, following Bermuda Grass.	Medium soil well supplied with moisture.	36	22	30	2 50	22 00
SUNDRY VARIETIES									
Bermuda Grass (*Cynodon dactylon; Capriola dactylon*, Scutch Grass).	A medium broad-leaved grass, strongly creeping. Does not survive winter north of Pennsylvania.	Early fall	Valuable in the South for putting-greens, fair-greens, and lawns; also for pastures and hay-fields. Binds sand.	All soils.	12	36	$0 50	$4 75	$45 00
Crested Dog's-tail (*Cynosurus cristatus*).	Leaves narrow and flat. Tends to grow in tufts. The young leaves are folded in the bud. Base of leaf-sheaths yellow.	Early summer	Of limited usefulness in this country, except as an occasional ingredient in tee and fair-green mixtures.	Hard, dry loams.	24	30	70	6 50	60 00
Sweet Vernal (*Anthoxanthum odoratum*).	Narrow, flat leaves. The young leaves are rolled in the bud; leaf-sheaths hairy.	Late spring	Very fragrant when drying. Occasionally used in mixtures of seeds for hay-fields.	All soils.	18	10	1 50	13 00	120 00
Meadow Foxtail (*Alopecurus pratensis*).	Medium broad, flat leaves. Flower-heads resemble timothy. Base of leaf-sheaths violet. The young leaves are rolled in the bud.	Late spring	Useful to the golfer only for bunkers and the "rough." As a field-grass gives large yields early.	All soils.	36	10	95	9 00	85 00
Tall Oat Grass (*Avena elatior, Arrhenatherum elatius;* False Oat Grass).	Very broad leaves; plant has the appearance of a slender, small oat.	Early summer	Useful to the golfer only for the "rough" or for bunkers. Valuable for hay and pasture.	All soils.	48	14	60	5 50	50 00
Orchard Grass (*Dactylis glomerata;* Cocksfoot).	Large plant, bluish green in color, with flattened leaf-bases. Ligule prominent. The young leaves are folded in the bud.	Late spring	Interests the golfer only for the "rough." Widely used for hay and pasture, for which purposes it is of additional value in that it thrives under trees.	All soils.	48	14	35	3 00	25 00
Timothy (*Phleum pratense;* Herd's Grass; Cat's Tail).	Very broad leaves; coarse, vigorous plant. Base of stem bulbous. Ligule small, pointed. Young leaves rolled in the bud.	Summer	Useful to the golfer for the "rough." The most important American grass for hay and pasture.	Rich land.	36	45	20	1 75	15 00

Sundry Seeds for Golf Courses and Lawns

We do not include White Clover in our mixtures for putting-greens, fairways, tees, tennis-courts, polo fields, nor in our best mixtures for house lawns.

We include Clover only in our lowest-priced mixture, which we call "High Grade Lawn Seed," because Clover is generally omitted nowadays in the finest lawns. For the convenience of our customers who wish it, we offer

SUPERFINE WHITE CLOVER. Oz. 10 cts., ¼lb. 25 cts., lb. 90 cts., 10 lbs. $8, bus. (60 lbs.) $45, 100 lbs. $75. Mixed with grass seeds the usual allowance of Clover is 5 per cent.

YARROW (*Achillea millefolium*). A deep-rooting, drought-resisting plant with delicate, fern-like leaves, sometimes used on tees or putting-greens. May be sown alone (when one pound is sufficient for a plot of ground 40 by 40 feet) or in combination with grass seeds. **Lb. $2.50.**

GORSE, or FURZE (*Ulex Europæus*). This shrub makes British courses bright with its yellow blossoms in the spring. It is a slow grower and it will be some years before it will be effective. Broadcast ten pounds per acre over the "rough" and harrow in. Not recommended for the extreme North. **Lb. $1.50.**

The Eradication of Clover from Turf

Of the several varieties of clover in commerce, there is but one which is of sufficiently dwarf habit to enable it to live under the constant cutting and rolling of a lawn and this is white Dutch clover. Until recent years it has always been a custom to include this white Dutch clover in any mixture of seeds, the reason being that the plants grow very speedily and root very deeply. In consequence, a turf is very quickly obtained after sowing with a clover mixture, and the clover generally stands dry weather very well, its roots drawing moisture from deep in the soil, when the shallow-rooting grasses are suffering from drought. Players have long recognized the objections to white clover, particularly on golf greens, and also to an extent on the fairways. The comparatively broad leaflets of white clover look strangely out of place where a fine turf is required. Clover plants wear very badly. While grass will stand up well under the heavy wear of tennis or polo, clover bruises down into a sticky mass. Old customs die hard, and it is frequently still urged that a mixture of grasses and clover be sown, but the modern greenkeeper regards clover absolutely as a weed under all conditions, and it is to him a very noxious weed in that it is so hard to eradicate. The drought-resisting properties of white clover are largely possessed also by the Fescue grasses which are widely used nowadays and which give good results in dry situations.

When the mistake has been made of including white clover in a mixture of seeds for a lawn, or when clover has appeared as being one of the weeds natural to a soil, the greenkeeper is confronted with the problem of removing it from the turf. The following is the best course to pursue:

(*a*) Thoroughly rake the turf with very sharp fine-toothed rakes. This will tear out quite a quantity of the creeping stems of the white clover, and it will further have the effect of opening to the air the soil surrounding the roots of the grass plants, thereby stimulating them.

(*b*) Apply Stumpp & Walter Co.'s Anti-Clover Manure at the rate of 2½ ounces per square yard (75 to 100 pounds per average green), first mixing the manure with twice its bulk of sand, compost, screened mushroom soil, or humus.

(*c*) Work the preparation into the green by rubbing the turf with the backs of the rakes.

(*d*) Repeat this treatment at least every spring and fall. If play permits, do it twice every spring and fall, and continue the process until the clover is eradicated.

Stumpp & Walter Co.'s Anti-Clover Manure works upon the principle of stimulating and feeding the grass plants, but neglecting the clover, which is permitted to starve.

On land from which you are discouraging clover, never use fertilizers showing a high phosphoric acid content (see table of fertilizers) and never apply lime. If indications point to the necessity for applying lime use charcoal instead; also look into the matter of drainage. Greens on to which surface water drains are frequently infested with clover; diverting this water will result in cleaner greens.

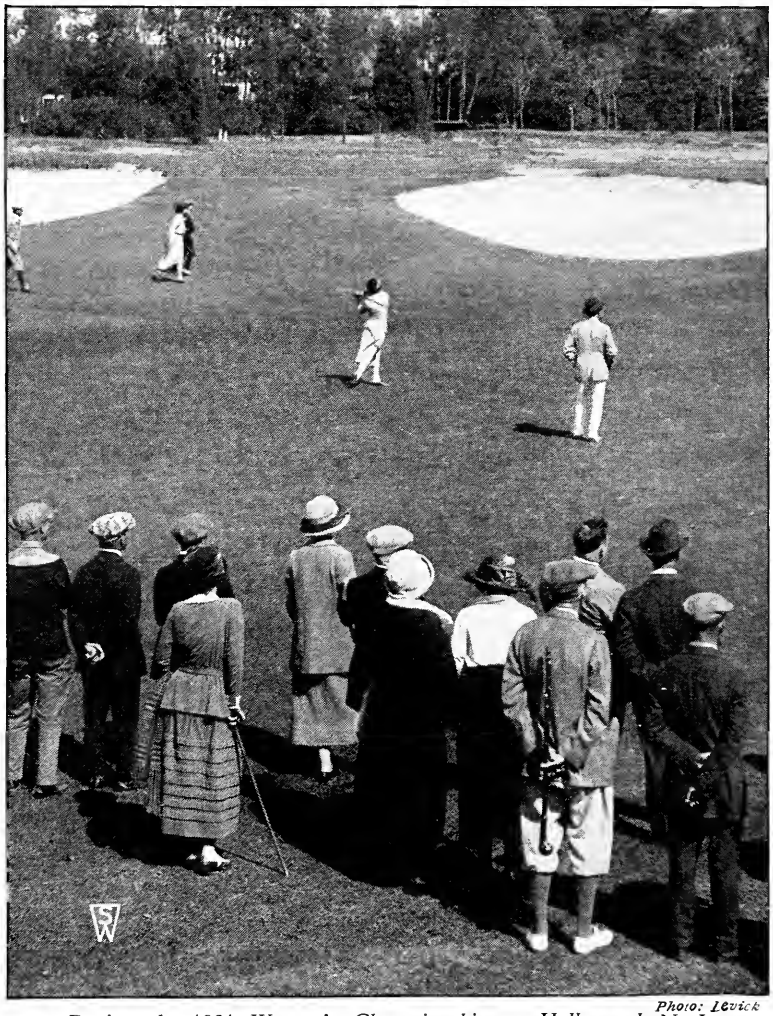


Photo: Levick

During the 1921 Women's Championship at Hollywood, N. J.
Stumpp & Walter Co.'s grass seeds used

Quantities of Grass Seeds to Sow

There is considerable variation of opinion on this point, but generally we find practical turf-growers with years of experience lean toward heavy seeding. We give below, in tabular form, our ideas on this point, and we would say that, although we have known of cases of disappointment traceable to too light seeding, it is rare to see a case where seed has been sown so thickly that failure has occurred, due to that cause.

QUANTITIES RECOMMENDED	MINIMUM		AVERAGE		HIGH	
	Lbs.	Value	Lbs.	Value	Lbs.	Value
(*a*) **Golf Putting-Greens**						
Separate varieties: Mixed Bents (Creeping Bent)	30	$67.50	45	$101.25	60	$135.00
Separate varieties: Chewing's New Zealand Fescue	75	56.25	100	75.00	125	93.75
Mixtures: Special Putting-Green Bent Formula	50	37.50	75	56.25	100	75.00
Mixtures: Standard Putting-Green Mixture	50	30.00	75	45.00	100	60.00
(*b*) **Golf Fairways, Polo Fields, Football Gridirons, Diamonds, etc.**						
Mixtures. Per acre	150	75.00	200	100.00	250	125.00
(*c*) **"Rough" on the Golf Course**	50 to 100 lbs. per acre ($17.50 to $35)					
(*d*) **Tees**	1 pound per each 200 square feet					
(*e*) **Tennis-Courts**	Bus.		Bus.		Bus.	
Regulation size, 78 ft. by 36 ft	½	$6.00	¾	$9.00	1	12.00
Full size, 130 ft. by 65 ft	1½	18.00	2	24.00	2½	30.00
(*f*) **House Lawns**	Lbs.		Lbs.		Lbs.	
Per acre	100	47.50	150	71.25	200	95.00
Per 400 square feet	1	.60	1½	.90	2½	1.40

NOTE.—Most of our grass mixtures weigh 25 pounds to the measured bushel. One pound of grass seed measures, approximately, 1⅓ quarts; one quart weighs about ¾ pound.

Use one-quarter to one-half the above quantities when renovating existing turf.

Always leave as long a period as possible between preparing new land and sowing seed, to give an opportunity for weeds to grow and be destroyed.

Well prepared soil and the finest possible seed, barely covered, are the essentials of good turf.

Hints on Sowing Grass Seeds

There are some very important points to remember in the sowing of seeds and among them are:—

Have the soil properly prepared. Not only must it be of such a nature that the young plants will be supported, nourished, and fed, but it must be reduced to the very finest possible condition, free of sticks, stones, clods of soil, pieces of fresh manure, etc. One can hardly spend too much time, care, and attention in the preparation of the soil; before entrusting to it the best seed you can buy, see that it is worked up to the very finest pitch of perfection. Screen the uppermost layer if your appropriation permits. Leave as long a period as possible between preparing the soil and sowing.

Sow the seed only on a still day. If you attempt to place seed on or into the ground when there is a wind blowing, you lose part or all of it, and you will be at a loss to account for patches, or large or small areas that are bare when later they should be covered with verdure.

When sowing grass seeds by hand, the back should be well bent. It is a good plan to divide the seed into two portions and to cover the land twice to insure its even seeding. Stir the contents of the bag now and again.

Do not cover the seeds too deeply. Most grass "seeds" are very much smaller than they appear. The seeds, as we know them, are husks which contain at one end the very tiny grain, and it is only from this grain that the young plant is developed. When we thus consider how very small the seeds actually are, it will be realized how easy it is to cover them too deeply. The thing to do is, as soon as the seeds have been scattered onto the soil, to very lightly stroke the soil with rakes, being careful to just cover the seed and no more. If there is any doubt in your mind as to your being able to cover seed sufficiently lightly, you may take a portion of soil and mix the seed with it; then scatter the soil-and-seed mixture and roll. Or you may take a hand-sieve or riddle and sift onto the seeds a light coating of screened soil, sufficient barely to hide them from view. On large areas, sow with a wheelbarrow seeder and follow with a bush harrow, as described on page 4. A good final preparation of the soil before seeding is to run a Cultipacker over the land, then sow and Cultipack a second time, driving the machine at right angles to the first direction, which will take the place of the rolling described in the following paragraph. It is necessary to use a team or tractor to pull the Cultipacker, and its use is therefore restricted to spaces of an acre up.

Roll immediately the seeds are sown. If you sow seeds and do not roll, they will be largely wasted unless you have used a Cultipacker. Rolling at once compacts the soil, and water from the lower layers of the soil is induced immediately to come to the surface by capillary action, and growth will commence, even if the weather is comparatively dry. It is generally not necessary to water newly sown land: better to wait until the young seedlings appear, except in the case of a settled spell of drought, in which case watering may be necessary.

When to Sow Grass Seed

Late summer is the time when Nature herself sows her seed, and all other things being equal, late summer or early fall—in other words, the months of August and September—is the best time for sowing seed, and this is more especially so if the seeding is a large one. The soil is warm at that time and it is generally in very good condition for plowing, harrowing, and rolling. After sowing, the first shower will cause the plants to show above the surface of the soil. A course constructed and sown in August or September should be in shape for play the following June; that is, if the soil is suitable, the right varieties of seed have been sown in sufficient quantity and the season is one favorable to the growth of grass.

Sometimes circumstances demand that the seeding should take place in the spring, and that is not at all a bad time to do this work; it is the next best, after fall seeding. Seeds will not germinate anything like so quickly or so well in the spring as in the fall, chiefly because the land is cold; and a little more patience is necessary. In the section around New York the chief difficulty attendant upon spring seeding is that a heavy weed crop will grow along with the grass—crab-grass in particular will give trouble. With fall seeding weeds are not so serious a problem. Spring seeding may be undertaken just as soon as all frost has left the soil and the land becomes sufficiently dry to work without injury. It must

The correct way to use a hand-fork. Note that the greenkeeper's left hand slides down the shaft prior to lifting. (1) Dig the soil about 6 inches deep, but only when it is dry; if rain has fallen recently allow a few days of fine weather to elapse before commencing work. (2) As you dig, lift each clod high enough to enable you to turn it completely over. (3) Strike the inverted clod with the back of the fork to break it.

be remembered that any digging, plowing, raking, or harrowing that is done when the land is wet will have the effect of solidifying it into hard lumps, and it may take several years to get the land into good condition again.

Grass seed may be sown in the late autumn, and it is not uncommon to sow it on the snow, the idea being that, as the snow disappears, the seed is gently deposited in the soil, and it will start to grow earlier than it would be possible to work the land after waiting until it has dried. Of course, this can only be done where the land is level, as anything in the nature of a washout when the snow disappears in the spring will mean that all the seed deposited will be wasted. We have thus considered fall, spring, and winter seeding. There is only a month or so in the very driest and hottest part of the summer during which large quantities of seed cannot be economically sown. It is a great advantage if land be prepared early, and allowed to lie fallow during these hottest

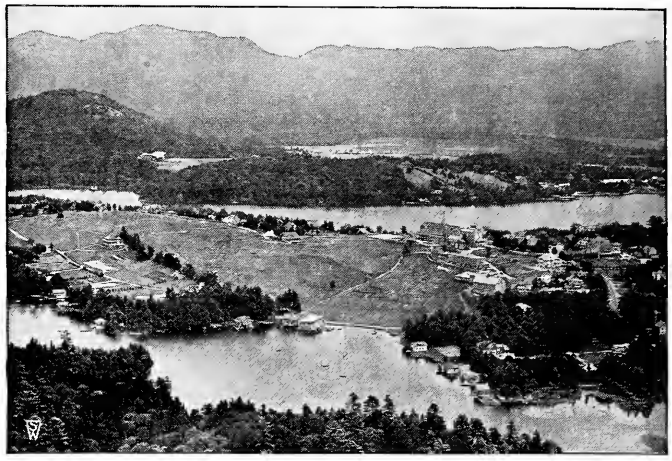


Photo: Major Hamilton Maxwell

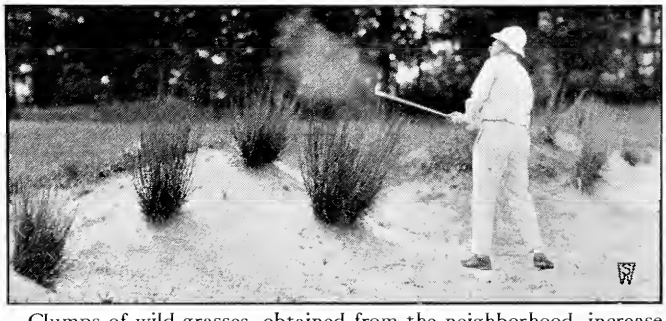
Airplane view of the nine-hole course of the Steevens House at Lake Placid, in the Adirondack Mountains. The Stumpp & Walter Co. offers a complete service to resort hotels—grass seeds and fertilizers, vegetable and flower seeds, advisory help when called for.

months. Occasional rains may start weed seeds into growth, and frequent harrowings or rakings will destroy them.

The greenkeeper is often confronted with the problem of covering with verdure a recently constructed mound or bunker. Top-soil is either not available or the shape of the mound and its steep grades render impossible the spreading of the coating of top-soil necessary to carry grass. We suggest the following method:

Equip your men with grub hoes or mattocks (suitable types are listed on page 38) and with pails containing a fifty-fifty mixture of soil and rotted manure or mushroom soil, or compost, to which has been added 2½ pounds of seed of Mixed Fescue Grasses for Bunkers. Now, with the mattocks open up holes in the sides of the mound about 5 inches across and 5 inches deep; let the holes be evenly spaced about 15 inches from center to center. Fill the holes with the mixed compost and seed, and tamp firmly.

A weedy bunker or mound on which plantain, chickweed, dandelion, crab-grass, and other weeds flourish is a menace to all your greens within half a mile or more. Its shape frequently prevents its being cut, and the consequence is that weed seeds are allowed to ripen and blow all over the course. On the other hand, the Fescues are excellent grasses for putting-greens, and they may be allowed to seed on the bunkers without risk of doing any damage. Further, Fescues are quite the best grasses for exposed, dry, sandy situations.



Clumps of wild grasses, obtained from the neighborhood, increase interest in the traps of the Huntington Country Club. Stumpp & Walter Co.'s seeds used on this course.

Seeds—Price versus Quality

The Stumpp & Walter Co. sell their seeds strictly as of proved maximum purity and maximum vitality. In other words, they do not allow seeds to leave their premises until the findings of their Analyst, supported by certificates of Federal and State testing departments, show the highest possible percentage of purity and of germination.

What exactly does this mean, and of what importance is it to you? Take, for instance, a sample of Red-Top of a quality that would be sold as the Stumpp & Walter Co.'s Superfine Grade: such a sample would have a certified purity, perhaps, of 96 per cent and a certified vitality of, say 95 per cent. This means that of any thousand tiny granules taken from the sample, 960 of them are pure, plump, healthy seeds of Red-Top, and that only 40 grains out of 1,000 are doubtful. There may be among these 40, and generally are, broken Red-Top seeds, empty husks, and short lengths of stems of the grass. There may, too, be found an occasional *weed seed.* A germination of 95 per cent, of course, means that when 1,000 seeds are sown on suitable soil, 950 of them are potential Red-Top plants. A sample of Red-Top of the high percentages mentioned is very rare and is seldom offered outside of the Stumpp & Walter Co.'s Superfine Grade. Instead of 96 and 95 per cent, a purity of 85 per cent and a germination of 85 per cent is quite frequently found in "high-grade" commercial samples. Think what this means: in 1,000 seeds, 150 questionable grains instead of 40; or *your broken seeds, empty husks, short lengths increased four times. Your risk of introducing weeds increased from the irreducible minimum to an abundant certainty.* A germination of 85 per cent means, with the 1,000 seeds that we have in mind, that only 850 that are sown will grow, where 950 will grow in the case of the Superfine sample. In other words, one pound of the Superfine Quality Seed will produce over 10 per cent more plants than will one pound of the ordinary good commercial grade, in addition to its being as free from weed seeds as painstaking care can make it. Now we have been talking of Superfine and *good* commercial samples of Red-Top. Commercial analysts will tell you that samples of Red-Top are not uncommon with a purity as low as 40 per cent and with a germination of 30 per cent down to zero. A simple calculation will convince anyone that the purchase of such a sample for seeding purposes *at any price at all, however low,* is a spendthrift policy. In the above example we have taken Red-Top, a seed that is much in commerce and, because the farmer uses it, the sale of it is well and very properly watched by Federal and State officials. In the case of those grasses where the demand is much less, such as Red Fescue or Mixed Bents, (Creeping Bent), and where the cost permits possible high rewards to the dishonest, careless, or ignorant dealer, the figures are even more startling:—

	Lowest figures that have come before our Analyst		Average of a good quality commercial sample		Maximum of a particularly choice "Superfine" sample	
	Purity %	Germ. %	Purity %	Germ. %	Purity %	Germ. %
Creeping Bent.....	15	18	45	50	75	75
Red Fescue.....	74	40	85	75	90	85
Kentucky Blue Grass...	60	14	80	60	90	87

The Summerlea Golf Club, Montreal, Canada, used Stumpp & Walter Co.'s seeds exclusively in sowing their course, August, 1922. A fine, thick, mat-like turf on their entire twenty-seven holes resulted in less than two months.

Does not this show very clearly the absolute necessity of purchasing only from those houses which specialize in grass seeds and service, and *which are acquainted fully with the purpose for which the seeds are needed?*

Weeds in Newly Sown Turf

As a premise it is safe to say that weeds will *always* appear with young grass. We ask anyone who has had any experience at all with green-keeping, gardening, or farming what he would expect if he were to prepare a piece of land for seeding up to the point where the seed should be sown, *but not to sow any seed.* Would he expect the land to remain free of plant-life for years after, simply because he had dug the land so carefully, raked it so thoroughly, maybe had worked on it for perhaps several years? Would he expect it to be weed-free? He would not. A few days following the first warm shower he would expect to find—and would find—the seedlings of thousands of weed seeds that are always in soil and are always blowing on to the land from surrounding areas. If he still allowed his land to remain untended, he would in the fullness of time have his plantains, docks, chickweed, self-heal, and dozens of other weeds in full possession, simply because soil absolutely free of weed seeds does not exist in territory where plants will grow. Soils may vary, and do vary considerably, as to the quantities of weed seeds they contain, but it is a matter of degree only, and we can describe a soil as "very clean," but never can we describe it as "weed-free."

The weed seeds germinate only when they are sufficiently near the surface, and in cleaning a soil the thing to do is to rake or hoe the land as soon as the weeds appear, which will cause them to die, but the turning will bring close to the surface other weed seeds, the next turning others, and so on. It may be possible, over a period of time, in this way to make a soil *almost* weed-free, but we have never known one *entirely* weed-free.

In sowing down new seed, therefore, one must not be disappointed if some weeds appear along with the young

Weeds in Newly Sown Turf, continued

grasses. And one should not do the obvious thing, which is to at once accuse the seedsman of supplying seed containing weeds: do not do this until you are sure that a similar area not sown would not produce the kind of weeds that are showing in the new turf, and until you have had a sample of the seed analyzed by a competent botanist and the quantities and varieties of weed seeds it may contain reported to you. It is always advisable to keep, for reference, in sealed packages, small representative samples of each kind of seed purchased and sown: if later you have any question in your mind as to the purity of the seed, you are then in a position quickly to decide one way or another. If you find a strange weed introduced into your land, and if your botanist's reports state it is in the seed sample, you have a definite cause for complaint against your seedsman.

Thus, weeds in greens are always to be expected and provision must be made to eradicate them as quickly as possible; but labor is costly, and it is but common sense to give the *maximum preparation* to the land and to sow only seeds of the *maximum purity*. Assume, for the sake of argument, that we have three samples of Blue Grass; one bad, with a purity of 60 per cent; one of fair commercial quality, 80 per cent pure; and one of the highest superfine quality, 90 per cent pure. Taking 1,000 grains from each we would have 400, 200 and 100 grains respectively of impurities. Assuming that but 1 per cent of these impurities are weed seeds (they are generally more), then in every 1,000 seeds of the first we sow 4 weed seeds, of the next, 2, and of the next but one trace, all of which will have to be removed later when in the seedling stage. It is obviously a foolish policy to *intentionally* sow seeds of weeds which later have but to be removed.

Will you conduct the following experiment when sowing seeds?

Prepare a piece of land—the size makes little difference, a space 10 by 10 feet would be ample. Dig it, top-dress it, rake it, fertilize it—just as you treat the seeded portion of your land except *that you sow no seed.* If in the course of a few weeks you are rewarded with a crop of weeds on your newly sown greens or fairway, it will add greatly to your peace of mind to turn to your unseeded patch and find that the same weeds are growing there, and, in consequence, have not necessarily been sown with your grass seeds.

Moss

Turf that is thin and which shows, instead of grass, occasional patches of moss, is frequently met with on almost every golf-course. It is due, generally, to one of two causes: either the soil is waterlogged and sour in consequence, or the soil is so deficient in plant-food that it cannot support grass. If there is no doubt as to which is the cause, attempts should be made to remove it; but if there is a doubt, it is well to assume at first that poverty of soil is the trouble, because it generally is so, and because a process of renovation is much less expensive than a large drainage undertaking, and the results are always beneficial, even if they may be largely of a temporary nature.

How to Eradicate Weeds

Weeds in fallow land are easily destroyed by cultivating or hoeing the soil, and we urge strongly that, before any land is sown down to grass, as long a period as possible be allowed to elapse between the final preparation of the ground and the sowing of the seed, to permit the weeds to grow and to give the constructor an opportunity to kill them. On many soils it is necessary to destroy weeds in this manner quite a number of times before it is anything like clean.

Weeds in roadways, gravel paths, and the like, may be exterminated quickly and economically by means of Herbicide, a chemical which will destroy all vegetation upon which it is poured.

Weeds in existing turf present some of the greenkeeper's hardest problems, and their eradication may be considered under the following headings:

Weeding by the Application of Chemicals Broadcast

This method is based on the principle that many substances have a caustic effect on the leaf of plants, but when scattered on the soil around them will do no harm. Many weeds, particularly those with broad, flat, or hairy leaves, and more especially those with weak fibrous root systems, may be eradicated by this treatment. Climax Lawn Sand is scattered on the turf at the rate of 6 ounces per square yard where weeds are thick; and, where the weeds are not so numerous, a small quantity may be placed on the center or crown of each weed. The shape of the *grass* leaves permits the Lawn Sand to fall down on to the soil between them and they are not harmed—rather, they are benefited, for the Lawn Sand is in fact a highly concentrated grass fertilizer. The broad, hairy, or flat leaves of most weeds, however, hold and retain the chemical and this burns the leaves. Those weeds which have rather weak root systems are killed when their leaves are destroyed, and in this class may be placed the following:

Veronica, or Speedwell	Mouse-Ear
Chickweed	*Young* Plantains
Young Dandelions	Moss

The 17th Green, Morris County Golf Club, Morristown, N. J., where the Women's Metropolitan Championship was held last year. Grass Seed supplied by the Stumpp & Walter Co. for the past seven years.

Weeding by the Spraying of Chemicals

This method is used by the farmer to destroy charlock or mustard from his wheat, barley, or rye (which are in reality large grasses). Thirty pounds of blue vitriol (powder) are dissolved in 100 gallons of water, and the solution is sprayed on to the whole crop. A very fine mist has to be produced with a spraying machine, and it has to be applied so as to wet thoroughly all the leaves and stems of all the weeds. The grass will be unharmed but many of the seedling weeds will be destroyed. Fifty gallons of the solution would be sufficient for an acre, and it should be used when young grass is about 2 inches high and before the first cutting. This method is not suitable for putting-greens, but it may at times be useful for newly sown fairways on land that is not clean. Annual weeds and seedlings generally may be expected to be destroyed by this method.

Hand Weeding

To remove weeds from established putting-greens, it is advisable to resort to hand-weeding. Crabgrass and other weeds appear at a time when the schools are on vacation and it is frequently possible to employ boy-labor on this work.

We have just perfected a device that fills a long-felt need in the clearing of turf of weeds; we have named it the "Stumpwall" Weeder. It reproduces in a mechanical way the action of the pocket-knife and thumb of the experienced greenkeeper. Note how a practical man slips his knife-blade just under the soil, cutting the root of the crab-grass or star-grass, and at the same time placing his thumb on the weed, drawing it out of the turf, leaving only the smallest bare place that is scarcely noticeable at the time and which heals over almost immediately. The Stumpwall Weeder reproduces this mechanically. A sharp cutting blade cuts the root, and claws grasp the weed. With a minimum of injury to the turf, unskilled assistants, equipped with Stumpwall Weeders, will clear a green of crab-grass in a remarkably short time. They cost $1.50 each, or $16.50 a dozen.

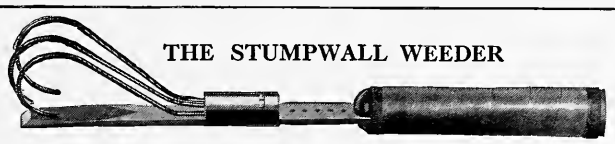
We suggest that a putting-green be cleared as follows:

(*a*) Obtain two lengths of cord as long as one side of the green and with a peg attached to each end. Stretch one of these cords along one edge of the green, and place the other on the green parallel to the first cord and 3 feet from it. Thus, a strip a yard wide is marked off ready to be cleared.

(*b*) Set a boy at work to remove every weed from this alleyway. Equip him with a Stumpwall Weeder or a Chisel Knife, as offered on page 40. With the Stumpwall Weeder he merely "jabs" all the weeds within reach; if equipped with a Chisel Knife he removes small weeds by inserting the knife close to the weed, grasping the weed with his thumb, and pulling knife and weed out together. Large weeds are removed by inserting the knife about 3 inches away from the weed and about 3 inches deep: pressure on the knife will then cause the soil to crack, when the weed may be lifted out root and all.

(*c*) Provide a second boy with a pailful of dry, screened compost or clean soil, mixed with 5 pounds of grass seeds. Instruct him to follow his partner and fill each hole with the mixture, pressing down with his foot.

(*d*) Inspect the cleared alley.



THE STUMPWALL WEEDER

Patent applied for. Price, $1.50 each, $16.50 per dozen.

(*e*) Remove the outer cord and place it parallel to the second cord, but 3 feet nearer the center of the green. Set the boys at work on the second alleyway thus formed.

Hand Weeding with Chemicals

Take a jar of sulphuric acid (commercial strength), and a number of thin "slivers" of hard-wood. Place the jar in front of you and dip a sliver into the acid a short way only and then jab it into the center of the weed. Continue this until every weed within reach has been treated: move along and treat the next area until the whole green has been treated.

Killing weeds in this way is cheaper than hand-weeding, but we find the dead weed causes a bare patch which takes some little time to heal, the soil having been sterilized, whereas with the hand-weeding process the weed is removed, pure grass seeds are put in its place, and in a few days the turf heals.

Rolling

Generally speaking, very light land may be heavily rolled with impunity at any time, except when wet. Heavy soils may be rolled with a light roller occasionally; also only when the soil is dry. The question as to what is a light and what is a heavy roller is a matter of experience to decide. Taking a mower which rolls a path 5 feet wide, anything like 1,000 pounds would be light; anything beyond 1,500 pounds would be heavy. In hand-rollers, taking as an example one that is 2 feet wide, 200 pounds would be light and 400 pounds would be heavy. Within these limits, the green committee can readily determine the kind of roller best suited for their greens. In addition to rollers of this type, a putting-green is much helped by passing over the surface a very light wooden roller. The work this does is entirely confined to the grass and to the barest surface of the soil.

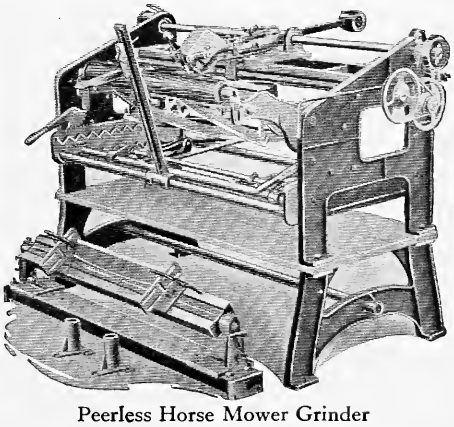
Peerless Horse Mower Grinder

A machine that has been built for use with power (½ horsepower), designed to sharpen tractor, horse, and pony mowers, as well as hand mowers. Will grind spiral reel knives up to 40 inches. A well-made piece of machinery that will give efficient service for many years. All bearing parts are renewable at slight expense. Shipping weight 500 lbs. Price, $250, f.o.b., Plymouth, Ohio.

Ideal Lawn Mower Grinder

A smaller machine, though equally well made. Designed to sharpen hand mowers with 24-inch blades or less. May be ordered either to work by hand or with connections for power (¼ horse-power). Price, $100, f. o. b., Plymouth, Ohio.

NOTE.—Above prices do not include electric motor. Skate sharpening attachment furnished with both machines.



Peerless Horse Mower Grinder

Turf Versus Seed

Occasionally a club is offered a supply of turf that has been lifted to give place to building operations, and the temptation to purchase and use it is great. We have in mind a certain committee that was much impressed with about two acres of fine lawn which was velvet-like in texture: they purchased it at a fancy price, lifted it, and laid it with every care. Their greens looked wonderful for a few days, when they started to go back: their deterioration was continued to such a point that they finally decided to dig in the remains of their turf and sow seed.

The usual experience is that newly sodded ground never afterward looks so well as it looked on the day it was laid. The chances are in favor of the sod having been produced on very different soil to that of the course, and, in consequence, the varieties of grass which comprise it are those which will not succeed in their new surroundings. Our suggestion to a club is, therefore, never to purchase sod from outside for construction or repair work.

Turf Nurseries

The production of sod on your own course, however, for occasional repairs is also another matter, and we strongly urge upon green committees the advisability of always possessing a turf nursery, where a tract of grass is made with as much care and thought, as a new putting-green, and the turf rolled, mown, top-dressed and otherwise tended as any of the greens. Such an area could well be utilized in many cases by the professional for instruction, or as a practice-green. When sod is needed for the repair of greens and tees, a supply is thus available consisting of just those varieties that are natural to your course, and patching can thus be undertaken or even new greens constructed with the material right at hand.

On many courses the greens can be classed under two headings: those on high and dry ground, and those on a more moist foundation. In such a case two areas of nursery turf should be cultivated, one on high ground and the other in a low situation.

We find that a ten-inch hole-cutter is very useful for slight repairs. A few discs can be taken out of a green from the center of clover patches, say, or from worn or weedy spots, and immediately similar discs of fine turf can be transferred into their places from the turf nursery.

For larger repairs, the cutting into squares 1 by 1 foot is the best, while for construction work the use of a horse turf-cutter, as listed on page 37, will very quickly more than repay its cost.

Laying Turf

When transplanting sod for repairs or for construction work, the following should be carried in mind:

The turf should be of uniform thickness; 1½ inches is sufficient.

The turf should be taken from a situation exactly similar as regards moisture, aspect, shade, and soil to that on which it is to be laid.

The land should be prepared with thoroughness.

The turf should occupy the minimum amount of time between its lifting and relaying.

The turf should be "tamped" firmly onto its new bed.

The turf should be "cemented" into place by rubbing into all cracks and crevices a mixture of soil, compost, or rotted manure and seed.

Plenty of water should be given after sodding.

The months of June, July, and August should be avoided for this work if possible.

One and one-half to 2 inches of soil and grass roots is a good thickness to which to cut turf, and a good idea is to aim to lift them a trifle thicker than this, and to prepare a wooden tray of a size exactly to hold the sods: nail walls on to three sides of this tray exactly 1½ inches high inside measurement. Prior to setting the sods, place each one in the tray, grass side downwards, and shave off excess soil and roots by means of a scythe blade, resting each end of the blade on the sides of the tray when cutting: draw the blade toward you, and arrange the tray on a suitable stand with the fourth or open side away from you.

Prepare the soil just as carefully, although perhaps not quite so deeply, as for sowing seed. At least a 2-inch layer of top-soil should be added, and to this five loads per green of spent mushroom soil or rotted manure may be added, and the whole worked together. Dust on each green 150 pounds of Emerald Grass Fertilizer, and rake with a view to distributing this fertilizer and to prepare finally the land for the reception of the sods. Do not walk unnecessarily upon the newly sodded area, and it is a good plan to lay planks upon which to carry or wheel materials.

Vegetative Greens

Those clubs which have had the benefit of the advice and the personal care of the experts of the Department of Agriculture at Washington have been able to make, under their guidance, some greens consisting entirely of Creeping Bent, taking advantage of the property of this grass of producing runners, which trail along or just under the surface of the soil and produce roots and growing shoots at intervals of an inch or so along these runners. The process is very simple:

A supply of the runners, or "stolons" to be more correct, is obtained, and they are cut up in a hay-cutter into lengths about an inch long, broadcasted carefully onto the prepared soil of a new putting-green, and lightly covered in the same way as seed. The result is that a green is obtainable in almost as short a time as is possible with seed, of absolute uniformity, and consisting entirely of pure Creeping Bent. Such greens are very satisfactory. The same very careful preparation of the soil as for seed is necessary, and it is just as essential that the land, after its final preparation, be kept as long as possible before seeding, to permit weed seeds to germinate and be destroyed with rakes and hoes. The nature of Creeping Bent is such, however, that its very character, matting and intertwining one with another, as the plants do, is such as to prevent, very largely, the development of weeds once it has taken hold, and assuming that the

soil and surroundings are favorable to the growth of Creeping Bent. Another method is to prepare the soil thoroughly and to plant out runners of Creeping Bent, placing them ½inch below the surface and in a continuous line, end to end; have the rows 3 feet apart, and keep the soil between the rows well cultivated until the Creeping Bent plants entirely cover the area. This gives one a turf nursery from which slugs or turfs of Creeping Bent may be taken for repairing or constructing new greens.

A very excellent method of combining the two methods of seeding and vegetative reproduction is to prepare a turf nursery as suggested on page 18, but to seed it very differently from the ordinary established practice.

Prepare the soil very carefully, and sow seeds of genuine Creeping Bent in drills 20 inches apart. When the young plants appear above ground they should be weeded frequently. Occasional dressings of Emerald Grass Fertilizer may be given from time to time to the soil between the rows, and this soil should be hoed every ten days. The grass will thicken and the space between the rows will grow smaller and smaller until the plants from one row will meet and knit with those from another; at the end of a further period, the Creeping Bent turf will be ready to lift, although the longer it is kept the better will be the result. At the outset the grass should be kept mown to a height of 2 inches, and frequently rolled along the rows; after the rows have knit, the mowing-machine may gradually be lowered.

The most modern, and perhaps the most promising method of combining the vegetative and seeding methods is to sow seed in the ordinary way—we prefer a mixture of two or more varieties—and when the turf is established, which should be at the end of ten weeks of growing weather, to plant runners of Creeping Bent at intervals of 6 inches each way. Take a chisel, or the blade of a Stumpwall Weeder, and make an incision in the turf at an angle of 45 degrees, slip the runner or stolon into the hole and when a section of the putting-green has been grafted, pass a roller over it to close the holes. Do not forget to let the sprinklers run freely as the work progresses.

The Creeping Bent runners are generally the cultivations of different strains which have been located from time to time, and these strains vary considerably in their resistance to disease and seashore conditions and in their color. On the whole, the vegetative greens that we have seen are a trifle disappointing as to color, and they are a little coarser than we would have expected after the great care that obviously has been given them. The Creeping Bent that would be obtained from seed would consist of a mixture of strains, some more resistant to conditions than others—some less; some more pleasing as to color and texture—some less.

We have helped several golf clubs by locating on their courses patches of Creeping Bent growing wild, with which they have constructed turf nurseries by the vegetative method. Small plugs of their own Bent have been planted at intervals of a foot each way, and the spaces between kept continuously hoed until the Bent has spread and covered the entire area. This has given them an ideal piece of turf either for repairing old greens or constructing new ones.

We have seen very few failures with the vegetative method of producing turf, but when there has been a lack of success we have traced it to the planting of runners in dry soil during hot weather, or allowing the runners to become dry before planting. April, May, early June, late August, and September are the best periods of the year in the northern states for vegetative planting of Creeping Bent.

We do not think that the vegetative method of producing turf will in any degree replace the use of seed, and by far the finest greens we have seen have been produced from seed. The extra degree of immunity from fungous disease which turf from seed possesses over that produced from stolons is alone sufficient, in our opinion, to recommend straight seeding, or the combination method of seed and runners, rather than the straight vegetative method.

Mowing

We doubt if there is a more expensive item in the upkeep of a golf course than mowing. During the spring and fall, on a course in good condition, it is frequently found necessary to cut the greens daily; on others every two days is the rule. Close cutting tends to the production of "fast" greens, while a longer growth of grass slows the ball considerably.

We suggest that the greens be cut quite closely during the cooler months of the year, but, during June, July, and the first part of August, it is a good plan to let the grass lengthen somewhat and so do something to avoid the burning that so frequently occurs.

The question as to whether the cuttings should or should not be left on the turf is a much-discussed one. We lean to the side that machines should be furnished with catchers, and the clippings removed every time. It is true that to leave them on the greens is to return to the soil something of what the plant has taken out of it, but a long process of decay has to take place before the small amount of nitrogen and other plant elements that are in the leaves will be in a fit state for the plant to again take advantage of them, and this decomposition can best be carried on in the compost heap which is referred to on page 24.

Newly sown grass on the putting-greens should be clipped with a well-adjusted machine as soon as it is 2 inches high, while that on the fairways should be cut when it is 3 inches high. Later the machines may be gradually adjusted down until the grass is cut to the length preferred by the members.

Cutting grass induces the production of fresh shoots, and the more grass is cut the more it "tillers" in this way, until the newly sown grass ceases to be a collection of individual plants and becomes a tough matted mass.

It is poor economy to purchase cheap mowing-machines. A high-grade, ball-bearing mower outlasts by many times the cheaper outfit: its adjustments are more easily made and are more easily maintained: a slight misadjustment will pull out grass plants in the same way as a hair-clipper in the hands of a careless barber will tug one's hair. The higher grade machines look expensive as compared with average machines, but so does a high-grade automobile as compared with the popular makes, and, like the automobiles, a difference in price is warranted. A putting-green is, or should be, the acme of perfection in fine turf, and to obtain it the highest grade up-to-date tools are necessary. It is difficult to recommend particular makes of lawn-mowers.

All the advertised makes are efficient and economical in operation, and in tractors the Worthington in combination with the Shawnee Triple Mower appears to be right. The Ideal, as well as the Toro combination, is good.

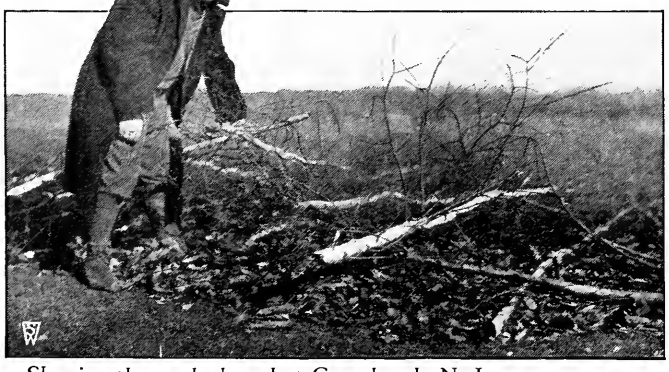
The several machines listed on page 46 are all good. They are of such simple construction that a break-down means nothing more than the quick supply of some inexpensive spare part.

Winter-kill

On almost every northern golf course, in the spring when growth has commenced, bare patches here and there will appear. On some courses there are not many of them; on others, the total bare area is quite large. Happy is the greenkeeper who has a course which does not suffer materially from winter-kill. From our experience, we find that the chief cause of these bare patches is the collecting, in depressions and pockets of the turf, rainwater or water from melting snow. The condition of the soil does not allow this water quickly to get away, and a drop in the temperature converts it into solid ice. This cake of ice, in the late winter, freezes hard at night and partly melts during the daytime, and it is this freezing and thawing at the end of the winter which is the cause of most winter-kill. The only radical cure is a system of drainage, so altering the configuration of the greens, that surface water readily drains away or by insuring with under-drainage that all excess moisture disappears the moment it collects. The usual spring treatment of these winter-kill patches is to rake thoroughly the soil, add a 1-inch layer of compost, again rake, then sow a small quantity of seed. The amount of seed required is usually figured at the rate of 1 ounce per square yard of bare land.

Scott North, professional at Saranac Lake Club, protects all his greens with splendid results. He places young evergreen trees and branches in a position to cause a drifting of snow over the entire green to a depth of about 2 feet. Such a method is only 100 per cent effective in a section with a heavy snowfall, and it would be difficult to follow where evergreen trees are scarce.

Isaac Mackie, professional at Canoebrook, uses dead leaves, held in place with birch saplings and branches, on those of his greens which ordinarily winter-kill every year. With this protection he carries his greens through perfectly.



Showing the method used at Canoebrook, N. J., to protect greens against winter-kill. A layer of leaves, held in place with birch branches. Stumpp & Walter Co.'s seeds are used on this course.

The Effect of Heat and Drought

Some turf looks very good in the spring, early summer, and fall. It is frequently a dense mat, free from weeds and perfect in every respect, but when the really hot days of July come, the grass burns and becomes very unsightly.

This often is due to exceptional conditions of soil and a somewhat artificial turf, in that varieties may have been sown which are not suitable to excessively dry conditions; but the fact that the turf is very carefully taken care of enables the grass to survive during ordinary periods, and it is only when a period of drought arrives that the unsuitable varieties do not flourish; instead they dry and turn color. The cure for this should be along the lines of *adjusting the seed to the soil* and *adjusting the soil to the turf.* The sowing of additional seed at least once a year, fall preferred, consisting of a mixture such as the following, would be advisable:

20% Fine-leaved Sheep's Fescue	10% Various-leaved Fescue
30% Red Fescue	15% Rough-stalked Meadow
10% Red Top	15% Kentucky Blue

Such a mixture should give good results on turf, when added to grass already there, and it is generally required in sufficiently small quantities that it may be used widely. Thirty to 50 pounds per acre on fairways, and 30 pounds per green of this mixture should afford satisfactory results. We carry this mixture always in stock and we offer it on page 9.

Under the heading of adjusting the soil to the turf, it would be a good plan to top-dress the greens every spring and fall with a ½-inch layer of a compost made up as follows:

50% good clean sandy loam 50% commercial humus

Thoroughly rotted mushroom soil, compost, or absolutely decayed horse- or cow-manure may be substituted for the humus. This mixture, after being spread on the greens, should be well distributed and rubbed into the soil by using rakes held the reverse way (that is, using the back of the rake). The fairways, also, on such a soil might well be given a dressing every fall, consisting of spent mushroom soil or thoroughly well-rotted manure, either of which might be figured out at the rate of 20 tons per acre.

Shaded Greens

Shaded greens are frequently the source of more worry to the greenkeeper than all the other greens combined. It is a good plan if special care be taken in the initial construction to seeing that the green is tile drained. Next in the construction work see that the green is so graded that all surface water is led away quickly.

In these greens, above all others, a well-prepared top-soil is necessary, consisting at least of the top 4 inches specially made up of 30 per cent sharp sand and 70 per cent good top-soil, with a ton of charcoal worked into the surface. A quantity of these materials should be passed through a ¼-inch rotary screen to make the final surface, and the green should be sown with a mixture of seeds in which Creeping Bent, Chewing's Red Fescue, and Rough-stalked Meadow Grass are used in equal proportions. We can supply such a mixture at $1.25 per pound.

A Few Notes on Soils

Most varieties of grass are "comfortable," and will give the most permanent success, from a golfing point of view, when they are grown on soil of a *medium* texture. This word is frequently mentioned in connection with agriculture, but its meaning to some may be a little obscure. We all know a clay soil: one which sticks to one's shoes when wet, and becomes of the nature of concrete when dry, and, we are all familiar with a truly sandy soil, one through which rain will quickly disappear, and which, when dry, will sift easily through the fingers when held in the hand. Midway between these two extremes is found a *medium loam*, and if it errs a little on the sandy side, we call it a *sandy loam;* if it contains more clay than sand, we call it a *clay loam.* Soils which contain a preponderance of clay—clay loams—are also termed *heavy soils.* Those which contain a large quantity of sand—sandy loams—are known as *light soils.*

During the course of years, plants have grown and have died on the soil in question. Animal life of all kinds, too, has existed there, and these remains, vegetable and animal, contribute another ingredient to the top 9 inches or so of soil. These remains, in a decayed form, are known as humus, and where they are very much in evidence, and when they form a major part of the soil, the soil is termed "*muck land.*"

A medium loam is the best land for a golf course. A sandy soil can very quickly be brought into shape; heavy land is very difficult to handle, however, and muck land is almost impossible, from a golfing point of view.

We have considered the mechanical texture of the soil; something of the chemical condition must be thought of. Grass plants need lime, nitrogen, phosphoric acid, and potash, as their most important foods; and because grass is such a shallow-rooting plant, they further need these in sufficient quantity in the top 4 inches of the land. Ordinary soil, which has carried crops of good quality previously, quite frequently has sufficient of these elements. You will note that we say one which has previously carried a crop of good quality.

In preparing land for grass, one of the most frequent sources of error is to plow or to dig the land so deeply that the top-soil is placed at too great a depth and some of the subsoil, that is to say, the layer next under the top-soil, has been brought to the surface, covering the true growable soil. Subsoil is very frequently deficient in humus and also in plant-foods, and by thus cultivating too deeply it is possible to commence the construction of the course with the handicap of a poor, worthless soil, while a good growing soil has been buried a few inches below the surface. Look at a grass plant and you will notice that it is very exceptional for the roots to penetrate more than 4 inches into the soil. It is thus obvious that good soil, buried to a greater depth than 4 inches, is practically lost to the grass. In the construction of both greens and fairways the conservation of the top soil is thus a matter of the fullest importance.

Drainage

Land that is soft and soggy at times, when other portions of the course are dry; land which, on test, invariably gives an acid reaction; land on which sedges, rushes or wild iris are found luxuriating—all such land needs tile-draining.

Pipe- or tile-drainage is simple, provided care is taken to see that all the pipes that are laid have a steady and gradual fall to their outlet. A main trench should be dug, running from the affected area by the shortest route to a ditch, river, water-hazard, or trap. Radiating from this, further ditches should be dug in the affected area. These ditches should be as straight as possible, and the branch should not meet the main trenches at right angles, but preferably at an angle of 45 degrees, to ensure an even flow of water. Branch ditches should join the main ditch separately; in other words, the branch on the right and the branch on the left should meet the main ditch at different points. In the main ditch a row of 4- or 6-inch drain-tiles (the size refers to the diameter of the pipe) should be placed. They should be closely laid, end to end, but no attempt is to be made to cement the joints. It is largely through the open joints that the water enters the pipe from the surrounding soil. In addition to water entering the pipe at the joints, there is also a gradual seepage from the side through the porous walls of the pipe. For the branch ditches, drain-tiles 3 or 4 inches in diameter are usually used, and these should be similarly laid, end to end, accurately but with no attempt at joining. Where the branches meet the main drain, it is sufficient that the main drain be continuous, and that the side pipes just butt against the main line of pipe. It is not usual to have tiles of a "Y" shape to accommodate the branches, although it can be readily understood that the drain would be a little more efficient if they were used. A commencing depth of 1½ feet under the surface for the branch drains is usual, and a steady fall in the system determines the depth of the other pipes. After being laid in the bottom of the trenches, it is a good plan to at first put a layer of stones on top of the pipes, then return the subsoil, and finally the top-soil.

A screen of wire netting over the outlet for the drain is necessary to prevent moles, rabbits, rats, field-mice and woodchucks from entering the tiles and choking the system.

Where an outlet, as suggested above, is not available, it is sometime possible to dig a large well or tank into which the drainage pipes may be run, and which, when all the tiles are laid, may be filled with rocks, building rubble, and clinkers. Sometimes the land is so wet that even this cannot be dug without it continually filling with water. In this case, there is nothing to do but devise some mechanical means whereby the water from such a well could be siphoned out.

In many cases the disposal of surface water is alone sufficient to clean a stagnant piece of land, in which case a series of wide, shallow depressions may be run, with a gradual fall, to an outlet, making the work more of a grading job than one of trench-digging. Further, a wet, soggy depressed patch may frequently be corrected by dumping a few loads of earth upon it, turning it into a slight hillock instead of a depression.

Where situations exist that show drainage problems, it would be a good plan for the designer of the course to so arrange his plans that such water-logged soil be turned into a very interesting trap or water-hazard.

Are Fertilizers Necessary?

This question is often asked when a new course is being laid out. If your soil has previously been farm-land, if it is of medium texture, and *if it has previously carried good crops*, it would probably be false economy to add fertilizer to fairways, but these conditions so rarely rule that the addition of some plant-food is generally required. If the soil is heavy or if the soil is light, it will generally benefit mechanically with the addition of decayed vegetable matter or humus. This may be added in one of the following three ways:

(*a*) Farmyard or stable manure may be applied.

(*b*) If time permits, a green crop may be sown, and when the plants have grown to a suitable size, the land may be dug or plowed, turning the plants under the land, where they will decompose.

(*c*) A quantity of commercial humus may be applied.

The above refers to fairways. *It always pays* to add fertilizer to the soil of new greens. As we see it, the way to build a putting-green is to use as thick a layer as possible of good top-soil. In the top 4 inches, incorporate mushroom soil and sand (up to 25 per cent of sand if the top-soil is unusually mucky), and *add a layer of screened soil and chemical fertilizer* over all. In this sow suitable seeds. From 100 to 200 pounds of chemical fertilizer per green are usually used.

The Manure Problem

Time was when the farmer, bringing his produce to market, would, for a consideration, remove and dump on his land the horse-manure accumulated by the city horse-owner. Later he was glad to remove it without cost, and now, with horses becoming fewer and fewer, manure is mounting higher and higher in value. Few good farmers can be induced to sell manure, and the club is usually forced to go farther and farther away for its supplies. With the disappearance of the horse, and with increasingly efficient methods of garbage destruction in cities, there is a possibility that the supply of manure may cease altogether for all practical purposes.

We are still in a position to quote on car lots of Horse-Manure. For limited areas, Pulverized Sheep-Manure is a satisfactory substitute for rotted stable-manure. In this case the droppings of sheep in the stockyards are collected, subjected to sufficient heat to drive off moisture and to kill weed seeds, and the material is then practically in a powdered form. This, after it has been applied, very quickly reabsorbs moisture, and its bulk is thereby increased.

Shredded Cattle-Manure is a highly concentrated animal manure which is also of value in this way, but artificial fertilizers will not take the place that animal manure occupies in green-keeping; chemical and desiccated animal manures are a splendid adjunct, but are in no sense a complete substitute.

The real solution to the manure famine, however, is very simple: it is no less than, *with the aid of fertilizers*, to grow a bumper crop of some bulky material and, with the addition of some more fertilizer, to plow it under the soil where it will speedily decay. Such a process increases, enormously the vegetable matter in the soil, improves its texture, and increases its water-holding capacity; it adds and retains valuable plant-foods; it helps to clear land of weeds; and it solves the manure problem.

There are a number of plants which lend themselves to this purpose in that they are quick-growing and bulky and their seeds are inexpensive. Generally, it is best to select some one of the legumes because all plants of this family (peas, beans, clover, etc.) have the well-known property of absorbing the free nitrogen which is in the air around us, and, with the aid of bacteria, converting this nitrogen into nitrates. Thus, a plowed-in crop not only adds considerable bulk of vegetable matter to the land but it actually increases its fertility through the additional nitrates which are added to the soil. Note that this work is performed with the aid of soil bacteria, which are usually in the soil in sufficient numbers to do the work quickly; in the event that they are not, it is always a safe insurance to *inoculate the seed* of all legumes before sowing with the necessary nitrogen-fixing bacteria. (We offer at foot of this page suitable cultures of these bacteria under the trade name of "Farmogerm.")

Having inoculated the seed and prepared the land for seeding, we recommend that some chemical fertilizer be applied, such as acid phosphate, bone meal, or the like. (See the table following the next page.) Then scatter the seeds broadcast at the rates indicated on page 8, harrow in lightly, and roll. A good time to plow is just before the land is wanted for seeding to grass, unless the land is foul with weed seeds, when a period during which the land may lay fallow is desirable; but in any case, it would be a good plan not to allow the crops to reach such a degree of maturity that they seed; if it is still too early for grass seed, plow in the cover-crop when it is in flower and before it has ripened its seeds. In plowing, let the furrow be as shallow as possible consistent with completely inverting the sod. Attach chains to the plow if it is found necessary.

After plowing, a dressing of our Fairgreen Fertilizer may be given at the rate of 1500 pounds per acre, the land then harrowed and sown down with grass seeds. Cover the grass seeds by means of a bush harrow lightly drawn over the land, and roll.

We suggest that when constructing a golf course, or undertaking any other agri-horticultural proposition it is a good plan not to allow even the smallest amount of land to remain idle. It is an excellent idea to allow a cover-crop to stand over the winter, say rye or wheat or winter vetch, or, better still, a combination of all three.

Farmogerm

Supplies the nitrogen-fixing bacteria necessary for the successful growth of Beans, Peas, Field Peas, Alfalfa, Sweet Clover, Red Clover, Mammoth Clover, Crimson Clover, Alsike Clover, Vetch, Soy Beans, Cowpeas, Field Beans, Field Peas; also Mixed Garden crops. Separate cultures are offered for each of the above; state for which crop required.

Garden size	$0 50	3-acre size	$2 50
1-acre size	1 00	12-acre size	9 00

Charges prepaid

A Simple Method of Testing a Soil for Lime

Soil that has not carried a crop for some years, or in which a very high proportion of vegetable matter exists, will frequently show an acid condition. This is due to the fact that, when vegetable matter decomposes, one of the results of decomposition is the formation of a quantity of humic acid. Very few grass plants thrive in soil which is highly acid. Most grasses succeed best in land which is only slightly so, and it is frequently necessary to correct a highly acid condition. The most usual method of correcting acidity in soil is to add lime.

Although lime is decidedly a plant-food, an excess of it is injurious, and it is very undesirable to apply lime to land which already has a sufficiency of it. It is always to be recommended, therefore, that the following experiment be used to determine whether lime is needed or not. Obtain two watch-glasses or crystals and from a drug store a supply of both blue litmus paper and red litmus paper. Take a small strip of the blue and place it in the bottom of one of the watch crystals; take a piece of red, and place it in the bottom of the other crystal. Now take a handful of the soil to be tested, which must be in a moist condition, and place it in one of the watch-glasses, covering the litmus paper. Take the other watch-glass with the litmus paper in position, and place it on top of the soil. Press the glasses together quite tightly and bind them with an elastic band. Leave for an hour, by which time one of three things will have happened. Should the red litmus paper have turned bluish you may conclude that your soil already has enough or even too much lime. If your blue litmus paper has turned red, your soil is evidently acid, and will benefit by an application of lime. If neither the red nor the blue paper has changed color, your soil is neither extremely acid nor extremely alkaline, and under such conditions it is generally desirable not to apply lime.

Other pointers that suggest acid conditions and a consequent need for lime would be:

(*a*) The presence of sedges, rushes, sorrels, or wild iris shows lack of drainage, with consequent probable acidity. In this case, drainage is probably needed badly.

(*b*) Patches of moss indicate either acidity or poverty of soil: that is, a lack of the foods needed by grass. It is a good thing to correct for both possible causes by dressing with lime and then adding compost or manures and a chemical fertilizer.

(*c*) Sour land, needing lime, has a disagreeable smell that is readily recognized by greenkeepers.

(*d*) Land that lies low, land which has recently been cleared of trees and brush, or land that is excessively wormy —all these usually are signals that lime is advisable. All the above, too, if excessive, indicate that drainage should be considered also.

A note of warning. Do not add lime to putting-greens until the question has been well considered, because the effect of a dressing of lime is very often to increase the size of white clover plants already there, and in some cases to stimulate into growth seeds of white clover which ordinarily would remain dormant in the soil. Under these conditions, a partial substitute for lime would be charcoal: a dressing of this sweetens the soil but has little effect, one way or another, on clover.

Is It Necessary to Test a Soil for Other Elements Than Lime?

Of other plant-foods needed by grass, the three most important are: nitrogen, phosphoric acid, and potash. An analysis of soil will almost invariably show that these three are present in sufficient quantity to support grass. But an analysis will not tell you how much of these may be ready at the plants' immediate disposal, and how much is locked up for future generations of plants to use. These elements, although widely present in soils, are generally in a state in which the plant cannot use all of them at once. The decomposition, which alone time can effect, is necessary gradually to release these elements for the use of plants. As, therefore, a chemical analysis does not tell you fully what small proportion of the elements in question are immediately available, and as, if it did, such proportion would be very small, it is generally desirable to proceed along the following rules. In sowing down a new course, if the land has previously carried good crops, it will generally not be economy to add further quantities of nitrogen or phosphoric acid, but if it has lain waste for some years, it is always desirable to add a chemical fertilizer containing both nitrogen and phosphoric acid. In existing turf, in view of the fact that the greens are being cut, which is another way of saying the greens are being cropped regularly every day or two during the summer, it is always a good rule to return to the land approximately as much phosphoric acid and nitrogen as the grass clippings may be expected to have removed together with the quantity of these elements that may have seeped away in the drainage water. In other words, in sowing down new land, the addition of these two elements is generally desirable, and in the treatment of existing turf, their addition is almost always desirable. It is fortunate that grass plants need very little potash, and there is generally sufficient in the soil to take care of their requirements; it is usually unnecessary to add it except to protect against fungous disease.

The commercial fertilizers are always sold on a basis of analysis, and the somewhat cryptic array of figures, generally three, represent ammonia (containing nitrogen), phosphoric acid, and potash.

In practice it is found that phosphoric acid is the one element that is most frequently lacking, and is the one most needed by young grass; and an economical and desirable fertilizer would have an analysis of 2–10–1, which would mean: 2 per cent ammonia—nearly 2 per cent nitrogen—10 per cent phosphoric acid and 1 per cent potash. It will be understood that in the case of newly sown fairways an additional quantity of nitrogen will have been added by the cover-crop or manure. We offer a material that we consider an ideal dressing for fairways in our "Fairgreen Fertilizer," and the cost, approximating only about $35 per acre, is such as to warrant its being used in quantity.

The Compost Heap

Practice extended over a number of years indicates that good turf is the result of constant, unremitting care as much as of initial selection of soil and seed. In other words, turf has to be "nursed" along all the time, and the most effective way to care for it is to scatter broadcast materials which feed or protect the grass. These materials consist essentially of two ingredients:

1. A plant-food, yielding some one or another of the elements required by grass, chief being ammonia, phosphoric acid, potash and lime, mixed carefully with:

2. A "filler" or base which serves the primary purpose of distributing evenly the above-mentioned food and which secondarily may be of value by adding further quantities of plant-food, and, what is more important, may be used to improve the mechanical condition of the land.

Such a mixture we call "compost." Land to grow grass must not be too light or too heavy, too porous or too sticky; must not contain too much vegetable matter, nor must it contain too little. It should, in short, be as near as possible to a medium sandy loam, and, in deciding on a "filler" or base, that one should be chosen which will have a tendency to correct and bring to the happy desired mean the soil of the greens.

The filler may be obtained as wanted, and the grass foods or fertilizers may be purchased from time to time, but there are many advantages to be derived by procuring these ahead of time and storing them. They are stored in a "compost heap."

A compost heap is the greatest producer of fine grass, and every course should possess one. It is a storehouse of soil-building material, the use of which tends to make the land mechanically and chemically perfect, and with it greens and tees are periodically top-dressed. Compost improves with age—the more decayed it is, the more valuable it is.

All grass will benefit with an application of compost, but especially turf which is thin and poor or coarse, and which covers soil which is (1) excessively light, (2) excessively heavy, or (3) which contains an excess of decayed vegetable matter. Grass does not like an over-abundance of any one ingredient in the soil, and, by means of top-dressings, it is possible eventually to correct such a condition so far as the uppermost layer of the soil is concerned.

As to when top-dressings should be given, we advise a comparatively heavy dressing of compost before winter, say 3 or more cubic yards per green; a medium-heavy dressing, say 1 or 2 cubic yards per green in early spring; and a very light dressing, say 3 or 4 wheelbarrow loads per green, every three or four weeks during the playing season. This latter quantity is so small that play is not interfered with.

What is an ideal compost for top-dressing depends upon the soil upon which the greens are built. For land that is light (1), we advise a mixture of good top-soil, mushroom soil, and Emerald Grass Fertilizer.

For land that is medium or heavy (2), we recommend a mixture of coarse sharp sand, mushroom soil, Emerald Grass Fertilizer and hydrated lime.

In constructing the storage-pile, mushroom soil should be spread in a layer 4 inches thick, the top-soil or sand 3 inches thick spread over it. Continue with alternate layers of Mushroom Soil (4 inches) and top-soil or sand (3 inches) until the pile reaches a height of 4 or 5 feet. On the top of each layer of soil add a little Emerald Grass Fertilizer, and for heavy land on each layer of Mushroom Soil dust a very small quantity of hydrated lime.

For land that has an over-abundance of vegetable matter in its composition (3), use sand only, or a mixture of sand and top-soil, with Emerald Grass Fertilizer. Care has to be taken in selecting your top-soil, because it frequently contains weed seeds.

A compost heap cannot be too large. Although a top-dressing may with every advantage be given immediately the heap is made, the longer the compost is kept, the more valuable it will be. Sufficient to last several years is not too much. An average eighteen-hole course will consume a minimum of 100 tons (3 carloads) of Mushroom Soil, and 60 cubic yards of coarse, sharp sand every year for top-dressing and other work. It is a good plan to make one's heap long and narrow, say 10 feet wide, 6 feet high, and as long as necessary.

This heap of layers of sand or top-soil, and manurial matter should preferably be in a pyramid shape, as this will shed rain, but it is far better for the club to realize that every rainstorm is robbing their manure of some of its value and to *provide a roof* over the compost heap so that the fertilizing materials will be conserved.

There is no special apparatus required for applying top-dressing. It is readily broadcasted by means of shovels or by hand, and where, by accident, a little may have been deposited somewhat too thickly, it may be evenly distributed with the aid of birch brooms or rakes. When taking compost from the heap, use care to spade through in a vertical manner, thus obtaining a complete mixture, and *pass the material through a rotary screen before applying.* When the compost heap has been newly made, the largest mesh of this screen will generally be of ½-inch mesh, but as the heap gets older and decay becomes more complete, a screen with a ¼-inch mesh may be used. All material which refuses to pass through the screens may be returned to the compost heap to decay further.

There are other uses to which we may put compost. In any construction work, particularly new greens or tees, a layer of compost is invaluable to form a seed-bed. In sodding, the soil on to which the sods are to be laid can well be mixed with a little compost to ensure their "taking," and, after laying, they may be cemented together by sprinkling over them, between the cracks, some of the above-mentioned compost, to which a few pounds of suitable grass seeds have been added.

After weeding, if a little sifted compost is mixed with seed and the holes filled with it, the greens immediately recover. Bare patches that have been caused by wear, grub attacks, and other causes, may be quickly repaired with some of this seed and compost mixture. When planting trees, when seeding bunkers, and when conducting many other of the operations around a golf-course, a supply of compost is invaluable. The purchase of materials for the compost heap may be regarded as an investment which continually increases in value.

SCOTCH SOOT

Scotch Soot contains Nitrogen, the one element that grass plants need. Traces of sulphur, phosphates and potash are also found in soot.

The turf is given a moderate stimulus, because the Nitrogen is in such a form that its action is gentle and lasting; yet it acts very quickly.

Putting-greens take on a rich dark color as a result of an application of Scotch Soot.

Injurious forms of animal life are discouraged. We know courses (in the United States) where Scotch Soot has been applied regularly to the greens, and last year these courses were immune from the attacks of the white grub.

Scotch Soot is of benefit as a fungicide. Its small sulphur content makes it so.

We believe the use of Scotch Soot will result in the improvement of your turf, help you prevent white grubs and ward off brown spot.

When to use Scotch Soot: We suggest spring and early fall.

How to use Scotch Soot: Simply broadcast it over the turf; it will not burn the grass.

How much Scotch Soot to use: On an average size green 75 x 75 feet, and on the approaches, apply 50 pounds mixed with twice its bulk or more of sand, screened top-soil, or humus. Figure larger or smaller areas at the rate of 500 pounds per acre or 1½ ounces per square yard. Four of these dressings, April, May, August and September, will be most beneficial.

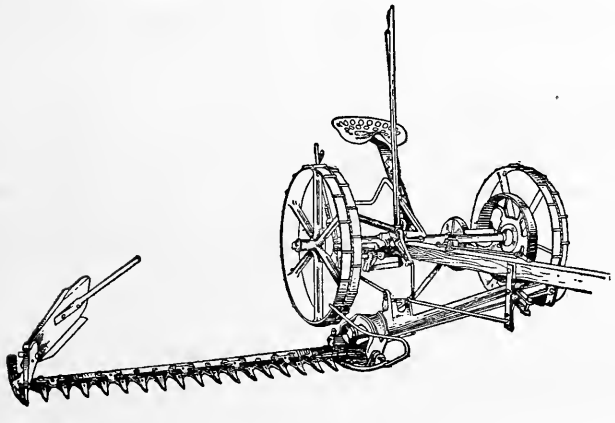
We offer genuine Imported Scotch Soot at:

$7 per 100 lbs., $32.50 per 500 lbs., $120 per ton. F.O.B. New York, immediate shipment.

SULPHATE OF AMMONIA

Is occasionally used as a liquid manure for the purpose of stimulating grass. Dissolve 2½ pounds in a 50-gallon barrel of water, and use four to six barrels on an average green, preferably during wet weather and never during hot, sunny weather. Some greenkeepers repeat every month or six weeks, but it should be remembered that only nitrogen is introduced when Sulphate of Ammonia is applied; phosphorus and potassium are needed too, and the repeated use of Sulphate of Ammonia alone is harmful. Support it with monthly top-dressing of compost containing Emerald Grass Fertilizer.

100 lbs. $7.50, 500 lbs. $35, ton $125.



HAY MOWER

For cutting the rough; useful too for the fairway if it has been allowed to grow too long for the regular cutter.

One Horse, 3½-ft. cut	**$80 00**
Two Horses, 5-ft. cut	**85 00**
Two Horses, 6-ft. cut	**90 00**

FUNGICIDES, INSECTICIDES

Ammoniated Copper Solution. An excellent preventive of the Brown-Spot Fungus in putting-greens. Spray weekly if an attack is feared. Mix one gallon of the solution with 40 gallons of water. Gal. $4.

Arsenate of Lead. Powder. Recommended occasionally for cutworms. Lb. 45 cts., 5 lbs. $2, 10 lbs. $3.50, 50 lbs. $14, 100 lbs. $25.

Bichloride of Mercury (Corrosive Sublimate). A deadly poison.. Occasionally recommended for killing earthworms. Keep it under lock and key. "Vermol" is safe and more effective. Lb. $2. Special quotations on quantity.

Black-Leaf 40. A concentrated solution of nicotine sulphate; an excellent spray for lice which appear on shrubbery. Dilutes one part to 900 or 1,000 parts of water, according to treatment. Full directions on each package. 1-oz. bottle 35 cts., ½-lb. tin $1.25, 2 lbs. $3.50, 10 lbs. $13.50.

Blue Vitriol Powder. Lb. 35 cts., 5 lbs. $1.50, 10 lbs. $2.75, 25 lbs. $5.75, 50 lbs. $10, 100 lbs. $15.

Bordeaux Mixture Dry Powder. One of the best fungicides known, on account of its metallic copper. Copper in this form stimulates the growth of plants on which it is applied, acting as a tonic. Bordeaux Mixture is the recognized fungicide for the control of most fungous diseases. Apply dry or dilute 4 to 4½ pounds to 50 gallons of water. ½lb. 20 cts., lb. 35 cts., 5 lbs. $1.50, 10 lbs. $2.75, 25 lbs. $5.75, 50 lbs. $10, 100 lbs. $17.25.

Bordeaux Mixture, Paste. The standard fungicide. Spray frequently as a preventive of fungus in turf. Full directions with each package. Lb. 35 cts., 5 lbs. $1.50, 10 lbs. $2.75, 50 lbs. $10, 100 lbs. $18.50.

Carbon Bisulphide. Gives off a gas which is fatal to ants, grubs, and earthworms. Although a poison and highly inflammable, is safe if reasonable care is used. Will kill grass, hence must be introduced into the soil through a special funnel as shown on page 40. Lb. 75 cts. Special quotations on quantity.

Climax Lawn Sand. This is by far the best preparation for eradicating weeds from existing turf. It will not destroy established perennial weeds such as dandelions, plantains or crab grass, but it will kill young dandelions, young plantains, together with those annual weeds which have a fibrous root system, such as chickweed, mouse ear, veronica, also moss. Further, it feeds the grass, and we recommend its extended use. For areas heavily infested with weeds, we advise that the Lawn Sand be scattered over the turf at the rate of six ounces per square yard, while for individual weeds, a small quantity, say a spoonful, placed on the crown of each weed will very quickly destroy it, and will stimulate the surrounding grass, so that the patch left by the weed very quickly heals. 3½ lb. can 65 cts., 7-lb. can $1.25, 14-lb. can $2, 28-lb. pkg. $3.75, 56-lb. pkg. $7.25, 140 lbs. $14.

AND SUNDRY CHEMICALS

Cyanide of Soda. Another highly dangerous poison, but necessary for killing the white grub. Lb. 75 cts.

Fish-Oil Soap. Will control many of the insect pests that attack plants; of value to the greenkeeper as a means whereby Carbon Bisulphide may be worked up into an emulsion for control of the small white grub. Lb. 25 cts., 5 lbs. $1.10, 10 lbs. $2, 100 lbs. $15.

Formaldehyde. An effective and widely known fungicide and germicide of occasional value for turf. Fluid pound (pint) 50 cts., 60-lb. keg $18.

Herbicide. For destroying weeds in roadways, paths and gutters. Fatal to grass and other plants, including weeds, but does not injure stone, woodwork or the shoes of the person applying it. One gallon of Herbicide mixed with forty gallons of water is sufficient for 100 to 150 square yards of roadway. Qt. 60 cts., ½gal. $1, gal. $1.75, 5-gal. keg $7.50, 10-gal. keg $13.50, 30-gal. cask $30, 50-gal. bbl. $45.

Kerosene Emulsion. Occasionally recommended as a spray for putting-greens infested with white grub. Contains 55 per cent kerosene. Dilutes 1 part to 25 to 50 parts of water. Qt. 60 cts., gal. $1.50, 5 gals. $6.25.

Lime-Sulphur, Concentrated. For spraying trees to destroy San José scale. One gallon makes ten gallons of spray; dilute with cold water. Qt. 50 cts., 1-gal. can $1, 5-gal. can $3.25, half-barrel (about 25 gals.) $8, barrel (50 gals.) $14.

Paris Green. A well-known poison occasionally demanded when a green is infested with cutworms. Mix 5 pounds with 50 pounds of moistened bran and scatter on the green after play is over for the day. Brush up and remove next morning. Lb. 55 cts., 5 lbs. $2.50, 14 lbs. $6.

Powdered Sulphur. Twenty-five pounds per green of this, dusted over the turf is frequently effective in warding off an attack of fungus. Lb. 25 cts., 5 lbs. $1, 10 lbs. $1.60, 100 lbs. $10.

Sulphuric Acid. Commercial strength. Occasionally used as a weed-killer. Extreme care in using this material is necessary. Fluid pound (pint) 75 cts.

Tobacco Stems. Sometimes used by greenkeepers as a dressing for putting-greens. Bale of 100 lbs. $4.

INSPECTION OF GOLF COURSES

A part of our service is to make personal inspections of golf courses and advise with you on the ground. Usually we can arrange to do this without cost to you—we suggest that you write us.

Stumpp & Walter Company's Ready Reference Formulæ for Greenkeepers

FERTILIZERS AND MANURES

*Materials marked thus should always be mixed with twice their bulk of sand, soil, or humus before being applied to existing turf.
The chemical symbols, where given, are those of the active ingredient. Commercial grades of chemicals used for fertilizing purposes are more or less impure and contain other materials also.

MATERIAL	WHY IT IS USED	WHEN IT IS USED	TYPICAL ANALYSES (Subject to variation) Ammonia, phosphoric acid, potash	WHAT MAY HAPPEN IF TOO MUCH IS USED	HOW MUCH MAY BE USED: When preparing new land for grass — Acre (Lbs.)	Putting-Green (Average) (Lbs.)	Square Yard	HOW MUCH MAY BE USED: For top-dressing existing turf — Acre (Lbs.)	Putting-Green (Average) (Lbs.)	Square Yard	PRICE (Subject to change without notice): 100 lbs. F.O.B. New York	500 lbs. F.O.B. New York	2000 lbs. (Ton) F.O.B. New York	Per ton (2000 lbs.) in carload lots F.O.B. shipping point
(a) CHEMICAL FERTILIZERS — These add to the land the plant-foods required by grasses, but they have little effect upon the mechanical condition of the soil														
Stumpp & Walter Co.'s Fairgreen Fertilizer	Adds to the soil the elements required by grass. Although quick to act, its effect is spread over one to two years.	Spring, summer, or early fall.	2–10–1	An excess may burn the grass temporarily, but quite safe when used in the quantities indicated.	1500	....	5 ozs.	750	....	2½ ozs.	$3.00	$13.50	$50.00	$40.00
Stumpp & Walter Co.'s Fertilizing Meal. (For top-dressing)	Nurses along grass that has been newly sown; nourishes and protects it during the most critical period of its existence.	Spring, summer, or early fall.	6–3–2	Cannot harm the young grass unless applied greatly in excess of the proportions suggested.	....	....	....	2000	200	6 ozs.	6.25	27.50	90.00	75.00
***Stumpp & Walter Co.'s Emerald Grass Fertilizer.** (For Putting-greens)	A well-balanced formula, designed to feed only the finer grasses, and to keep them in a fine, healthy condition.	Spring, summer, or early fall.	4–6–3	Used with ordinary care, it will not damage existing grass in any way. We advise always that it be mixed with twice its bulk of top-soil, sand or humus.	1500	150	5 ozs.	750	75	2½ ozs.	5.50	20.00	70.00	60.00
***Stumpp & Walter Co.'s Anti-Clover Manure**	Supplies food to the grass plants only; these are encouraged and they flourish, while clover is eventually crowded out. Frequent dressings are advised.	Spring, summer, or early fall.	6¼–12–0	The above remarks apply. Should the upper leaves of the grass plants be scorched through using quantities in excess of those suggested, the turf will quickly recover; no permanent damage is likely.	1500	150	5 ozs.	750	75	2½ ozs.	6.00	25.00	80.00	70.00
***Coe-Mortimer Grade A** (For Golf Putting-greens)	For *golf courses.* Two brands which are popular with many greenkeepers.	Spring, summer, or early fall.	7–3–2	An excess may burn the grass temporarily, but these brands are quite safe when used in the quantities indicated.	1500	150	5 ozs.	750	75	2½ ozs.	....	..	60.00	50.00
Coe-Mortimer Grade B. (For Golf Fair-greens)			5½–3–2		1500	..	5 ozs.	750	....	2½ ozs.	....	....	50.00	45.00
Basic Slag; Thomas' Phosphate Slag $Ca_4P_2O_9$	Contributes phosphoric acid and lime. Is slow-acting.	Fall and winter.	0–16–0	Safe to use, but if applied too freely tends to encourage clover.	2000	200	6 ozs.	1000	100	3 ozs.	3.75	17.00	60.00	50.00
***Kainite, Hardsalt, Sylvanite. A natural mixture of the salts, potassium chloride and magnesium sulphate, with common salt.** KCl, $MgSO_4$, $3H_2O$.	Valuable to *scatter on the manure pile* or compost heap every time additions are made to it, where it acts in fixing the nitrogen which otherwise will gradually leach away; allow 50 lbs. of kainite to every ton of manure. Valuable also for applying to land for grass and clover.	Any time: for top-dressing avoid early spring.	0–0–12	Do not use in excess of the quantities advised.	1500	150	5 ozs.	750	75	2½ ozs.	3.00	13.50	50.00	45.00
***Land Plaster, Gypsum, Calcium Sulphate, Sulphate of Lime, Plaster of Paris.** $CaSO_4$, $2H_2O$.	Widely used as a *dusting for the manure pile* to fix and retain the volatile nitrogen. Of value for adding lime to soil without giving it an alkaline reaction.	Any time.	.....	Keep within recommended limits.	2000 to 6000	200 to 600	6 ozs. to 20 ozs.	1000	100	3 ozs.	Per bbl. of 300 lbs. 10.00	...	....	....
Lime, Hydrated. Calcium Hydroxide, Slaked Lime. CaH_2O.	Lime is a plant food, and, further, it liberates other foods in the soil. It also corrects acid conditions in the land. Lime is of use for binding loose soils, while, curiously enough, it also opens heavy land.	Any time.	60% calcium oxide	In excess, plant-food may be liberated too quickly and be lost with drainage-water. Further, too much lime on soil which does not really need it will destroy vegetable matter that forms part of the soil and render the whole area sterile.	2000 to 6000	200 to 600	6 ozs. to 20 ozs.	500 to 3000	50 to 300	1½ ozs. to 10 ozs.	100 lbs. 2.00	8.75	30.00	18.00
Limestone, Pulverized Calcium Carbonate. $CaCO_3$.	The above remarks apply, but Pulverized Limestone is slower to act.	Any time.	45% calcium oxide	The above remarks apply.	2000 to 8000	200 to 800	6 ozs. to 25 ozs.	500 to 3000	50 to 300	1½ ozs. to 10 ozs.	1.50	6.00	18.00	9.50
***Muriate of Potash, Potassium Chloride.** KCl.	A much used *constituent of mixed fertilizers.* The growth of plants is dependent upon a sufficient supply of potash and muriate is one of the most convenient means of applying it.	Any time.	0–0–50	An excess would singe the turf.	750	75	2½ ozs.	350	35	1 oz.	6.00	27.50	100.00	85.00
***Nitrate of Soda, Chili Saltpeter.** $NaNO_3$.	Adds nitrogen, but in such a form that the grass plants can take immediate advantage of it. It is best to regard nitrate of soda as a stimulant merely, and its use is recommended only in limited quantities.	Spring to late summer.	18–0–0	It is quite easy to damage seriously a turf with Nitrate of Soda. The results from a single dressing are frequently so marked and so quick that there is a temptation to use it too freely. We advise that no more than two dressings be given in any one season; do not force the grass.	....	....	....	350	35	1 oz.	5.50	25.00	90.00	75.00
Phosphate, High Grade Acid or Rock, Soluble Calcium Phosphate. Phosphate of Lime. $CaH_4(PO_4)_2$.	Adds phosphoric acid and small quantities of lime. Splendid for soils showing an alkaline reaction.	Late winter, spring or early summer.	0–16–0	An excess will sour the soil, and if continued dressings be given it may render the soil sterile.	1000	100	3 ozs.	750	75	2½ ozs.	3.00	12.50	40.00	35.00
***Soot, Scotch** (Imported)	The usual impurities of Soot are splendid plant-foods, and its use is invariably followed by a luxurious dark green turf. It also discourages soil-pests, such as grubs, wireworms, cutworms, and earthworms.	Spring, summer, or fall.	3½–0–0	An excess may smother the grass or choke it. Further, dressings in excess of those indicated by us are likely to take some time before they disappear, in the meanwhile, they are unsightly.	....	. .	...	500	50	1½ ozs.	7.00	32.50	120.00	105.00
***Sulphate of Ammonia.** $(NH_4)_2SO_4$.	Has approximately the same effect as Nitrate of Soda, but is less harmful. Discourages many types of weeds, and its continued use frequently results in a cleansing and lining of the turf.	Spring to late summer.	25–0–0	The same warning note may be sounded as with Nitrate of Soda. Sulphate, however, is slower to act, and is far safer. Tends to make the soil acid.	.	...	....	350	35	1 oz.	7.50	35.00	125.00	110.00
(b) MANURES OF ANIMAL AND VEGETABLE ORIGIN — In addition to adding plant-foods, many may with safety be used in sufficient quantity to affect markedly the mechanical condition of the soil														
Ashes, Canada Hardwood. Active ingredient is Potassium Carbonate, K_2CO_3.	Potash is the chief plant-food in Wood Ashes, and it is generally present in sufficient quantity in most soils; for this reason, Wood Ashes are not often needed on golf-courses.	Any time.	0–0–5	An excess will smother or choke the grass.	3000	300	10 ozs.	1500	150	5 ozs.	Per bbl. of 200 lbs. 5.00	....	40.00	30.00
***Blood, Dried**	Adds nitrogen and a small quantity of phosphoric acid and lime. A splendid dressing for light soils.	Late winter, spring or early summer.	16–0–0	The land will show an acid reaction after repeated dressings; various fungous growths will be encouraged; maggots, worms and other trouble-makers may be introduced.	1000	100	3 ozs.	500	50	1½ ozs.	100 lbs. 6.00	27.50	100.00	85.00
***Bone Meal**	Adds nitrogen, phosphoric acid, and lime to the soil. Is slow-acting and lasting; a splendid grass-food, but has the reputation of encouraging into growth any seeds of white clover that may be in the land.	Any time.	3–24–0	The soil may become sour; grubs, earthworms, and other forms of life encouraged, and fungous growths developed.	1500	150	5 ozs.	750	75	2½ ozs.	4.50	20.00	65.00	55.00
Cottonseed Meal	Yields a small quantity of nitrogen, but does so gradually. Its use results in a fine dark green turf. Cottonseed Meal is particularly useful as a dressing for young grass.	Spring, summer or fall.	3½–3–1	An excess may smother or choke the grass. Otherwise, the material is comparatively harmless.	2000	200	6 ozs.	1500	150	5 ozs.	4.50	20.00	65.00	55.00
Cow or Cattle Manure, Shredded and Desiccated.	Cow-droppings from which excess moisture has been driven off, the process also killing most of the weed seeds. Not often recommended for golf, but when used, 400 pounds may be estimated as the equivalent of a load of fresh Cow-Manure.	Spring, summer, or fall.	2–1½–1	Do not use much in excess of quantities advised; the land may sour.	2000 to 5000	200 to 500	6 ozs. to 16 ozs.	1000 to 2500	100 to 250	3 ozs. to 8 ozs.	4.50	15.00	55.00	45.00
***Sheep Manure, Pulverized and Desiccated.**	Sheep-droppings, treated as above. Highly recommended for greens and tees, particularly on soils which either are excessively heavy or excessively light.	Spring or early fall.	2½–1½–1½	Keep within recommended limits. Sheep-Manure in excess is somewhat caustic, and burning would result.	2000 to 5000	200 to 500	6 ozs. to 16 ozs.	1000 to 2500	100 to 250	3 ozs. to 8 ozs.	5.00	18.00	65.00	55.00
Spent Mushroom Soil	Stable-manure which has produced a crop of mushrooms, and which is partly rotted. Recommended for tees, greens, and fairways. Splendid for starting a compost heap.	Spring, summer, or fall.	1–1½–1	Difficult to use too much, provided it is mixed well with the soil on which it is being applied. If this is not watched the material would be likely to dry out during hot weather and become unsuitable as a medium for grass.	20,000 to 50,000	2000 to 5000	4 lbs. to 10 lbs.	10,000 to 25,000	1000 to 2500	2 lbs. to 5 lbs.	....	....	....	5.00
***Tankage; Blood and Bone**	Has approximately the same effect as Bone Meal, but Tankage is seldom used for golf purposes.	Any time.	6–12–0	Earthworms, grubs, and fungous growths will be encouraged, and a general acid condition of the soil is likely to result from its excessive use.	1000	100	3 ozs.	750	75	2½ ozs.	4.50	22.50	80.00	70.00
Tobacco Fertilizer and Insecticide.	For *lawns,* vegetables, flowers and farm crops. Consists of refuse tobacco leaves and stems ground to a coarse powder. In addition to its value as a fertilizer it kills many soil insects, and drives away beetles, ants, cutworms and snails. Slow-acting.	Any time.	2½–½–4	An excess may smother or choke the grass. Otherwise the material is comparatively harmless.	5000	500	16 ozs.	3000	300	10 ozs.	4.00	17.00	60.00	50.00
Horse-Manure, Cow-Manure, Farmyard Manure	Is almost a necessity on all construction work, but for putting-greens should be used in a rotted condition. Green committees are urged to procure a supply whenever available and store in compost heaps.	Any time, but use only fresh manure in fall or winter, and then for plowing under.	½–1–½	Difficult to use too much, short of changing entirely the character of the soil. Do not smother grass with too much rotted compost.	30,000 to 60,000	3000 to 6000	6 lbs. to 12 lbs.	15,000 to 30,000	1500 to 3000	3 lbs. to 6 lbs.	These materials are sometimes obtainable locally, with more or less difficulty. On request, we are always glad to quote prices. (Carload lots only.)			
***Chicken-, *Pig-, *Goat-, *Sheep-, *Pigeon- Manure**	Should never be used except when at least a year old, and then preferably composted with other materials.	Any time, when properly cured	Composition various	Remarkably easy to use too freely. These materials are high in plant foods, caustic, and may burn or stain the grass.	1000	100	3 ozs.	500	50	1½ ozs.	Obtainable locally in limited supply.			
(c) MECHANICAL MATERIALS — Most of them furnish little or no plant-food, but are valuable for (1) changing the texture of the soil, and (2) for mixing with, and helping the distribution of other more potent fertilizers. In other words, generally are of great value in compost														
Charcoal	When mixed with soil, Charcoal tends to lighten it; it helps to dry out wet land and to sweeten sour soils. As a top-dressing, it frequently has the effect of producing a fine sod where only coarse grass previously existed.	Any time.	Composition various	None of these materials will support grass alone, and their use in excess of the quantity indicated in the adjoining columns would be likely to produce a sterile condition. Of particular value for mixing with Nitrate of Soda, Sulphate of Ammonia, and other concentrated materials which would be likely to damage turf unless means are taken to insure their even distribution. Those chemicals which need blending in this way are marked thus (*) in this table.	4000	400	12 ozs.	2000	200	6 ozs.	4.50	20.00	65.00	55.00
Humus, Prepared Blacksoil, or Muck.	May be used profitably on sands, sandy loams, or even on heavy land if it is deficient in vegetable matter. Highly valuable, and cost alone limits its use.	Any time.	Composition various		30,000 to 60,000	3000 to 6000	6 lbs. to 12 lbs.	15,000 to 30,000	1500 to 3000	3 lbs. to 6 lbs.	100 lb. box 3.50	500 lb. box 15.00 F.O.B. New York	Ton in bales 40.00 F.O.B. Shipping Point	Bulk 10.00
Sand	Excellent as a top-dressing at all times, especially as a protection over winter. Frequently has the effect of fining the turf. Assists surface drainage. Sand should be "sharp," that is, its grains should be about the size of the letter "o."	Any time.	Composition various		....	6000 to 12,000	12 lbs. to 24 lbs.	30,000 to 60,000	3000 to 6000	6 lbs. to 12 lbs.	These materials are sometimes obtainable locally, with more or less difficulty. On request, we are always glad to quote prices. (Carload lots only.)			
Top-soil or Loam.	A practical necessity for the production of permanent grass. If grading is necessary during the construction of a fairway, care must be taken always to preserve and return the surface 6 inches. In the building of putting-greens or tees, a layer at least 6 inches thick should be applied, consisting of top-soil and such other materials as appear necessary.	Any time.	Composition various	Weed seeds must be expected with top-soil, even when it is obtained with the greatest care from the cleanest spots. Arrange to spread out the material for as long a period as possible before using or before sowing with grass seeds; this will give the weed seeds an opportunity to grow, when they may be killed by hoeing.	On new putting-greens, use from 20 to 50 loads of top-soil per green (the latter figure is not excessive). Mix with Mushroom Soil, Humus, Peat-Moss, or Sand, as may be necessary to render it mechanically fit to carry a turf; also with Emerald Grass Fertilizer, Bone Meal, or similar grass-foods. As a medium for top-dressing, 20 loads per acre, or 2 loads per green, would be usual.									
Prepared Golf Fibre.	A vegetable product that requires many years before it will decay in the soil. In the meanwhile, it will absorb moisture and give it up slowly to the grass plants. Further, its presence in the top layer of the soil of a putting-green adds materially to the resilient, carpet-like feel of good turf.	Any time.	Composition various	Do not use in very much greater quantities than those suggested. The remarks under Charcoal, Humus and Sand apply also to Peat-Moss.	....	1000	2 lbs.	....	500	1 lb.	Per bale of approximately 200 lbs. $6.00. 10 bales $55.00.			

PRICES SUBJECT TO CHANGE

LIME

There are four imperative reasons for the use of Lime:

It is one of the essential food elements of plants.

It has the property of unlocking other food elements in the soil.

It sweetens and makes fertile soils that are acid, decomposing the humus or organic matter in the soil.

It corrects the mechanical condition of land, tending to lighten soils that are heavy and sticky, and tending to bind soils that are light and sandy.

Lime strengthens the internal structure of plants, increases root-production, and aids in the production of starches and sugars. It is needed in quite large quantities by grass and clover land.

HOW MUCH LIME TO USE

On land that is not at the time carrying a crop, you may use from one ton to three tons to the acre, the heavier the land the more freely, as a rule, does one apply Lime: do not apply more than one ton at a time to sandy soils. For sweetening pasture fields or grass land generally use one-half the above quantities.

Lime may be applied at any time to land that is not being cultivated, generally after plowing or digging and before harrowing or raking. Use it on grass or clover in the winter, spring or fall—not during summer. We offer Lime as follows:

PULVERIZED LIMESTONE. Made from the purest crystalline, white limestone obtainable, and has many advantages over burnt or caustic Lime. Not being caustic, it does not burn the humus in the soil, and may be applied at any time of the year without danger. It is good for all crops, especially for the successful growing of Grass, and, owing to its extreme fineness, admits of very even distribution. Put up in 100-lb. bags $1.50, 500 lbs. $6, 1,000 lbs. $10, ton $18.

HYDRATED LIME. This Lime is especially prepared for use on soil and is a combination of calcium-hydroxide and calcium-carbonate, very finely pulverized. Hydrated Lime is another name for slaked lime; it may be regarded as quick-lime combined with one-third its weight of water. 5 lbs. 30 cts., 10 lbs. 50 cts., 25 lbs. $1, 100-lb. bag, $2;.500 lbs. $8.75, 1,000 lbs. $16, ton $30. In lots of 3 tons or over we can offer at the rate of $27 per ton. Carload lots at $18 per ton, f. o. b. shipping point.

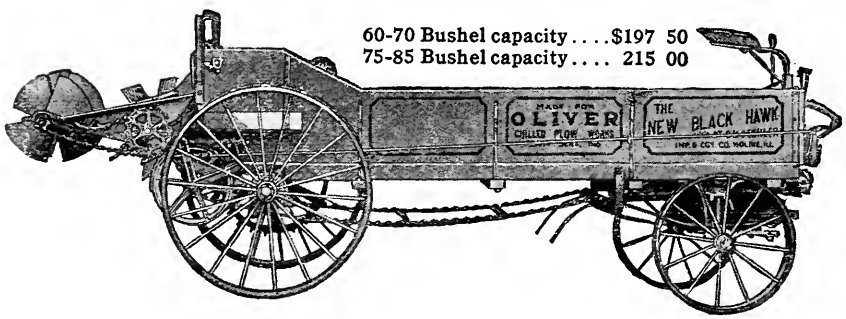
A SPECIAL QUANTITY PRICE ON LIMESTONE

We are favorably situated in regard to Lime in **carload lots** and we offer Pulverized Limestone in quantities of 30 tons or more at $9.50 per ton f.o.b. shipping point; packed in heavy weight paper bags.

WHAT KIND OF LIME TO USE

For **large areas,** such as golf courses, estates or farms, where frequent applications are not profitable, use **Pulverized Limestone:** it is slow in its action but its effects last for quite a long while. When using Lime in quantity, Pulverized Limestone is to be preferred.

For **small areas,** like suburban gardens and house lawns, and in cases where applications may be made every year or oftener, use **Agricultural Hydrated Lime:** it is very quick in its action—you will see results in a few weeks, but it is not lasting in its effects.



60-70 Bushel capacity....$197 50
75-85 Bushel capacity.... 215 00

MANURE SPREADER

In the design of this spreader the principle of rotary motion is employed wherever possible. This reduces friction to the minimum, decreases draft and insures long life. This spreader is closely coupled, the entire wheel base is only 92 inches which insures ease of handling and lightens the draft. The entire spreader mechanism is chain drive, supplying the most positive, economical and durable form of power transmission. The driving chain that lowers into mesh with the main drive sprocket is in motion only when operating the distributing device. This greatly reduces wear as the chain is lifted from the main sprocket wheel when the spreader is thrown out of gear, leaving no parts running idle.

Compost

HOW FAR WILL IT SPREAD?

Thickness of layer	Quantity deposited				Area that 1 cubic yard will cover
	Per square yard	Per 400 square yds. (Small putting-green)	Per 500 square yds. (Average putting-green)	Per 600 square yds. (Large putting-green)	
Inches	Cubic yds.	Cubic yds.	Cub.c yds.	Cubic yds	Square yds.
.1	.0028	1.12	1.40	1.68	360
.2	.0056	2.24	2.80	3.36	180
.3	.0084	3.36	4.20	5.04	120
.4	.0112	4.48	5.60	6.72	90
.5	.0140	5.60	7.00	8.40	72
.6	.0168	6.72	8.40	10.09	60
.7	.0196	7.84	9.80	11.76	52
.8	.0224	8.96	11.20	13.44	45
.9	.0252	10.08	12.60	15.12	40
1.0	.0280	11.20	14.00	16.80	36
2.0	.0560	22.40	28.00	33.60	18
3.0	.0840	33.60	42.00	50.40	12
4.0	.1120	44.80	56.00	67.20	9
5.0	.1400	56.00	70.00	84.00	7.2

What Does Soil Weigh?

The terms "heavy" and "light" when applied to soils refer to the kind of labor necessary to work them and they have no reference to the actual weight of the material. A glance at the following table shows that a cubic yard of "heavy" soil actually weighs less than a similar quantity of "light" soil.

Weight of Soil Materials

	Cubic foot Lbs.	Cubic yard Lbs.
Humus (as naturally found)	20.9	564
Humus (prepared)	35.0	945
Water	62.3	1683
Clay	63.0	1701
Medium top-soil	71.3	1925
"Heavy" (i. e. sticky top-soil)	89.4	2414
Quartz (sand)	90.3	2438
"Light" (i. e. sandy) top-soil	96.6	2608
"Heavy" (i. e. sticky) subsoil	101.4	2738
Medium subsoil	102.3	2762
"Light" (i. e. sandy) subsoil	106.9	2886

Cover the Manure Heap

Manure will deteriorate in value unless it is protected by a roof. Every rain will wash away its most valuable chemical constituents, and it is far best kept in a shed or similar building. If this is not possible, and the open is the only place for the heap, then at least construct it with sloping sides so as to shed rain, and cover with a 4- or 6-inch layer of soil.

A further advantage in placing the manure or compost heap under cover is that during bad weather work need not stop. On large estates, golf-courses, etc., there is a steady demand for screened manure or compost, and the screening, under cover, is an excellent rainy-day job.

Mixing Fertilizers

It is usually quite unnecessary for the Greenkeeper to mix his own fertilizers, for the Stumpp & Walter Co.'s line of already mixed fertilizers will be found sufficient for most requirements. They are blended in accordance with well-tested formulas. However, for those who prefer to mix their own, the following two points will be of assistance:

First. Some fertilizers should never be mixed together or applied at the same time. Never blend:

Calcium cyanamid with sulphate of ammonia, acid phosphate, or animal manures.

Sulphate of ammonia with basic slag, calcium cyanamid or lime.

Lime with bone-meal, tankage, blood, acid phosphate, basic slag, sulphate of ammonia, or animal manures.

Acid phosphate with basic slag, calcium cyanamid, or lime.

Basic slag with animal manures, acid phosphate, sulphate of ammonia or lime.

Other fertilizers may be mixed with safety.

Second. Make your blends immediately before you use them. There are many substances among the list of fertilizers which will very quickly deteriorate if kept any length of time after mixing together.

When applying fertilizers to grass, a quantity of top-soil, sand, or humus may well be used as a filler or distributor when applied to a small area in the proportion of two parts by bulk of compost, sand, or humus to one part of the fertilizers to be applied. (It is generally not practical to use a base when fertilizing large areas—fairways for example.)

The use of a filler ensures an even distribution of the active material, avoids any burning of the grass, protects the plants, and may be employed to improve the mechanical condition of the land. For example, greens on heavy land will be greatly improved by the continued use of sand with every top-dressing; the advantages are obvious of employing humus to aid in the distribution of fertilizers to light, hungry soils.

We are prepared to advise personally with you on your turf difficulties, a service which has been a characteristic of our business for the past ten years.

Sheep on a Golf-Course

On light land, the presence of sheep is generally very advantageous. They keep the fairways well cropped, and, generally, in their feeding they are very thorough. The effect of their treading in firming and compacting light land is very valuable, and their manure is rich in plant foods. They will generally not do much damage to putting-greens, because the grass on the green is always kept so well cut that there is little temptation to cause them to leave the longer grass of the fairway. On medium or heavy land, or on any soil during wet weather, sheep should be rigorously excluded.

One of the principal features of our business is to keep always a display of seasonable goods at our spacious stores, and we invite our patrons who come to New York to visit our establishment. You will find our people never too busy to talk with you about your turf problems.

Materials for the Compost Pile (SEE ALSO PAGES 24 AND 25)

MUSHROOM SOIL, in cars containing from 30 to 40 tons, $5 per ton, f. o. b. Pennsylvania shipping point. Through freight rate to your station gladly quoted on request. Mushroom Soil is partly decayed horse-manure, which has grown a crop of mushrooms. Only pure droppings from healthy animals will produce mushrooms; hence Mushroom Soil is a particularly desirable type of manure. It is highly concentrated, and in comparing its cost with that of fresh stable manure, it may be assumed that one ton of Mushroom Soil is equal in value to at least two tons of fresh manure.

HUMUS, in cars containing from 30 to 40 tons, $10 per ton, f. o. b. New Jersey shipping point. Special quotations on request for less than car. Humus is decayed vegetable matter that has accumulated for centuries in swamps and woodlands. It is occasionally preferred by greenkeepers for top-dressing.

PULVERIZED LIMESTONE. Wrapped in heavy-weight paper bags, in cars containing from 30 to 40 tons, $9.50 per ton, f.o.b. New Jersey shipping point. Special quotations for less than car quantities.

Limestone has many advantages over burnt or caustic Lime. Not being caustic, it does not burn the humus in the soil, and may be applied at any time of the year without danger. It is good for all crops, especially for the successful growing of grass, and, owing to its extreme fineness, admits of very even distribution. There are four imperative reasons for the use of Lime:

It is one of the essential food elements of plants.

It has the property of unlocking other food elements in the soil.

It sweetens and makes fertile soils that are acid, decomposing the humus or organic matters in the soil.

It corrects the mechanical condition of land, tending to lighten soils that are heavy and sticky, and tending to bind soils that are light and sandy.

Lime strengthens the internal structure of plants, increases root production, and aids in the production of starches and sugars. It is needed in quite large quantities by grass land. Clovers respond to a dressing of Limestone even more than do grasses. Hence we do not advise its indiscriminate use on putting-greens.

S. & W. Co.'s Special Grass Fertilizers

S. & W. Co.'s Emerald Grass Fertilizer. For putting-greens and tees. A well-balanced formula designed to feed the finer grasses only and to keep them in best condition. It will not burn the grass if applied with average care. For preparing the soil of new greens and tees it may be used at the rate of from 100 to 150 pounds per average-sized green (less in proportion for tees), or from 4 to 5 ounces per square yard. Take care that it is mixed with the soil no deeper than 3 inches. As a top-dressing use one-half these quantities—50 to 75 pounds per green—and mix with twice its bulk of compost, sand, or humus, to ensure its even distribution. $5.50 per 100 lbs., $20 for 500 lbs., $70 for 2,000 lbs.

S. & W. Co.'s Fairgreen Fertilizer. For fairways and for large areas of turf generally. Use at the rate of from 1,000 to 1,500 pounds per acre when preparing new land. Take care that it is mixed with the soil no deeper than 3 inches. To improve existing turf, use one-half this quantity (thus allowing 500 to 750 pounds per acre). Has a quick effect upon grass and the improvement is lasting. May be used during spring, summer, or fall. Is a desirable grass food and it will not burn if it is not used in excess of the foregoing quantities. $3 per 100 lbs., $13.50 for 500 lbs., $50 for 2,000 lbs. Write us for carload prices delivered to your station.

S. & W. Co.'s Anticlover Manure. For putting-greens, tees, and fine lawns. Is a complete plant-food, but stimulates chiefly the grasses. These are encouraged to grow at the expense of clovers and other leguminous weeds. The grass is seen to improve after the first top-dressing, and under average conditions clover will disappear after a few applications. Should be applied as a top-dressing to existing turf every spring and fall, at the rate of 50 to 75 pounds per average green, mixed with twice its bulk of compost, sand, or humus, to make certain that it is applied properly. For smaller or larger areas, allow 2 to 3 ounces per square yard. $6 per 100 lbs., $25 for 500 lbs., $80 for 2,000 lbs.

S. & W. Co.'s Fertilizing Meal. A light, mealy substance, high in plant-food, the purpose of which is to nurse newly sown grass along, nourishing and protecting it and pushing it to quick maturity. It is designed to be broadcasted on the young turf at the rate of 6 ounces per square yard, 150 pounds per average green, or 2,000 pounds per acre. Apply at any time of the year as soon as young grass has grown to be an inch high. $6.25 per 100 lbs., $27.50 for 500 lbs., $90 for 2,000 lbs.

For a general description of fertilizers and manures, see table between pages 24 and 25.

An Appreciation We note the following in *The Sun and New York Herald* of August 8, 1920: "One of the best golf courses in the Metropolitan district is that of Hollywood at Deal, N. J., where the international professional best ball match between the American and British teams of Hagen and Barnes and Ray and Varden was played last Sunday. Here is a course, the soil and turf of which are as close to perfection as there is any need for these to come."

We note the following in *The Globe* of September 22, 1920: "Both Varden and Ray have agreed that Hollywood is the best course that they have ever seen in America, and they have played a lot of them."

NOTE.—On the Hollywood course the Stumpp & Walter Co.'s Seeds and Fertilizers have been used exclusively and their advice followed, for the past six years.

Top-Dressing Putting-Greens

The farmer crops his land once, or perhaps twice a year, and he endeavors to return to the land in manure and chemical fertilizers approximately the same or a rather larger quantity of nitrogen, phosphoric acid, potash, and lime that his crops have taken from the land. The greenkeeper is cropping his greens every one or two days, and in a similar manner should return to the soil that which is taken from it. It is true that grass clippings may be left on the turf to decay and return their elements to the soil, but this is a very slow process, and in the meanwhile the grass suffers in texture and quality if the clippings are allowed to remain; further, the continued scattering of grass leaves, which dry into hay, gives the turf a light color, and the whole green is displeasing to the eye.

To return to our farmer: he is growing crops which root anything from 10 to 24 inches into the soil. With turf we have a crop which roots 4 inches only: this means that for success the top 4 inches must be of the highest quality that can be procured, and it also means that the wastage of plant-foods carried down into the soil by rain- and drainage-water is many times greater than the loss suffered by the farmer. Hence it has been found in practice that it is very necessary to top-dress the greenkeeper's growing crop, just as certainly and far more frequently than the farmer manures his. The best method to pursue is to arrange for top-dressings so frequently that they can be very light in quantity—so light, in fact that after being applied they are practically invisible after the first watering.

Top-dressings should consist primarily of a base of such material that will:

1. Correct any mechanical defects in the soil. Sand, for example, is good for sticky soils, Top-Soil for light soils, Mushroom Soil or Humus for land deficient in vegetable matter.

2. All other things being equal, it is best to use a material which at the same time affords some food for the grass. Mushroom Soil, or Cotton Seed Meal would come under this head.

3. Be free of weed seeds. Top-Soil is invariably full of weed seeds of one kind or another, and should be used only after samples of it have been spread on a flat surface for a few weeks to ascertain what and how many weeds develop directly from it.

Following is a list of suitable top-dressing bases:

Compost (A specially compounded mixture that should be available on every course. See page 24.)

Sand	Charcoal
*Humus	Screened Peat-Moss
*Mushroom Soil	*Top-Soil
*Rotted Stable Manure	*Certain factory by-products

*These materials should only be used after thorough test to ascertain their freedom from weed seeds and—very important in the case of strange substances—that they are harmless to plant-life. To the base, selected with a view to the soil requirements, will be added such other materials as the condition of the turf seems to indicate. In other words, the base serves as a carrier to distribute quickly and evenly whatever plant-foods the greenkeeper decides to use. These plant-foods have been listed (at least those more generally used) on table following page 24, from which the greenkeeper will be able to make his selection.

It is a good plan to start a system of regular top-dressings every three weeks. If the grass is in good shape, and its condition does not really call for definite feeding, then give the top-dressing of base only: Sand, Humus or Mushroom Soil. The point is to "nurse" along one's greens by these oft-repeated dressings.

The application is simple, about three or four wheelbarrow-loads of the base, mixed with the determined quantity of the plant-food, is turned several times with spades, screened and broadcasted by hand over the green.

The principles of top-dressing a fairway are essentially the same as above, except, of course, the dressings cannot be given as often. Once a year is as much as most clubs can afford, although twice a year, spring and late summer, would generally repay the club for the expense involved.

A reference to the table between pages 24 and 25 will give an idea as to quantities generally used, both of base materials and the more active chemicals. These quantities may be adopted so far as the fairway dressings are concerned, but they may be reduced materially when the regular three-weekly dressings are given to the greens. Reduce the base materials sufficiently that play will not be interfered with and that the appearance of the turf will not suffer, and reduce the active materials to one-quarter or one-half. For example, while the average quantity of Emerald Dressing is given at 75 pounds for a putting-green, if given very frequently, it may be wiser to make this 25 to 40 pounds.

Coal Ashes

In exceptional circumstances, the addition of coal ashes to soil may be of benefit; where the soil is sticky or clayey, for example, or where it consists of black muck-land, coal ashes may sometimes be used if their cost and transportation are nominal. Otherwise, we urge that they be not added to your soil, for not only are they worthless from the point of view of their fertilizing value, but there is no doubt that they have a decidedly poisoning effect when applied to soils that ordinarily are fertile.

Use your coal ashes for mixing with your concrete, for your garden paths, greenhouse shelves, or as a cover outside for bulbs when rooting. Be suspicious too of sand taken from river beds in industrial sections: it is often harmful to grass.

Worms in Putting-Greens

THE PRO AND CON

Worms aërate the soil—they allow air to penetrate further and more freely than it will in soil that does not contain worms. They drain the land—water will flow more freely into the subsoil through their burrows than through the rest of the soil. Worms add to the fertility of the soil by taking into their systems portions of the subsoil, and, by a process akin to digestion, modify it; materials needed for food are extracted and materials excreted by the worm are added to it; this modified soil is ejected in the form of casts, and experiments have shown that the soil of worm-casts is very fertile.

Further, an excess of earthworms is but a symptom of bad soil conditions; it may be defective drainage, excess of moisture, too much organic matter, soil acidity, or an overdose of animal manures.

Enough of the pro; now for the con. Worms are disagreeable in appearance and to many people nauseating; their casts invariably contain weed seeds brought up from the depths below and placed amid conditions favorable to growth. Worm-casts make putting impossible. They may be removed by brushing, but the brushing has to be done immediately the casts are formed, otherwise the grass is smothered and killed in patches; this means brushing daily at least, and such brushing, though beneficial when done in moderation, is a very serious cause of damage when done continuously. Any casts that are made between brushings are either rolled flat or trodden flat by the players, in both cases making a bare patch from 2 to 3 inches in diameter which does not heal under ten days. Fine grass is injured by the continued movement of earthworms through its roots in the same way as a plant in a flower-pot is injured by the working of a worm among its roots. A wormy green is unplayable in spring or fall or during wet weather.

If you decide to get rid of earthworms, there are several ways by which you may do so.

In the first case, you may use corrosive sublimate, a dangerously poisonous chemical which you may mix with sand at the rate of one pound of the sublimate with 100 pounds of sand. This mixture is sufficient for a space of 4,000 square feet; spread it over the turf and water it in. The advantages of this method are that it is comparatively cheap and it is easy to apply; it is effective against such worms as are close up under the surface. Its disadvantages are the risk of using a chemical with such dangerous possibilities; its effectiveness is dependent upon the depth to which it is carried (naturally) and the fact that when it reaches the worm it may not be sufficiently strong to be potent. Should you prefer to apply bichloride of mercury in a liquid form you may take 10 lbs. of the bichloride, 3 lbs. of ammonium chloride (which is necessary as a solvent), and dissolve them in a fifty-gallon barrel of water. This makes a stock solution, a half-gallon of which you may mix with 50 gallons of water to flood upon the green. 20 to 25 barrels of the dilution may be applied to an average green. We supply ammonium chloride at 25 cts. per lb.

We prefer a worm eradicator of the non-poisonous, dry-powder type. We consider "Vermol" to be the best of this class, and we recommend it above all others because it is easy to apply, very safe, and, in our opinion, does more efficient work than corrosive sublimate. We believe the reason for its high efficiency lies in the fact that it does not entirely dissolve in the water used for washing it into the turf, but *remains partly in suspension*. With the powder in suspension it is easily seen that the more water is used the further down into the soil the material is carried; so, practically speaking, *there is no limit* to the quantity of water you may use with "Vermol." "Vermol" not only brings the worms to the surface, but kills them; curiously enough it is guaranteed quite harmless to animal and bird-life, and it does not sterilize the turf.

"VERMOL" **Worm Eradicator is the best of the non-poisonous class of worm-killing preparations. Price, ton $75, ½ ton $40, ¼ton $22.50, F. O. B. New York, Chicago, Pittsburgh, Detroit, and San Francisco. Used at the rate of ½ pound per square yard, 250 pounds per average putting-green. Full details as to its application will be found at the end of this book—page 3 of cover.**

Fungous Diseases

The sudden appearance of patches of dead grass on a putting-green or lawn immediately puts the greenkeeper on his guard for fungous disease. Sometimes we believe these patches are due to the washing away of the fertility in the particular area of soil, to the scaldings of dogs or other animals, to the burning effect of hot sun on dewladen or cobwebbed grass, to beetle and grub attacks, or to some other purely mechanical cause. Quite frequently, however, they are due to fungous—and we believe occasionally to bacterial—disease. It is advised that the following points be followed in the case of turf upon which an attack of these bare patches is expected, no matter whether the cause is mechanical, bacterial, or fungoid in origin:

(1) Dressings of 50 pounds of Scotch Soot, 15 pounds of Powdered Sulphur and 15 pounds of Tobacco Dust per average putting-green be given every three weeks.

(2) No top-dressings be given at any time in which mushroom soil, humus, or manure exceeds 25 per cent of the composition.

(3) Fertilizer dressings containing blood, tankage, or other material of an insect-attracting nature be witheld.

(4) A dressing of charcoal and sand be occasionally given through the year to such greens as are of a heavy or sticky nature.

(5) Onee greens are affected poling and rolling be discontinued, and that they be not used or walked upon when wet.

(6) Immediately greens become affected in the least measure, the spots be soaked with a solution of bichloride of mercury, using 5 pounds with 1½ pounds of ammonium chloride and 25 gallons of water. Always use wooden receptacles for bichloride, and be careful in its use—not only is it a deadly internal poison, but many people are affected by it in the same way as poison ivy.

(7) On the first sign, spray the greens twice a week at least, oftener is better, with Ammoniated Copper Solution or Bordeaux Mixture. You may dust on powdered Bordeaux, but this method is not so effective as spraying.

(8) Use catchers on all lawn mowers.

Raking the patches, top-dressing, and seeding will, of course, follow the above treatments as a matter of routine.

A deficiency of potassium in the soil is conducive to attacks of fungous. Keep the grass growing steadily by regular monthly dressings of compost containing Emerald Grass Fertilizer which contains a high proportion of potash.

Small White Grubs

During late summer the work of the small white grub becomes apparent on many areas of turf land. Patches of dead grass appear, and these patches it will be found, may be lifted and rolled back like a rug. The small white grubs which have done this damage by eating off the roots of the grass plants will be found in their hundreds as the turf is raised.

Small White Grubs discovered upon raising the turf. Note the damage done—the sod can be lifted up like a carpet

Cyanide Treatment

A recent bulletin of the U. S. Golf Association recommends that Cyanide of Soda be applied to the turf in solution. Great care must be exercised however, as Cyanide of Soda is one of the deadliest poisons known to man.

In experiments which have been made it has been found that when a solution of 10 ounces to 50 gallons of water was applied to an area of 200 square feet, a 96 per cent extermination of the grubs was effected. This strength of solution turned the grass yellow, but it fully recovered in from three to four weeks.

Eight ounces to 50 gallons of water produced an 80 per cent kill, and turned the grass yellow in spots but did not produce any permanent injury.

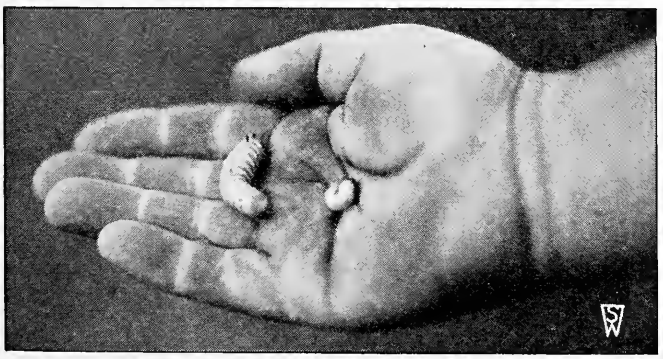
A six-ounce solution produced a 50 per cent kill and did not affect the grass at all.

The saturation of the turf should be done early—late in August or early in September—and the turf should be heavily rolled after treating. The treatment also killed angleworms.

While the grass seemed to be burned immediately after treatment, a month later it was of a deeper and richer color and more vigorous than the grass in untreated portions, showing that the Cyanide, in its secondary effect, has some fertilizing qualities.

Great care must be used in handling Sodium Cyanide, as it is a deadly poison; it eats away all brass and copper fittings.

The proper quantity to use is 50 gallons of solution to 200 square feet of area. This means wetting the turf almost to the point of saturation, and we recommend for the proper distribution of this solution S. & W. Co.'s Water Barrel Truck with a 50-gallon barrel and sprinkler attachment; the cost is $33, and it is ideal for small areas. For larger areas we recommend a Watering Cart—one carrying 175 gallons and needing one horse, costing $175; 450 gallons, for two horses, $566; 600 gallons, also for two horses, $612.



The Large White Grub, which is referred to on the next page, and the Small White Grub described above

Bisulfide Emulsion Method

The N. J. Experiment Station gives us the following method. Dr. T. J. Headlee says it was worked out by Mr. B. R. Leach for use against the grub of the Japanese Beetle, whose habits are similar to those of the Small White Grub. We have found the method effective, simple and safe.

(*a*) Take a 2½-gallon cauldron; put 2½ gallons of water in it, together with 2½ pounds of Whale Oil Soap. Stir, and boil until thoroughly dissolved. Allow to cool. This forms the "Stock Soap Solution," a supply of which should be always on hand, and while the turf is being treated it will be necessary to prepare it continuously.

(*b*) Put in an Ice Cream Freezer—

15 pounds Carbon Bisulfide
3 pints Stock Soap Solution (cold)

With the cover on the machine, work the Freezer until the mixture becomes about the consistency of ice cream. This should be done out-of-doors, and the operator should not smoke. At first the machine will work easily, but after a while, when the mixture thickens, it will work stiffly. This thick, creamy substance we will call the "Bisulfide Emulsion." It will be necessary always to keep a supply of this in preparation.

(*c*) Place 1½ pints of Bisulfide Emulsion in a water-can, the size of which is not material; fill the can with water to the brim and stir thoroughly.

(*d*) Apply the contents of the water-can to an area of 100 square feet.

(*e*) While it is being sprinkled, commence washing the emulsion into the turf, using a hose. Let the water run for as long a period as it has been found by previous experiment necessary to fill a 50-gallon barrel. The idea is to apply to each 100 square feet 1½ pints of the Bisulphide Emulsion and 50 gallons of water. If the water does not readily sink into the soil, but washes off unduly, turn it off awhile and apply again, but count only the time during which the water is actually being applied.

The above directions are for areas within reach of a water-supply. For small areas away from a supply a 50-gallon barrel and truck may be filled with water and 1½ pints of the Emulsion. (We offer an outfit of this kind for $33.)

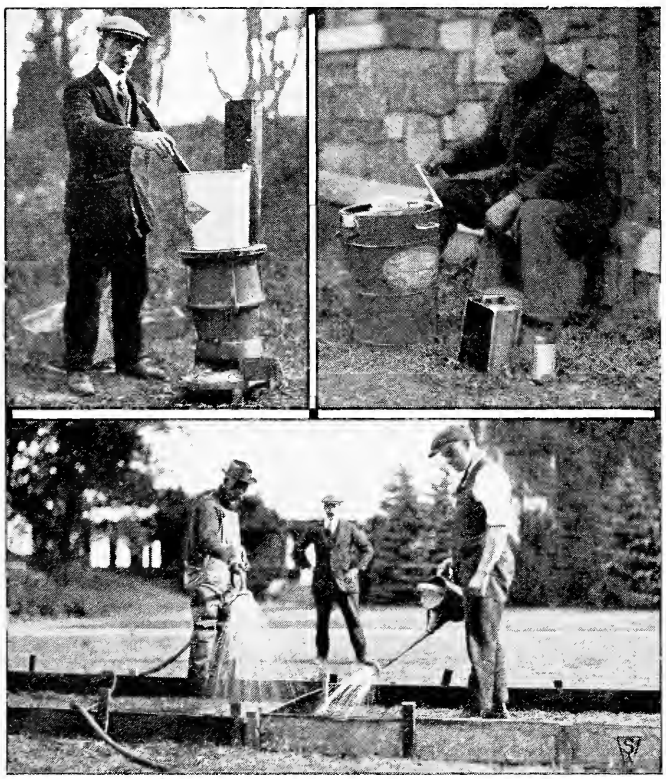
For large areas away from water it is necessary to use a road watering-cart. For one of the 600-gallon type, fill partly with water, add 18 pints of the Emulsion, stir with a wooden paddle, fill with water, again stir and apply. 600 gallons should be applied to an area of 1,500 square feet.

Crushing the Grubs

The grubs are soft-bodied animals, and in warm weather are found close up under the surface. Heavy rolling is therefore recommended as likely to destroy many of them.

After any of the above treatments the usual method of renovating the turf should be undertaken.

We want to emphasize most strongly that these treatments are not practical unless they are done early; before the grubs have had time to eat off a large portion of the grass roots. At the first sign of brown patches and dying grass, late in August or early in September, lift the grass with the hands, and if the turf is loose and comes away from the soil get busy. Spring is also a good time to work. The grubs are to be found then under the surface, but the damage they do is not apparent as it is in the fall.



Bisulfide Emulsion Treatment for the Small White Grub. Upper left: Preparing the "Stock Soap Solution." Upper right: Mixing the Bisulfide of Carbon and Stock Soap Solution to make the "Bisulfide Emulsion." Lower: Applying 1½ pints of the Bisulfide Emulsion and 50 gallons of water to each 100 square feet. In this case boards have been used to hold the water and to mark clearly the areas treated.

Large White Grub

This is a pest much in evidence in the South, but not noted by us further north than Long Island. It is derived from the large green June beetle. It does not eat off the roots of grass, but it burrows into the turf, throwing up a heap of soil similar to a worm-cast, but several times larger. To eradicate it insert a Stumpp & Walter Co.'s Funnel and Skewer 4 inches deep and near to the hole, withdraw the skewer portion and pour in a small tablespoonful of Bisulfide of Carbon.

Craw- or Crayfish

In the South these animals cause trouble in low-lying areas, making a hole in the turf large enough to swallow a golf-ball. The funnel and skewer treatment with Bisulfide or Carbon advised in preceding paragraph is satisfactory, using 2 tablespoonfuls of the fluid.

Ants

These troublesome pests may be generally got rid of as follows:

1. Purchase a supply of Bisulfide of Carbon, and a Stumpp & Walter Co.'s funnel and skewer.
2. Make three or four holes with the apparatus on and near to each ant-hill, and
3. Inject into each hole about a teaspoonful of the Bisulfide, taking care that none is spilled onto the surrounding grass.
4. Close the hole by pressing on it with the shoe.

Select a day for the job when there is no wind blowing. Bisulfide of Carbon will kill the grass if any is spilled upon it.

A well-known greenkeeper in the metropolitan district draws our attention to the ease with which ants may be eradicated from greens by means of a lawn-sweeper, as described on page 45. After collecting the ants in the box of the sweeper it is essential that they be killed quickly—a good way is to dump the contents of the box onto a fire. Select a time for the brushing when the ants are working, and by repeating the treatment for a few mornings ants will cease to be a trouble.

Moles

Many courses are troubled with this annoying little animal. The best plan to get rid of him is to use a number of mole-traps of an up-to-date pattern, and place them in position immediately over the end of the mole's run at the spot where he is known to be working. There is one point to bear in mind in regard to the mole, and that is he possesses an extraordinarily keen sense of smell, so much so that he can immediately detect the fact that the human hand has touched the trap that has been set for him; so, in using mole-traps, it is always advisable to let them remain exposed to the air for a few days before setting, and to always work with them with the hands gloved. It is of further advantage if the gloves be buried for a day or two in soil before using.

We have had good reports regarding "Mo-Lo," a recently introduced mole poison, and we list this preparation on page 39.

There are several methods of exterminating moles by means of poison, and in cases where the ordinary means do not suffice to keep them under control, we will gladly give details of schemes, which we have and which we know to be effective, to any greenkeeper or other person interested.

An esteemed client writes us from Ausable Forks, N. Y., telling us of the good results he has had by connecting the exhaust of a power mower or automobile with a hose and putting the other end in one of the mole runs. Starting the engine on a rich mixture caused smoke to come up all over his lawn; ten minutes' running seems to have accounted for all the moles in the area reached by the lethal fumes of the gasolene engine.

The Construction of Turf Tennis-Courts

By A. D. TAYLOR and G. D. COOPER
Landscape Architects, Cleveland, Ohio

Size. Lawn tennis-courts (double) require an unobstructed area 60 by 120 feet in an open, unshaded place. A full-sized championship tournament court should be 66 by 130 feet.

Orientation of the long way of a court should be north and south because most tennis is played afternoon and evening and this orientation does not compel any player to face the sun when it is low.

Selection of Site. The surface of the general area chosen should be as nearly level as possible without sacrificing surface drainage and a location should be selected, if possible, where large trees will not cast shadows across the court nor a light-colored background occur at ends or sides.

A good, porous, deep clay loam soil is the best, as it eliminates artificial drainage which has a tendency to drain away valuable moisture from the shallow grass roots. Such a soil is also natural grass land. Where this type of soil does not occur naturally it may be necessary to use a composted soil.

Subgrading. Generally the first step in the construction of a turf court is the grading. As the prime requisite for such a court is a deep bed of uniform top-soil, it is generally well worth while to strip the existing top-soil from the site of the court and bring the subgrade to a uniform surface which slopes as the finished court is intended to, or at an even steeper grade. At least 1 foot in depth of good top-soil is required for a permanent turf and 2 feet is better.

Underdrainage. Where the soil is naturally light or sandy or gravelly no underdrainage may be necessary, but on heavy soil, or where the surface drainage is poor, it should certainly be installed. No rule can be laid down which would apply to the draining of all courts since no two situations require the same treatment. Each court should be studied as a new problem, bearing in mind that if the drainage is too good the difficulty can be overcome by watering the turf but if the drainage is insufficient the whole court may have to be reconstructed to remedy this fault. The drains should all be installed and tested before any top-soil is back filled on the court and inlets should be placed so as to dispose of the surface water by getting it into the drains as quickly as possible. If the court is bordered at either end or side by a slope which is likely to throw surface water across the court, inlets should be placed, and the surface of the ground outside the court arranged, so as to carry this water into the drains before it can run on the court.

Replacement of Soil. The replacement of top-soil on the court should be done so as to secure a uniform layer of soil over the whole of the court. Too much attention cannot be given to the securing of a properly prepared seed-bed nor too much care given to the fertilizing, harrowing, weeding, and general care of the soil before seeding. As stated above, if the top-soil is not natural grass land, it may be necessary to use composted soil. This is really the ideal way to prepare a turf tennis-court as it allows the introduction of suitable plant-food in a thorough manner throughout the whole top layer of soil and also permits modification of the character of the top soil by the addition of a portion of soil of heavier or lighter character. (For details of this method of soil preparation see the discussion of a compost heap on page 24.) When a composted soil is replaced on a court it is always well to allow for shrinkage. The amount of shrinkage to allow for when replacing composted soil varies with the degree of fineness to which the organic matter has been reduced and the age of the compost. As a rule, the older the compost is, the less shrinkage it will undergo.

It will be a good rule to allow about 30 per cent for shrinkage for coarse, young compost; 20 per cent for fine, old compost; and 15 per cent for top-soil. In other words, if the bed is filled in with coarse, young compost to a depth of 9 inches it should be finished 3 inches above the surrounding soil to allow for shrinkage.

In any event, the top-soil layer should be a good grade of loam, neither too heavy to dry out quickly after a rain, nor too light to stand hard trampling or to hold some moisture even in dry weather. It should be dark colored, uniform in texture and free from lumps, sticks, stones, trash, and rubbish of all sorts.

Fertilizing. Since a turf tennis-court, when once laid down, is intended to be a permanent feature, and also since an ideal soil for turf is so rarely found, it is always wise to fertilize the soil before sowing seed. This fertilizer should be chosen with a view to correcting the soil mechanically as well as chemically. The addition of some form of decaying vegetable matter or humus is sure to benefit any soil which is too light or too heavy, in a mechanical way, and this is in addition the most lasting form of fertilizer. If the soil has been composted this humus material will already be incorporated in it, but otherwise will have to be provided through the use of stable manure or commercial humus or

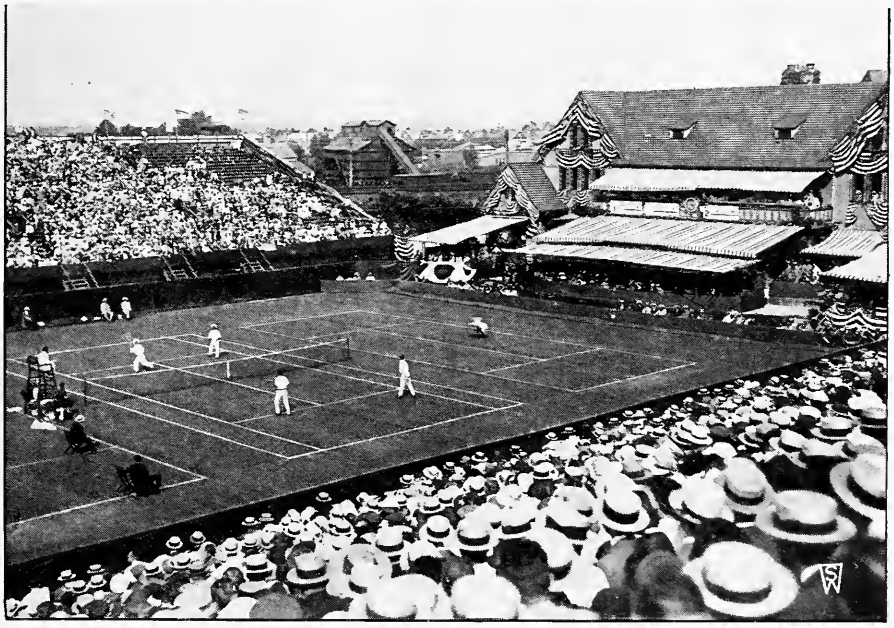


Photo: Levick

Davis Cup Doubles at Forest Hill, 1922. Grass seeds have been supplied here for a number of years by Stumpp & Walter Co.

The turf required for lawn tennis must be firm and yet elastic, and composed of grasses which can be mown close and which will recuperate after excessive wear. Our mixture is composed of the best-known, fine-leaved, deep-rooting grasses, properly proportioned so as to give an even playing surface throughout the year. Stumpp & Walter Co.'s Lawn Tennis Mixture. Qt. 50 cts., 4 qts. $1.75, 8 qts. $3.25, bus. $12, 10 bus. $115. Charges prepaid when cash accompanies order.

The Construction of Turf Tennis-Courts, continued

mushroom soil. Stable manure or mushroom soil may be applied as thickly as 1 cubic yard to each 10 square yards of ground or 80 cubic yards for a tennis-court. Such a large quantity of manure, however, if applied at one time should be thoroughly incorporated by harrowing or spading and at the same time all sticks, stones and rubbish should be removed.

After the manure has been thoroughly turned under, apply 200 pounds of Emerald Grass Fertilizer to a tennis-court and harrow the ground thoroughly so as to form a good seed-bed. This material should be used in ample season to avoid burning the grass seed, say not less than seven days before the seed is sown. The fertilizer should not be incorporated deeper into the soil than the upper 3 inches.

It is important that complete fertilization be effected before the seed is sown, as once the turf is established, any further enrichment can be effected only under disadvantages to which other crops are not subjected. Grass is a fixed crop and ordinarily derives its food from the top layer of soil and therefore this fact should always be borne in mind when fertilizing for turf.

Surface Grading. The finished surface grading of a lawn of any sort is almost always the most particular piece of work connected with the job. This is especially true when the ground is to be sown to seed as, once the seed is sown, the grade cannot well be changed. It is also an important part of the work in that the final seed-bed or germinating layer is prepared at this time. A fine, friable surface layer, sometimes called the germinating layer, is always an essential when fine grass seeds are to be sown. The court should be repeatedly raked until all stones are removed or a final layer of sifted soil should be put on. The roller should be used until it becomes apparent that there are no soft spots left. The raking and rolling will pulverize the soil and leave it in a firm condition so that the soil moisture may readily find its way up from below. This firm condition is very essential to proper germination of the seed. In case earthworms are much in evidence in the soil used to build up the court, this is the time to remove them and "Vermol" worm eradicator should be used before the seed is sown, as outlined on page 3 of cover, and preferably it should be used before much fertilizing with artificial fertilizers is done.

Unless the seed-bed is thoroughly prepared much seed will be lost, since even the coarse seed, like the fescues, should never be buried deeper than ¾-inch and the finer seeds, such as bent grasses, probably fail to survive being buried more than ¼-inch. Thus a great saving in seed may be effected by the preparation of a fine germinating layer.

Seeding or Sodding. The question of whether to seed or to lay sods is a perennial one. In the case of a fine piece of turf, however, such as a tennis-court should be, there is not much room for argument. Sodding cannot be recommended unless a very fine grade of turf can be secured. This turf should be of a uniform texture, color, and thickness. In other words, either a turf nursery should be available or some other source which contains sufficient turf which can be removed to the new location easily. This turf should be all of one sort of grass or a uniform mixture of suitable grasses. Needless to say such a source of supply is rare and the cutting and removing of such turf, together with the cost of relaying it, is a very expensive piece of work. The labor of relaying turf sods has in recent years cost more than three times as much as the total cost of raking, rolling, and seeding down to turf, including the cost of the seed and some fertilizer. Therefore if cost is an item to be considered, and if a very uniform turf is desirable there is ordinarily no question but that it is better to seed down a tennis-court than to sod it.

Seeding. The soil must be in a perfect condition of tilth and a screened top layer should always be provided if possible.

Seed must be sown carefully and thoroughly on a still day. If sown by hand, the sower should not be afraid to bend his back a little as the farther the seed travels, the more likely it is to fall unevenly.

The fine sorts of seeds which are used on tennis-courts should be covered lightly. That means not to exceed ⅛-inch for the bulk of the seed. Cover by a light brushing over with a "bush harrow" or by sifting a light layer of very fine soil over it. Then if a drought follows the seeding, the deeply covered seeds are likely to secure enough moisture to germinate, while if a crust forms, due to rain, the seeds covered lightly will be in an advantageous position to grow. Part of the seed should be sown while walking along a north and south line and the remainder while moving in a direction at right angles to the first so as to ensure that no spaces are left unseeded.

A light rolling should always be given immediately after the seed is sown and covered. This compacts the soil enough to bring the seed into firm contact with it and also insures the start of capillary action, thus by this means the seeds are assured of a compact, moist, germinating layer.

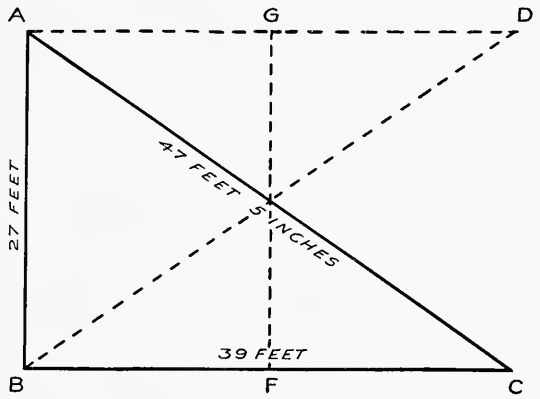
Time to Seed. Grass seeds can be successfully sown in the spring but the early autumn is the best season. In the spring all the weeds seem to be active and ready to compete with the newly sown seed for possession of the soil while by autumn few weeds are left and the grass can get ahead of the weeds. Also in the spring, unless seeding is done very early, hot weather follows quickly and before the grass plants are large enough to shade the ground, while in the autumn there generally follows several weeks of growing weather with warm days and dew at night to moisten the ground. In the spring, if the land is heavy, early working is likely to leave it sticky and impossible to sow fine grass seeds, while in autumn all land is in good condition to work as soon as the fall rains start. No dates can be definitely set for the beginning and ending of the spring or fall seeding seasons, but the months of April, May, August, and September are the best ones throughout the northern states. Very little seeding should be done before April 10 in the spring or August 15 in the fall, while June 1 and October 1 are the average closing dates.

Varieties of Grass. A turf tennis-court sown to one sort of grass would be an ideal sort to play on and for appearance but such a turf is liable to fail when most needed. No one grass is at its best at all seasons of the year and, therefore, a one-variety turf is likely to make a poor appearance and playing surface just when it is most needed. Also those grasses which are subject to disease are likely to be entirely destroyed and thus leave the court bare, whereas a mixture of grasses would not all be lost at once.

A mixture of grasses should, therefore, be selected which will provide a thick, short carpet of grass of a uniform texture so far as possible and also provide this turf at the seasons of the year when the court is likely to be most in use. Chewing's New Zealand Red Fescue is undoubtedly one of the best sorts of grass to use as it fulfills nearly all the requirements of a perfect turf plant and is at its best during the summer months when courts are most used. Of the bent grasses, the Creeping Bent or Mixed Bent and the Colonial Bent, which is nearly identical with our Native Rhode Island Bent, are undoubtedly the best. These two turf plants are at their best in early fall and thus carry the court after the Red Fescue has passed its maximum development. Red Top is another Agrostis or Bent Grass which may be used but is not so creeping in its habit. Kentucky Blue Grass may be used for its quality of reaching its maximum development in early summer, and Perennial Rye Grass for its habit of quick growth and its property of recuperating quickly after hard wear. No White Clover should ever be used as it is slippery under foot and spoils the appearance and playing quality of the turf.

How to Lay Out a Tennis-Court

(Courtesy Spalding's "How to Play Lawn Tennis")



As a double court practically includes every line to be found in a single court, it is best to take first the measure for the latter. Having determined the position of your net, plant in the ground, in the line chosen, two pegs, 27 feet apart (at the points *A* and *B* in the diagram). Then take two measures and attach their respective ends to the pegs *A* and *B*. On the first, which will measure the diagonal of the court, take a length of 47 feet 5 inches; on the other 39 feet; pull both taut in such directions that at these distances they meet in a point *C*. This will give one corner of the court. At that point *F*, 21 feet from *B*, put in a peg to mark the end of the service-line. The other corner, *D*, and the other end of the service-line *G*, may be found by interchanging the measures and repeating the process. The same measurements on the other side of the net will complete the exterior boundaries of the court. By prolonging the base-line 4 feet 6 inches in each direction, and joining the four new points thus obtained, we can make the side-lines of a double court. It only remains to mark the central line. This is done by joining the middle points of the service-lines. If a double court alone be required, the interior side-lines need not be prolonged to meet the base-lines. Remember that in all cases the netposts must stand at a distance of 3 feet from the side-lines.

For a court where a single or double game can be played, the size is 78 feet in length by 36 in width. 4½ feet inside the side-lines, and parallel with them are drawn the service-lines.

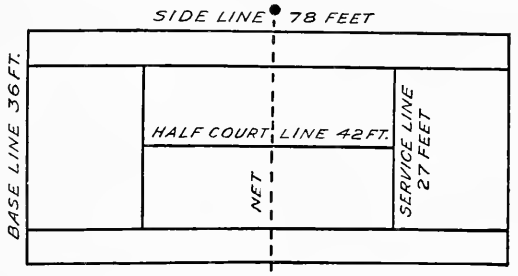


Diagram of a Single and Double Court

Clay Tennis-Courts

The building of a clay tennis-court is identical with that of building a road, and a member of the club who is a civil engineer in all probability would be available to supervise the construction of such a court. It is usual to dig out the site to a depth of 12 inches, and to level very carefully the bottom of the excavation. It is here that the engineer or surveyor will be most useful. If the services of a surveyor are not available, it is possible to level accurately the bottom of the excavation by means of pegs driven in at intervals, and these pegs being leveled accurately by means of a spirit-level attached to a long board. Next fill the excavation to a depth of 6 inches with large broken stone, trap rock, brick rubble, or similar material. Procure a heavy roller and roll thoroughly this layer. Use a heavy pounder in those corners which cannot be reached with the roller.

On top of this 6-inch layer add one of 3 inches, and consisting of fine broken stone, coarse gravel, or coarse ashes. This layer should be rolled and also be watered very thoroughly. Let the water hose run almost continuously for several days. Check up the levels and add further quantities of this second layer where necessary. Fill in the remaining 3 inches with a mixture consisting of five parts of clay loam and one part of sharp sand. The material should be thrown onto the area by means of shovels and should be raked lightly to insure its even admixture. When the court is finally covered, levels should once more be checked up, and provision made that the center of the court is 2 inches higher than the sides, this "camber" being sufficient to shed surface water. The court should be watered and rolled twice a day for two weeks, after which it should be ready for use. For the first few months the levels should be checked up after every heavy rain.

Weeds in clay courts need give no trouble, if they are occasionally watered with Herbicide, a poisonous weed-killer.

Photo: Levick

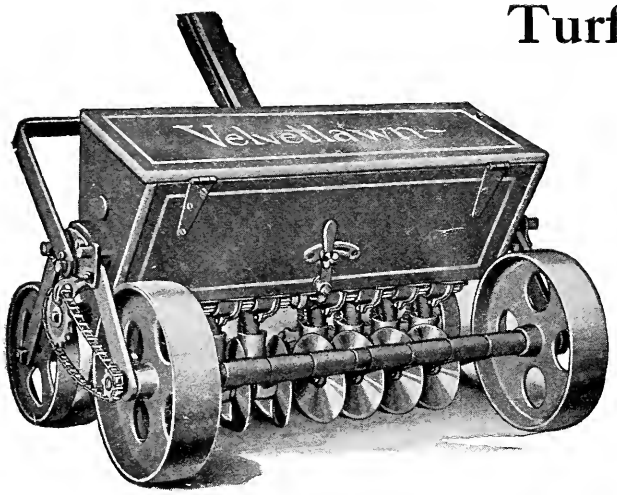
Finals between Argentine and Meadowbrook, 1922, at the Rumson Country Club, N. J. Polo field produced from Stumpp & Walter Co.'s seeds.

For fine, uniform, hard-wearing, and quickly recuperating turf, we find that the formula of grass seeds as long used at the famous English field at Hurlingham gives the utmost satisfaction in this country. The grasses used are of the best superfine quality, of the highest purity and strongest vitality. Use 200 pounds per acre.

Hurlingham Formula. Superfine Quality. The weight per bushel is 25 pounds. Lb. 60 cts., 5 lbs. $2.75, 25 lbs. $12.75, 100 lbs. $50. Charges prepaid when cash accompanies order.

We are prepared to advise personally with you on your turf difficulties, a service which has been a feature of our business for the past ten years.

Turf Keeping Requisites

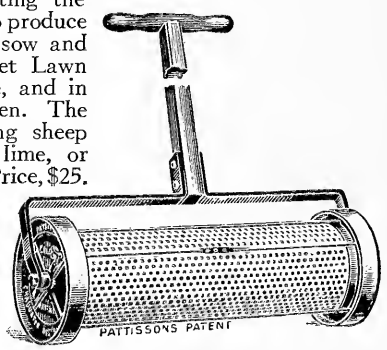


Velvet Lawn Seeder

Velvet Lawn Seeders

Velvet Lawn Seeders produce high quality turf all over the country with a reduced cost and saving of time and seeds. These machines sow the seeds in and not on top of the soil; wind, heavy rains and birds eannot disturb them. The soil is opened at a uniform depth with eight discs, set 2 inches apart; to each disc is connected a spout through which the seed passes from the hopper direct into the soil; a lever attached to the hopper regulates the rate at which the seeds are sown. Each disc is followed by a roller, closing the furrow, compacting the soil, and insuring a good "catch." To produce a velvety sward it is advisable to sow and cross-sow. At each run the Velvet Lawn Seeder sows a strip 16 inches wide, and in half an hour will sow a putting-green. The machine is useful also for applying sheep manure, bone-meal, wood-ashes, lime, or finely screened dry compost to turf. Price, $25.

We offer also a horse-drawn Velvet Seeder at $60.



Top-Dressing Distributor

Top-Dressing Distributor

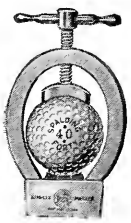
For top-dressing putting-greens. It graduates the distribution exactly to requirements and the cylinder, being within 1½ inches of the ground puts the dressing just where it is wanted, even in windy weather. Consists of two perforated cylinders, the outer one actuated by a regulating thumb-screw, regulating the flow of material. Price, $37.50.

No. 5

Clock Golf

For practice in putting nothing excels this game. The figures are arranged in a circle from 20 to 24 feet in diameter, or any size that the lawn will admit.

No. 5. Drop forged plates with double prongs. $10 per set of eighteen.



S. & W. Co.'s Simplex Golf-Ball Marker

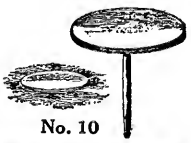
Patented in United States and Great Britain

No. 1. Impresses initials, but does not injure the ball. Marking being below surface it will not wear off, and will retain pencil, ink or other coloring. Burnished brass. $3.50 each.

S. & W. Co.'s Tee Balls

No. RB. Made with composition golf ball top. White enameled. $1.25 per pair.

No. WB. Similar to No. RB, but made of wood, painted plain white. $1 per pair.

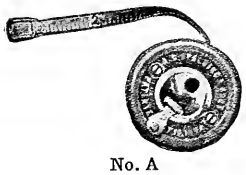


No. 10

Teeing Plates

No. 10. Round metal plate to lie flush with ground; drop forged. $1 per pair.

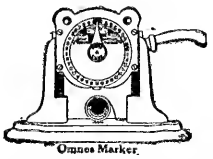
No. RB



No. A

Measuring Tape

Especially adapted for laying out tennis courts and golf-course work. With this tape one person can easily secure accurate right angles, yet the tape is equal to any other for straight measuring also. Enclosed in hard leather case, flush handles with patent automatic handle opener; all mountings nickel-plated. Accuracy guaranteed. **No. A.** 50 feet. $6 each. **No. B.** 100 feet. $10 each.



Omnes Golf-Ball Marker

FOR CLUB USE

Simple to operate, substantial in make-up, and really indispensable in the equipment of an up-to-date club. Any arrangement or number of letters or figures may be marked simply by turning adjusting arrangement. Handsomely finished and really the most complete Golf Ball Marker made anywhere. $35 each.

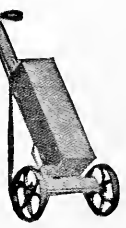
Golf Tee Towels

These are of the finest grade; they will stand hard wear, and in use they will give off no lint. Size 13 x 21 in. $1.50 per doz.

No. 26

S. & W. Co.'s Eureka Wet Tennis Marker

For grass or clay courts. Uses liquid water-slaked lime. Makes clear cut line. Simple to operate. Flow of liquid under instant control.



No. 11

No. 11. Vertical; small tank. $22.50 each.

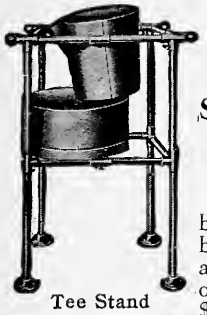
No. 26. Horizontal, for club use, large tank. $30 each.

Wicker Balloon Flags

These are very visible, being large, yet light and durable. Well painted with three coats of best enamel. Length, 8 feet. $5.50 each.

All prices subject to change without notice. All orders will be accepted only subject to our ability to supply the goods. Prices shown are those in effect February 15, 1923

Golf-Course Equipment



Tee Stand

S. & W. Co.'s Tee Stand

Compact arrangement for golf tees. $18 ea.

S. & W. Co.'s "Cherokee" Golf Ball Washer

Patent applied for

Takes off everything but the paint. Should be at every tee of a well appointed course. Used on prominent courses. $20 each.

Separate brushes for washer, $1 each.

"Cherokee" Golf Ball Washer

S. & W. Co.'s Golf-Ball Paint

	Each	Doz.
WHITE ENAMEL		
¼-pt. can	$0 75	$8 25
⅛-pt. can	50	5 50
RED ENAMEL		
¼-pt. can	75	8 25

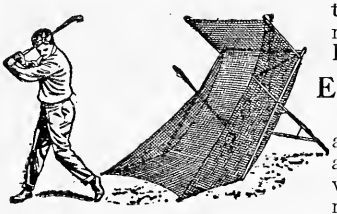
S. & W. Co.'s Golf Ball Retriever

Bamboo pole; wire basket; well made. $3 each.

Golf Ball Racks

Useful on much-frequented courses. Each player or one player in a party drops his ball in the rack when he arrives, his relative position being determined by the position of the ball in rack. Substantially made of iron, heavily japanned. For 36 balls. $18 each.

Golf Ball Rack



Eureka Golf Driving Net

For practicing, especially iron approach shots. May be put up almost anywhere. Complete with different colored pockets in net, uprights, etc. $18 each.

S. & W. Co.'s Marking Discs and Flags

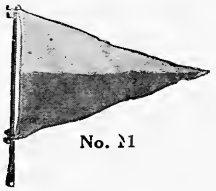
No. 2

No. 3

No. 7

No. 2

No. 9



No. 11

No. 10F Flag
Attached to No. F Flag Support

Marking Discs

Metal Discs, painted Red and White and numbered 1 to 18 to designate the number of hole. The iron shaft is strongly fastened to disc and is about 4 feet long.

	Each
No. 3. Heart shape	$2 00
No. 7. Circular holder, without flag	2 00
No. 2. Miniature Marking Discs. Heart Shape, for Putting-Courses	$1 00
Separate Flag for No. 7 Disc	1 00

Direction and Marking Flags

Colors: Red, White, Red and White, Blue and White, and other combinations of colors.

	Each
No. 9. Flags only, oblong shape	$0 60
No. 2. Flags, numbered as ordered	75
No. 11. Flags only, triangle shape	$0 60
No. 10F. Flags, with attaching hooks, for use with No. F supports, listed below	1 00

Marking Flag Supports and Poles

	Each
No. F. Flag Support, iron upright, with revolving flag holder. Pat. April 5, 1912	$2 75
No. BSF. Bamboo Poles, with spike and patent flag support attached	3 25
No. BX. Bamboo Poles, 10 feet, with spike	$2 00
No. C. Cherokee holder for bamboo flagstaff	1 35
No. BF. Bamboo Poles, with brass ferrule	1 25
No. B. Bamboo Poles, plain, 18 feet	50

No. 30

Golf Hole Rims, Midlothian Patent

(Patented March 21, 1899)

No. 30. Solid iron casting inside. Prevents the hole from being racked by the weight of the flagstaff or pole, which is kept always in an upright position, with small hole in iron casting to accommodate iron rod disc upright. $1.50 each.

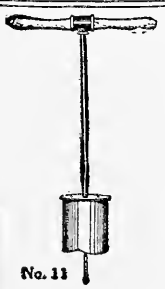
No. 31. Similar to No. 30, but hole large enough for bamboo poles. $1.50 each.

S. & W. Co.'s Iron Hole Rim

No. 20. For lining holes in putting green. The cross-piece prevents ball from falling to bottom of hole. 75 cts. each.

No. 25. Combination style. Suitable for bamboo or iron rod. $1 each.

No. 20



No. 11

S. & W. Co.'s Steel Hole Cutters

No. 11. Improved style with point for centering, and device for ejecting earth and sod after cutting clean hole. Cutter is of best steel and has substantial wood handle. $10 each.

"Bogey" Hole Cutter (English make). Notched teeth. The easiest working, cleanest cutting and most durable Cutter made. $12 each.

Ten-inch Hole-Cutter (Turf-Repairer). Cuts out a weedy or bare patch on the putting-green and enables you to replace it with a disc of good turf. Imported. $16 each.

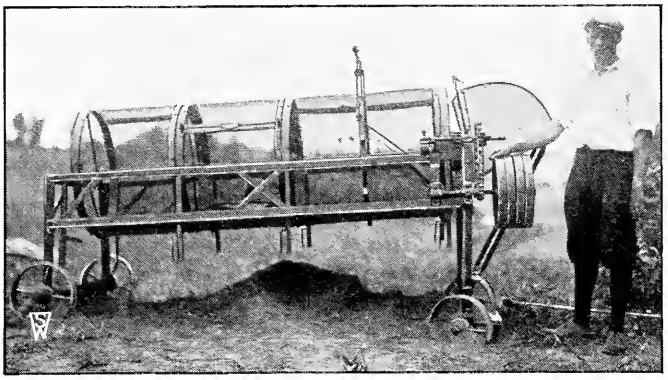
Rim Extractors and Setters

Rim Extractor. For extracting Nos. 30 or 31 Hole Rims. 70c each.

Rim Setter. For setting rim and leveling edges. $2.50 each.

All prices subject to change without notice. All orders will be accepted only subject to our ability to supply the goods. Prices shown are those in effect on February 15, 1923

PRICES SUBJECT TO MARKET CHANGES



Rotary Soil Screen

Price, $145, F. O. B. New York

For quickly and efficiently screening compost for top-dressing turf, also for removing stones and large particles from potting soil, sand, gravel, ashes, rotted manure, etc. Strongly made of heavy woven wire, so well balanced that very little power is necessary to operate it.

Capacity. The Rotary Soil Screen will take care of average soil about as quickly as two men can shovel into the hopper, screening from 1½ to 5 cubic yards per hour, the rate depending, of course, on the condition of the material—moist, heavy soil screens slower than dry, light soil.

Operating. The Rotary Soil Screen may be rotated by hand, or power may be taken by means of a belt from the rear wheel of an automobile, from a tractor, kerosene engine, or electric motor. An ideal outfit is a kerosene engine developing 1½ horse-power with 500 revolutions per minute of a 4-inch pulley wheel. When ordering it is a good plan to tell us what form of power you have available.

The Machine is Movable. Seven-inch wheels make the apparatus sufficiently portable to be of service on any part of a golf-course or estate.

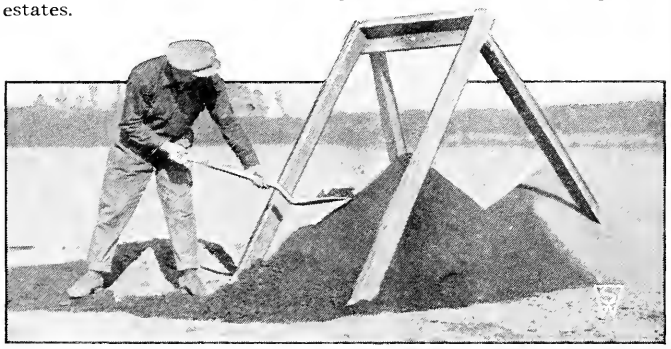
Mesh. You may specify any mesh when you order. We recommend ⅛-inch, ¼-inch, and ⅜-inch as the most desirable for the three sections, and we send these unless instructed otherwise. We can supply extra screens at any time; these can be bolted in place in a few minutes.

Junior Rotary Soil Screen

Price, $95, F. O. B. New York

We offer a smaller machine. Instead of three sections, as shown in the illustration, this smaller outfit consists of the first section only. The framework is shorter than that of the larger machine, but in other respects it is identical. The capacity is about one-quarter less than that of the larger machine. We ship in ¼-inch mesh unless any other is specified.

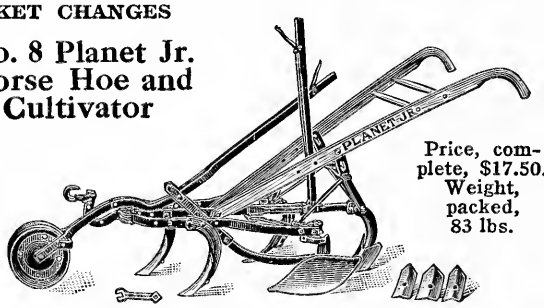
Which Machine to Purchase. We advise the large machine for construction and landscape work and for maintenance on a golf-course; also for commercial florists and other users of soil in quantity. We recommend the Junior Rotary Soil Screen for use on private estates.



Flat Screens

Handy for compost, soil, sands, gravel, etc. Extra-heavy wire; spruce frames, square mesh. Small size, 25 x 62 in., $8.50; large size. 28 x 66 in. $9.50. State whether ¼-, ½-, ¾-, or 1-in. mesh is desired.

No. 8 Planet Jr. Horse Hoe and Cultivator

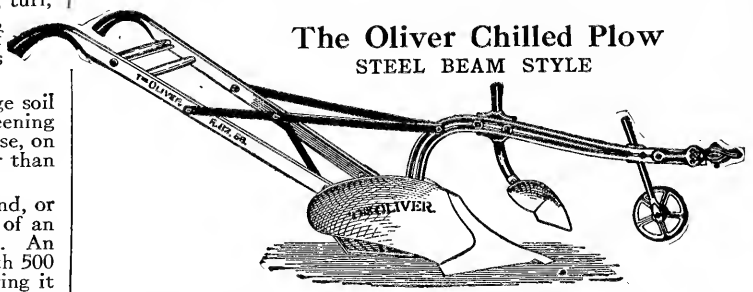


Price, complete, $17.50. Weight, packed, 83 lbs.

No other cultivating machine is so widely known as the Planet Jr. Combined Horse Hoe and Cultivator, for it is in use throughout the civilized world. It is so strongly built as to withstand incredible strain, yet it is light and easy to handle. This implement is excellent for the periodical cultivation of fallow land prior to seeding. The longer a fairway is allowed to remain after plowing and finally seeding and the more it is cultivated during that period, the fewer weeds will be in your final turf, and the soil will have been brought into the best possible condition.

The Oliver Chilled Plow

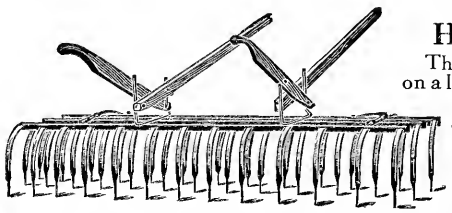
STEEL BEAM STYLE



The Oliver Plow is adapted for clays, sands, or stony soils. As a general-purpose Plow it is acknowledged to be the best. Made in one-horse and two-horse sizes, with steel and wood beams.

		Capacity	Steel Beam	Wood Beam
No. B-C	One-horse, light	5 x 10 in.	$10 00	$10 00
No. 10	One-horse, heavy	5½ x 11 in.	12 75	12 75
No. 19	Two-horse, medium	6½ x 12 in.		15 75
No. 20	Two-horse, medium	7 x 13 in.		16 00
No. 82	Two-horse, light	7½ x 13 in.	15 00	
No. 83	Two-horse, medium	7½ x 14 in.	16 00	
No. 84	Two-horse, heavy	9 x 16 in.	17 50	

Plows with wheel, add $2.25. Plows with jointer, add $4.25.



Horse Weeder

This has the same effect on a large scale as a specially sharpened rake has on small areas. Is a very valuable implement for the final preparation of soil for grass seeds, although its primary object is to stir the land and destroy weeds among farm crops. To straddle rows one or more teeth are removed. One horse pulls it. Price, $17.50.

Canal Barrow

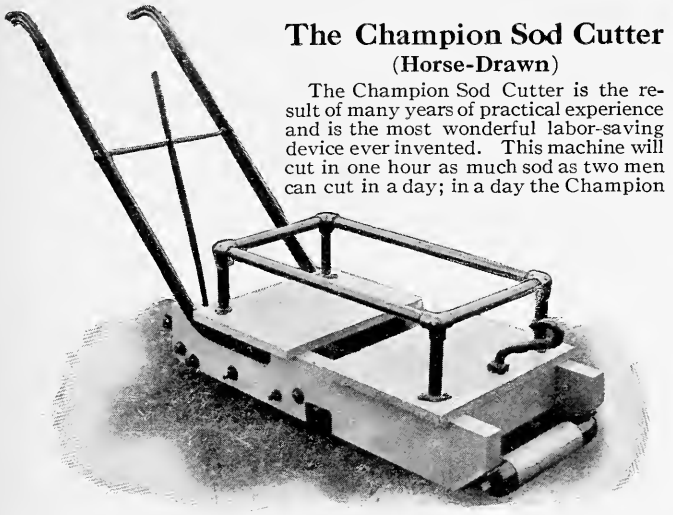
The ideal Wheelbarrow for landscape and golf construction work. The wheel is of steel and the body is strongly made, superior to the ordinary Barrow in common use. Price, $5.

Steel Disc Smoothing Harrow

The frame measures 6 feet 8 inches by 6 feet, and has four sets of rollers, having 58 discs 8 inches in diameter. A very useful Harrow, $40 each.

PRICES SUBJECT TO MARKET CHANGES

The Champion Sod Cutter
(Horse-Drawn)



The Champion Sod Cutter is the result of many years of practical experience and is the most wonderful labor-saving device ever invented. This machine will cut in one hour as much sod as two men can cut in a day; in a day the Champion will cut from 25,000 to 35,000 feet of sod, and at this rate you can save the price of a machine in a short while.

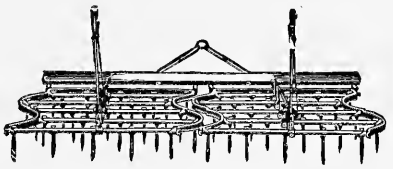
This machine is so constructed that it can be adjusted to cut the sod the one uniform thickness, 1 to 2 inches, 12 inches wide. This is very important, especially when a vast amount of sod is to be laid. One man can lay as much sod as three or four men can by the old method of cutting. $50 each.

Solid Steel Scrapers

Necessary in all golf construction work.

No.	Width	Capacity	
1	32 in.	7 ft	$13 00
2	29 in.	5 ft	12 50
3	26 in.	3 ft	12 00

All-Steel Lever Spring Spike Tooth Harrow



This Harrow, having *spring action* upon the *teeth*, allows them to yield in meeting an obstruction, thus saving strain or breakage.

For One Horse.

With 25 Teeth in One Section, Spreading. 4 ft..... $11 00
With 30 Teeth in One Section, Spreading. 5 ft..... 12 00

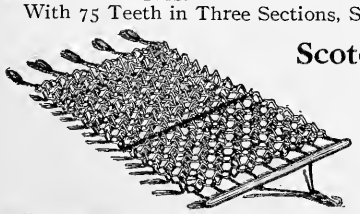
For Two Horses.

With 50 Teeth in Two Sections, Spreading. 8 ft..... 20 50
With 60 Teeth in Two Sections, Spreading. 10 ft..... 22 50

For Three Horses.

With 75 Teeth in Three Sections, Spreading. 12 ft..... 32 00

Scotch Chain Harrow



Hundreds of wrought-iron links are woven into what is practically a blanket of chain. This arrangement is ideal in smoothing land as a final preparation for grass seeds; it may also be drawn over the soil after seeds are distributed for the purpose of covering them. Used on driveways and race-tracks, it smooths the surface, eliminating ruts and footprints. The Scotch Chain Harrow is made in three sizes, the Small for one horse, the Medium for two horses, and the Large for tractor. Small size, 5 x 6 ft., $35; Medium, 6 x 7½ ft., $45; Large, 7½ x 7½ ft., $55.

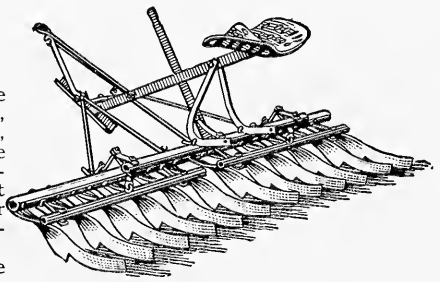
Spike Rollers

Invaluable for the greenkeeper, groundsman, and large lawn owner. The secret of fine turf is largely a matter of continued top-dressings; these top-dressings are much more effective if their application is followed by a good spike rolling and then a brushing. This places the compost *just where it is needed*, namely 1 and 2 inches down *into* the soil. An occasional spike-rolling will open "hide-bound" turf, correct the results of excessive heavy rolling, and facilitate circulation of air and moisture in the soil.

Hand Spike Roller for putting-greens, tennis-courts, and small lawns. $125.

Horse Spike Roller. For golf fairways, polo-fields, and large lawns. 3 ft. 1-horse (1,600 lbs.) $425; 5 ft. 2-horse (2,000 lbs.) $490.

Acme Pulverizing Harrow

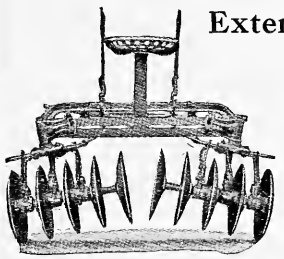


A general-purpose Harrow that crushes, cuts, turns, smooths, and levels all in one operation. For reducing clod land into that fine tilth necessary for proper seeding; valuable on fairways.

All sizes are flexible except Nos. G and H.

No.		Each
G	For One Horse, cuts 3 ft	$14 00
H	For One Horse, cuts 4 ft., 4 in	18 00
23	For Two Horses, cuts 6 ft., 6 in	28 00
26	For Two Horses, cuts 8 ft., 6 in	32 50
24	For Four Horses, cuts 13 ft., 6 in	62 00
25	For Two Horses. For Orchards	38 00

Extension Disc Harrow, with Reversible Gangs



Square braces take the heavy, backward thrust of the gangs. Levers are bolted to the frame and are very rigid. The frame is of angle steel, slotted to allow adjustment of gangs. These can be shifted from one side to the other or just turn them around on the pivot quickly and easily. Each With ten 16-inch Solid Discs... $45 00

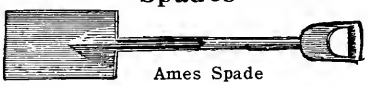
The Bendelow Putting-Green Cultivator

A patented device by means of which turf may be aërated, top dressed and seeded. Consists of a steel frame, through the center of which is run a steel shaft on which are fastened fourteen steel circular knives. The machine is pushed over the green the same as a lawn mower, and is recommended for turf that is compacted and "hide-bound"—the result of too frequent rolling with heavy rollers. Price $100, f. o. b. Chicago.

Bendelow Putting-Green Cultivator

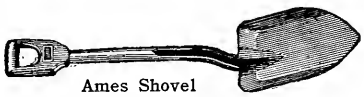
Implements of General Use on a Golf Course

Spades


Ames Spade

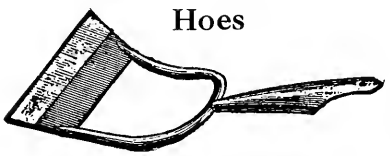
Ames Spades are the same grade as the celebrated Ames Shovels. Each
D Handle and Long Handle.....$2 25
S. & W. Co.'s Spades are the same grade as S. & W. Co.'s Shovels. Each
D Handle and Long Handle.....$1 50
Boys' Spades. Special finish..... 1 75

Shovels


Ames Shovel

Ames Shovels are the best manufactured; give best service. Each
Square Point, D Handle.....$2 25
Round Point, D Handle..... 2 35
Long-Handle Shovels same price.
S. & W. Co.'s Shovels.
Square Point, D Handle..... 1 75
Round Point, D Handle..... 1 85
Long-Handle Shovels same price.

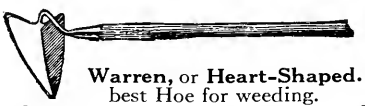
Hoes



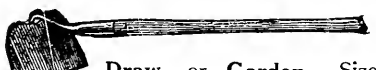
English Scuffle Hoe. Imported. Positively the best. The quality of material used and finish is superior to all others.

	Each		Each
4-in.	$1 00	8-in.	$1 40
5-in.	1 10	9-in.	1 50
6-in.	1 20	10-in.	1 70
7-in.	1 30	12-in.	2 00

Extra-strong handles, 4½ ft., 50 cts.; 6 ft., 80 cts. each.

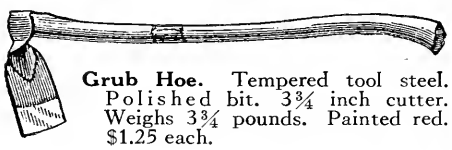


Warren, or **Heart-Shaped.** The best Hoe for weeding. Each
Small size.....$1 25
Medium size..... 1 40



Draw, or **Garden.** Sizes for boys, ladies, and men.

	Each	Doz.
5-in.	$0 90	$9 00
6-, 6½-, 7-, and 7½-in.	1 10	11 00



Grub Hoe. Tempered tool steel. Polished bit. 3¾ inch cutter. Weighs 3¾ pounds. Painted red. $1.25 each.

Screens

Handy for compost, soil, sands, gravel, etc. Extra-heavy wire; spruce frames, square mesh. Small size, 25 x 62 in., $8.50; large size, 28 x 66 in., $9.50. State whether ¼-, ½-, ¾-, or 1-in. mesh is desired.

Forks


Spading Fork

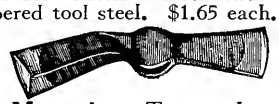
Spading Forks. Best grade; tines spear-pointed with diamond-shaped backs; handle strapped both sides. Of superior quality and very strong. Each
4-tine, D Handle.....$1 85
5-tine, D Handle..... 2 40
Long-Handle Forks, same price.


Manure Fork

Manure Forks. Best grade; strong oval tines. Long-Handle Forks, same price. Each
4-tine, D Handle.....$1 85
5-tine, D Handle..... 2 00
6-tine, D Handle..... 2 25
Hay Forks.
Best grade; strong oval tines, made only with long handles. Each
3-tine, Long Handle.....$1 30
4-tine, Long Handle..... 1 45
Turf Prying Fork.
Specially prepared for hand-forking greens; six short tines.....$3 00

Picks and Mattocks

Contractors' Picks. Both ends pointed. Tempered tool steel. $1.65 each.



Cutter Mattocks. Tempered tool steel. Painted red. Polished edges. $2 each.

Pick Mattocks. Tempered tool steel. Painted red. Polished ends. Weight about 6 lbs. $1.75 each.

Garden Line Reels

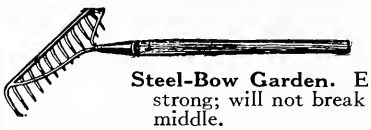
Malleable Iron. Holds 100 feet. $1.25.
Eureka. Galvanized steel. Single, 500 feet size, $3.25. Double, 1,000 ft. size, $4.

Garden Line

Best Braided Linen. 100 feet, one length, $1.50. 200 feet, one length, $2.75

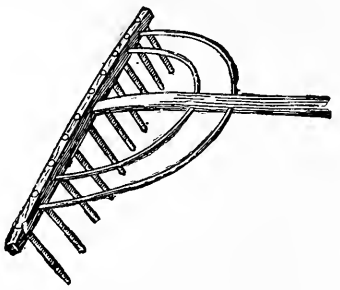
Rakes

Reversible Steel. Suitable for lawn and garden. Has 24 teeth. 75 cts. each.



Steel-Bow Garden. Extra strong; will not break in the middle. Each
12-tooth.....$1 10
14-tooth..... 1 20
16-tooth..... 1 30

Steel Garden. Cut from one piece of steel; strong and durable. Each
10-tooth.....$0 90
12-tooth..... 1 00
14-tooth..... 1 10
16-tooth..... 1 20
Steel Gravel. Like the Garden Rake. Made substantial, with short teeth. Each
14-tooth.....$1 20
16-tooth..... 1 30
18-tooth..... 1 50
A charge of 50 cts. per Rake is made when any of the above are ordered specially sharpened for renovating turf.



Wood, Hay and Lawn. Made light and substantial, with tubular steel bow; does not break like the wood bow.

	Each	Doz.
12-tooth Hay	$1 20	$12 00
24-tooth Lawn	1 50	15 00

Bamboo Rake. Japanese manufacture. Weighs only 20 ounces; cleans the turf as gently as the human hand. Each, $1.25; doz., $13.75.

Bamboo Basket

Better known as Long Island Potato Basket. Woven split rattan; handle opening under rim. Well made. A very useful type for a golf course.
½-bus. size.....$1 75
Bus. size..... 2 25


Bamboo Basket

General-Purpose Baskets

Used for many purposes on the golf course. Handy for carrying leaves and rubbish, etc. Best oak splint, reinforced with iron hoops. Made strong and for long service.
1-bus. size.....$2 00
1½-bus. size..... 2 50
2-bus. size..... 3 00
3-bus. size..... 4 25
4-bus. size..... 5 00

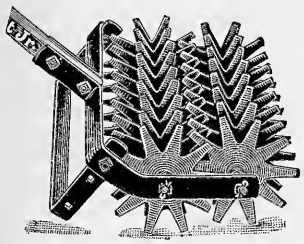

General-Purpose Basket

Sundry Requisites

No. 25 Planet Junior Combined Hill and Drill Seeder, Double-Wheel Hoe, Cultivator and Plow

Price, $22

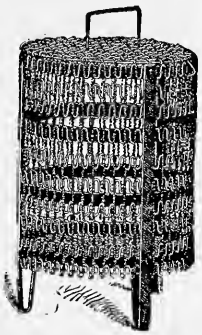
This machine is invaluable for two golf purposes: for the construction of a Creeping Bent turf nursery we suggest that the seed be sown in parallel rows 20 inches apart, the rows kept carefully weeded, when at the end of a year a fine mat-like turf will be available; for construction or repair work. Another invaluable use for the Seeder is in the club's vegetable-garden: seeding in a straight line, at regular intervals, and at the proper depth are among the essentials for the production of a good supply of high quality vegetables.



Planet Jr. Star Pulverizer, $6.50

This new tool is especially adapted for preparing the seed-bed, and will be found of great value in smoothing and fining the soil surface. The rear blade is 13½ inches wide. After the crops are started, it may be used between rows as a weeder or as a crust breaker.

Burners for Leaves, Paper and Rubbish



The best receptacle used for burning leaves, papers, and all kinds of rubbish. This handy Burner is a safeguard against many fires that have their origin in the burning of rubbish in the open. The Burner is extra strong, manufactured of heavy galvanized steel wire, reinforced with iron supports. Made to give life-long satisfaction. We supply this Burner in three sizes.

No.	Diam.	Height	Weight	Each
2	15 in.	24 in.	16 lbs.	$3 50
2½	18 in.	30 in.	22 lbs.	5 25
3	20 in.	35 in.	33 lbs.	7 00

Soil-Testing Outfit

(For Lime)

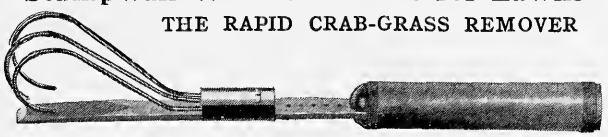
AUTOMATIC. Any 12-year-old boy can make the tests.

Substantially built from steel, brass, aluminum, to last a life-time.

Enables you to test definitely a soil and determine the correct quantity of lime required. $12 each.

Stumpwall Weed Extractor for Lawns

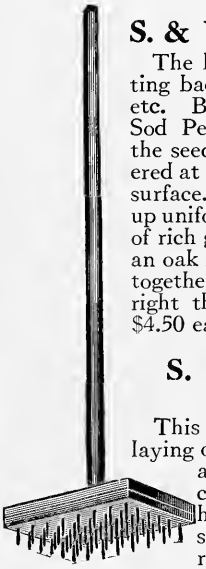
THE RAPID CRAB-GRASS REMOVER



Patent applied for. A 12-inch hand tool designed to extract crab-grass, star-grass, chick-weed, self-heal and plantain from putting greens and fine lawns. In removing crab-grass, a skilled greenkeeper will insert his pocket-knife under the plant, sever the root, and with thumb and knife remove the crab-grass with the minimum disturbance to the surrounding turf.

Experience proves that it is difficult to instruct young unskilled helpers to do the same. Instead the tendency is to *gouge* out the weed, causing instead a *large bare patch*. The Stumpwall Crab-grass Remover enables an inexperienced worker to do mechanically what an experienced greenkeeper can do by hand. In practice it is twice as fast. $1.50 each, $16.50 per doz.

S. & W. Co.'s Sod Perforator



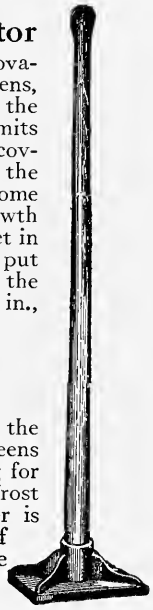
Sod Perforator

The best low-priced device for renovating bad spots in lawns, terraces, greens, etc. Before sowing grass seed, use the Sod Perforator. The operation permits the seed to enter the soil, where it is covered at about the correct distance from the surface. The seed will germinate and come up uniformly, producing a vigorous growth of rich grass. The spikes are firmly set in an oak block, made in two halves and put together with screws. The handle is the right thickness and length. 12 x 12 in., $4.50 each.

S. & W. Co.'s Iron Sod Tamper

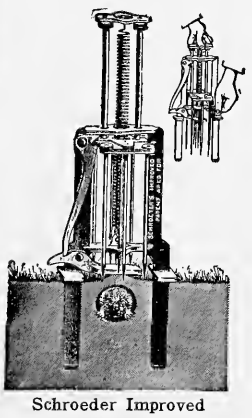
This Sod Tamper is in demand for the laying of sod. It is used on putting-greens and terraces; also in the spring for compacting the sod after the frost has disappeared. The Tamper is square. A wooden handle of right size is firmly secured to the Tamper.

Size ins.	Weight lbs. each	Price
8 x 8	17	$2 75
10 x 10	20	3 00



S. & W. Co.'s Iron Tamper

Mole Traps



Schroeder Improved

Schroeder Improved No. 1. It has a rest on top for a weight, also eight sharp prongs and a strong spiral spring. $2 each, $20 per doz.

The Rittenhouse. The simplest, safest, and surest mole trap ever invented. Self-setting. No danger of its going off unless the trigger is touched. Made of all steel and tinned. Six in a crate. The spears are spring steel, therefore not so long as soft steel. $1.10 each, $11 per doz.

Reddick's. $1.25 each, $12 per doz.

Rittenhouse

MO-LO Will Clear Your Lawn of Moles and Field Mice in a Few Nights

Directions:—Punch a hole in top of run, drop in one MO-LO and cover lightly. Do this every eight or ten feet. Keep MO-LO away from children or domestic animals. *It is poisonous.* Package, 25 cts.

George Low Sand Rake

For Traps on a Golf-Course

Invented by one of the best-known golf professionals in the country. Ridges the sand, prevents the ball being teed up in the sand, compels a player to use his niblick instead of rolling his ball with a putter. Gives the traps a wonderful appearance. Price, $2.50; doz. $27.50.

A Complete Garden

A New Book on Landscape Gardening

Tells what, when, and how to plant in any place, for any purpose. Every phase of harmonious landscape architecture and gardening, in a book of more than 400 pages with numerous illustrations. The Complete Garden. By Albert Taylor, M.S.A. $6, postpaid.

Books for the Golfer

TURF FOR GOLF COURSES. By C. V. Piper and R. A. Oakley. This is an authoritative and practical treatise on the production and maintenance of grass turf. Postpaid, $3.

GOLF FOR BEGINNERS. By David Hunter, Professional at Essex County. Dave Hunter takes the learner step by step, making the fundamentals so clear that proficiency is assured. Pocket size. Postpaid, $1.

GOLF FUNDAMENTALS. By Seymour Dunn, of Lake Placid, N. Y. Four New Books on Golf, all bound in one volume; a most exact and interesting course of 50 lessons on how to play the game; a guide to the beginner; a reference book for the advanced player when off his game. 453 illustrations; many motion picture views. Bound in cloth, postpaid $8.

Turf Brooms

Birch Brooms. Superior make. 75 cts. each, $7.50 per doz. Without handles, 50 cts. each, $5 per doz.

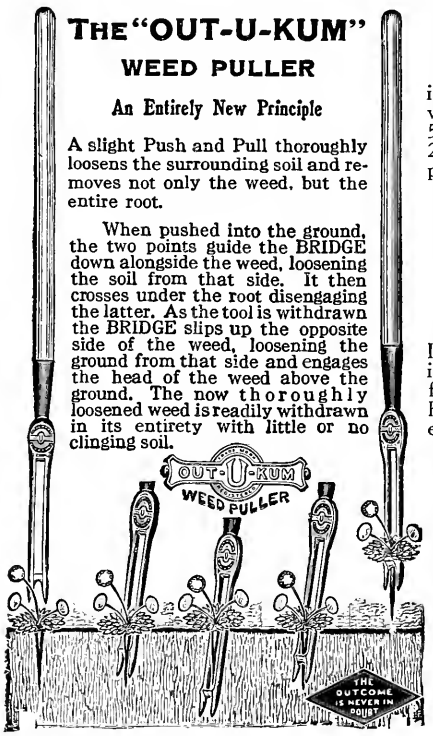
Bamboo Brooms. Very light. Do the work without injury to the grass. Complete with handles. $2 each, $20 per doz.

THE "OUT-U-KUM" WEED PULLER

An Entirely New Principle

A slight Push and Pull thoroughly loosens the surrounding soil and removes not only the weed, but the entire root.

When pushed into the ground, the two points guide the BRIDGE down alongside the weed, loosening the soil from that side. It then crosses under the root disengaging the latter. As the tool is withdrawn the BRIDGE slips up the opposite side of the weed, loosening the ground from that side and engages the head of the weed above the ground. The now thoroughly loosened weed is readily withdrawn in its entirety with little or no clinging soil.

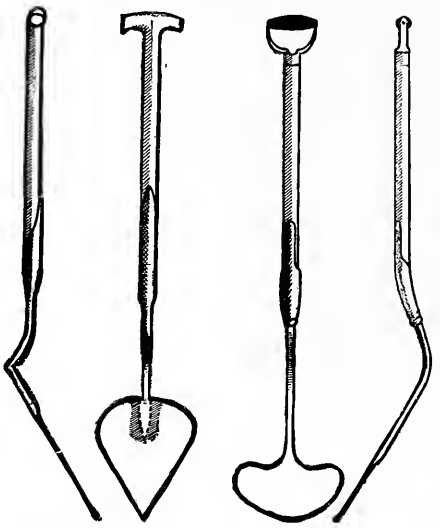


Bamboo Poles

Widely used for sweeping and distributing worm casts. 18-ft., 50 cts., $5 per doz.; 20-ft., 60 cts. each, $6 per doz.

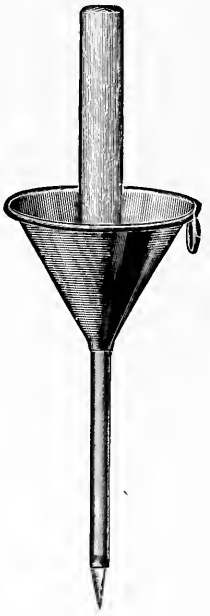
The "Out-U-Kum" Weed Puller

Made of refined malleable iron, highly polished. Black enameled ferrule and select waxed hardwood handle. $1 each.



English Sod Lifter
Length 4 ft.

American Sod Lifter
Length 4 ft.



Funnel and Skewer
Length 12 ins.

Sod Lifters

English Pattern. Heart-shaped, strong, and highly efficient. $7 each.

American Pattern. Preferred by many on account of its light weight. $2 each.

Racing Irons. English make. Used to produce the vertical cut when lifting sod by hand. $6 each.

Stumpp & Walter Co.'s Funnel and Skewer

Specially designed for applying carbon bisulfide through the turf into the soil. $1.50 each.

Carbon bisulfide will burn grass; hence it is necessary to employ a device of this nature to convey it through the grass down into the soil.

Narrow Trowel

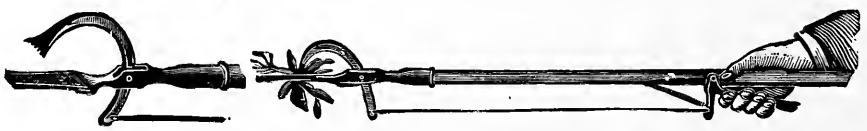
Of use in extracting dandelions and other weeds from turf. 5-in. 20 cts. each; 7-in. 30 cts. each.

S. & W. Co.'s Special Chisel Knife

Similar to an asparagus knife, but shorter. Made especially by us for extracting weeds from putting-greens. $6 per doz.

NOTE

The benefit of a Grass Seed Expert, who has made a life study of this subject, is at your disposal.



Cleveland Lawn Weeder

Is simple to operate and not only saves the back, but is actually a pleasure to use. The cut is a good illustration, showing how to work it. $1.50 each, $15 per doz.

IMPLEMENTS, continued

Hedge Shears

Plain	Price
8-in. blade	$3 25
9-in. blade	3 75

Hedge Shears

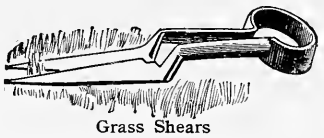
Solid steel blade, crucible tool-steel, tempered to hold an edge. Give good service. Shears with notch are the best for cutting heavy stems of hedge plants.

Plain	Price
10-in. blade	$4 00
Ladies'	3 00

With Notch	Price
8-in. blade	$3 75
9-in. blade	4 25
10-in. blade	4 50

S. & W. Co.'s Grass Shears

A very simple but practical locking device holds the Shears together. Made of the best crucible tool-steel; polish finish. One size only, 6½-in. blade, $2.50 each.



Grass Shears

Western Grass Shears. Made of good quality tool-steel. A one-piece Shears. Plain finish, 6-in. blade, $1.50 each. A leather shield is furnished with each Shears.

Border Shears

Grass Edging or Border Shears

Designed to trim the overhanging grass on borders around flower-beds and walks. 9-in. blades of high-grade tool-steel; polished handles and blades. Without wheel, $5.50 each; with wheel, $6 each.

Lawn Shears

Designed to cut grass under hedges, fences, grape arbors, and flower-beds or shrubs. 9-in. blades of high-grade tool-steel, polished handles, and blades. Without wheel, $6 each, with wheel, $6.50 each. NOTICE: When shipping the above Shears, unless stated on orders, we send Shears with wheel.

Lawn Shears

Scythes

Imported English. Has a riveted back, broad, thin, light blade. Best Scythe for cutting grass, rye, oats, etc.

30-in.....$2 75 | 34-in.....$3 25
32-in..... 3 00 | 36-in..... 3 50

The Little Giant. Has a ribbed back, is heavier and better adapted to rough work.

32-in.....$2 00 | 36-in.....$2 40
34-in..... 2 20 | 38-in..... 2 60

Scythe Snath, or Handle. The very best, with patent socket. $2.25 each.

Bush Scythe. High-grade steel blade. Painted red. 18-in. $1.25 each; 20-in. $2 each.

Bush Hook. Forged steel. 36-inch hickory handle. $3 each.

The benefit of a grass-seed expert—one who has made a life study of this subject—is at your disposal

Grass Hooks

Imported English. With heavy riveted back, thin cutting blade; easy to sharpen; forged from the best-grade steel. **No. 2,** 90 cts. each; **No. 3,** $1 each; **No. 4,** $1.15 each.

Leather Horse Boots

(QUALITY KIND)

Easily attached to the horse's feet; prevent marring the lawns. Frequently after rains, or in the spring, the lawns are soft and easily cut up. Use a good leather boot and save the lawn. Quality Kind are made good. Double-thick soles and uppers reinforced; heavy parts put together with copper rivets. Small size, $14; medium size, $15; large size, $16 per set of four.

SCYTHE STONES, Genuine English. Round, tapering. 75 cts. each.
Genuine Carborundum. No. 190, 75 cts. each; No. 192, $1 each.
Red-End. 15 cts. each, $1.50 per doz.

SCYTHE RIFLES, Emery-coated. 25 cts. each, $2.50 per doz.

Wire Stretcher and Tackle Block

A Handy Tool for Every Golf Course

No. 2 Stretcher. Shipping weight, 5 lbs., $2.25 each.

These are useful for all purposes of tackle blocks, and at the same time are excellent wire stretchers. All the metal being wrought and malleable iron, they are practically indestructible and are strong enough for strain of at least half a ton.

Directions.—For stretching wire, place the hook around the post, and secure the wire in the eccentrics; then pull the wire tight and secure the rope to the post. Then staple the wire securely. To unite the ends of wire, fasten one end in each eccentric; then draw them up and twist them together.

Boss Staple Puller

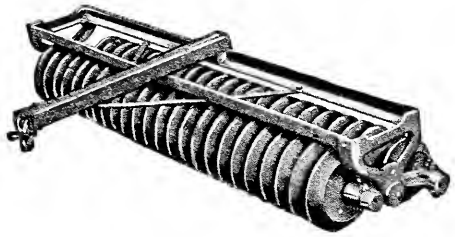
The simplest, strongest and most perfect staple puller ever made. Pulls the staples with one blow of a hammer and does not injure the fencing. 11½ inches long, made of the best cast steel and is light and strong. Mailing weight 1½ lbs. 75 cts. each.

POST-HOLE DIGGERS, Iwan's Split Handle. 6 inch, $2.50 each.
Perfection. $1.50 each.
Gibb's Lock Lever. $2.50 each.

POST-HOLE AUGER. 6- and 7-in., $2 each; 8- and 9-in., $2.25 each.

IWAN WELL DIGGER. 6-in., $1.85 each; 8-in., $2.15 each; 9-in., $2.50 each.

PRICES SUBJECT TO MARKET CHANGES



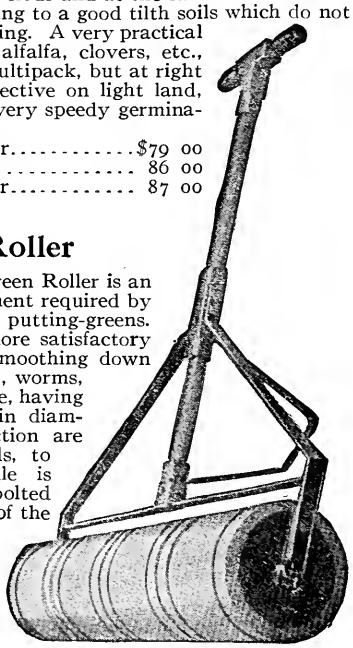
Cultipacker

This implement will break up clods and at the same time firm the soil; it is of great value in reducing to a good tilth soils which do not respond to the harrow after plowing. A very practical method of sowing grass seeds, alfalfa, clovers, etc., is to cultipack, sow, and again cultipack, but at right angles. This is particularly effective on light land, the rolling effect resulting in a very speedy germination.

8 ft. wide, equipped for tractor.....$79 00
8 ft. wide, equipped for horse..... 86 00
9 ft. wide, equipped for tractor..... 87 00

Putting-Green Roller

The S. & W. Co.'s Putting-Green Roller is an indispensable part of the equipment required by golf clubs in maintaining perfect putting-greens. This Roller being of wood is more satisfactory for gathering worm-casts and smoothing down all uneven spots caused by frost, worms, ants, etc. The roller is 4 feet wide, having four 12-inch sections, 10 inches in diameter. The ends of each section are banded with 2-inch steel bands, to prevent splitting. The handle is reinforced with steel braces, bolted to solid cast heads on both ends of the roller. The S. & W. Co.'s Putting-Green Roller is endorsed by many of the best golf clubs of America. The net and shipping weight is 186 lbs., $22.50 each.

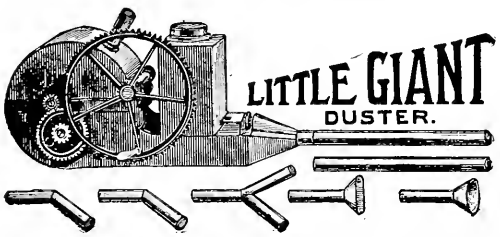


Wheelbarrow Powder Sower

For an illustration of this we would refer to page 43 of this catalogue. It is identical in appearance with our Wheelbarrow Grass Seeder; in fact, we offer a hopper that is interchangeable with it.

Complete machine for distributing powder only.....$16 00
Special Hopper to use with our Wheelbarrow Seeder..... 11 00
Combination Seeder and Powder Distributor..... 27 00

For an illustration showing a similar machine, our golfing friends are referred to page 115 (April 26, 1922) of the Bulletin of the Green Section of the U. S. Golf Association.



Powder Duster

For applying Dry Bordeaux Mixture, Soot, or Tobacco Dust to lawns, also Paris Green, Arsenate of Lead, etc., to potatoes and other vegetables, tobacco, cotton, etc. Made so strongly that, with average care, the machine will give efficient service for many years. Price, $12.

S. & W. Co.'s Reenforced Nursery Spade

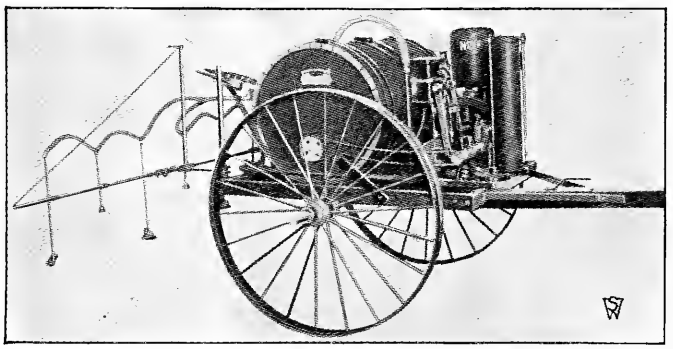
A well-made Spade, being strongly and heavily strapped close up to the "D" handle. For all-round garden work, and will last a lifetime. Price. $2.50

Early Bird Rakes

The Early Bird Putting-Green Rake has been found to be a better, more efficient, and economical implement for cleaning the greens than any yet on the market. It will leave the green smooth and clean. The Early Bird Rake is unqualifiedly endorsed by leading golf professionals, golf-course experts, greenkeepers, and players who appreciate the importance of a perfect putting surface.

Width, 30 in.; weight, 8¼ lbs.....$10 each

Power Sprayer



This outfit is suitable for spraying large areas of turf with bordeaux mixture as a protection against fungous disease, or it may be used to spray young grass with a solution of sulphate of copper to kill seedling weeds as described on page 17.

Specifications.—The pump has a 2¾-inch cylinder, porcelain lined; 4⅛-inch stroke, 50 R.P.M. capacity 4¾ gallons per minute. Weight, with truck, 700 pounds; height, 44 inches from ground to top of tank; length 6 feet 6 inches. Adjustment of wheels, 50 to 72 inches.

Makeup of Bean Truck Sprayer.—Outfit 600, Simplicity engine 1½ H.P., magneto ignition; Bean Simplicity double-back geared power pump with gauge; pressure regulator is built into pump; 100-gallon tank fitted with handhole, cover and drain; complete rotary agitator fitted in tank and connected to pump; steel platform with all parts connected up and securely fastened in position; special truck; two 36-inch wheels; 4-inch tires; extra-long axle; fitted with shafts; adjustable attachment with four nozzles completely fitted; extra packings; valve seats, gaskets, wrenches. This outfit will be shipped thoroughly tested and ready for use.

The above, complete with 1½ H.P. Simplicity engine, $260, f.o.b. Lansing, Mich.

Bamboo Spray Pole for Tall-Tree Spraying

Bamboo Spray Poles are brass-lined to resist the corroding effect caused by strong solutions. Each Spray Pole is equipped with a drip-shield at the top and brass shut-off at the bottom. Spray Poles over 12 feet are not entirely satisfactory and we do not recommend them.

8 ft. $4.20, 9 ft. $4.40, 10 ft. $4.60, 12 ft. $5.30.

Seed Sowers, Fertilizer Distributors and Auto-Sprays

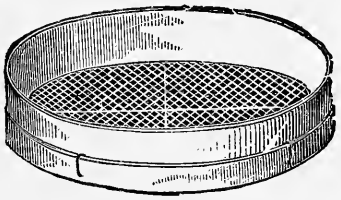
S. & W. Co.'s Lime and Fertilizer Sower

This Force Feed Lime and Fertilizer Sower is the most perfect machine on the market for sowing all brands of commercial fertilizers. Nitrate of Soda, Emerald Grass Fertilizer, Fairway Fertilizer, Anti-Clover Manure, Pulverized Limestone, Sheep-Manure, Bone Meal, Dry Wood Ashes, etc. Hopper holds 10 bushels. Actual width of sowing is 8 feet. Capacity from 50 to 4,500 pounds. The screen in the hopper and revolving agitator prevents clogging and packing of material on the feeds and insures an even distribution of fertilizers. All feeds can be instantly shut off or opened to any desired amount. Has two 30-inch wheels with 4-inch concave tires. Shipping weight 360 lbs. $50 each.

Auto-Spray

Recommended for applying bordeaux mixture to putting-greens. Convenient, durable, efficient. Useful with all solutions, also in applying cold-water paint or whitewash. Holds four gallons. Illustration shows our new "Auto-Pop" attachment which doubles the efficiency by saving half the solution and labor. Tank made of galvanized steel or brass. High-grade hose. Castings for handle, etc., all malleable. No continuous pumping as in the case of the Knapsack Sprayer, nor continuous pumping or slopping as in the case of the bucket pump. A few strokes of plunger compresses enough air to cover half a putting-green.

Auto-Spray No. 1B. Brass Tank, with "Auto-Pop"	$9 00
Auto-Spray No. 1D. Galvanized Tank, with "Auto-Pop"	6 00
2-foot Brass Extension Pipe.	60
Brass Elbows for spraying under vines	35
Brass Strainer for straining solution	1 20
Bordeaux Nozzles	1 50



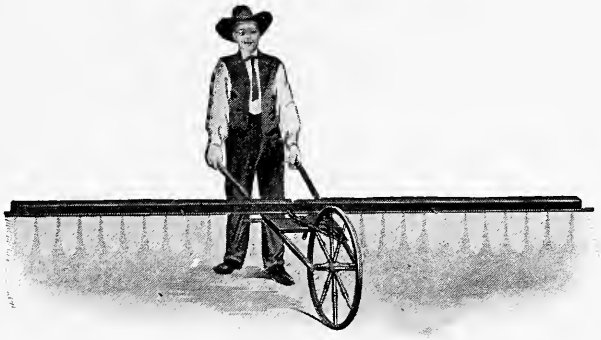
Sieves

For covering newly sown seed there is no better way than to riddle on to it a very light covering of soil. For this purpose we offer Hand-Sieves, 20 inches in diameter and in ¼-inch mesh, although any mesh specified may be ordered. 20-inch Steel (heavy), $1.55 each.

Vegetables and Flowers for the Club House

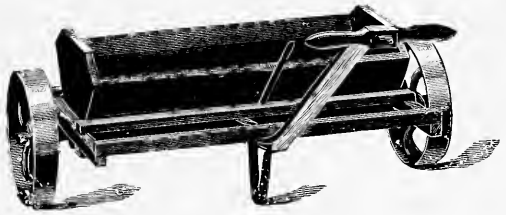
We suggest that you grow your own Vegetables and Flowers. Together with good land, well handled, *the best possible seeds are essential.* We list these in our illustrated catalogue, a copy of which will be gladly sent on request.

S. & W. Co.'s Wheelbarrow Seed Sower



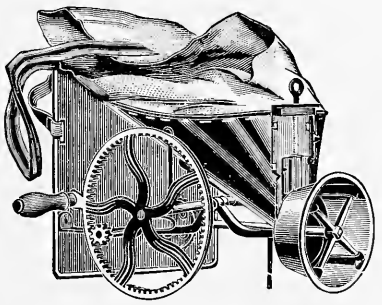
We recommend this practical machine for sowing all grass mixtures. It is provided with a double hopper, 14 feet in length and well balanced. One side of this seed hopper is adapted for all heavy seeds, such as timothy, clover, alfalfa, millet, etc. The opposite side sows lighter, smaller seeds, such as Fairway Formula, red-top, blue grass, bent grass, orchard grass, etc. The machine is simple to operate. A boy can work it. The operator can easily regulate the machine to sow any desired quantity to the acre. It does not clog and will sow evenly an area 14 feet wide. Full directions are in each hopper. Weight, 45 lbs. $16.50 each. Special hopper to enable this machine to distribute Bordeaux or fertilizers, $11. Complete machine, both as seeder and powder distributor, $27.

S. & W. Co.'s Hand Fertilizer Sower for Top-Dressing Lawns



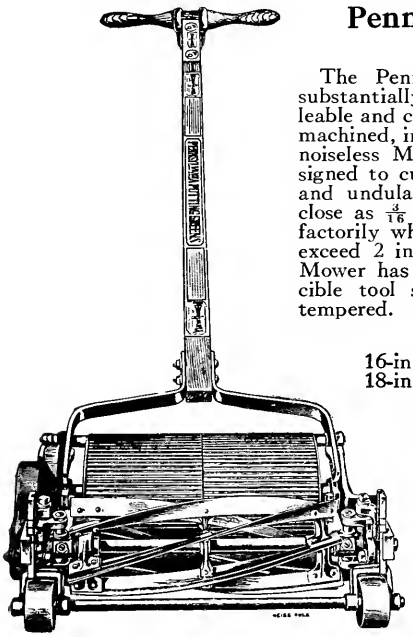
Has the same adjustment as a more expensive horse-power machine and will sow all commercial fertilizers. The hopper is 34 inches long and holds one and one-half bushels. Besides top-dressing greens, lawns, etc., it is a handy machine for all kinds of garden and field work. When two blades are removed, it will sow damp sand. Also is an excellent machine in the winter for covering icy roads and walks with sawdust sand, etc. Shipping weight, 83 lbs. $20 each.

Cahoon's Improved Broadcast Seed Sower



This is the only Broadcast Seed Sower that has come to stay. It is well known as a practical and cheap broadcaster. Wheat, rye, oats, barley, hemp, timothy, millet and Hungarian grass are used in this Seeder. The operator can sow from four to eight acres an hour, walking at an ordinary gait. The seed is scattered from 8 to 20 feet on each side of the operator, according to the kind of seed. The heavy seed, like wheat, is scattered the greatest distance. Packed weight, 8 lbs. Can be sent by parcel post. $5.25 each.

Hand Lawn Mowers



Pennsylvania Roller Mower

Pennsylvania Roller Mower

The Pennsylvania Roller Mower is substantially constructed of steel, malleable and cast. The parts are accurately machined, insuring an easy running and noiseless Mower. This machine is designed to cut grass on borders, terraces and undulating greens. It will clip as close as $\frac{3}{16}$ of an inch and cuts satisfactorily where grass is not allowed to exceed 2 inches in height. This Roller Mower has six revolving blades of crucible tool steel, oil-hardened and oil-tempered.

	Gross weight	Net weight	Price
16-in. cut.	88 lbs.	66 lbs.	$34 50
18-in. cut.	94 lbs.	71 lbs.	39 00

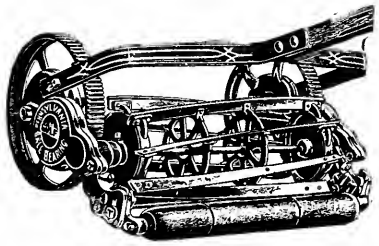
Grass Boxes, all sizes, $8 each, extra.

Pennsylvania Lawn Trimmer Ball-Bearing

Made to meet the demand for a serviceable tool to take the place of grass shears and other devices for cutting grass left at the edge of lawns, around flower-beds, etc. Will cut to within $\frac{3}{8}$ of an inch of walls, fences, walks, etc. Will mow any border wide enough to run one wheel on. High 8-inch wheel; runs easily; self-sharpening.

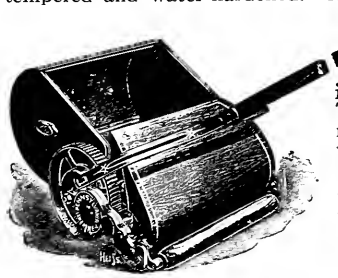
Width of cut 6 inches; gross weight 26 lbs.; net weight 20 lbs. $11.50 each.

The Aristocrat Golf Mower, Ball-Bearing



The Aristocrat Golf Ball-Bearing

The Aristocrat is the acme of putting-green Mowers. Extreme tests have proved this machine superior to all other Mowers in keeping the greens in first-class condition. The Aristocrat was specially designed for putting-greens. Consideration was exercised in the construction of this machine to give the longest service, ease of adjustment and operation, and the best possible satisfaction that can be obtained from a Golf Mower. The life of this Mower is long compared with the other styles of Golf Mowers. The seven revolving blades and the bottom knife are the best crucible tool-steel, oil-tempered and water-hardened. A double train of gears drives the revolving blades from two 9½-inch traction wheels. The greens are shaved to $\frac{3}{16}$ of an inch and left even and smooth. The Aristocrat is ball-bearing, runs easily, and does not jump when starting.



The Aristocrat with Grass Box Attached

Considerable weight of the Mower is carried by the sectional iron roller, which rolls the worm-casts and assists in keeping the green true and even. Wherever the Aristocrat has been given a thorough test, it has been accepted and given the preference. The illustration with the Grass-Box attached shows the Aristocrat complete, and the way it should be operated to obtain the best results.

The Aristocrat is used exclusively and highly recommended by many of the best golf, tennis and cricket clubs.

Size	Gross weight	Net weight	Price	Grass Box
17-inch cut	102 lbs.	72 lbs.	$36 00	$8 00
19-inch cut	104 lbs.	76 lbs.	40 50	8 00

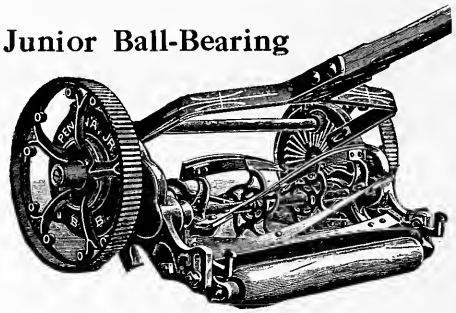
S. & W. Co.'s Ball-Bearing Mower

A high-grade standard machine, adopting only the best features in its construction. The cutting parts are made of oil-hardened water-tempered crucible tool-steel, and are positively self-sharpening. The knives and blade will hold a durable edge and will not dull as the softer cutting parts of other Mowers do. The simple adjustment sets the machine to shave the lawn to ½-inch or up to 1½ inches as may be desired. The axle revolves in extra-large balls placed in hardened tool-steel cones and cups, and is driven with two gears by two 10-inch traction wheels. These wheels are made durable and are not easily broken.

This Lawn Mower is made to give good and long service and with ordinary good care will last from five to ten years.

Size	Cross weight	Net weight	Price	Grass Catcher
14-inch cut	65 lbs.	40 lbs.	$15 00	$4 75
16-inch cut	67 lbs.	42 lbs.	16 50	4 75
18-inch cut	71 lbs.	45 lbs.	18 00	5 25
20-inch cut	76 lbs.	48 lbs.	20 00	6 00

Pennsylvania Junior Ball-Bearing



Pennsylvania Junior Ball-Bearing

Has all the good features incorporated in a perfect Lawn Mower. The five revolving blades are driven by a triple set of gears and a 10-inch traction wheel from each side. The revolving blades and the bottom knife are the best crucible tool-steel, oil-tempered and water-hardened. The Pennsylvania Junior is capable of cutting grass 6 inches high. Will not jump, as many of the lower-priced machines do.

Size	Gross weight	Net weight	Price	Grass Catcher
15-inch cut	71 lbs.	48 lbs.	$27 50	$4 75
17-inch cut	74 lbs.	51 lbs.	31 00	4 75
19-inch cut	77 lbs.	53 lbs.	35 00	5 25
21-inch cut	80 lbs.	55 lbs.	38 50	6 00

Pennsylvania Golf Mower

Low wheel, plain bearings, for home greens

This Mower is especially adapted for small golf links, tennis courts, bowling greens, and cricket creases. Can be adjusted to cut $\frac{3}{16}$ of an inch, practically shaving the lawn. **Size, 16-inch; gross weight 67 pounds; net weight 37 pounds; price, $22.50; grass box $8.**

The "K" Hand Power Stump Puller

By means of this device land may be cleared of stumps economically and quickly. The device is made from the finest steel and has two speeds, a high for light pulling and a low for heavy pulling; the equipment also comprises pulley-blocks, cable, etc. Offer No. 1. Puller, blocks, grab, 200 ft. of cable of ¾ and ⅞in. diameters. Capacity 280,000 lbs. $330. Offer No. 3. Puller, blocks, grab, 155 ft. of cable of ¾ and ⅞in. diameter. Capacity 280,000 lbs. $298. Offer No. 4. Puller, blocks, 75 ft. of cable of ¾ and ⅞in. diameter. Capacity 140,000 lbs. $210.50.

Special Root Hook for low cut stumps; affords a hold for the cable without digging. Extra $23.

Lawn Cleaners, Golf Sweepers, and Lawn Rollers

PRICES SUBJECT TO MARKET CHANGES

Stumpp & Walter Co.'s Lawn and Golf Sweeper

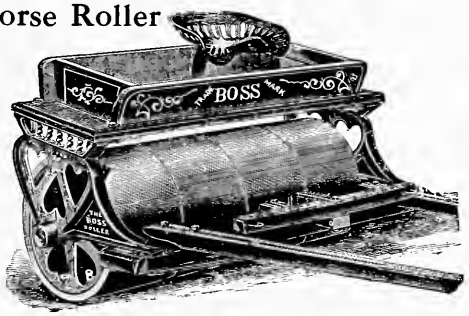
Is equipped with Palmetto Brushes of the toughest fiber and unaffected by water. Sweeps and gathers fresh cut and dead grass, leaves, stones, and other litter. Reduces labor from hours to minutes. Beautifies the grass. A real necessity for the quick and economical sweeping of lawns and golf-courses. Labor saving, efficient, and durable machine. This new sweeper is practically an all year round machine, for wherever there is a plane surface to be swept, whether sidewalk or porch, the S. & W. Co. Lawn and Golf Sweeper will do the work easier and quicker.

Width, 28 inches. Net weight 84 lbs.; gross weight 106 lbs. Price $33, Extra Wheels without Rubber Tires $5 each. Brush Reel, 28-inch, complete with brushes $13. Grass-Box, 28-inch size, $10.

Pennsylvania Putting-Greens Lawn-Sweeper

The PENNSYLVANIA Lawn Cleaner and Rake is quickly converted into an efficient sweeper for removing worm casts from putting-greens without injury to the turf and in a tenth of the time consumed by usual methods. The three steel rakes are removed and the brushes substituted. The brushes are made of high-grade fibre, set in a hardwood head, and give long wear. Moisture will not injure the brushes, and owing to the construction of the machine, they are easily removed for cleaning or for interchanging with the raking cylinder. The machine is not taken apart during this operation. 24-inch sweep $35; 36-inch sweep $50.

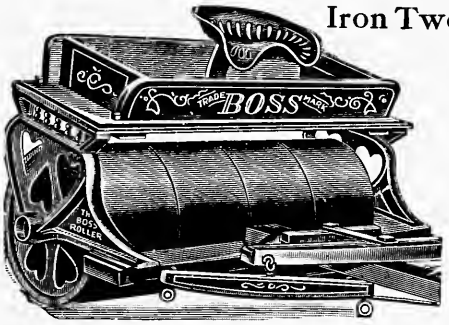
Iron One-Horse Roller



This machine is designed to meet the demand for a one-horse Roller. The construction is the same as the two-horse Roller, except that it has the shaft in place of the pole. Each section is turned smooth on the surface with outer edges beveled. Quality and finish are the same as of the two-horse Roller and also include the weight, box, seat, and shaft. They give long and excellent service.

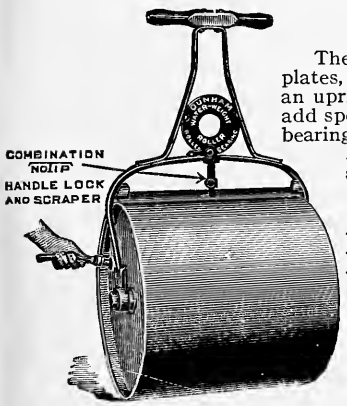
No.	Diameter	Length	Sections	Weight	Price
60	20 in.	48 in.	4	950 lbs.	$90 00
61	20 in.	60 in.	5	1,150 lbs.	106 00
62	24 in.	48 in.	4	1,200 lbs.	114 00
63	24 in.	60 in.	5	1,450 lbs.	133 50
65	28 in.	48 in.	4	1,350 lbs.	127 50

Iron Two-Horse Roller



Suitable for roads, lawns, and golf-courses. This Two-Horse Iron Roller is manufactured to do heavy work. Has been used with excellent success on golf-courses and private estates, on roads, lawns, and putting-greens. This is the best draft Roller on the market. It has babbitt-metal bearings, pulls directly from the axle, and is so perfectly balanced that there is no weight on the team. It is equipped with a substantial weight box for additional weight, seat, and pole. Each section is turned smooth on the surface with outer edges beveled. This Two-Horse Roller is superior in quality, construction, and finish.

No.	Diameter	Length	Sections	Weight	Price
71	20 in.	72 in.	6	1,300 lbs.	$117 00
72	24 in.	60 in.	5	1,450 lbs.	133 50
73	24 in.	72 in.	6	1,700 lbs.	153 00
75	28 in.	60 in.	5	1,650 lbs.	151 50
76	28 in.	72 in.	6	1,950 lbs.	175 50



Filled with Water or Sand

The Dunham "Water-Weight" Lawn Roller

The Dunham Water-Weight Roller is a most satisfactory Roller. The construction consists of three heavy steel plates, pressed together and electric-welded, forming one solid steel drum with no leaky joints; handles are always in an upright position, as shown in the illustration, and held in this position with counterbalance weights, which also add speed and ease of operation to the Roller. Axles are of high-carbon steel, perfectly round, and revolve in roller bearings, the same as used in automobile construction. This feature alone has proved this Roller to operate with 44 per cent less energy or power than is required to operate other Rollers. The proper way to fill this Roller is shown in the illustration. The weight of each Roller empty and filled is given with the diameter and length below.

No.	Diam. in.	Length in.	Sections	Weight empty lbs.	Filled with water lbs.	Price
WB3	14	20	1	60	200	$18 50
WB5	18	24	1	75	300	22 25
WB7	24	24	1	110	500	25 75

Cast-Iron Hand Lawn Rollers

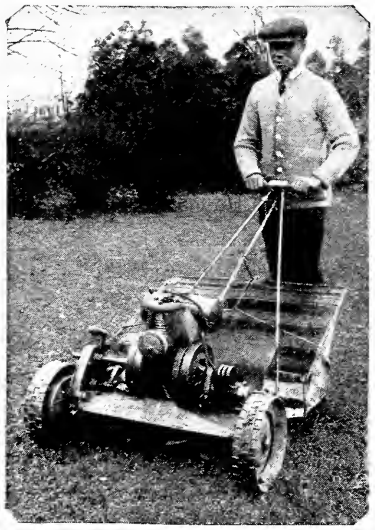
Made in one, two, and three sections. The face of each Roller is made smooth, with outer edges rounded to avoid cutting the lawn or garden. Roller-bearing, outside counter-balancing weights to keep the handles in an upright position. The Rollers of two or more sections are preferable, as they will not injure the grass when turning. The best one-man Rollers are those averaging from 250 lbs. to 500 lbs.

No.	Sections	Diam. in.	Length in.	Weight lbs.	Price
1	2	15	15	150	$14 50
2	3	15	22	200	20 00
4	2	20	20	250	25 50
7	2	20	24	300	29 50
8	3	20	30	350	$34 50
9	2	24	20	400	39 50
10	2	24	24	450	44 00
13	2	28	24	500	50 00

Cast-Iron Hand Lawn Rollers

TRACTORS
Gas Mowers and Horse Machines

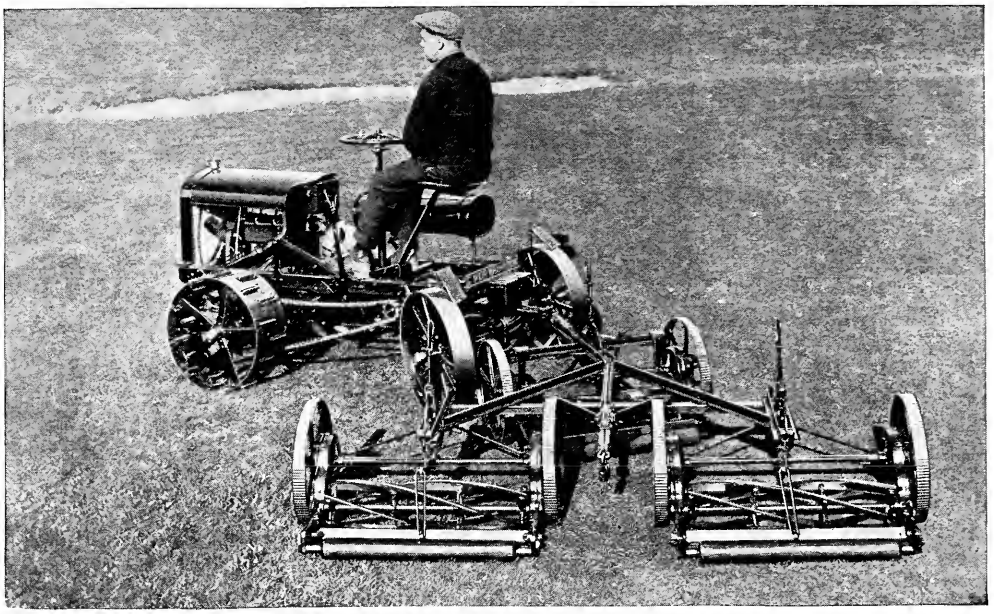
Write for Descriptive Literature



The Four-Acre Power Lawn Mower

The motor has a 2½ in. bore with 2½ in. stroke, and runs at 3½ miles per hour at 1,000 revolutions per minute. Cuts 4 to 5 acres a day on a consumption of one gallon of gasolene. Width of cut 24 ins. Price $280 f. o. b. New York. Grass box $5 extra.

FOUR-ACRE ROLLER MOWER. A gasolene machine recommended by the manufacturers for use on putting greens. Design similar to the above, but with roller drive and a closer cutting unit. Price $325 f. o. b. New York.

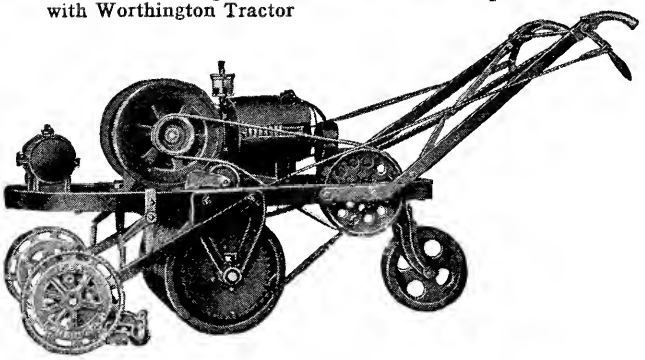


The Use of a Tractor in Combination with a Gang Mower. The Shawnee Triple Mower with Worthington Tractor

Shawnee Mower and Worthington Tractor

By taking the dependable Ford engine, and adapting it to the requirements of the greenkeeper a machine has been evolved that is light in weight, economical in operation, and the adjustment of which is within the capacity of anyone.

Prices. Tractor only $900. Mower only: 3 cutting units $400, 5 units $675. Combination: Tractor and 3 units $1,250. Tractor and 5 units $1,500. All f. o. b. factory in Pennsylvania.



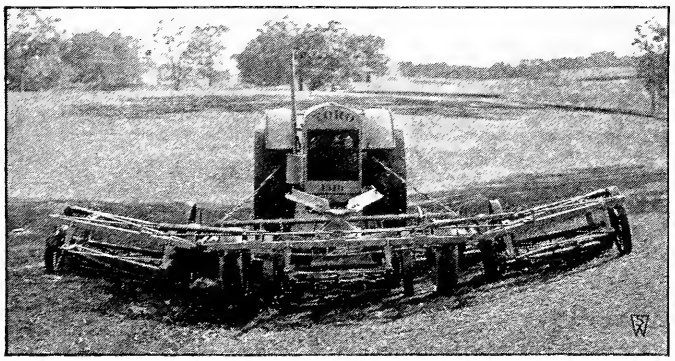
Ideal and Ideal Junior Power Mowers

Ideal. A very practical and dependable Mower, built with as few parts as possible. Cuts a swath 30 inches wide at a speed of 2¾ miles per hour.

Price $360, f. o. b. your station. Sulky or riding attachment, $30 extra. Extra Cutting Unit, $60 each.

Ideal Junior. Similar to the above, but having only a 22-inch cutting blade.

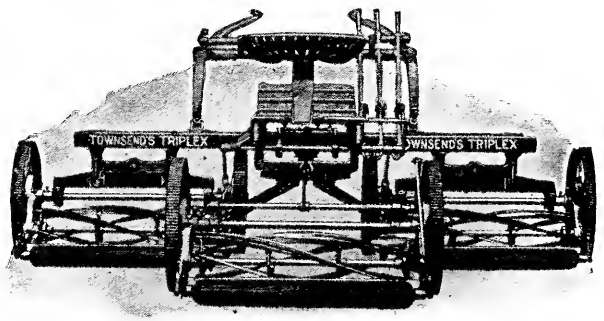
Price of "Junior" Mower, $240. Extra 22-inch Cutting Unit $45, delivered to your station.



Toro Equipment

The combination of light, speed-governed, well-made Tractor with forward operating frame represents one of the most practical outfits for the golf-course today. With the five cutters operating the Toro will mow 35 acres of fairway in sixteen hours.

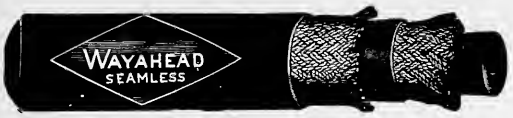
Prices: Tractor alone, suitable for construction work, $675, Tractor with frame for 3 cutter units $950, Tractor with frame for 5 cutter units $1,000; Cutter Units, each $115. Three-Section Roller $150, Wagon $125. All f. o. b. Minneapolis.



Townsend's Triplex Horse Mower

Here is a Horse Mower that will cut a swath 86 inches wide. It floats over the uneven ground as a ship rides the waves. One Mower may be climbing a knoll, a second may be skimming the level, and a third may be paring a hollow. Price, $375, f. o. b. factory. Weight 600 pounds. Extra Unit, $100, f. o. b. factory in New Jersey.

RUBBER HOSE



S. & W. Co.'s Special Brand (Wayahead). Surpasses all the cheaper grades of Hose. Its durability is not excelled by higher-priced Hose. It is three-ply, seamless, and non-kinkable. Standard lengths, ¾-inch bore, 25 ft., $4.50; 50 ft., $8.50.

Electric. Three-ply, non-kinkable, molded Hose. The strength and durability of this Hose place it with the very best grade of Hose manufactured.
Standard lengths, ¾-inch bore, 25 ft., $6; 50 ft., $11.50.
Standard lengths, ½-inch bore, 25 ft., $5.50; 50 ft., $10.
Other lengths, ¾-inch 23 cts. per ft., ½-inch 20 cts. per ft.

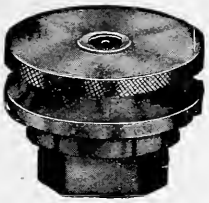
Golf-Course. Six-ply, heavy duck Hose, with exceptionally strong black tube and white cover. Especially adapted for use on golf-courses, tennis-courts, and cricket-creases. This is guaranteed for any pressure and hard work as usually found on golf-courses and private estates. Will stand up and give satisfaction under conditions where ordinary garden Hose has failed. Standard lengths, ¾-inch bore, 25 ft. $5.50; 50 ft. $10. Standard lengths, 1-inch bore, 25 ft. $9; 50 ft. $17.

HOSE NOZZLES

Stott's. A Nozzle that has become a favorite among rose-growers, etc., for exterminating red spider. Splendid Nozzle for reaching under the foliage; gives a very fine, misty spray. Single, $1.50, double, $3.

Mistry Jr. Can be used for spraying whitewash. $1.75 each.

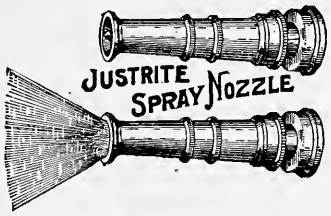
Magic. Brass Hoze Nozzle, ¾-inch. Has a shut-off, a stream, and a rose spray. Without rose, $1.20.



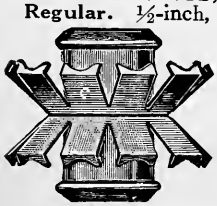
Mistry Jr. Nozzle

Justrite Spray. A very popular adjustable Nozzle. It gives a copious spray or a well-defined full stream. Has a positive shut-off, by turning the barrel of the nozzle. 90 cts.

Bordeaux Spray Nozzle. A good nozzle for whitewash and all heavy spray materials. $1.50.



HOSE COUPLINGS, Evanston. ¾-inch, 50 cts. each.
Regular. ½-inch, 25 cts.; ¾-inch, 30 cts. each.



Perfect Clinch Mender

HOSE MENDERS

Cooper's Brass. ½- and ¾-inch, 12 cts. each, $1.20 per doz.; 1-in., 15 cts. each, $1.70 per doz.

Perfect Clincher. ½- or ¾-inch, 15 cts. each, $1.50 per doz.

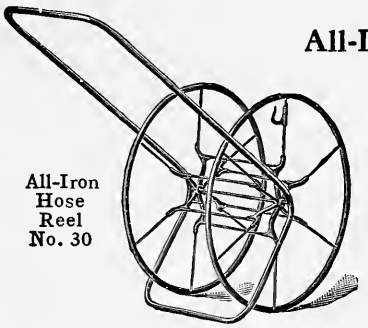
Hudson. ½- or ¾-inch; state size. Box of 6 tubes and 20 bands, with pliers, $1.

Sykes Hose Holder

A simple and inexpensive device for holding the hose. With this the nozzle can be placed at almost any angle. 35 cts.

Siamese Attachment

This brass hose attachment is an excellent arrangement for operating two or more lawn sprinklers at one time. Can be attached to hose and sprinklers very easily. ¾-inch, $1.25 each.



All-Iron Hose Reel No. 30

All-Iron Hose Reel

The All-Iron Hose Reels are constructed entirely of iron, and are indestructible. They are light in weight, frictionless, and the wheels being high, they are easily manipulated. These Reels cannot tip over when unreeling and there is no weight on the handle.
No. 10, 21-in. wheel, holds 100 feet ¾-in. hose, $5 each.
No. 20, 24-in. wheel, holds 150 feet ¾-in. hose, $5.50.
No. 30, 30-in. wheel, holds 500 feet ¾-in. hose, $9 each.

Watering Pots

We offer a special line of strongly made pots in heavy gauge galvanized iron. Note the solid spout; this, with the dome top, makes these pots the strongest made. The nose is attached firmly to the spout with a screw joint, and the cap is removable to permit of cleaning. These compete in price with the cheaper pots now on the market. 6 qt. $1.15; 10 qt. $1.60; 16 qt. $2.20.

Truck and Water Barrel Combination

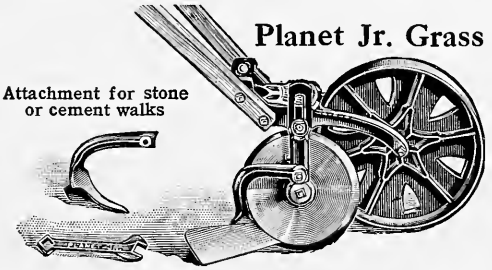
This consists of a 50-gallon barrel, mounted on a strongly made truck; the wheels are of steel with 3-in. treads. Outfit, as illustrated, $23. We furnish a sprinkler attachment, by means of which liquid manures and various chemicals may be watered on to turf; this can easily be attached to the barrel, turning the outfit into a convenient 50-gallon watering cart. Sprinkler attachment, extra $10.

Watering Carts

For sprinkling roadways and for applying chemicals to large areas of turf.

175 gallons, one horse	$175 00
450 gallons, two horses	566 00
600 gallons, two horses	612 00

Planet Jr. Grass Edger



Trims the turf around the edges of the flower-beds, walks, etc., giving a finished appearance to the lawn. Complete, $6.50 each.

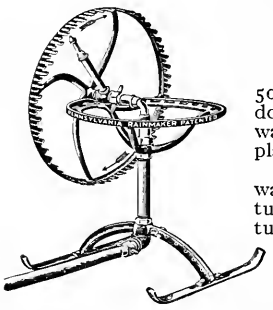
Turf-Edgers

Solid Welded Steel Edging. Socket handle; made of the very best steel; imported English. 8-inch, $2.50 each; 9-inch, $3 each.

Half-Moon. Solid steel, with a polished handle. $1 each. Without handle, 75 cts. each.

LAWN SPRINKLERS

PRICES SUBJECT TO MARKET CHANGES

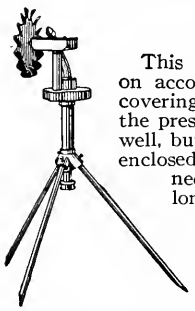


Rainmaker

This Sprinkler waters an area of 300 to 500 square yards with drops of spray; doesn't flood; swamp at the center; doesn't wash out soil; doesn't chill tender grass or plants; and works without attention.

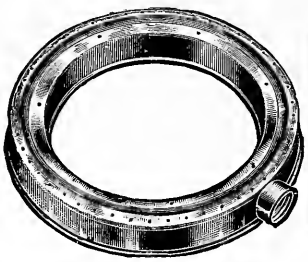
It is made on the turbine principle. The water coming from the nozzle strikes the turbine paddles, turning the wheel. As the turbine wheel revolves it travels around the circular base, carrying the jet around approximately eight times a minute. It distributes the water evenly over the entire area so gradually that it allows it to sink into the ground and not run off into low places.

The Rainmaker can be easily regulated to throw heavy or medium drops, or fine spray. With a pressure of 40 to 60 pounds it will distribute this evenly from the center to the extreme edge of a circular area 60 to 75 feet in diameter. Most of the spray travels through the air much further than is true of all other Sprinklers. That gives it time to lose the chill so harmful to plants. $25 each; 3 for $23.75 each.



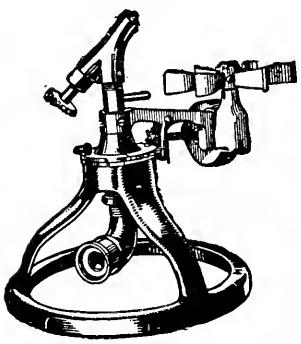
Double Rotary Sprinkler

This Sprinkler has many friends among greenkeepers on account of the efficient manner in which it sprays, covering a circle up to 50 feet in diameter in cases where the pressure is good. On low-pressure lines, too, it works well, but the area covered is much smaller. The gears are enclosed and run in oil; they are so simple that it is rarely necessary to make any adjustments even after very long wear. $12 each.



Ring Lawn Sprinkler

The S. & W. Co.'s Ring Sprinkler is not to be compared with the cheaper Ring Sprinklers. It is made of brass, firmly constructed, and guaranteed to stand the water-pressure of any municipal waterworks in the United States. 90 cts.

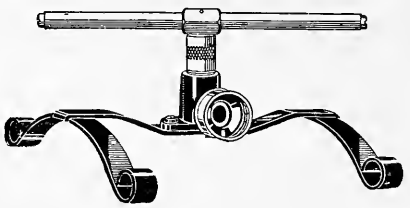


The Dayton Rotary and Oscillating Sprinkler

The Dayton is the most practical, durable, efficient Sprinkler devised for watering putting-greens and is now being used by thousands of lovers of a beautiful lawn or garden. It sprinkles in a circle. It sprinkles in a half-circle. It sprinkles from a 3-foot radius to a 40-foot radius. It sprinkles every inch of ground. It is better for your lawn or plants than sprinkling with a hose. It operates on any pressure from 15 pounds up. The nozzle can be adjusted to any kind of a stream. It pays for itself in water saved and convenience. It is made of the best brass, aluminum, and German silver. $8.

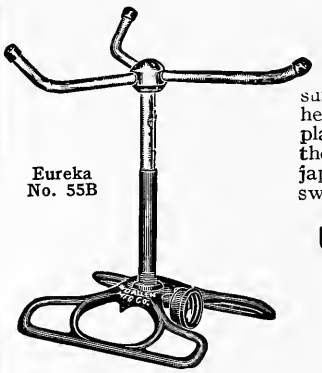
Oscillating Irrigators

They can be attached to garden hose with ordinary water pressure and will automatically irrigate the entire surface with a fine, dense, rain-like spray thirty feet on either or both sides, covering a rectangular area sixty feet in width the entire length of the machine. Can be adjusted to water one side with any length of stroke by the turning of two thumb screws. Irrigators are simple, portable, efficient and economical. Strongly constructed, does not get out of order. Complete with ¾-in. or 1-in. hose connection. 5-ft. Sprinklers $8, 10-ft. Sprinklers $12, 15-ft. Sprinklers $20.



Rainbow Revolving Sprinkler

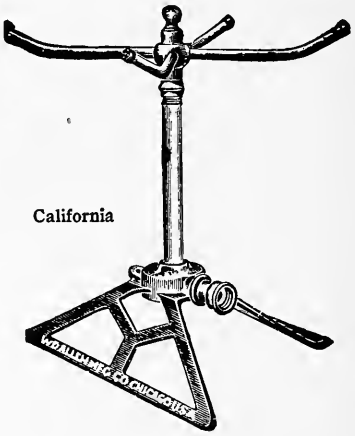
The ideal Sprinkler for a low water pressure. Operates on a hard fiber washer which absorbs 20 per cent of water, furnishing a leak-proof and frictionless joint. This efficient little apparatus has proven through actual tests to deliver the maximum amount of spray on a low pressure; no wear and tear. Will water a circle of 40 to 50 feet in diameter. Price, $3.



Eureka No. 55B

Eureka No. 55B

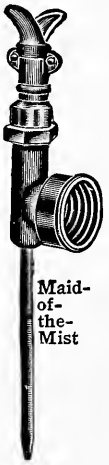
The Eureka Sprinkler will revolve under extremely low pressure, and is a first-rate article. The head, arms, and upper stem are nickel-plated brass and all bearing parts of the Eureka are of brass. The base is japanned black and has a loose swivel. Height, 10 inches. $2.25.



California

California Lawn Sprinkler

Is made with three and four arms. Arms and head are polished brass. Attached to a sled base, 10 inches square. Can be readily drawn about the lawn and will not upset. With 4 arms, $2.50.



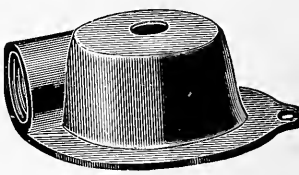
Maid-of-the-Mist

Maid-of-the-Mist Sprinkler

An effective device for sprinkling lawns, gardens, or flower-beds. The water flows with unimpeded force, and is divided and deflected by the two lips of the swivel piece, which it causes to revolve rapidly, scattering the water in fine drops and evenly over a circular area of 25 feet. It works more satisfactorily with a very low pressure of water than any Sprinkler we know of. With spur, $1.25, mailed 10 cts. extra. With sled (recommended) $1.75.

The C. B. G. Sprinkler

Cheap but Good



Is made on the well-known principle of the tangential spray. Nothing to get out of order. Will last a lifetime. It is easily drawn about the lawn without shutting off the water. 60 cts. each, $6 per doz.

Turbo Irrigators

Will thoroughly and evenly distribute the water like fine rain over circular area about 100 ft. in diameter. Complete with tripod, collapsible stand and connection for ¾-in. or 1-in. hose, $15. Turbo Heads without stands, $12.

"Vermol" Worm Eradicator

The best of the non-poisonous class of worm-killing preparations. A powder that is harmless to animals, but remarkably effective in promptly bringing earthworms to the surface and *killing them.* Of definite value, too, as a grass food.

PRICE: Ton $75, ½ton $40, ¼ton $22.50; three tons or over at $65 per ton. F. O. B. New York, Chicago, Pittsburgh, Detroit and San Francisco. Used at the rate of ½lb. per square yard.

When to apply "Vermol." At any time of the year when the worms are "working;" that is, when they indicate, by producing worm-casts, that they are close up under the surface of the soil. Worms are generally "working" during settled spells of warm, damp, overcast weather, and such conditions usually are suitable for applying "Vermol." They are deep in the soil, and conditions usually are unsuitable for applying "Vermol" when the weather is cold, hot, sunny, or windy.

How to find if conditions are favorable for applying "Vermol." Take approximately a pound of the powder, spread it on a piece of wormy turf measuring 1 by 2 yards and water it freely with hose or watering-can. If *many* worms come to the surface *quickly*, the conditions are right for a general application of "Vermol." If only a *few* worms appear, either the conditions are such that it is advisable to defer further experiments until another occasion, or the particular piece of turf is not so badly infested as was thought.

How much "Vermol" to use. Figure up roughly the length and width of the green, tennis-court or lawn in yards. Multiply together and divide by two: result is the correct quantity of "Vermol" in pounds for the particular job. The powder is applied at the average rate of half a pound to the square yard, and a golf green measuring 25 by 20 yards, for example, will need 250 pounds of "Vermol," and an eighteen-hole course, with greens of these dimensions, would require two to two and a half tons.

How to apply "Vermol." Having ascertained that the worms are "working," carry the proper quantity of "Vermol" to the green, spread the powder evenly, then with one or more lines of hose proceed to flood the green with water. Use *plenty*, and do not hesitate to take advantage of a high pressure.

If water is not laid on to your greens, apply "Vermol" during rain.

Worms will appear by the thousands and will quickly die. At the end of an hour the last worm will probably have come to the surface, when the green should be swept and the dead worms gathered and placed on the compost heap, where they quickly decompose.

It is a good plan to let the sprinklers run for a short while and next morning to again collect the worms: a few will have appeared during the night.

"Vermol" will not injure the grass. We have supplied it for a number of years, and it has always given complete satisfaction. It is used everywhere.

"Vermol" is perfectly safe to use—it is absolutely non-poisonous. A nine hole golf course needs one to one and a quarter tons, an eighteen hole course needs two to two and a half tons.

SOLE DISTRIBUTORS FOR UNITED STATES AND CANADA

Stumpp & Walter Co

30 and 32 Barclay Street New York City

Extreme Purity Necessary in Seeds for Turf

THE LAWN OWNER annually spends a large sum for the purpose of removing weeds from his turf. The seeds from which these weeds spring may be already in the soil, and they further may be washed onto the grass, blown onto the grass, and deposited there by birds or other agencies. It is obviously unwise to add to these weeds which ordinarily find their way onto a sward, by sowing more weed seeds—in other words, by sowing seeds which could, by dint of a little more care and trouble, be made freer of weed seeds. No one need ever sow any seeds which have not been cleaned and recleaned to the highest point of perfection. Such seeds cost a few cents per pound more than commercial stocks, but such a slight extra charge is offset again and again by the saving in the labor bill for weeding. Further, you will invariably get *more seeds of the kind you want* in a pound of seed that has been thoroughly recleaned than you will from seeds that have not been so thoroughly purified, because along with the weed seeds, empty husks and other materials are withdrawn by the cleaning. Very often the highest-priced seed is really cheaper (by actual count of seeds) than the lower-priced seed.

Stumpp & Walter Co

30 and 32 Barclay St. New York City