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A MONTHLY PERIODICAL TO PROMOTE THE BETTERMENT OF GOLF COURSES

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Sense or Nonsense in Experiments

The average greenkeeper looks with something akin to dread upon an incoming green committee at the beginning of each year. He knows that if the personnel of the committee has been changed he will be asked to apply a lot of new, half-baked notions that are contrary to his practice. There is something so obvious and simple about growing grass that everyone, even the cliff-dweller of the city, thinks he can speak with authority.

Every golf course should be maintained on some definite program year in and year out. The past should be kept as the standard, unless a departure is warranted by some good reason, and the reason should be good. Changes of program should be made sensibly with a clear view of the results that may be expected. There is no sense in trying anything and everything. Many a green has been ruined by that sort of thing. Just because someone learns that the experiments of the Rhode Island Experiment Station have shown that the continued use of sulfate of ammonia induces a soil condition that is beneficial to bent grasses and detrimental to weeds, don't think that this can be accomplished all at once by an overdose, but first learn all the facts about existing conditions, the faults to be corrected, the remedy to be applied, and the results to be expected. Go at it sensibly, with a full knowledge of the situation. If someone says that a moving equipment of some other make is better than the equipment in use, find out why before making the change and getting an assortment of different makes on hand. On one course, we know of four different makes of mowing machines that were in use—clearly a waste of money. Results can never be gained by changing about from one thing to another. While we advise conservatism in changes of program of treatment from one year to another, we insist that it should be progressive conservatism. Every greenkeeper and green-committeeman should keep posted and up to date on all matters relating to turf growing. He should know what others are doing, and particularly what remedies or treatment may be applied to correct conditions that are faulty; but careful study and consideration should precede any change.

Never, in any circumstances, make a change of treatment or attempt an experiment without leaving a check—an unchanged spot to be used as a basis of comparison. The combination of horse-sense and horse-manure is hard to beat, and it will be well to use it as a starting point for everything. There is no obligation to try everything that appears in THE BULLETIN. Go along in the old way until by careful study convincing evidence is available that a change is needed, and then make it sensibly and leave a check.

See That Your Greenkeeper Receives The Bulletin

The Green Committee observes that a good many clubs are having at least one of the two copies of THE BULLETIN mailed to the club itself. The man who shoulders the bulk of the responsibility for the upkeep of your turf is your greenkeeper. It is he above all who should receive THE BULLETIN. Copies should go to him addressed either to his residence, or in care of the club in such manner that they will unfailingly fall into his hands. If your greenkeeper's name and address are not on the mailing list for THE BULLETIN, send this information at once to the Green Committee.

Any number of additional subscriptions may be obtained, for members of the club only, at $2.00 for the year 1922, when applied for by the Secretary of the club.

The Green Committee of the U. S. Golf Association is always glad to publish items showing how work around courses can best be done.

Back Numbers of the 1921 Bulletins

Only the July, August, September, October, November, and December numbers of the 1921 BULLETIN are now available. These may be obtained by member-clubs at 20 cents per copy.

Books and Bulletins for Reading and Reference

It will pay every golf club to have a small library of well-selected publications for the use of the green committee and the greenkeeper. We have, therefore, prepared the following list covering most of the topics that are of importance or interest in connection with a golf course. In addition to these publications, the catalogues and other advertising matter sent out by dealers and manufacturers are often very desirable for reference. In ordering a book always ask for the latest edition.

BOOKS

MANUAL OF WEEDS. *Ada Georgia.* The Macmillan Co., 66 Fifth Ave., New York, N. Y. A popular, profusely illustrated treatment of the subject.

FARM MANURES. *C. E. Thorne.* Orange Judd Co., 523 Plymouth Court, Chicago, Ill. An excellent book on manures and fertilizers.

SOILS. *S. W. Fletcher.* Doubleday, Page & Co., Garden City, N. Y. A popular but thorough and practical treatise.

SOIL MANAGEMENT. *King.* Orange Judd Co., 523 Plymouth Court, Chicago, Ill. A very useful and dependable book.

CONSTRUCTION OF ROADS AND PAVEMENTS. *T. R. Agg.* McGraw-Hill Book Co., 370 Seventh Ave., New York, N. Y. A standard work on the subject.

CONCRETE CONSTRUCTION FOR RURAL COMMUNITIES. *Seaton.* McGraw-Hill Book Co., 370 Seventh Ave., New York, N. Y.

SEWERAGE AND SEWAGE DISPOSAL. *Metcalf and Eddy.* McGraw-Hill Book Co., 370 Seventh Ave., New York, N. Y.

PRACTICAL FARM DRAINAGE. *Elliot.* John Wiley & Sons, 432 Fourth Ave., New York, N. Y.

TEXTBOOK OF LAND DRAINAGE. *J. A. Jeffrey.* The Macmillan Co., 66 Fifth Ave., New York, N. Y.

LANDSCAPE GARDENING. *F. A. Waugh.* Orange Judd Co., 523 Plymouth Court, Chicago, Ill.

BIRD LIFE. *Frank Chapman.* D. Appleton & Co., 35 West 32d St., New York, N. Y.

SOME ESSAYS ON GOLF COURSE ARCHITECTURE. *Colt and Alison.* Charles Scribner's Sons, 597 Fifth Ave., New York, N. Y.

FARM MOTORS. *A. A. Potter.* McGraw-Hill Book Co., 370 Seventh Ave., New York, N. Y.

FORAGE PLANTS AND THEIR CULTURE. *C. V. Piper.* The Macmillan Co., 66 Fifth Ave., New York, N. Y.

APPLIED ENTOMOLOGY. *H. T. Fernald.* McGraw-Hill Book Co., 370 Seventh Ave.. New York, N. Y.

FARM MACHINERY AND FARM MOTORS. *Davidson and Chase.* Orange Judd

To correct a typographical error in the March BULLETIN, *cut this line out and paste it over the seventh line in the second paragraph on page 88:*

greens, the entrance or approach is called south, the back (which is usually

To correct an error in the March BULLETIN, *cut this numeral out and paste it over the numeral 6,348,000 in the last line on page 90:*

UNITED STATES DEPARTMENT OF AGRICULTURE PUBLICATIONS

The following may be obtained free upon application to the Department of Agriculture, Washington, D. C.

FARMERS' BULLETIN 338—MACADAM ROADS.
FARMERS' BULLETIN 444—MOSQUITOES—REMEDIES AND PREVENTIVES.
FARMERS' BULLETIN 493—ENGLISH SPARROW AS A PEST.
FARMERS' BULLETIN 583—COMMON MOLE.
FARMERS' BULLETIN 597—ROAD DRAG AND HOW USED.
FARMERS' BULLETIN 600—BORING TAPROOTED STUMPS FOR BLASTING.
FARMERS' BULLETIN 609—BIRD HOUSES AND HOW TO BUILD THEM.
FARMERS' BULLETIN 621—HOW TO ATTRACT BIRDS IN NORTHEASTERN UNITED STATES.
FARMERS' BULLETIN 660—WEEDS: HOW TO CONTROL THEM.
FARMERS' BULLETIN 670—FIELD MICE.
FARMERS' BULLETIN 701—BAGWORM: AN INJURIOUS SHADE TREE INSECT
FARMERS' BULLETIN 702—RABBITS IN RELATION TO TREES AND CROPS.
FARMERS' BULLETIN 708—LEOPARD MOTH; AN ENEMY OF SHADE TREES.
FARMERS' BULLETIN 739—CUTWORMS AND THEIR CONTROL.
FARMERS' BULLETIN 747—GRASSHOPPERS AND THEIR CONTROL.
FARMERS' BULLETIN 750—ROSES FOR THE HOME.
FARMERS' BULLETIN 752—ARMY WORM OR "GRASS WORM" CONTROL.
FARMERS' BULLETIN 755—COMMON BIRDS OF SOUTHEASTERN UNITED STATES.
FARMERS' BULLETIN 760—HOW TO ATTRACT BIRDS IN NORTHWESTERN UNITED STATES.
FARMERS' BULLETIN 779—HOW TO SELECT A SOUND HORSE.
FARMERS' BULLETIN 788—THE WINDBREAK AS A FARM ASSET.
FARMERS' BULLETIN 799—CARBON DISULPHID AS AN INSECTICIDE.
FARMERS' BULLETIN 805—DRAINAGE OF IRRIGATED LANDS.
FARMERS' BULLETIN 814—BERMUDA GRASS.
FARMERS' BULLETIN 832—TRAPPING MOLES.
FARMERS' BULLETIN 844—HOW TO ATTRACT BIRDS IN MIDDLE ATLANTIC STATES.
FARMERS' BULLETIN 851—THE HOUSE FLY.
FARMERS' BULLETIN 864—PRACTICAL INFORMATION FOR BEGINNERS IN IRRIGATION.
FARMERS' BULLETIN 912—HOW TO ATTRACT BIRDS IN EAST CENTRAL STATES.
FARMERS' BULLETIN 932—RODENT PESTS OF THE FARM.
FARMERS' BULLETIN 940—COMMON WHITE GRUBS.
FARMERS' BULLETIN 945—ERADICATION OF BERMUDA GRASS.
FARMERS' BULLETIN 974—CLEARING LAND.
FARMERS' BULLETIN 978—BARNYARD MANURE IN EASTERN PENNSYLVANIA
FARMERS' BULLETIN 994—COMMERCIAL BORDEAUX MIXTURES.
FARMERS' BULLETIN 1002—CANADA THISTLE: METHODS OF ERADICATION.
FARMERS' BULLETIN 1037—WHITE ANTS AS PESTS IN THE UNITED STATES.
FARMERS' BULLETIN 1087—BEAUTIFYING THE FARMSTEAD.
FARMERS' BULLETIN 1097—THE STABLE FLY.
FARMERS' BULLETIN 1101—THE ARGENTINE ANT.
FARMERS' BULLETIN 1123—GROWING AND PLANTING HARDWOOD SEEDLINGS
FARMERS' BULLETIN 1130—CARPET GRASS.
FARMERS' BULLETIN 1131—TILE TRENCHING MACHINERY.
FARMERS' BULLETIN 1140—GRASSHOPPER CONTROL IN THE PACIFIC STATES.
FARMERS' BULLETIN 1169—INSECTS INJURIOUS TO DECIDUOUS SHADE TREES AND THEIR CONTROL.
FARMERS' BULLETIN 1170—MEADOWS FOR THE NORTHERN STATES.
FARMERS' BULLETIN 1171—GROWING ANNUAL FLOWERING PLANTS.
FARMERS' BULLETIN 1177—CARE AND IMPROVEMENT OF THE FARM WOODS.
FARMERS' BULLETIN 1178—TREE SURGERY.
FÉRMERS' BULLETIN 1208—TREES FOR TOWN AND CITY STREETS.
FARMERS' BULLETIN 1247—AMERICAN MOLES.
FARMERS' BULLETIN 1209—PLANTING AND CARE OF STREET TREES.
FARMERS' BULLETIN 1227—SEWAGE AND SEWERAGE OF FARM HOMES.
FARMERS' BULLETIN 1234—GULLIES—HOW TO CONTROL AND RECLAIM THEM.
FARMERS' BULLETIN 1239—COMMUNITY BIRD REFUGES.
FARMERS' BULLETIN 1254—IMPORTANT CULTIVATED GRASSES.

The following may be purchased from the Superintendent of Documents, Washington, D. C.

THE WOODLOT. FOREST SERVICE BULLETIN 42. 15 cents.

SEEDS OF BLUEGRASSES, GERMINATION, GROWING, HANDLING, ADULTERATION, AND DESCRIPTION. PLANT INDUSTRY BULLETIN 84. 5 cents.

AGRICULTURAL SPECIES OF BENT GRASSES. DEPARTMENT OF AGRICULTURE BULLETIN 692. 5 cents.

IDENTIFICATION OF GRASSES BY THEIR VEGETATIVE CHARACTERS. DEPARTMENT OF AGRICULTURE BULLETIN 461. 5 cents.

QUALITY AND VALUE OF IMPORTANT TYPES OF PEAT MATERIAL. DEPARTMENT OF AGRICULTURE BULLETIN 802. 10 cents.

MISCELLANEOUS PAMPHLETS FREE ON APPLICATION

BULLETINS ON CONCRETE STRUCTURE. Portland Cement Association, 111 W. Washington St., Chicago, Ill.

TILE DRAINAGE. SPECIAL BULLETIN 56. Michigan Agricultural College, East Lansing, Mich.

CONCRETE ON THE FARM. Atlas Portland Cement Co., 134 S. La Salle St., Chicago, Ill.

Brown-Patch and the Bordeaux Treatment

LYMAN CARRIER

Greenkeepers are now having their first experience with plant diseases. If there is any truth in the statment that "misery likes company" there should be much consolation from the fact that fruit growers and gardeners have been forced to combat these pests for many years.

In nature there is a well-organized balance which keeps the face of the humid parts of the earth clothed in vegetation and peopled with animals big and little. When certain plants try to hog the earth there is always a remedy. Some bug or other enemy will step in and keep the obstreperous plant in its proper place. If this bug or other enemy gets puffed up with its own importance and develops porcine habits of "bugland über alles," some bird or rodent will come along and deplete its population. Nature loves a mixture, plays no favorites, but rewards the fittest.

When man upsets the settled order of nature by attempting to grow one thing, and one thing only, he must give it protection from its natural enemies or there is going to be trouble. He may get along for a few years seemingly without a care, but sooner or later he will have to fight to protect his crop. Peaches, cotton, beets, beans, and potatoes in the good old days were grown without the depredations of a single serious pest. Now peaches have the jaundice and scale; cotton has its boll-weevil and pink boll-worm; beets, the crown rot; beans, anthracnose; and potatoes, bugs and blights. There is no use to bewail the fact and vainly wish for the care-free days. The grower must find the remedy and apply it. These remedial treatments should be considered as essential as plowing, harrowing, or harvesting, and be charged accordingly to the cost of growing the crop.

Brown-patch, a most troublesome plant disease, has come to match its power to spread and destroy fine turf against the greenkeeper's ability to prevent its ravages. This is the price that must be paid for extra fine turf. If golfers were satisfied with the mediocre results which

they can get with the old-fashioned shotgun mixture of grasses of all shapes, shades, sizes, and habits, there would be little or no trouble from brown-patch. But with a fine, velvety turf of bents or fescues there will always be the danger of infestation of this disease, and so it is up to the greenkeeper to provide the remedy.

The disease is now pretty generally recognized by most greenkeepers, but as some are still unfamiliar with it a repetition of the symptoms by which it is diagnosed may not be out of place.

Description of the Disease

Brown-patch is caused by a fungus, which is a term applied to a large group of plants. Fungi have no green in their make-up. This is a distinctive difference between a fungus and an ordinary plant. There are many different kinds of fungi. Some are large as toadstools, mushrooms, puff-balls, etc. The ones which cause disease are of a much smaller growth, often too small to be seen unless magnified.

A fungus not having the green chlorophyll of higher plants must get its food from other organic matter. It can not manufacture food for itself out of raw materials, as grass and trees do. Some fungi live only on dead tissue, as the mushrooms, toadstools, etc., while others attack living things. The brown-patch fungus thrives on a large number of living plants and takes an enormous toll from our farm crops. It is the organism which causes one of the serious blights of potatoes and tomatoes. Grass escaped the depredations of this fungus until greenkeepers began growing its favorite species in compact, closely clipped turf, where it could easily spread from leaf to leaf. Fungi draw the sap or juice from their host-plants by means of little thread-like filaments called *mycelium*. The mycelium of brown-patch can be seen by the unaided eye when the disease is active. It forms a cobwebby, tangled growth among the grass leaves like mildew. Fungi do not bloom and seed in the same manner as the higher plants. They do not need to, as they have a much more efficient means of spreading. Some form spores, which are little one-celled bodies that serve the same purpose as seeds in the higher plants. Anyone who has ever kicked a ripe puff-ball and noted the cloud of dust which rose in the air can appreciate the possibilities which that fungus has for spreading. Each particle of that dust is capable of producing another puff-ball if it falls in a favorable location for it to develop.

There are other fungi which are still more devilish in their ability to spread. They do not take the trouble even to form spores, but propagate by the "vegetative method." Those who have compared the propagation of creeping bent vegetatively against seeding, will recognize the advantage which these fungi possess. Small resting bodies form on the thread-like filaments, or mycelium, which are capable of growing even after prolonged drying. This method of propagation corresponds to the growing of a crop of potatoes from planting the tubers. These little bodies by which the fungus exists while it is not actively growing are called *sclerotia*. The brown-patch fungus possesses this latter method of propagation, which makes it no nice friend of the greenkeeper.

When a brown-patch sclerotium or tuber sets up housekeeping in an exclusive neighborhood of fine, velvety turf plants, it sends out its mycelium, which penetrates the cells of the grass leaves and appropriates

the food which the grass by hard work has made out of soil, air and water.

The first evidence which a greenkeeper has of the disease is a small smoky-looking spot when seen early in the morning. This spot has much the same appearance as would result from pouring boiling water on the grass. A close inspection will reveal the cobwebby mycelium. If the day is clear these spots will turn to a brown color by noon. The damage appears all to be done at night.

The spots may not be larger than a silver dollar the first day, but they spread rapidly if the weather is favorable for the fungus. Where there is but one point of infection the disease spreads in concentric circles and the patch keeps a circular form. As frequently happens, there are many points of infection which soon join together in an irregular area.

Brown-patch was common before the nature of the disease was understood. Sun-scald and drought injury have often been assigned as the cause of the trouble. We still find typical cases of brown-patch where the greenkeeper is making frantic efforts to overcome the trouble by treating the soil. Top-dressing, aeration, and watering or not watering are commonly resorted to. As turf hit by brown-patch frequently recovers in the course of a month or six weeks without any treatment, it is difficult to convince some greenkeepers that the remedy which they applied is not a sure cure for the disease.

White clover, bluegrass, and certain weeds, so far as our observations go, are immune to brown-patch. When the disease attacks a green it often selects the bents and fescues and leaves untouched the white clover and bluegrass which may be growing in the turf. This is a helpful characteristic for identifying brown-patch in its final stages. Dry weather is not so discriminating in regard to the kinds of plants it injures.

Weather Favorable to Brown-Patch

There is much yet to be learned in regard to the climatic conditions which are favorable or unfavorable to the fungus. Each year brings outbreaks of the disease, when, according to all the rules of the game, it ought to be dormant. A few years ago it was thought that the trouble need not be expected except on hot, muggy nights of July and August. Last year it proved to be more than "a midsummer night's dream." The first appearance here about Washington was noted in May. A heavy outbreak occurred in early July, followed by an encore in September. The disease appears to be extending its depredations to the winter turf in the extreme South. There is no way of predicting an outbreak of brown-patch. It may at any time make its appearance whenever there is good growing weather for grass. So far the spring and fall months have been fairly free from the trouble.

While it is not possible to accomplish much in the way of curing grass that is sick from brown-patch, the trouble does not always kill the roots, so anything that is good to make grass grow will help the recovery of a green that has been hit with the fungus. Top-dressing with compost or fertilizers, and judicious watering, are advisable.

Treatment

The only remedy which has proved successful so far is the well-known fungicide, Bordeaux mixture. This material has long been used for spray-

ing fruit trees and other crops which are subject to blights. The value lies in prevention rather than cure. After grass has become infected with the fungus nothing can be done for the areas that are hit. By the judicious use of Bordeaux, it may, however, be kept from spreading to healthy grass. Those who have had brown-patch on their greens in the past had better not wait for the disease to appear before beginning the treatment. The chances are much in favor of its reappearing in successive seasons, and the sooner the Bordeaux is applied after hot weather comes the more likelihood there is that it will hold the fungus in check.

At the Arlington experimental farm last year the plats which received Bordeaux were about the only ones that survived the combination of drought and brown-patch, which made the rest of the turf garden look as if it had been burned.

Dry vs. Liquid Bordeaux

Bordeaux mixture is now on the market in a powdered form, which is very convenient to use. This is the form which was used last year at the Arlington farm. Liquid Bordeaux, so far as a limited number of experiments show, is just as effective in controlling the disease as is the powder. At present we have no evidence that there is any difference between the dry and the liquid Bordeaux so far as preventing brown-patch is concerned. The choice of which form to use then should be decided on, first, which is the more convenient to use, taking all things into consideration, and secondly, which is the cheaper.

Preparing Bordeaux Mixture

Bordeaux mixture owes its beneficial effects to copper sulfate. But copper sulfate when used alone in a strength sufficient to prevent fungus disease will burn the grass. It is necessary to counteract the caustic effect of the copper sulfate with lime.

Bordeaux mixture is made in several different strengths, of 2 to 6 pounds of copper sulfate combined with equal weights of quicklime and enough water to make 50 gallons of the spray. For spraying grass, a mixture containing 5 pounds of copper sulfate is perhaps best. The procedure is as follows: Take 5 pounds of the copper sulfate in a muslin sack and suspend or stir it about in a barrel two-thirds full of water until dissolved. In another barrel slake 5 pounds of lump quicklime such as builders use for plastering. Be sure it is freshly-burned lime and not air-slaked. It is best to start gradually, pouring on a little hot water until the lime becomes active, then adding slowly more water until it is thoroughly slaked into a milky liquid. When ready to use, mix this milk of lime into the dissolved copper sulfate and add enough water to make up the 50 gallons—that is, an ordinary vinegar barrel full. The mixture should then be strained through muslin to take out any lumps or dirt which might clog the nozzles of the sprayer, after which the material is ready for use.

Stock solutions of dissolved copper sulfate and milk of lime may be made up in quantity, and they will keep indefinitely if not mixed together. Then all that is necessary when wanted for use is to measure out the proper proportion of each and mix. In mixing these two materials together, one or the other should be very dilute; for if strong solutions are mixed they will form a curdled mess that will be difficult to spray. It is for that reason that the directions given above call for two-thirds of a

barrel of water for the copper sulfate. Much less water will dissolve 5 pounds of copper sulfate, but it should be diluted to that quantity before adding the lime.

Thus prepared, however, liquid Bordeaux mixture must, to be effective, be applied immediately after it is made up, and no more should be made at one time than can be used the same day it is prepared. If it is desired to stabilize the mixture so that it will keep indefinitely, this can be done by the addition of one-eighth of an ounce of ordinary granulated sugar for every pound of copper sulfate used.

Equipment for Mixing

Where only a small quantity of Bordeaux mixture is needed two barrels, ordinary pails, funnel, etc., are all that are required in the way of equipment for preparing it. But where a considerable quantity is required, such as will be necessary for frequent sprayings of eighteen greens, it is advisable to build a platform high enough from the ground so the liquid can be allowed to run into the spray tank by gravity. In that case, the mixing barrel should have a faucet at the bottom which can be opened and closed, and water should be piped to this platform. All that has to be elevated by hand labor is the lime and copper sulfate. Stock solutions of copper sulfate and lime are prepared in advance. When ready to use, measure out enough of the copper sulfate solution to be equivalent to 5 pounds of the crystals. Put this in the mixing barrel and fill about two-thirds full with water. Measure out the milk of lime to give 5 pounds of the burned lime and stir this into the dilute copper sulfate. Fill up the barrel with water. Tie a muslin sack over the faucet of the mixing barrel, and let the mixture strain through into the spray tank.

Sprayers

Sprayers are on the market in great variety of styles and sizes from the little pop-gun hand-pumps to the 250-gallon or larger power outfits. If spraying the greens is to be one of the regular lines of work on a golf course, it would be advisable to equip at the start with a large power sprayer if the layout of the course will permit of its use, so that one loading of the machine will answer for spraying all of the greens. With such an outfit, the actual time required to spray a green should not be more than a minute or two. But, of course, it will take considerable time for a man and team to haul the machine around to all the greens.

Mixing and using liquid Bordeaux is nasty work at its best. The men do not like it. On windy days they get more or less covered with the spray. Clogged nozzles, leaky hose, and other mishaps make the work disagreeable. Remember, liquid Bordeaux mixture should be applied in a spray, so that every bit of the grass foliage is covered. An ordinary sprinkling pot will not answer.

Applying Dry Bordeaux

The writer prefers using the dry Bordeaux powder to the liquid. It is more nearly fool-proof and less disagreeable to handle. One man alone can apply it, while with the liquid it is necessary to have a team to haul the sprayer. There is now no special machine on the market designed for spreading Bordeaux powder on turf. There are several dust-guns which are made to throw out a cloud of dust to cover fruit trees, small

Fig. 1. A dust-gun used for applying Bordeaux powder to a putting-green.

fruits, grapes, cotton, etc. Whether these will answer for turf work remains to be seen. In Figure 1 is shown one of these dusters, which works by hand. Dr. Harban has had a wheelbarrow grass-seeder equipped to handle the powder. This apparatus appears very satisfactory. It covers a wide strip of turf and applies the powder evenly and lightly (Figure 2). With either of these devices there is a great saving of Bordeaux powder over what is taken when it is scattered by hand, and the work is done in a small fraction of the time.

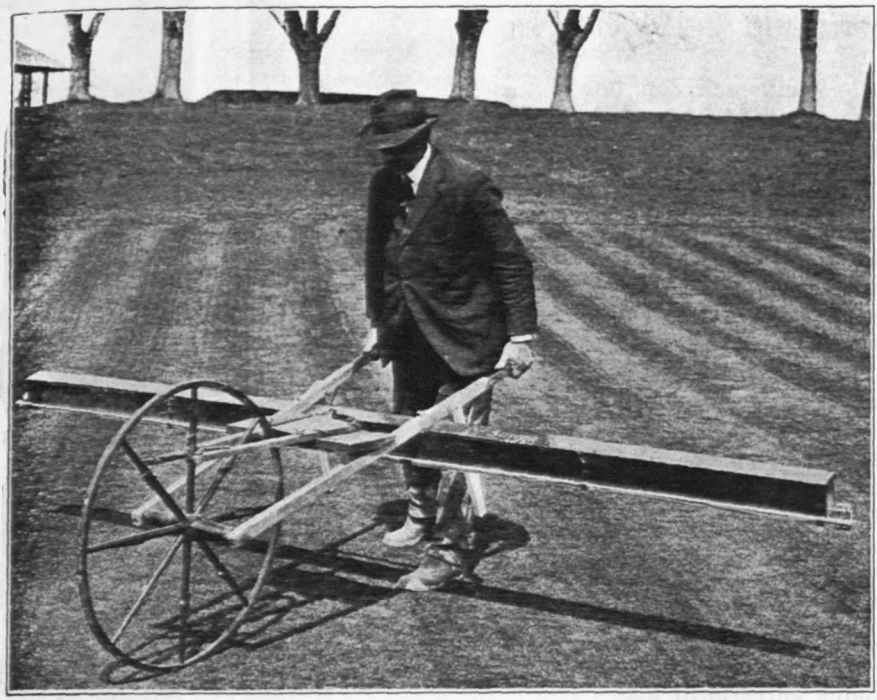

Fig. 2. A wheelbarrow grass-seeder adapted to the spreading of Bordeaux powder

Amount of Bordeaux to Use

Our experiments have not progressed to a point where we can say what minimum amount of the powder and how few applications will prevent the ravages of brown-patch. The first purpose has been to find a remedy; the second, to determine the most economical use. Experiments are planned which should give an answer to the second objective.

It is only by keeping at all times a covering of the Bordeaux on the leaves of the grass that we feel safe. This makes the treatment of turf grass much more difficult than is the case with farm crops. The frequent mowing and constant renewing of the growth of grass on putting-greens make it appear imperative that the Bordeaux be applied every two or three days during the periods of most danger. The plan we followed was to apply the powder after every rain or watering of the grass, and in no case did we wait longer than a week between applications, until late in the season. We hope that such frequent applications may not prove to be necessary, but it is well to be on the safe side. No more Bordeaux need be used than is necessary to give a light dust covering on the grass. When applying it by hand, as we did last year, it took about one pound of the powder to 1,000 square feet of surface. When applied with a dust-gun or the wheelbarrow seeder, one pound should cover a much larger area, say, an ordinary sized green of 5,000 square feet. It should be kept clearly in mind that Bordeaux does nothing but prevent the disease from attacking healthy plants; it is easily washed off the leaves, and should for that reason be applied after

and not immediately before watering. A heavy rain may render an application of Bordeaux of no value and another treatment should be applied soon after the rain stops.

Effect on the Grass

The only effect on the grass noticed during the growing season last summer from the use of the Bordeaux was beneficial. The grass receiving the treatment was healthy, vigorous, and had good color. During the dormant stage of winter, however, there was a marked difference in the appearance of these plats when compared with those which were untreated. The leaves of the grass receiving Bordeaux turned to a reddish bronze color, and the plants were slower in starting growth this spring. At the time of this writing they have practically all recovered, and the new growth gives no indication of any injury. This peculiar color of the grass makes it advisable to study the cumulative effect from frequent applications of Bordeaux, as too much copper sulfate may prove detrimental when carried on over a period of years. There are no data on this point, as there are no experiments on record where so many treatments with Bordeaux have ever been applied before as we used last year on this grass.

Effect on Earthworms

An interesting side-benefit resulted last year at the Arlington farm from the use of Bordeaux powder for brown-patch. We discovered in the fall that there were no earthworms in the plats where Bordeaux had been applied during the summer. Repeated tests with mercuric chloride both last fall and this spring failed to bring out a single worm from the Bordeaux plats, while plenty of them could be found on the adjoining untreated turf. Of course, it is unsafe to draw conclusions from just one season's work, but the results were so definite that there seemed to be no mistaking the fact that Bordeaux mixture was effective in eradicating earthworms as well as controlling the brown-patch. If this holds true in the future there will be the added inducement for using Bordeaux.

Soil Beds for Use on Golf Courses and How They Can Be Made at a Very Small Cost

William Connellan, Friendship, Washington, D. C.

At the Detroit Golf Club in 1920 some of the fairways were in bad shape with cuppy-lies in places. The soil is of a very sandy nature and no amount of rolling seemed to do any good. The grass was fescue and grew in tufts.

Top-dressings with compost of manure made in a pile by the usual method, we figured, would be very expensive and unnecessary. So we set about to make soil beds on various parts of the course in the rough and near the fairways which were to be top-dressed, thus saving long hauls. We selected about a quarter acre and covered it to a depth of one inch with clay (34 cubic yards), and about the same quantity of manure. After the clay had dried out we rolled the beds in order to break up the lumps, and then disked them with a disk harrow. The next operation

was to plow, then thoroughly disk and work until the plots were well mixed to a depth of nine inches.

There were five of these soil beds located at various points about the course, which gave us enough fine rich soil to cover four and one-half acres of fairway to a depth of one-half inch.

I believe every golf course should have a compost heap of well-rotted manure for use in construction work, such as the building of greens, tees, and fairways; but for poor or worn-out fairways the soil-bed method is by far the best and cheapest way to make top-dressing. Making soil beds in the manner described does away with the expensive method of composting manure in a heap. The idea is to have the top-dressing handy to the place where you are going to use it, and save long hauling; you also save a lot of hand labor in mixing the materials.

At the Grosse Ile Golf Club, where we started construction in the fall of 1919, the first thing we did was to start three large soil beds of about one acre each. The soil there is a heavy clay. On these beds we used three inches of coarse sand, two inches of humus, and one inch of manure, and mixed the beds to a depth of ten inches. We allowed weed seeds to germinate and then ran the disk harrow over the beds to destroy the weeds just before they went to seed. We put two inches of the soil bed mixture as a germinating layer on all the tees and greens we built before seeding them.

Making Soil Beds

If the soil on your course is of a clay or heavy texture, try to locate a sand deposit on the grounds. On the other hand, if your soil is of a very sandy nature, try to locate a supply of clay. In either case find out if there are any peat or muck deposits on your property. These soil resources are to be found in many localities, but in some cases where they are not found the materials will have to be purchased from the outside.

Soil Beds for Sandy Courses.—Select a piece of ground 25 yards wide by 50 yards long, in the rough and out of the line of play. This will give about one-quarter of an acre. Haul and spread on this 35 cubic yards of clay, which will cover the bed to a depth of about one inch. Allow it to dry out for a few days, then roll and harrow until the clay is well pulverized. The next step is to haul and spread 35 cubic yards of stable manure, plow not over 6 inches deep, and then harrow thoroughly with a disk until soil, clay, and manure are well mixed. Plow again, this time going deeper, say about 8 inches deep, and disk-harrow as before. If muck or peat can be had on the grounds, 25 cubic yards of muck may be used, and the amount of manure can then be cut down from 35 cubic yards to about 20 cubic yards.

Soil Beds for Heavy Clay Soils.—Proceed in the same manner as for sandy soils, but instead of using clay for first dressing apply about 50 cubic yards of sand, more or less, as the case may require, then disk thoroughly after this is done. Then apply 35 cubic yards of stable manure, plow under shallow, and replow and work same as described above.

Allow weed seeds to germinate, but before the weeds come to seed either plow them under or disk-harrow until they are cut into the soil. In other words, summer-fallow the soil beds until they are needed for use.

Material for soil beds can be used at once for top-dressing, but it is much better to leave it stand for a couple of months, after which time it may be sown down to a green-manure crop, such as cowpeas, or spring or winter rye. When these green-manure crops come to maturity they may be plowed under and followed by other crops until the soil is wanted for top-dressing. This increases, or, at least, conserves the humus content.

Four soil beds of the dimensions given, located at convenient places on the course, will provide enough top-dressing material to cover approximately eight acres of fairway one-half inch thick. Where time permits, good soil beds can be worked up by applying 10 tons of manure to the acre and sowing a couple of crops, such as cowpeas or soy beans, for green manure, to plow under. In addition to this, old sod, leaves, grass, clippings, or muck (if there is any to be had near at hand), may be added. If the soil is a heavy clay, the ashes from the clubhouse could be used on soil beds with good results. Also good soil beds can be made by using the rubbish cut from the rough each year.

Cost of Making Soil Beds at the Norwood Golf Club, Long Branch, N. J.

The approaches to all the greens were top-dressed for an average distance of 40 yards in front of each green last November. About four acres of approaches in all were dressed about one-half inch thick with soil bed material. The soil at Long Branch is very sandy. The soil bed was made in the same manner as described above, and was 20 by 50 yards in size.

Cost to Make

35 cubic yards manure, at $3.00 per yard on bed		$105.00
One team and man 6 hours working bed, at $7.00 a day		4.75
Total cost of soil bed (about 275 cubic yards of material)		$109.75

Cost to Top-Dress Fairways

3 teams hauling material to approaches, 3 days, at $7.00 a day	$63.00	
3 men loading wagons, 3 days, at $3.50 a day	31.50	
2 men spreading material, 3 days, at $3.50 a day	21.00	
1 team with chain harrow, 2 days, at $7.00 a day	14.00	
		129.50
Total cost		$239.25

This made the top-dressing cost about $13.30 for each approach.

Fresh flags and newly painted poles.—These dress up a course and help to divert the attention of the captious critics. Change flags and poles once a month. Bamboo flag poles painted with alternate stripes of black and white locate and show off the hole better if the black stripe is at the bottom. Freshly painted flag poles and fresh flags set off a golf course like a clean shave sets off a green-keeper.

Heroic bunkers.—When these are placed about a mashie-shot hole they give an intensive mental hazard—the only real feature possible to such a short hole.

The Fallacy of Sowing Fine Turf Grasses in Spring

C. V. Piper and R. A. Oakley

Waste in any form in golf course making and maintenance should be avoided wherever it is possible to do so. One of the greatest sources of waste is in the sowing of seed. The rate of seeding is commonly too heavy. Much poor seed is sown which, if simple germination tests were made beforehand, would not have been used. Seed of grasses poorly or not at all adapted to the locality or to the purpose intended too frequently is selected. But these are not the chief causes. The greatest waste comes from reseeding old greens and fairways and sowing new ones at the wrong time of the year. Under the best of conditions the reseeding of old turf produces results of very doubtful value, and when the reseeding is done in the spring in most of the northern part of the golf belt, the effort and seed are almost sure to be wasted. It is desired here to call attention to the mistaken practice of sowing seed of the fine northern turf grasses in the spring of the year and to point out some of the reasons why the practice is unsound.

When the question is asked, "Why are lawns and greens sown in the spring?" the answer is invariably, "Because it is the right time to sow seed." This reply smacks of reasoning from a faulty premise. True enough, spring is the proper time to sow most garden seeds, and likewise it is the proper time to sow seed of most field crops. No sensible man would think of planting corn, for example, except in the spring after the warm weather arrives, but on the other hand no sensible man would think of sowing winter wheat at any other time than in the fall. The fallacy in the argument of the advocates of spring seeding lies in regarding the northern turf grasses as similar in their temperature and length-of-day relations to corn, spring wheat, and oats. As a matter of fact they are more nearly comparable in these relations to winter wheat and timothy. These turf grasses stool and root best under conditions such as exist during the fall and very early spring. This is doubtless due to the fact that lower temperature obtains then than during the late spring and summer, and the days are relatively shorter. Which factor of the environment—the cool weather or the short day—is the more responsible for this habit of growth of the turf grasses, is not known. Until recently it was supposed that temperature was the only important factor involved, but it has been proved beyond doubt that the relatively short days of fall exert a decided influence.

The seedlings that result when seeds of bents, fescues, redtop, or Kentucky bluegrass are sown in September soon produce new shoots from their lower nodes or joints. This is called "stooling." At the base of each plant there are several nodes or joints grouped closely together. While the weather is cool and the days are short there is no tendency for the stems upon which the nodes occur to elongate, as is done in summer when the culm is formed and the plant goes to seed, but new shoots continue to grow, thus making a close turf. The exact manner in which the turf is produced differs somewhat with the species. In addition to abundant stooling, a substantial development of roots takes place while the weather of fall is still favorable for growth.

When the seed of the northern turf grasses is sown in the spring, especially south of the latitude of New York, the rapid approach of warm

weather and the advent of the longer days provide conditions that are conducive to the elongation of the stems. This elongation, under normal conditions of growth, ultimately tends to result in the formation of culm and seed-head. Mowing, of course, prevents seed production; but the plants incline to spindle rather than to stool. Therefore, seedling plants from seed sown in the spring fail to form the close, vigorous turf that is produced from fall sowing, and they are less able to hold their own against crab-grass and other summer weeds and the many vicissitudes incident to the hot summer months. Even grass seedlings that get a poor start in the fall and appear to have made little or no growth, when spring arrives, have a great advantage over spring seedlings, though the latter come from early spring sowing.

The recommendation has been made by some that the seeding of certain of our northern turf grasses (particular kinds not specified), should be delayed until that time of spring when the weather and the soil have warmed up well. A study of the behavior of these grasses will soon convince the intelligent observer of the fallacy of this recommendation. If spring seeding must be done, then in the name of common sense do it as early as possible and not wait for corn-planting days to arrive. Green committees are urged to adjust their making and maintenance programs so that the sowing of seed, whether it is for the making of new greens or fairways or the reseeding of old ones, will be done some time during or near the early part of September. If greens or fairways must be seeded in the spring, do it early, and make the soil conditions as nearly ideal as possible. Having done these things, pray for a good season. The young grass plants will need all the help they can get.

A full-sized chapter might be written on the other phases of prevention of waste in seeding and reseeding greens and fairways. Certainly in a great majority of cases the rate of sowing is excessive. Much seed is positively wasted in this way. But the waste that comes from the willy-nilly practice of sowing seed on old turf is the least defensible of all. There may be conditions under which the reseeding of greens is a desirable thing to do, but it should be done with wisdom and understanding, which means, in the fall with a good compost dressing. Some day a wise green committee chairman will actually "count the teeth of the horse"; that is, he will properly check up the effects of reseeding and will learn by this incontrovertible method how much of the benefit, if he is fortunate enough to secure benefit, is due to the seed and how much to the compost and treatment that accompany reseeding. The golf clubs of America will erect a monument to his memory.

Courtesy of the game.—Every green committee should pound away at the members on the observance of the courtesies of the game. Members are naturally selfish or careless. Constant reminders by notices posted on bulletin boards or put in lockers or on caddy bags may make a convert now and then. A sharp reprimand to persistent offenders is good for the whole membership.

Whiskers on the bunkers.—Let the whiskers grow on the backs of bunkers. A bunker isn't a bunker until it grows whiskers. Some golf architects suggest clumps of rough grass in large bunkers.

Watering the Fairways

FRANK L. WOODWARD, DENVER, COLO.

The most valuable property-right in all of the Rocky Mountain region has always been water. Popular opinion would give the palm to mining or oil for the reason that to these is attached the halo of speculative or get-rich-quick romance, but in reality the backbone of the prosperity of all this vast region is its farm crop and livestock industries, and the fundamental requisite for the successful carrying on of either of these is sufficient water. It is in connection with the appropriation, distribution, and use of water that the tragic, romantic, and substantial history of this part of the country has been written. If it were not for the beneficial use of water in all of the many and varied ways that have been devised for its application, the entire western part of the continent would indeed be the desert waste it was formerly declared to be.

What is true in general as to the importance of water to the West applies equally when the subject of golf is involved. If a turfed course is contemplated, the first question to be asked is, How much water is available? And it is far more important that this question be answered satisfactorily than the customary questions regarding soil, adaptability, conformation, and the like.

When the location of the present course of the Denver Country Club came to be determined, much controversy arose for the reason that most of the tract selected was apparently a sandy waste. It had never been cultivated, and many doubted whether grass could ever be made to grow upon it, but careful investigation had proved that the soil, though very light and sandy, contained ample nutritive ingredients to produce a good turf *if sufficient water was applied.* The needed water was developed by sinking cribs some ten or twelve feet below the surface in the bed of Cherry Creek about a mile above the club grounds. These cribs collect part of the underground flow of this stream, which is then conducted by a 24-inch pipe line on the club's property at its highest point. This flow continues uninterruptedly the year round. Cherry Creek, for nine months of the year, may apparently be dry as a bone, but the underground flow goes merrily on, varying somewhat with the dryness of the season but sufficient at all times to provide water enough to maintain good fairways. Some of the members of the club contend that this has given Denver the best fairways of any golf club in the country. This view may be a trifle over-enthusiastic, but it is true that throughout the year they are green and carpet-like and have all the good points of an ideal playing surface. When it is realized that every growing thing upon the course—shrubs, trees, flowers, and every blade of grass on teeing grounds, putting-greens, fairways, and even rough—must be regularly and frequently watered, the vital importance of this necessary element in our equipment will be appreciated.

Distributing mains are laid so as to carry this water to every part of the course. These mains are 8-inch tile pipes with cemented joints. At various points, say, every 500 feet, outlets are arranged with shut-off valves. The mains run down between courses and the outlets are in the rough; consequently no obstacles are put in the way of play. The flow is entirely by gravity and the "head" is low, at no point being greater than three and

one-half feet; consequently the pressure is very slight and the force of the water, as it flows over the surface, is not great enough to "wash" the soil or produce cuppy lies. The great advantage of this plan is that it enables us to get the water to the roots of the grass; whereas, with sprinkling, much of the water blows away or evaporates in this arid climate. The soil is so absorbent that irrigating can proceed during play with very little inconvenience, for in a few minutes all surface water has disappeared and the sandy nature of the soil tends to minimize muddy conditions.

The method by which this water is applied at the Denver Country Club often strikes the eastern visitor as unique and remarkable, but it is merely the old irrigation method, long used in this part of the country, slightly modified to suit the peculiar circumstances.

The method is to flood the entire course instead of sprinkling it. As it is expressed here, we "irrigate" the entire fairway system and all of the rough. This is done through 8-inch hose made of heavy duck canvas in twenty-foot lengths. There are no couplings. The end of each length of hose is overlapped into the end of the next length. This overlap amounts to from ten to fourteen inches. The end nearest the outlet valve is stuck into the end of the next length, and this process is continued until a "line" of hose has been "laid" in whatever direction is desired and to the required distance, usually one or two hundred yards. The water is then turned on. The flow from the extreme end will gently spread a sheet of water, one-half or three-quarters of an inch thick, over several hundred square feet of surface. The irrigator will then break the "line" at the next joint by merely pulling it apart. The water will then flow from this point over the ground down to the place where the irrigating began, and gradually, by breaking each joint in turn, the whole area from the end of the "line" back to the outlet will receive a thorough soaking.

In ordinary weather it requires about four days to go over the entire course in this way, using two men working at different points on the grounds. In the hottest part of the summer this force is doubled, two men working day-times and two at night; and, of course, the hotter the weather, the more water is applied.

The system works easily and economically. The first cost of the installation of cribs, pipe line, and distributing system represents the capital investment. The current cost is represented by labor and replacement of hose. About two thousand feet of this hose is used annually. Its life is rarely more than one season.

The quantity of water required to irrigate fairways by this method would vary with conditions of soil and climate. One of the eastern courses that waters its fairways as well as its putting-greens, is very proud of a pumping plant that delivers 600 gallons per minute. To the layman that sounds like a lot of water, but great quantities are required; and in the language of irrigation the standard of measurement is not gallons, but feet and inches. The quantity of water used for the fairways at the Denver Country Club is 3½ second feet; or in terms of gallons, 1,600 per minute.

There is always one danger connected with writing for general distribution about methods employed at any golf club, and that is that the same methods may be attempted elsewhere, under conditions that are in nowise similar, with the result that failure follows and waste occurs. The wonderfully favorable results that have attended the wholesale watering plans

in vogue at the Denver Country Club have, however, led to the query, Why would not other clubs profit equally if similar plans should be followed, modified, of course, where necessary to conform to conditions prevailing elsewhere?

Summer visitors in Denver exclaim in wondering envy about the constant greenness, springiness, and splendid condition of our fairways, even in the hottest, most scorching weather. They say, "at home everything is brown, dry, and baked to a crisp. Why can't we get fairways like this?" Well, they could with a little extra enterprise on the part of their greenkeeping organization. The importance of watering fairways has not been sufficiently realized. It is, however, coming more and more to be appreciated. If golf courses are to be kept up in really first-class condition, it is obvious that they should not be allowed to dry up and become baked and blistered during a considerable portion of every playing season. The time to plan for the watering of fairways is, of course, when the course is being originally laid out, as the equipment can then be installed with a minimum of expense, but most players will agree that the added pleasure of playing over green, resilient fairways at all times warrants a considerable outlay in the installation of some system for the watering when needed of all the "pretty" on the course.

It must not be forgotten also that the constant irrigation of turf is in itself a method of fertilization, for the reason that water, thus gently flowing over turf, deposits fine particles of silt, organic matter, and other forms of nutrition that aid materially in maintaining a healthy sod.

When the rainfall is so slight or the climate so dry as to necessitate irrigation of fairways, studies could profitably be made of systems employed both in Colorado and California. In fact, the latter State has developed the science and technique of irrigation more elaborately than any other section of the country. In general, the following are the necessary things that must be remembered and provided for:

(1) Secure an ample supply of water so as to enable a large quantity to be applied quickly.

(2) Arrange a distribution system for this water to reach every point and with frequent outlets so that the surface connections required will be as short as possible.

(3) Do not figure on high pressure lines for irrigation. Water in quantity can not safely be applied to turf under much of a "head." The flow secured must be very gentle; otherwise washing of the soil, uneven surface, and cuppy lies will result.

(4) Irrigation can never be employed on newly-seeded ground. It is not safe to begin to use this method until a good thick stand of turf has become well rooted.

What is a proper green fee, and why?—It is obvious that it costs a club money in the way of locker service to take care of guests, and a green fee should be charged that will cover costs and leave something to be credited to the green committee.

Keep the men busy.—It is considered good practice not to "dock" men for parts of days lost on account of rain. This keeps them on the place ready to go to work if it clears up. There should be plenty to do under shelter—nice rainy-day jobs.

Distribution of Maintenance Costs

ADOLPH F. SEUBERT, INVERNESS CLUB, TOLEDO, OHIO

With comments by Messrs. Alan D. Wilson, Hugh I. Wilson, and W. C. Ferguson.

I have had no experience in the practical work of greenkeeping. My business life has been devoted to the employment and handling of labor in factory management. I believe I was put on the Green Committee at Inverness in the hope that I might contribute something out of my experience to the problem of regulating and controlling expense and ascertaining the proper cost of doing the work. This article, therefore, is submitted more to "start something" than to state definitely what should or should not be done, and my feelings will not be hurt in the least if some practical greenkeeper or someone else takes issue with my conclusions.

Heretofore, as I understand it, labor costs on golf courses have been kept in a very crude way under general heads, such as *labor, maintenance, new work,* and the like, which mean very little. No attempt has been made to break up maintenance costs in any way so as to get the facts as to the costs of the different kinds of work. It is obvious that there can be no comparison of the maintenance costs on different courses until the figures are kept on a common basis.

The first step to be taken in the ascertainment of any costs is to divide the work into natural divisions, just as factory costs are broken up into the operations. This division must be based upon the method of doing the work and must be natural and not too complicated, so that accurate records can be kept without much trouble.

In order to keep our costs during the coming year, we propose to use a separate time-card or time-sheet for each employee, so as to show the kind of work done each day, the number of hours, the rate of pay, and the totals in dollars. It should be easy enough at the end of each week to combine the totals from these individual time-cards and put them on a summary or résumé sheet to show the totals for each week for each of the different kinds of work. On page 125 is shown the time-distribution sheet we expect to use, and on page 126 the résumé or weekly sheet. Considering the way in which our work is to be done, it is believed that our classification is reasonably natural and not too elaborate, and it may be well to explain the various items.

Routine work on putting-greens.—This includes all the work ordinarily done as routine work on the greens. We expect to employ six men to cut, roll, weed, and care for the greens, and to trim and take care of the traps around and about the greens. An extra man will cut and trim approaches and edges of the greens with a power mower. All this will be the daily routine, and all this labor will be put under this heading.

Mowing fairways, mowing rough, and mowing tees.—These need no explanation. We shall have one man running tractor mowing machines practically all the time during the cutting season. A man will be used where necessary in the rough, and one man will take care of the tees.

Care of bunkers.—This will include the work on the bunkers and traps other than those around and about the putting-greens.

Fertilizing, seeding and top-dressing greens.—We expect to top-dress our greens very frequently. Last year this was done about once a month and it is planned to do it oftener this year. This item includes the

CHECK NO..... WEEK ENDING.....192....

NAME.....

Inverness Club—Time Distribution Record

	MAINTENANCE	Sun.	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Total Hours	Total Amt.	
1	Routine Work on Putting Greens										
2	Mowing Fairways										
3	Mowing Rough										
4	Mowing Tees										
5	Care of Bunkers										
6	Fertilizing Seeding and Top Dressing Greens										
7	Fertilizing Seeding and Top Dressing Fairway										
8	Special Weeding Greens										
9	Worm Eradication Greens										
10	Watering Labor										
11	Labor on Compost										
12	Barn Work										
13	Repairs to Water Lines										
14	Attention to Tee Boxes, Moving Holes, etc.										
15	Repairs to and Upkeep of Equipment										
16											
17											
18											
19											
	NON MAINTENANCE										
20	New Work										
21	House Grounds										
22	Cutting Wood										
23	Trucking for Club										
24	Outside Buildings										
25											
26											
	Totals.....										

TOTAL HOURS.....RATE PER HOUR.....AMOUNT DUE.....

APPROVED.....SUPT.

RECEIVED PAYMENT.....

RESUME OF TIME DISTRIBUTION

INVERNESS CLUB (Green Committee)

	MAINTENANCE	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	Week Ending	TOTAL	
1	Routine Work on Putting Greens																	
2	Mowing Fairways																	
3	Mowing Rough																	
4	Mowing Tees																	
5	Care of Bunkers																	
6	Fertilizing Seeding and Top Dressing Greens																	
7	Fertilizing Seeding and Top Dressing Fairways																	
8	Special Weeding Greens																	
9	Worm Eradication Greens																	
10	Watering Labor																	
11	Labor on Compost																	
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15	Repairs to and Upkeep of Equipment																	
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17																		
18																		
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20	New Work																	
21	House Grounds																	
22	Cutting Wood																	
23	Trucking for Club																	
24	Outside Buildings																	
25																		
26	Totals.....																	

FROM.....192....TO.....192.... SIGNED BY.....

preparation, hauling, and spreading of the top-dressing, and it will also include special fertilization, such as an occasional application of sulfate of ammonia, and will also include the seeding. There seems to be no occasion to separate the costs of fertilizing, top-dressing, and seeding the greens. Seeding, for instance, is done only twice a year and the labor cost is trivial.

Fertilizing, seeding and top-dressing fairways.—This will cover about the same class of work on the fairways as is described above in respect to the putting-greens.

Special weeding on greens.—This means just what it says; that is to say, the weeding not done by the regular greensmen.

Labor on compost is intended to cover all the work in hauling materials and taking care of the compost piles, but will not include the screening of compost or the mixing of compost with other materials prior to application.

Attention to tee boxes, moving holes, etc.—This will cover the items mentioned, such as changing the tee markers, changing the position of tee boxes, moving locations of holes, changing flags, picking up grass cuttings, and the like.

The other items in our schedule seem to require no explanation.

Only experience will tell whether this classification is right or wrong. We have left spaces for other kinds of work as the items of classification will develop. Only experience will evolve a classification that can be used on all golf courses, and there seems to be no doubt of the desirability of the strongest kind of cooperation among golf clubs, looking to standardization of accounts, standarization of methods, and the acceptance of a common classification, so that there can be a comparison of costs.

It is more than likely that experience will show that golf courses will have to be divided into groups in order to get to a fair comparison of costs. It would hardly seem reasonable to keep the costs of a small nine-hole golf course on the same basis and with the same detail as the costs on a fine, beautifully maintained, eighteen-hole course. There are a great many courses in small towns that are maintained at a cost of from $1.500 to $2,500 a year. It would not be reasonable to keep the costs on such a course on the same basis as on a course that is maintained at a cost of from $20,000 to $25,000 a year; so I anticipate that experience will show certain natural groupings; but the principle will be the same and the necessity for standardization of accounts will be just the same.

In making up our time-sheet we started with a tentative sheet proposed by Mr. A. J. Hood, of the Detroit District Green Committee, and we have only added detail and have changed the arrangement. The classification proposed by the Detroit Green Committee included items such as cutting greens, cutting tees, cutting fairways, cutting rough, bunkers, ditches, roads, and miscellaneous, and it does not strike us that this method is either natural or in sufficient detail.

We have also examined a time-card used on the Maketewah Country Club, Cincinnati, which carries the following items: Watering greens and tees, cutting greens and tees, weeding greens, rolling and cleaning greens, preparing top-dressing, seeding greens and top-dressing, cutting greens, seeding fairways, care of traps, cutting slopes and long grass, repairing bridges and fences, repairs to equipment and odd jobs. Our objection to this classification is that it does not conform to our method of doing the work. It seems to us that the cost of work on the greens should not

be mixed up with the costs on the tees, unless of course the work is done by the same men and is not naturally capable of division. Seeding greens, unless it is special weeding, should come under care of greens, and so should the rolling and cleaning. Preparing top-dressing is as much a part of the cost of application as the spreading. Seeding fairways occurs but once or twice a year and does not amount to enough to bother with, and should be included in the general treatment of fairways.

A great many systems of factory accounting have broken down because the division of costs was too fine for practical use, and we have this objection to a cost-sheet which appears to have been used in Chicago, and which classified the items as follows:

Mowing fairways
Seeding fairways
Disking and top-dressing fairways
Rolling fairways
Mowing rough grass
Mowing mounds
Mowing and top-dressing tees
Sanding bunkers
Raking bunkers
Labor sprinkling
Power-house labor
Barn expense
Mowing putting-greens
Worm eradication putting-greens
Fertilizing putting-greens
Seeding putting-greens
Weeding putting-greens
Labor on drain-tile
Repairs to mowers
Repairs to sprinkler system and sprinklers

It might be possible to keep the costs on the golf course in great detail if a competent cost-clerk were employed, but the object to be obtained is a simple, easy, workable form that can be handled as a matter of routine, day by day, by the ordinary greenkeeper.

The salary of the greenkeeper is, of course, a part of maintenance costs, but the purpose of the time-distribution record now under discussion is to classify and record only direct labor. The manner of handling a greenkeeper's salary must depend upon the nature of his work. If he does nothing but give the work general supervision, then his salary is part of the overhead and should not be entered on the daily cards. If he devotes a part of his time to direct labor, then so much of his time should be entered on the daily cards and the balance which is devoted to general supervision should be treated as overhead.

To determine true maintenance costs the direct labor costs should be loaded with the overhead. The loading of overhead charges is strictly a matter of accounting and should be taken care of by the books rather than the greenkeeper; and there would seem to be no difficulty in keeping proper records if a daily record is made of the greenkeeper's direct labor in such form that the bookkeeper can understand how much of the greenkeeper's salary is to be treated as overhead.

At the end of the year or any period the total amount expended for direct labor for the various items of work will be known, the amount of direct labor of the greenkeeper will be known, and the cost of supervision will be known. It will then be a simple matter for the bookkeeper to spread the supervision expense proportionately over the direct labor items. Of course, the greenkeeper's direct labor items should not be loaded a second time. The supervision expense should only be spread over the costs of the labor of others than the greenkeeper.

This may seem a little complicated at first glance, but any bookkeeper ought to understand it.

Without a doubt someone somewhere in the United States has worked out a complete, satisfactory, and entirely practical distribution of maintenance costs, and whoever has anything that he considers worth while should contribute it to the Green Section for publication so that by the exchange of views and experience a standard system can be worked up in such shape that it can be used on a great many courses.

There are many courses that have special problems and special work and any standard system will have to make provision therefor.

It goes without saying that there should be a complete separation of the work on the golf course from the work around the house and general grounds, and there should be a separation of maintenance and non-maintenance work.

It ought to be made possible by standardization to lay the accounts of two or a dozen courses side by side and see where the money went, just exactly as a group of factories with which I happen to be connected are obliged to compete with each other, and the figures are made comparable by operation on a common system. It is hoped that by this time next year the Green Committee of the United States Golf Association will be able to send out a full set of forms, with complete instructions for use, about the same as the Interstate Commerce Commission prescribes for the accounting of railroads. This can hardly be done, however, until the proper forms are evolved. The subject is an important one, and it is hoped that everyone who has any suggestions to offer will not fail to let the Green Section members benefit by them.

COMMENTS BY MESSRS. ALAN D. WILSON AND HUGH I. WILSON, PHILADELPHIA, PA.

We have carefully gone over the cards accompanying Mr. Seubert's article on *Distribution of Maintenance Costs* and we feel that the author is on the right track when he tries to reduce the number of items and so simplify the card. But it seems to us that he should go still further in this direction, having in mind the difficulties of the average club in the practical application and use of such a system. It is our opinion that items 2, 3, and 4 should be consolidated into one item, which should read, *Mowing fairways, rough, and tees.* This really is one job, especially when it can be done with a tractor or triplex mower, and where the tees are so built that they do not have to be cut by hand. In any event it is all a rough mowing job.

We do not see why item 9 should not be combined with item 6 under the heading, *Fertilizing, seeding, top-dressing, and eradicating worms from greens.*

We do not understand what item 12, *barn work,* means. If it is the care of horses, we think it should be made clear, and if it is the care of equipment we think it should be combined with item 15.

In regard to item 13, *Repairs to water lines,* these are so trivial on the average course that we think it might be well to combine this item with 15. Another reason for this is that the watering systems of various clubs are of such different character that the cost of maintenance would not be comparable and would give no valuable information.

In his discussion of the heading, *Labor on compost,* Mr. Seubert says, "but will not include the screening of compost or the mixing of compost with other materials prior to application." The question arises whether the cost of screening compost should not be charged up against this labor. If you want to compare the difference between the cost of compost and commercial fertilizer of any sort, it seems to us that you should know the cost of the compost when it is completed and ready to apply to the greens; in other words, when it is in just the same condition as commercial fertilizer would be when delivered to you ready to apply or to mix with other materials.

We think the general lay-out is exceedingly good, but we do feel strongly that for practical value we must get the plan so simple that a man of average education will be able to apply it reasonably correctly and without undue labor.

COMMENTS BY MR. W. C. FERGUSON, GLEN ECHO COUNTRY CLUB, NORMANDY, MO.

With reference to the daily time-card I would say that I have never been in favor of a daily time-sheet. I think a time-card for each man covering a period of two weeks is more satisfactory. Keep these time-cards in a loose-leaf book and have them turned in semi-monthly. This is also convenient when a man quits the work in the middle of a pay period, as his particular time-card can be taken out of the book, checked up, and vouchered. It also gets away from the necessity of writing a man's name daily on the time-card. This is merely a matter of opinion, however, as the data desired can be obtained by either method. I am submitting herewith a form, on page 131, showing the pay-sheet suggested by a committee of the St. Louis Greens Section. This is a weekly sheet, and there are a number of features which I do not like in it. I am having some prints made up for my own use which are considerably different from these sheets.

With reference to the distribution record, I would say that I do not think this is complete. There is no provision made for showing supervision, nor maintenance items on the club grounds other than on the course itself. I believe this to be of enough importance to warrant subdivision. I do not believe the daily distribution of time as shown in the Inverness Club record is of much value for comparative purposes, and the work necessary to subdivide the pay roll for each day into various items is quite considerable.

The report, in my opinion, should show not only the expenditures for labor, but for material; for the weekly, fortnightly, or monthly period. It should also indicate the total expenditure on any subdivision of the work up to date of the report and may or may not show the amount expended up to that time for the previous year; but above all, it should show the total budget allowance. I am also submitting a form, on page 132, showing the record recommended by a committee of the St. Louis Greens Section, which can be used either as a fortnightly or monthly report. This shows all the items I have mentioned above. I used something of this sort, which was not subdivided in such detail, last year, and found it very helpful, the items detailed in this budget allowance being made up from the budget expenditures of last year. The advantage of having the budget allowance on each report is that one can immediately see when one is beginning to approach the end of one's "string."

As for the *Résumé of Time Distribution*, I cannot see what advantage that would have. I may not understand the purposes of this report, but at the present time I do not see how it would aid in the organization or direction of grounds work.

The St. Louis Greens Section is having printed forms which are identical with this monthly maintenance report and expect to make comparisons of costs on the subdivision basis as shown. The committee is aware of the fact that this record is not anywhere near perfect; but something must be done; and it is hoped that by the end of the year some experience will have been obtained on which to draw up an intelligent record for the succeeding year.

With reference to the article in general, I think it is very good, and believe it will bring out some interesting discussions which will be very beneficial

EDITORIAL NOTE

The comments illustrate and enforce the writer's point that a standard system is a necessity, and that there must be a compromise between too much detail and too little, and that the system must be natural and workable. The clubs must work together on a standard system though it may not exactly suit everyone.

The article relates only to labor costs and leaves for future discussion other matters of accounting, such as material costs, budgets, etc. The most important item of expense is labor, and there can be no comparison of figures until the figures are made up so as to show where the labor is used and what it costs. The Green Committee of the U. S. Golf Association will value the cooperation

Sheet No.................

Of....................

.....................................COUNTRY CLUB

GROUNDS and/or GREENS DEPARTMENT

Payroll No. .... for Week Ending .... 192.....

Name		Hours per Day							Total Hrs.	Rate	Total	Received Payment
		Fri.	Sat.	Sun.	Mon.	Tues.	Wed.	Thur.				
	1											
	2											
	1											
	2											
	1											
	2											
	1											
	2											
	1											
	2											
	1											
	2											
	1											
	2											
	1											
	2											
	1											
	2											
	1											
	2											
									Total			Note: No. 1 line for acct. letter No. 2 line for hours

LABOR DISTRIBUTION

Acct. Letter		Classification	Construction		Maintenance		Total	
Maint.	Const.		Hrs.	Amount	Hrs.	Amount	Hrs.	Amount
a	A	Roads and Walks						
b	B	Bridges and Structures						
c	C	Trees, Shrubbery and Flowers						
d	D	Lawns						
e	E	Tennis Courts						
f	F	Watering Greens and Tees						
g	G	Weeding Greens and Tees						
h	H	Cutting Greens and Tees						
i	I	Surfacing Greens and Tees						
j	J	Fertilizing Greens and Tees						
k	K	Seeding Greens and Tees						
l	L	Cutting Fairway and Rough						
m	M	Seeding Fairway and Rough						
n	N	Fertilizing Fairway and Rough						
o	O	Traps						
p	P	Piping and Drains						
q	Q	Balance of Links						
r	R	Maintaining Implements						
s	S	Supplies and Miscellaneous						
t	T	Livestock						
u	U	Supervision						
		Total Distribution						

Approved— Prepared by:

....................................Chairman G. and G. Comm. ....Grounds and Green Man

Form Approved by Greens Section of the St. Louis District Golf Association

.....COUNTRY CLUB

Grounds and or Greens Department

MONTHLY REPORTS TO CHAIRMAN

Month of ..... 192.. Maintenance and Upkeep Including Payroll No. ....

Acct. Letter	Classification	Material	Labor	Total Current Month	Total Same Month Previous Year	Total To Date During Year	Total Budget Allowance
a	Roads and Walks						
b	Bridges and Structures						
c	Trees, Shrubs and Flowers						
d	Lawns						
e	Tennis Courts						
f	Watering Greens and Tees						
g	Weeding Greens and Tees						
h	Cutting Greens and Tees						
i	Surfacing Greens and Tees						
j	Fertilizing Greens and Tees						
k	Seeding Greens and Tees						
l	Cutting Fairway and Rough						
m	Seeding Fairway and Rough						
n	Fertilizing Fairway and Rough						
o	Traps						
p	Piping and Drains						
q	Balance of Links						
r	Maintaining Implements						
s	Supplies and Miscellaneous						
t	Livestock						
u	Supervision						
	Total						
	Construction and Replacements						
A	Roads and Walks						
B	Bridges and Structures						
C	Trees, Shrubs and Flowers						
D	Greens						
E	Tennis Courts						
O	Traps						
P	Piping and Drains						
Q	Balance of Links						
R	Implements						
S	Miscellaneous						
T	Livestock						
U	Supervision						
	Total						

Acres in Grounds, Greens and Links .....

Form Approved by Greens Section of the St. Louis District Golf Association

of member clubs in adopting some system of distributing labor costs, whether it is their own or some other club's system, so that the experience of many can be available as a basis for the construction of a standard system next year.

It is hoped that the article will induce many clubs to attempt something in the way of a cost system and that there may be a general discussion of the subject through the columns of THE BULLETIN and otherwise, so that at the end of the year we shall have the material to use in making up something in the way of forms that can be accepted as standard.

Questions and Answers

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

1. **Economizing in seeding by use of mixtures for northern greens, fairways, and rough; wheelbarrow seeder vs. hand-sowing; rate of seeding; red fescue, bent, redtop, bluegrass, Pacey's rye-grass, orchard-grass, tall meadow-oat-grass, meadow-fescue, sheep's fescue.**—You advise for fairways bluegrass, 4 parts, fancy recleaned redtop, 1 part; for greens, German creeping bent and fancy recleaned redtop in equal proportions. As you know, prices are unusually high this year, and I would like to cheapen this a bit if it can be done without great harm. Red fescue at 50 cents a pound is much cheaper than creeping bent at $1.40. Could I use 25 per cent fescue, 25 per cent bent, and 50 per cent redtop? Our soil is a fairly rich clay-loam, not a bit sandy; I know fescues are sand-lovers. Will 5 pounds to 1,000 square feet be heavy enough? We are seeding new greens, not reseeding old ones. Is there any mechanical hand-sower that will insure sowing this seed more evenly and more economically than simply by hand-sowing? I presume a wheelbarrow seeder would be inadvisable for greens. Now, as to the fairways, can I cheapen my mixture a little by adding English rye, meadow fescue, or orchard-grass? If I use rye-grass, would the short-seeded or Pacey's rye-grass be better than the other grade? I am quoted the same price for either grade. What is the very cheapest seed I can use for new rough? I had thought of orchard-grass, meadow-fescue, and redtop. I am not striving to get a hard rough, but just grass on it so the general appearance will be good and so that should we want at any time to change fairways we could do so without much trouble. White clover is native to this section, and on old sod we find it abundant, and it will naturally creep into all our fairways.—(Pennsylvania.)

Our advice would be to effect your economy by using some redtop, but not to use fescue. In our experience it has been almost useless to seed fescue mixed with the bents, as in the end the fescues never endure in competition with the bents. You can reduce your bill therefore by seeding with a mixture of 75 per cent redtop and 25 per cent bent. The redtop will eventually disappear so that you will have pure bent. The fescue, we feel sure, will not give you this result. The bent seeds, including redtop, are very fine seeds, about 4,000,000 to a pound. Bear in mind that the rate we advise means about 20,000,000 seeds per 1,000 square feet, or 20,000 per square foot. Really one can get along with much less seed than this, but in our experience it is not advisable to reduce the seeding to a smaller amount, as it may take much longer to get a dense, well-knitted sod.

Wheelbarrow seeders are very satisfactory either on the greens or on the fairways. On the greens you can seed in about four directions across the green before you will use 5 pounds to 1,000 square feet.

On your fairways there is no objection to using rye-grass or meadow-fescue, but we would not advise the use of orchard-grass. Meadow-fescue is satisfactory in the moister soils. Rye-grass will grow in practically any soil; but bear in mind that rye-grass seeds are about fifteen times as large as redtop seeds, so that it is questionable whether you will get any economy by using rye-grass. Do not use rye-grass on the putting-greens, as it lasts too long there. Pacey's rye-grass is merely smaller seed screened out. We have no data on the relative economy of using these smaller seeds.

In your rough, sheep's fescue is ideal, but the seed is scarce. The next best thing, in our judgment, would be a thin seeding of orchard-grass and tall meadow-oat-grass. Both of these grasses make bunches and afford a very satisfactory rough. Tall meadow-oat-grass seed is, however, more expensive than the orchard-grass.

2. **Testing seeds for germination.**—What simple method or methods can we use in making germination tests here at home? Do germination tests properly bear any relation to purity determinations? For instance, a lot of seed might show 80 per cent purity, the remaining 20 per cent consisting of chaff or foreign seeds which we might not be able to distinguish from the true seed in selecting specimens for germination tests. In other words, if the germination test is carried out properly, should the specimens for that purpose be selected only from the 80 per cent of pure seed? This would be a difficult matter to accomplish in a test conducted at home.—(Indiana.)

Germination tests are usually made on the basis of pure seed; that is to say, 100 seeds are taken from a sample and the percentage of germination is based on the number that prove to be viable; therefore, a sample might have a germination percentage of 90, even though it contained only 10 per cent of pure seed, the remainder being inert matter. In selecting the seed for the test, however, an effort is made to get a sample that is representative of the bulk; in other words, caution is used not to pick out the plumpest and best-appearing seeds. Usually 100 seeds are selected for a test, so that the number of plants resulting represents the percentage of germination. The unit of measurement selected, however, is purely arbitrary, and if one knows what is desirable in the way of a stand from the seeding of any particular grass, it is quite easy to make a test by less exact methods. For instance, with creeping bent for putting-greens it has often been said that an ideal stand of seedlings is about seven seedlings to the square inch. If seed of the bents sown at the rate of one-quarter ounce to a test plot of 5 square feet accomplishes this result, we would regard the germination as satisfactory. This same rate of sowing would also apply in the testing of redtop seed. For fescue or bluegrass the rate for a test plot of 5 square feet would be one-half ounce of seed.

3. **Southern limit of the range of bent and fescue for putting-greens.**—I have recently read that by preparing the soil with certain special precautions good putting-greens of creeping bent or of red fescue can be grown anywhere in the southern States. Will you please advise us if such advice is reliable?—(Florida.)

One of the rather puzzling phenomena connected with all temperate perennial plants is that every one of them has a fairly definite southern

limit. Thus timothy can not be cultivated successfully farther south than about the northern limit of the cotton-belt. Apples are cultivated a little farther south than timothy, while both the pear and the peach succeed considerably farther toward the equator. The southern line of creeping bent and red fescue is about that of timothy. Curiously enough, in the drier half of the United States all these plants succeed farther southward than they do in the eastern part of the country. It is not at all safe, however, to assume that because fescue is good in southern California it will do equally well in Florida. Theoretical explanations of the phenomena involve temperature, humidity, and length of daily illumination, and are too technical to discuss here in detail. As yet no one has succeeded in making an all-the-year putting-green of either bent or fescue in the South. While we would not care to say it can't be done, the chances of success are very small. Until it has been accomplished the question you ask is purely of academic interest.

4. Watering Green.—Our club borders on a lake and our course is situated some 1,600 feet from the shore of the lake and on an elevation of 115 feet, so that we consider our drainage exceptionally good. What amount of water in gallons per square foot should we use to keep our greens in perfect condition?—(New York.)

We fear your question is an impossible one to answer in the way you ask it. The amount of water required to keep a green in the best condition depends upon a great many factors, including the quality of the soil, the surface drainage, the sub-drainage, and the elevation. These factors are so variable as to make it impossible to state the amount necessary to use in terms of gallons of water. Furthermore, these vary at the different times of the year and under different weather conditions. In our opinion the important principle connected with watering greens is to soak them thoroughly when you do water them. Thorough soakings every two, three, or four days, as may be necessary, are much to be preferred to light sprinkling every day. If both your surface drainage and sub-drainage are good, there is little to be feared from overwatering. If on the contrary your drainage conditions on the greens are not good, there is bound to be trouble regardless of how you water.

5. Corrosive sublimate, copper sulfate (Bordeaux mixture), and slaked lime in mixture.—Will a solution of corrosive sublimate mix with a solution of copper sulfate and a solution of slaked lime, and will each retain its active properties if mixed as above?—(Illinois.)

Our chemist reports on this as follows: "Solutions of copper sulfate and mercuric chloride (corrosive sublimate) in moderate concentrations do not show any visible reaction or change. Mercuric chloride solution is, however, apparently decomposed by Bordeaux mixture. This is, no doubt, due to the action of the excess lime in the Bordeaux mixture, since alkaline solutions precipitate reddish brown basic salts from mercuric chloride solutions. The supernatant liquid from a Bordeaux mixture produces this reddish brown precipitate when added to mercuric chloride solution." From the foregoing it appears that corrosive sublimate can be dissolved in a solution of copper sulfate without chemical change. If, however, it is put in Bordeaux mixture or in lime water, chemical changes result which doubtless influence the effects of both.

Meditations of a Peripatetic Golfer

When the spring comes, there is to most people an intense desire to worry the soil. Nevertheless, late summer or early fall is the time to harry the soil on a golf course.

"Yes, we use a complete commercial fertilizer and get good results," says one of my greenkeeper friends. We do not doubt his statement at all; but it is not economical. As a rule the potash and phosphorus in such fertilizers rarely help grass at all, and the freight paid on the filler is dead loss.

Soggy spots scattered over the course in early springtime. They are bully indicators of the places that need more drainage.

A natural, undisturbed soil surface is often beautifully undulated for a putting-green. Much better than any artificially made flat surface.

"Rome was not built in a day"; neither can good golf turf be secured in one season unless the soil conditions are remarkably favorable. It is much cheaper and more satisfactory to spread the construction of a new course over two or three years than to waste money in the endeavor to accomplish it all in one season.

Did you ever notice how quickly the grass starts to grow with the first touch of spring? That's one reason why the fine turf grasses should be seeded in the fall—so as to get that first, quick jump in the very early spring.

"Haste makes waste," is an old adage worth heeding. The fellow who tries to grow good turf quickly regardless of knowledge and experience learns that it is perfectly true.

Lovely shrubbery and entrancing flower beds about the clubhouse. "Swatting the pill" is not the only joy derived from golf.

There will be a free-for-all fight when we start discussing the question when and how to water greens.

A green committee of three that holds a session with the greenkeeper every Sunday morning. That's what we call team work.

The penalty for failing to replace a divot should be $5.00 and costs for the first offense, and 30 days for the second.

A brass stencil costing less than ten dollars, a few boards, and a little paint will make a world of signs warning members to replace divots, to remove footprints in sand traps, and to avoid climbing tops of bunkers.

Few golfers seem to believe in "signs." Put them up anyway. The ordinary man must read a thing seven times before he remembers.

Show me the compost piles and I'll tell you what kind of a green committee is in charge.