

THE BULLETIN

of the

UNITED STATES GOLF ASSOCIATION GREEN SECTION

Vol 8 Washington, D. C., March, 1928 No. 3

Contents

	Page
The Nature of Soil Acidity and How it Develops. By O. J. Noer, Madison, Wis.	46
"First Aid to the Beginner." By A. G. Chapman, Chairman, Green Committee, Audubon Country Club, Louisville, Ky.	48
How Glen View Waters Fairways. By Ed. Haupt, Greenkeeper.	51
Standardized Accounting. By William J. Rockefeller, Inverness Club, Toledo, Ohio	52
Clearing Land for Golf Purposes. By Kenneth Welton.	56
Bent Putting Greens in California. By Norman Macbeth, Wilshire Country Club, Los Angeles, Calif.	58
The Annual Greenkeepers' Convention.	61
Questions and Answers.	61

EXECUTIVE COMMITTEE

WYNANT D. VANDERPOOL, <i>Chairman</i> , 766 Broad Street, Newark, N. J.	H. KENDALL READ, Philadelphia, Pa.
RUSSELL A. OAKLEY, Washington, D. C.	WALTER S. HARBAN, Washington, D. C.
HARVEY L. WESTOVER, Washington, D. C.	H. Y. BARROW, New York, N. Y.
	JOHN MONTEITH, JR., Washington, D. C.

RESEARCH COMMITTEE

RUSSELL A. OAKLEY, <i>Chairman</i> , Washington, D. C.	JOHN MONTEITH, JR., <i>Pathologist</i> .
HARVEY L. WESTOVER, <i>Acting Chairman</i> , Washington, D. C.	

THE BULLETIN is published monthly by the United States Golf Association Green Section, Washington, D. C., at Room 7207, Building F, 7th and B Streets N. W.

Address all MAIL to P. O. Box 313, Pennsylvania Avenue Station, Washington, D. C.

Send TELEGRAMS to Room 7209, Building F, 7th and B Streets N. W., Washington, D. C.

Subscription Price: In United States of America, Canada, Mexico, and West Indies, \$4.00 per year; in all other countries, \$5.00 per year.

Entered as second-class matter, April 21, 1926, at the postoffice at Washington, D. C., under the Act of March 3, 1879. Copyrighted, 1928, by the United States Golf Association Green Section.

ADVISORY COMMITTEE

W. A. ALEXANDER, Chicago, Ill.
 EBERHARD ANHEUSER, St. Louis, Mo.
 A. C. U. BERRY, Portland, Oreg.
 WILLIAM F. BROOKS, Minneapolis, Minn.
 N. S. CAMPBELL, Providence, R. I.
 WM. C. FOWNES, JR., Pittsburgh, Pa.
 F. H. HILLMAN, Washington, D. C.
 THOS. P. HINMAN, Atlanta, Ga.
 FREDERICK C. HOOD, Watertown, Mass.
 K. F. KELLERMAN, Washington, D. C.
 NORMAN MACBETH, Los Angeles, Calif.

E. J. MARSHALL, Toledo, Ohio.
 W. L. PFEFFER, St. Louis, Mo.
 GEORGE V. ROTAN, Houston, Tex.
 SHERRILL SHERMAN, Utica, N. Y.
 FREDERICK SNARE, Havana, Cuba.
 JAMES D. STANDISH, JR., Detroit, Mich.
 W. R. WALTON, Washington, D. C.
 ALAN D. WILSON, Philadelphia, Pa.
 M. H. WILSON, JR., Cleveland, Ohio.
 FRANK L. WOODWARD, Denver, Colo.

The Nature of Soil Acidity and How it Develops

By O. J. Noer, Madison, Wis.

Many authorities, charged with turf maintenance, desire and strive to obtain acid soils, particularly on greens where bent grasses predominate. The bents appear to thrive in soils sufficiently acid to inhibit or prevent the growth of undesirable clover and weeds.

Sulfate of ammonia is most widely used to develop acidity. Besides its effect upon soil reaction, the sulfate supplies nitrogen, the plant food element most extensively used by grasses. Failure to control clovers and weeds frequently results from the use of supplementary materials which overcome the acid producing power of the sulfate.

A clear understanding of what constitutes soil acidity, how it develops, the effect of specific fertilizer materials, and the possibility of introducing lime or other alkaline material in sand, soil or water, must be considered in any program aimed to promote soil acidity.

Natural agencies tend to make soils either more or less acid. In humid regions (25 inches or more annual rainfall) soils gradually become acid, and less acid or alkaline in arid and semi-arid regions. During and after rains, the excess water as it passes down through the soil dissolves and removes more alkaline than acidic material, consequently the residual soil gradually becomes acid in character. In semi-arid and arid regions almost no water passes down through the soil. Evaporation at the surface tends to promote capillary water movement upwards and the dissolved materials, usually alkaline in character, accumulate as the water evaporates. Since these materials are water soluble they can be washed out of the soil. Removal is facilitated where tile drains are installed to carry the leaching waters away.

The rate at which acidity develops naturally depends upon the amount of rainfall, the type of soil, and the nature of the native material from which the soil was derived. The more thorough leaching in areas of heavy rainfall is self-evident, but that acidity develops more rapidly in sandy than heavy soils is not generally appreciated. If the parent rock from which the soil originated was low in alkaline materials, acidity asserts itself more quickly. Soils derived from limestone usually contain lime carbonate, and until removed, acidity develops slowly. Carbonic acid, always present in the soil water, gradually converts the insoluble lime carbonate into soluble bicarbonate which leaches from the soil. From 200 to 500 pounds of lime are annually removed in this way. Sulfate of ammonia hastens re-

moval by converting additional lime carbonate into soluble calcium sulfate which is also washed out in the drainage water. But until the lime carbonate disappears completely very little effect can be expected from sulfate applications so far as increasing soil acidity is concerned.

Chemists recognize three classes of substances, acids, bases and salts. As the name implies, acids are acidic in character, whereas bases are alkaline in character. Salts are usually neutral but may have acidic or alkaline properties. They are formed when chemical action takes place between an acid and a base, and may be either soluble or insoluble in water. Thus when hydrochloric acid (muriatic acid) and calcium hydroxide (hydrated lime) are brought together a salt called calcium sulfate (gypsum) is formed. This salt has neither acid nor alkaline properties but is neutral. When an acid and base react together they neutralize each other, each losing its distinctive properties. Yet salts are not always neutral. They may have acidic or alkaline properties. Just as the forceful individual dominates the weaker, so the strong, acid or base, imposes its will on a more feeble companion and the properties of the stronger predominate. Water may dissolve and remove acid or basic materials from insoluble neutral salts leaving a residue either acid or alkaline in reaction.

Soils consist essentially of exceedingly complex organic and mineral salts, almost wholly insoluble in water. It is from these substances that the more soluble basic materials are dissolved, and eventually removed from the soil by the percolating waters. The insoluble soil residue thus becomes acid in character, and is the reservoir from which soluble acidity develops, when soluble salts are added to the soil. The mechanism of the process can be demonstrated easily. If a fragment of granite rock is ground to a fine powder, placed in a bottle, water added and vigorously shaken, the water gradually becomes alkaline due to the solution of basic substances. When the water is removed the acid nature of the insoluble residue, caused by the solution of bases, can be demonstrated. If water containing a neutral dissolved salt (such as sulfate of ammonia) is now allowed to come in contact with the acid rock powder it becomes acid in character. The powder takes up and holds the basic portion of the salt (ammonia), and leaves a soluble acid (sulfuric acid) in the water. In humid regions the percolating waters dissolve and remove alkaline materials, leaving an insoluble soil residue capable of developing soluble acids when certain fertilizer materials are added to the soil.

The predominating opaque grains in sands are quartz or silica, a substance so insoluble and inert chemically that it has very little effect on soil reaction. Variations only result from changes in the fine mineral particles or inorganic matter, and since these constitute only a small portion of the sandy soils, changes occur more rapidly than in the heavier soils composed largely of silt and clay.

There is a rough correlation between the insoluble and soluble soil acids. Soils containing large amounts of insoluble acids are capable of yielding much soluble acidity. These are often referred to as potential and active acidity, respectively. It is the soluble or active acidity which controls growth of grasses, clover and weeds.

Soils have a remarkable power of resisting change in reaction. This power resides mainly in the organic matter, silt and clay par-

ticles, so permanent change takes place more rapidly and completely in sands than in the heavy soils. Repeated application of acid-producing fertilizers may be required to effect marked change of loam or heavier soil.

While there are a large number of methods for determining potential or insoluble acidity, it is the active or soluble acidity which concerns the control of clover and weeds. Portable sets for determining active acidity are now on the market and are all based on the same principle. Certain color indicators when placed in contact with the soil develop specific colors which are characteristic, and depend upon the intensity of the soluble acids. Differences are arbitrarily designated as Ph values. A neutral soil has a Ph of 7. Figures smaller than 7 represent increasing degrees of acidity, and those greater increasing degrees of alkalinity. The progressive changes are in units of 10. Thus Ph 6 is 10 times more acid than Ph 7, and Ph 5 is 100 times more acid than Ph 7 or 10 times more acid than Ph 6. Differences of .2 Ph can be distinguished easily.

Experiments indicate that clovers grow best at Ph ranges of 6 to 8. At about Ph 5 clovers usually are unable to exist, and it is doubtful if they can thrive in the range of Ph 5.5 to 6. In order to secure effective clover control these values should be obtained.

In the next article the effect of different fertilizer materials on soil reaction will be discussed.

"First Aid to the Beginner"

By A. G. Chapman, Chairman, Green Committee, Audubon Country Club,
Louisville, Ky.

MR. CHAIRMAN AND GENTLEMEN:* Being conscious as I am of my inexperience and realizing that the majority of those present today are at least by comparison advanced students of the game, I am fully justified in the embarrassment from which I am suffering at this time. Frankly, I doubt seriously if I can present anything to you worthy of your time. In my business of insurance it is a well-known fact that when an agent is first appointed he feels that the mass of details are almost beyond his power to master; after six months he begins to think they are easy and by the time he has reached the third six months of his service he almost invariably makes many suggestions to the executive officers as to their policy and general conduct of the business.

It is somewhat discouraging to observe the manner in which your work is received by some people of this country who are interested in, or who are supposed to be interested in, the efficient maintenance of golf courses. I think I am correct in saying that you get little support and find comparatively scant interest in what you are doing from my section of the country, where it is too far north to raise Bermuda and far enough south to make bent grass difficult. It is obvious that the folks in my section need your services more than any other.

On behalf of the newly appointed green chairman everywhere, and particularly in my section, I plead for your great patience and consideration. Please bear in mind that with most of us it is a matter

*Address given at annual meeting of the United States Golf Association Green Section at New York City, January 6, 1928.

of learning our multiplication table before we can comprehend your geometry.

The new chairman, as a rule, takes his work at the beginning of the fiscal year, with scant knowledge of what is expected of him. Somehow, it seems that the clubs give no more thought to the selection of the green committee that is going to spend \$20,000 of their money than they do to the brand of cigars that the steward sells at the cigar counter.

Take my case for instance. I have been chairman for about twenty months. When I was selected, and I have sometimes wondered how it happened—what I did not know would comprise all that could be written. I had never attempted to grow anything; knew nothing about agriculture, and the little smattering that I once had of chemistry had long since been forgotten. I did not know that there was such a thing as an experimental turf garden or a Green Section of the United States Golf Association.

It is quite likely that if I had had some little knowledge of my work I would have missed, through the conceit of little learning, the opportunity of taking the opinions of those connected with the Green Section as law and gospel. Very likely I would have injected some of my own ideas and in either case I am quite sure that I would not have been as far advanced in my efforts to learn how my work should be done as I am today. Scant knowledge always has a tendency to develop that terrible malady—a closed mind. By the way, in speaking to you gentlemen, I should like to submit that when a closed mind is pried open by your sound reasoning and logic the first result is usually a flood of disturbed waters and it takes some little time for thoughts to settle and become sufficiently clarified to be understood. I mention this in support of my plea to you for patience and consideration.

I was proud to accept an invitation to be on your program today—not that I have any message of interest to you gentlemen, even though the commanding generals are sometimes interested in the opinions of the privates in the rear ranks, but I do have a message for the newly appointed green committees wherever they may be located. I wish that science had gone far enough that I might with an amplifier make every one of them hear this statement: No matter how good a greenkeeper may be, nor how much experimental work he has done, there is valuable information for green committees in the United States Golf Association Green Section. Furthermore, I have found by experience and know that the committee is not only willing, but inspired by an unselfish interest to help the cause, is anxious to help green committees do their work more successfully, and I venture the statement that there is not a green chairman, regardless of his experience, who cannot be materially benefited by keeping in close touch with what is being done at Washington.

I have had a most interesting time in the last twenty months *boring* new friends and acquaintances for a little light on the subject of maintaining a golf course. The chances are that most everything I have managed to pick up is well known in all of the details by the majority of those present here, but on a chance that some of it might be new and with the possibility that I might justify your patience, I will try to bring out one or two thoughts that may be new.

In Washington last August at the meeting of the greenkeepers

I made it a point to talk with as many different greenkeepers as I could and in this way I developed conversation with a gentleman who has charge, I think, of a golf course in Pennsylvania. He gave me a tip concerning tee markers and I am genuinely sorry that I did not make note of his name.

Following his suggestion, I went to the ten-cent store and purchased half-a-dozen tin funnels and a supply of big nails and washers. By using the funnel as a mold we have made a very attractive concrete marker that can be dipped in prepared whitewash every month or so, thus allowing us to have two bright, tiptop markers at each tee the year around for practically no cost. The nails cost a dozen for 5 cents; the washers, 20 for 5 cents; the cement, 80 cents per 100 pounds; so that the total cost of this tee marker is a fraction less than one and one-half cents. I do not count the labor cost because a half-dozen tee markers can be made in approximately the same length of time that it takes to play a game of solitaire on a cold rainy day in winter when all of the inside work is about cleaned up.

Culled from general information I have made up a control sheet covering my operating expenses. The Board of Directors appropriated a specific sum of money for pure maintenance and a sum for machinery with an additional amount for permanent improvements, such as building fences, planting trees, extraordinary sewers, etc.

These amounts were allocated by months under four items: labor, including the salary of the greenkeeper; seeds and fertilizers; machinery and major equipment; and repairs, flags, sand, poles, cups and incidentals. By estimating these expenditures monthly, which is not a difficult task, we have a fairly accurate sheet from which we can tell how we are running at any time during the year. On the first of August the sheet showed that we had spent \$343 more for repairs and incidentals than we had anticipated. The greenkeeper checked over the items spent to see what caused the increase and was a little more careful regarding the future. Each month thereafter we were able to reduce our deficit under this subhead so that at the close of the fiscal year we were \$9 under our estimated expenditures for the item. This not only gives you a check, which is only good business, but it adds interest to your work, developing that pride of achievement that helps you to put up with the thoughtless and unreasonable criticism that usually is directed at the green committee. There are many advantages to this. We were in a position to put the club on test as to the amount of money that we would need at any given time. Furthermore, it is pretty convincing when you go to the board for appropriations and some watchdog of the treasury insists that that is too much money; then you pull out your sheet and you say, "Do you want me to cut this labor item? It will reduce the general care of the course; the grass will not be cut so often." When you get through, they will usually say, "Go ahead." It is very beneficial in several ways.

Another system that I have installed is the daily memorandum to be filled out by the greenkeeper every night and kept on file in his office for his own reference so that the committee can see at any time what the crew is doing, and what work is contemplated. I give him a pad, perforate it with a holder, and each day he fills out his memoranda noting the temperature, the weather, the men on the payroll, treatment of the greens, working time in the nursery, etc. I do not

think my greenkeeper liked this idea at first, but now I am quite sure that if he went to another club he would immediately adopt the system. It is valuable in that it causes him to definitely plan his work several days in advance. (You know how much more definite any idea becomes when you reduce it to writing.) It also gives the whole committee an opportunity to better understand the problems of the greenkeeper. Perhaps its greatest value, though, will come by comparing one year with another. If something happens to a green the records will show just what treatment it has received and the trouble can be better analyzed.

It is not always easy to get a successful greenkeeper to really study the articles written in THE BULLETIN and the scientific ideas advanced. In order to get this point over I have from time to time caused extracts to be copied, mostly from THE BULLETIN, and now have a loose leaf book of 52 pages, a copy of which has been given to the greenkeeper and another to his assistant. He is instructed in writing that he must do nothing on the golf course contrary to the method prescribed in this book, unless and until he has first given the prescribed method a thorough trial and even then he is not to disregard the advice given without consultation with the chairman of the green committee.

We had a man build a few greens for us last year who had experience and was familiar with Washington bent grass. In watching the work as it progressed, it was noticed that he did not pay much attention to watering the green before planting the stolons and then he used about two and one-half yards of soil to cover the stolons. There was a prolonged drouth following the planting of the green and in order to get sufficient water to keep it damp he again ignored the teachings of our little bible by sprinkling instead of keeping the soil moist with mist.

I called his attention to these things and I suspect he would like to have asked me just how many greens I had built and how many years of experience I had had that I should presume to give him instructions. Nevertheless, I was persistent and on the next green constructed I insisted that he follow the book. The result was almost immediate, and while I did not expect him to come forward and admit it, nevertheless he said enough to show that with all his experience he learned a good lesson and that he now has a more wholesome respect for the teachings of the Green Section than he had before.

I repeat that in my humble opinion the best greenkeeper and the best posted green chairman in the United States of America can be benefited by consulting, or, if you choose, exchanging ideas with the United States Golf Association Green Section.

How Glen View Waters Fairways

By Ed. Haupt, Greenkeeper

Our water mains are of cast iron pipe, from 2 inches to 6 inches in diameter, operating at a pressure varying from 65 to 75 pounds. These pipes are laid at the edge of the rough, just off the fairways, with outlets rising to the surface at intervals of 125 feet. These risers are of 2-inch pipe reduced to a 1-inch hose nipple. All hose in use is of the 1-inch size.

We use sprinklers, 7/16-inch nozzle, 1-inch hose, having a capac-

ity of 30 gallons per minute. This sprinkler covers a circle whose diameter ranges from 120 to 130 feet. Ten of these sprinklers, weighing 10 pounds each, operating from 20 to 90 minutes, depending of course on the condition of the soil, are sufficient to keep the fairways in perfect playing condition. By mounting a box on an automobile chassis, to move hose and sprinklers from place to place, I have sped up the work so that the time wasted in the operation is practically negligible.

The sprinklers used on putting greens are of similar make but smaller in size and cover an entire green at one setting. This permits the man to assist in watering the fairways after the tees have been watered and the greens sprinklers set. Two men working shifts of 12 hours each take care of this work. These men are taught to determine the condition of the soil by the way it feels under foot. Of course the night man works at a considerable disadvantage but the day man is in a position to check up on his work and retouch the places he has missed the night before. Sometimes it is necessary to operate the sprinklers on three or four fairways in order to bring the course in proper condition.

To the uninitiated greenkeeper fairway watering presents quite a problem, but by keeping these points in mind most of the difficulties will be smoothed out. First of all, over-sprinkling slows up play, hinders mowing of the course, and the general mud and mess do not present an attractive picture to the member's eye; but at the same time after a rain, one should never wait until the ground becomes dry and parched before watering. A little attention, wisely administered from day to day will go a long ways toward cutting down the operating cost of watering the fairways.

I believe our system is one of the finest in the country, not only from the standpoint of cost of operation, but the results we have secured have been but little short of perfect.

Standardized Accounting

By William J. Rockefeller, Inverness Club, Toledo, Ohio

A greenkeeper is frequently troubled by statements that the annual cost of maintaining such and such a course is only so much, and whenever such a statement is made the only answer available to the greenkeeper is by way of questions as to the items covered by the cost put forward as invidious comparison. The greenkeeper knows that the work, etc., entering into the total cost of maintaining courses is never the same, and that the total figures are utterly without value as comparatives.

One greenkeeper may be required to take care of extensive and elaborate grounds around a clubhouse and the cost of such care may be included in his total figures. Another may have little or nothing to do in that respect. One greenkeeper may have roads around a clubhouse or through the property to maintain, and another may have nothing of the sort. The standard of maintenance varies from excellent down through ordinary and indifferent to bad. The length of the season of course is a factor. It ought to be apparent to anyone who will think for a moment that the total cost or expense of maintaining one golf course can not fairly be compared with the total cost of main-

taining another unless information is available as to the items of cost making up the total.

The Green Section can perform no better service for the greenkeeper who is harassed and annoyed by such comparisons than by pointing out to club officials and trustees the unfairness and injustice of comparisons of total cost.

The cost of maintaining a course can naturally be broken down into various parts or items of cost. For example, the cost of water, seed, fertilizer, new machinery, repairs, and the like. It is easy enough to show the detailed cost of materials, supplies, machinery, and equipment if an inventory is taken and depreciation is set up as in any ordinary business, and this should be done on every course. At the end of each year an inventory of all materials and supplies on hand should be taken, all machinery and equipment should be valued, all depreciation should be figured, and the detailed inventory and figures should be kept as carefully as the same figures would be kept in any business.

The difficulty of keeping costs of maintenance arises in the segregation or allocation of labor costs, and it is believed that it is not practicable to set up any standard system of accounting that can be followed generally by greenkeepers.

In the first place, greenkeepers may be classed as farmers rather than as accountants or factory managers. The ordinary factory manager lives in an atmosphere of accounting. He is making the same thing day after day and utilizing his labor in the same way day after day, and with a reasonable system and adequate training there is no reason why he can not do his part in the maintenance of a cost system. It must be remembered also that even in a well-organized factory a cost system is frequently too complicated and too expensive to operate to be of any value, and it seldom happens that a cost system is installed that does not require simplification and revision as the result of experience in its operation. The point is that those who talk about standardized accounting for golf courses are men who have had their training and experience in factory operations and who have had adequate accounting staffs to work out and follow through the details. The ordinary greenkeeper has had no such experience. He is a farmer or a kind of farmer and he is a farmer in his actions and movements and also in his thought. It is possible to measure out grain and feed to stock and to test, weigh, and measure milk in a stable conducted by an agricultural college or a Government experiment station, and the resulting figures are always interesting and valuable, but the ordinary farmer, whose troubles now exceed those of Job, would feel that he was truly afflicted if he had to turn in a time ticket for every labor operation on the farm.

The ordinary greenkeeper feels the same way about it, and his employes know as much about keeping a record of the time devoted to the various phases of the work as they do about the botanical names of the grasses they walk over every day.

Some greenkeepers, for example, who are very particular, give the job of changing the cups and the markers on the tees to one man. Others permit that work to be done by the men who cut the greens. Every greenkeeper has his own way of doing his work, and he thinks that way is better than any other. He thinks he is right and knows perfectly well that everyone else is wrong, and it would be just as

easy to make water flow uphill as to make an ordinary greenkeeper do his work and handle his labor in some other way than his own. A standardization of accounting for the purpose of showing detailed costs would be of just as little value for purposes of comparison as total costs, for the reason that no two greenkeepers would do the work in the same way or keep the costs in the same way.

It should be fairly easy for any greenkeeper to keep a separate account of the labor cost of new work or major changes and repairs, but it will never be possible to induce or require greenkeepers to keep separate and show accurately the cost of watering, cutting greens, cutting tees, cutting fairways, mowing the rough, trimming up traps and bunkers, and the hundred and one items of the work.

This is not intended to be an argument against any effort to standardize greenkeeping accounting, but rather to suggest that the classification of accounts and the method of collecting the information and keeping the accounts must be so simple as to be understandable and workable.

As above indicated, the cost of materials, supplies, machinery, and equipment can easily be segregated. The cost of new work and major repairs can be segregated. The difficulty comes in the segregation of labor costs.

In some way, either through actual costs or estimated charges for the work the cost of doing work on clubhouse grounds should be separated from the greenkeeping costs and if this cannot be done by keeping an accurate account of time and materials used on clubhouse grounds, it should be done by a reasonable estimate and a charge for the work, and the cost or charge, however estimated, should go against the clubhouse and not account maintenance of the course.

It should also be possible to keep a separate account with fair accuracy of the extra costs due to tournaments. The difficulty with the position of the greenkeeper is that the clubhouse is always a voracious consumer of revenue, and there is always a louder howl against economy in clubhouse operation or a restriction of clubhouse activities than there is an insistence upon the adherence to an acceptable standard of maintenance of a golf course. When the deficit appears at the end of the year in large red figures, no one takes the time or trouble to analyze clubhouse costs or to plan economies in that direction. The first figure selected for pruning in setting up the next year's budget is always the golf course maintenance, and at that time the greenkeeper and the green committee are confronted with the statement that it cost only so and so to maintain such and such a course.

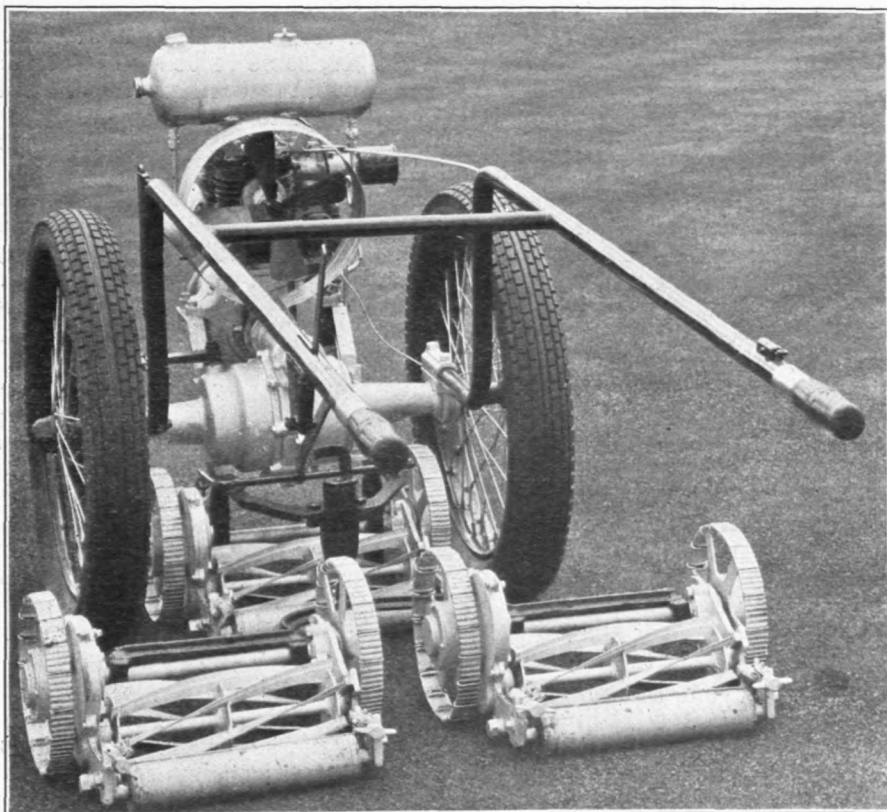
The green committee and the house committee are and should be natural and irreconcilable enemies and the green committee always gets the worst of it. A rough standardization of golf course accounting is possible and will be helpful to green committees in securing something approximating their rights and destroying the value of attempted comparisons of total cost, but it must be remembered that the standardization must be along general and sensible lines and only in such detail as can be followed by the ordinary greenkeeper. If house committees were included in the Eighteenth Amendment and utterly prohibited or abolished, green committees might hope to get some of their rights, but the millennium will be found on

the eighteenth hole when green committees cease to be oppressed and defrauded of their rights by those who want to emphasize clubhouse activities.

NOTE.—This is a subject in which all golf clubs should be vitally interested, and it is the hope of the editors of THE BULLETIN that the preceding article on standardized accounting by Mr. William J. Rockefeller will result in the publication of similar articles giving the experience of other clubs along this line. We want to urge every one who has had any experience with or ideas on this subject, whether favoring or opposing standardized accounting, to send us an article to be published in THE BULLETIN. There is little doubt that a series of articles along this line would give us reading material that would not only be intensely interesting, but extremely valuable. Let us urge you to put your ideas on paper now and mail them to the United States Golf Association Green Section, P. O. Box 313, Pennsylvania Avenue Station, Washington, D. C.

A New Type of Power Putting Green Mower

It is said that the mower illustrated below does no injury whatever to the surface of the green due to a principle involved in the tires which provides for the distribution of pressure over a considerable area. The motor is a complete tractor designed to draw a gang mower having three units. The tractor, in going from one green to



another, which it does on its own power, carries these units on the frame to which they are raised mechanically. This automatically renders the cutting knives inoperative and the use of separate unit carriers unnecessary. The mower is guaranteed to cut an average putting green in from 12 to 15 minutes.

Clearing Land for Golf Purposes

By Kenneth Welton

As it is sometimes considered necessary for golf club committees to make all possible speed in construction work, the writer hopes the following suggestions and observations will not be amiss at this time, since it has been found that a very useful part of clearing work can be easily done in the winter months.

From personal experience in various locations and from the experiences of golf architects and superintendents with whom the writer has discussed this subject the procedure outlined in this article has proved to be very efficient in clearing land intended for golf purposes. As roots are very objectionable in fairways, any method of removing the stumps and at the same time the maximum amount of roots at the minimum cost is of course highly desirable. As most clearing methods leave many large roots near enough the surface to be a source of continual annoyance later, the method here discussed aims at overcoming this condition.

Many farmers and ranchers employ a very simple mode of clearing land. They remove all standing timber, some to be sold either as lumber or fire wood, and some to be retained for their own use. The stumps are left in the ground either to rot or to be finally destroyed by slow burning. After a good many years what is left of these stumps can easily be disposed of. However, engineers and contractors on railroad or other clearing, have not the time to wait for nature's assistance, and while they too clear off the standing timber first they usually blow out the stumps. This method is comparatively cheap but will not do on golf course work, as most of the roots remain in the ground. Also a hole is left to be filled. Since neither of these means of removing stumps is satisfactory other methods have been used to overcome the objections. Some of these other methods developed by necessity have not been particularly economical. Often the tree is pulled over in some manner without cutting, the idea being to gain the leverage of the trunk and weight of branches. This pulls out the roots on one side of the tree as the tree is tipped on its side, but most of the roots on the other side still remain in place. To free the stump these are cut and hence remain in the ground to be painfully grubbed out later. Also usually before a large tree can be tipped over, some of the larger roots must be cut. Sometimes the trees are blasted before pulling them over, but this is of little help unless a large charge is used, and then it shatters the roots and usually splits the trunk of the tree, spoiling the lumber.

Apart from the difficulties enumerated there are more serious arguments against felling the tree without cutting it from the stump. There is much slow work in handling rigging, as a heavy chain must be attached well up the trunk to get the required leverage. If the power is a small tractor or team of horses, block and tackle is necessary for big trees, involving additional labor. Furthermore, in pulling trees over it is almost impossible to drop them where desired, since the falling tree usually slackens the line which otherwise would act as a guide. If work is going ahead at any speed the felled trees can not be trimmed, and cut logs and brush removed before other trees are felled. As a result they often fall across one another, caus-

ing extra labor and delay, as in that case it is hard to keep necessary roads open to get at the logs. Moreover, the tackle and chains are continually getting buried under fallen timber.

With the above disadvantages in mind, the following procedure has been evolved. The land is first cleared of timber, the trees being felled with axe and saw, leaving from two to three feet of stump, or enough to insure a good purchase with a chain, when the time comes to pull out the stump. By the use of the axe and crosscut saw, it is surprising how even leaning trees may be made to fall within a few feet of the desired spot. The foreman or one or two of the axe men should be skilled woodsmen. It is a treat to see a skilled woodsman make a tree twist, kick or jump in the effort to drop it in the desired position. The foreman will of course try to drop his trees so that they may be easily trimmed and sawed and the timber hauled away with little interference. The branches should be trimmed off, piled and burned when dry enough, the piles being kept near the center of the clearing so that the great heat developed will not injure trees that are to remain. The logs should be sawed into suitable lengths and skidded to piles where they are to remain temporarily. It is usually wise to pile the different kinds of wood separately. All this work can be done during the winter months, but the job of getting the stumps out of the ground will have to wait till the ground has thawed. In the early spring mud is often bad, and it usually pays to wait for comparatively dry ground to work on, but the urgency of the clearing work will have to determine this. Since the roots have had no chance to decay they will be firmly anchored in the ground. Therefore with all except the smaller stumps it will be found economical to loosen them with a charge of black or stumping powder before pulling them out. Powder is better since combustion takes place much slower than with dynamite, and tends to push rather than shatter the stump. The charge should be put well under the stump, in a hole prepared with an auger or bar. The weight of the charge will vary with soil type, size of stump and other conditions and can be easily determined by the crew after a little experimenting. The object is to use enough to loosen the stump without breaking the roots. The shock of blasting will also loosen the mass of earth from the roots and leave it in the hole, and the stump when pulled will be much lighter to handle. If the charge used has not been too heavy, the stump can be pulled from the ground with most of its roots intact.

By far the best power for this work is the 5-ton tractor with caterpillar traction. Tractors of this type will work through mud or over rough ground. They will pull a good many smaller stumps from the ground without preliminary blasting, drag large stumps to the dump without unhooking from them, or will pull a stoneboat load of smaller stumps. A 5-ton tractor will pay for itself in from 30 to 40 acres of fairly heavy clearing, and will always be worth renting at the price of three or four teams. If the job is not large enough to justify a large tractor the stumps may be removed with a stump puller and hauled away on stone boats with small tractors and teams. In some cases it may be necessary to use block and tackle as some stumps are very heavy and awkward to handle. There is a good stump puller on the market that can be attached to the ordinary light tractors used in golf course construction and maintenance. The stump puller method

is slower than the tractor direct, as the stump puller is not mobile while pulling and therefore can not move the stumps any distance.

Burning the stumps is often the only way to get rid of them. If you have a big pit in which you can roll them you are fortunate, otherwise a pulley arrangement to hoist them into piles for burning is a great aid. It is an endless task to burn scattered stumps. The stumps must be piled high so that a fire of intense heat will develop. The pulley should be attached to a cable between two high trees, or near the top of one very strong tree. The trees used as the boom of a derrick should be trees that are to be removed as they probably will be badly burned. After passing through the pulley, one end of the cable should be attached to the power unit. The other end will of course be attached to one or more stumps. The stumps can be quickly hoisted and dropped, making a compact pile of almost any size.

Sometimes a club has a steam shovel at work constructing greens, etc. If so, it can be used to advantage in loading and piling stumps. By passing a chain around the stump and looping one end over a tooth of the bucket the stump may be hoisted easily.

Local conditions of course affect this kind of work, more so as to cost than as to the method; so without giving figures, it is hoped that the outline of clearing methods discussed will either in whole or in part prove of assistance to those who have clearing to do on golf course property.

Bent Putting Greens in California

By Norman Macbeth, Wilshire Country Club, Los Angeles, Calif.

Although asked several times during the last two or three years to express an opinion about bent grasses for putting greens, I was disinclined to do so until comparisons could be made of greens which had gone through at least two summers and winters. Such comparisons can now be made.

As I am not at all expert in identifying different grasses, having little or no more knowledge of them than the average chairman of a club green committee, it might seem indelicate to name golf courses whose putting greens are commented upon; but an opinion is hardly worth writing unless it can be related by those who read it to putting greens they have also played upon. My opinions will, therefore, be given without any hesitation about naming golf courses.

Creeping Bent Vegetatively Planted

Inverness Strain.—Olympic Club, San Francisco, planted, I believe, in 1924. The grass is light-green in color and has an extreme tendency to develop a downhill grain and a fluffy condition of the turf. The greens require constant ruffling with wire brushes and mowing to counteract the tendency to grain, also frequent topdressing. The greens lose color in cold weather. They are susceptible to dollar brown-patch. The greens are a decided improvement upon the mixed grass greens previously aimed at as a general rule in the San Francisco district. The maintenance costs are probably not any less, because of the necessity for frequent brushings and topdressing, than those of the old greens of mixed grasses which required systematic weeding and reseeding.

The Inverness strain of bent grass was also used in putting greens on the Del Monte Course, and in Southern California on the courses at Santa Ana, Palos Verdes, and California Country Club in Los Angeles. Very much the same comments could be made in all cases. The Del Monte greens are being changed to a strain of seaside bent (*Agrostis maritima*), seed of which was produced in the Coos Bay region of Oregon.

Washington Strain.—Bent grass of the Washington strain has been planted in putting greens on Los Angeles courses at Hollywood Country Club, Griffith Park Municipal course, Oakmont Country Club, and on the Long Beach Municipal course. Most of these greens were made in 1925 and 1926. They are a glauca-blue color and were rather coarse the first year, but fined down considerably later. These grasses have a thick and compact turf which is superior, in my opinion, to that obtained with the Inverness strain. They show a good resistance to dollar brown-patch. The faults are tendencies to develop downhill grains, and to becoming too cushiony unless very frequently cut and topdressed. They go off color decidedly in cold weather.

Metropolitan Strain.—The grasses used here under this name are bright blue in color, and are of finer texture than Washington or Inverness. The greens require equally frequent brushing, cutting and topdressing, but do not develop a grain to anything like the same extent. At Lakeside Country Club, in Los Angeles, the greens were all made of grass sold as Metropolitan bent, and for two years they have been in perfect condition. They keep their color well in cold weather, and although the greens are undulating there is no variation of texture or putting speed between the high and low spots. The soil and the drainage of the greens are both ideal, and much better than could be expected on most courses. This advantage, coupled with the rather expensive upkeep given them, probably accounts for an absence of attempts to duplicate these greens on other local courses. This strain is, judging by reports, very resistant to brown-patch.

The grass being sold now locally as Metropolitan bent is apparently a mixture of two or more strains, which can be seen in the putting greens made early in 1927 at Virginia Country Club, in Long Beach. The effect in winter with two strains is a mottled appearance of the surface, which makes it somewhat hard to judge the putting speed even though the turf is fairly uniform in texture.

Metropolitan bent I consider superior for use in California to either Washington or Inverness strains as developed from 1925 to 1927.

Probably the best creeping bent yet grown vegetatively in Southern California was sent from the Arlington Farm Gardens, Washington, D. C. It came to the Hillcrest Country Club in Los Angeles in 1923 or 1924 for experimental purposes, and unfortunately it lost its identification tag. The turf was developed by Hillcrest Country Club in a nursery kept under putting green conditions, and in 1926 was laid over the old greens. The turf was about 10 months old when moved, of firm texture and bright green in color. The stolons are short and the nodes close together. These greens were topdressed for the second time this year in June, which was quite a saving in expense as compared with other bents in the district. They need close cutting

practically every day in the growing season or they tend to become cushiony, but at no time have they shown signs of graining. They are apparently highly resistant to dollar brown-patch, and keep their color well in cold weather. This turf is now about two years old.

Seaside Bent:* Seeded Greens

Seaside Bent (Agrostis maritima).—The La Cumbre Golf course in Santa Barbara was, I think, the first in California upon which this seed was used. The greens are now almost three years old, and have been in excellent condition throughout almost that entire time. Since then most of the new greens made in the Los Angeles district have been seeded to seaside bent, including the courses at El Caballero, St. Andrews, Bell Air, Riviera, Brentwood, Royal Palms, Parkridge, El Serreno, Sunset Fields, and Fox Hills. These were all new greens, some being seeded to seaside bent only and some to seaside bent mixed with redtop or *Poa trivialis* and Colonial bent.

Where greens are established with seed the first cost is considerably less than vegetative planting, and the maintenance is also less. It makes a turf of fine texture, and light blue-green in color. It may develop a grain in its early stages if not cut closely and brushed, but it does not develop a cushion. It is not so resistant to dollar brown-patch as Metropolitan but keeps its color well in cold weather.

Some greens of seaside bent which are two years old have never required brushing. They require about the same amount of top-dressing as mixed grass greens, and they stand wear well.

The introduction of bent grasses into California marked a distinct advance in putting green turfs, both in the way of better putting and cheaper upkeep. The golf courses built within the last three years have vastly better greens than those at most of the older clubs, but as seaside bent is so easily sown into old greens and so quickly dominates such varieties as bluegrass, redtop and fescue, it will not be long until there will be no excuse for a California course being without excellent putting greens throughout most of the 12 months of every year.

NOTE.—From the description of the appearance and behavior of what is here mentioned as the Washington strain of creeping bent there is some doubt of its being what we recognize as Washington bent which, as we know it, has no more tendency to develop a grainy structure than Metropolitan bent, and is of a bright green, rather than glauca-blue color. The grass used on the greens of the Hillcrest Country Club are more like Washington bent, and our records show that some stolons of the strain were sent that club in 1924.

A Correction

We wish to call attention to the last paragraph in the article entitled, "Further Experiments in the Control of Japanese Beetle Grubs," by Mr. B. R. Leach, in the February issue of THE BULLETIN. This statement was intended as an editorial comment but through an oversight appeared as though written by Mr. Leach. While it is recognized that lead arsenate is a standardized product it seemed advisable to issue a word of warning as a safeguard to those unaccustomed to buying arsenicals.

* The seed of the seaside bent here referred to was produced in the Coos Bay region of Oregon and purchased under the trade name of Cocos bent. This name is registered in the United States Patent Office and is therefore subject to certain restrictions as regards its general use.

The Annual Greenkeepers' Convention

Where shall it be held? May we have an expression of opinion from you?

At the annual meeting of the United States Golf Association Green Section held in New York City on January 7 and 8, 1928, Mr. H. K. Read, of the Country Club of Atlantic City, very kindly extended an invitation from his club to the greenkeepers to hold the annual meeting there this year. The generosity of Mr. Read and his club in offering such excellent facilities for the meeting is greatly appreciated. It was the thought of the Executive Committee that the greenkeepers would prefer to have the meeting at some other point than Washington, where it was held last year. The Committee furthermore felt that, in view of Mr. Read's interest in turf grass investigations, the Country Club of Atlantic City would have much of interest to show greenkeepers along this line. Moreover, a meeting at that point offers an opportunity for visiting the well-known Pine Valley course. Since that time we have received a communication from one of the greenkeepers' associations urging that the meeting be held in Washington again this year rather than at any other place, and that two or three days be devoted to the meeting. As this convention is designed primarily for the benefit of the greenkeepers it is the desire of the Executive Committee to comply with the wishes of the majority as to whether the meeting shall be held in Washington or in Atlantic City. We want therefore to urge all greenkeepers, either individually or through their associations, to write us at an early date of their preference as regards the place of holding the meeting and the time to be devoted to it. Furthermore, any suggestions as regards the program would be very acceptable.

QUESTIONS AND ANSWERS

All questions sent to the Green Section will be answered in a letter to the writer as promptly as possible. 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 Section.

While most of the answers are of general application, please bear in mind that each recommendation is intended specifically for the locality designated at the end of the question.

1. Kind of sand to use in traps.—We are ready to put sand in the traps on our new course and have ordinary building sand close to us. Some suggest mixing small pebbles the size of a coffee bean with this. What sort of sand should we use? (Indiana.)

ANSWER.—In choosing sand for traps the chief requirement is a clean sand—one that is as free as possible from clay, silt, or humus. It should not be so fine that it will blow about readily or tend to become smooth and compact, thereby largely nullifying the handicap that is supposed to exist where a player gets in a trap. Ordinary building sand is frequently used, although some clubs prefer a finer material provided it can be obtained white and clean. Some clubs that can afford it, go to the expense of procuring white beach sand, which is likely to be a little fine in texture although it is the color usually desired. It sets off the greens and bunkers very

clearly and gives a pleasant effect to the landscape. Under your conditions we would advise the use of the local builders sand if you can have it sifted so as to remove the small pebbles. Nothing is gained by having pebbles in the sand; in fact, they are a nuisance, as they often are thrown out on the green. After the traps are filled with the local sand you could from time to time add white sand to set them off.

2. Clover on fairways; value of pigeon manure.—The soil on our fairways is very acid and still clover seems to come in strong; also on the knolls where the soil is thin and stony there is some green moss coming in. Had we better use horse manure, or would you recommend some other fertilizer that is better suited to our soil? We could get pigeon manure locally at \$20 per ton. (Connecticut.)

ANSWER.—For thin, stony places on your fairways we know of nothing better than a topdressing of good soil mixed with horse manure, as suggested in your letter. When clover occurs in putting greens it is usually possible to reduce the growth of the clover to a considerable extent by fertilizing frequently and rather heavily with ammonium sulfate. Such treatment, however, is hardly practicable on fairways. In fact, where clover is abundant on fairways there is no practical treatment for its elimination. For general fairway fertilization some such material as cottonseed meal, Milorganite, or pulverized poultry manure gives very good results. Whichever of these materials is used should be applied at the rate of from 400 to 600 pounds per acre, depending upon the condition of the turf. Pigeon manure as a fertilizer for fairways is in about the same class as poultry manure. If a good quality can be purchased at \$20 per ton it would be practicable to use it. The rate of application ordinarily should range from 400 to 600 pounds per acre, depending somewhat upon the quality of the pigeon manure.

3. Comparative value of mowrah meal and corrosive sublimate for worming greens.—If pure mowrah meal, unadulterated, packed in original export bags can be secured at a price ranging from \$40 to \$50 per ton, f. o. b., Baltimore, is it your opinion that the average golf course can secure equally good results by using this material instead of corrosive sublimate at the present market price, which we understand is around \$1.40 per pound? Is it not true that mowrah meal can be safely handled and applied by any greenkeeper, whereas, corrosive sublimate is a deadly poison and must be handled with care? As mowrah meal contains from 4 to 6 per cent ammonia and approximately 1 per cent, each, phosphoric acid and potash, can it not be considered a complete fertilizer, whereas corrosive sublimate is merely a poison? (Maryland.)

ANSWER.—Our experience has shown mowrah meal to be an effective earthworm eradicator, provided it has not lost its original active properties or has not been adulterated. It is not, however, quite as effective as corrosive sublimate. One objection to the use of mowrah meal has been the cost, but with mowrah meal selling at \$40 to \$50 per ton and corrosive sublimate at \$1.40 per pound the difference in cost would not amount to much applied at the rates usually recommended. It is true that mowrah meal may be handled with perfect safety while corrosive sublimate is a deadly poison. Of course, corrosive sublimate has been used so much in recent years in brown-patch control that the danger from its use is pretty well

known and generally guarded against. Corrosive sublimate also has a tendency to burn the grass if not properly applied, while mowrah meal shows no injurious effect when applied at the rate of 15 pounds per 1,000 square feet, which is the usual recommendation. It is also true that mowrah meal contains the three plant food elements (nitrogen, phosphoric acid and potash) that are essential to what is generally recognized as a complete fertilizer. The percentages of these elements are low, and no one would be justified in paying \$40 or \$50 a ton for mowrah meal based on its fertilizing value alone. For your further information we are quoting passages from the May, 1924, BULLETIN of the Green Section as follows:

"From the standpoint of economy and efficiency, corrosive sublimate is without question the best substance to use to rid turf of earthworms. It is exceedingly efficient if properly used. But here lies the difficulty. It is quite apparent that, notwithstanding all that has been written and said with regard to the use of corrosive sublimate as an earthworm eradicator, there are many who have injured their turf by applying it improperly. . . . Corrosive sublimate is a violent poison and due care must be exercised in its use. . . . Mowrah meal is a very effective earthworm eradicator provided it has not lost its original active properties by improper storage or has not been adulterated. Furthermore, it possesses some fertilizer value, although not much when applied at the rate recommended for earthworm eradication. Burning of the grass may occur with heavy applications of mowrah meal, but not the slightest trace of burning has been noted from an application of 15 pounds to 1,000 square feet. Mowrah meal deteriorates with age, especially if stored in a damp place. It is also subject to adulteration with sand or similar inert matter. These facts should be borne in mind by the purchaser. . . . Until something better has developed, it is urged that corrosive sublimate or mowrah meal be used as here suggested. The careful and systematic use of either will give highly satisfactory results and will have a tendency permanently to lessen the earthworm problem."

4. Hastening recovery of grass on divots by fertilization and marking spots so treated.—Most of the divots made by players here take mainly grass or grass roots and practically no soil, so that replacing these divots has very little effect, as they do not take root, but wither. It occurred to us that probably the divot holes could be more quickly covered if they were treated with fertilizer shortly after being made. In order that it may be known what divot had been fertilized, it would seem advisable to include in the fertilizer some coloring matter so that the divot hole would not be continuously treated. We had in mind the use of cottonseed meal, nitrate of soda, and probably some filler, and would appreciate your opinion on this method and any suggestion that you might make, both as to the fertilizing material and the coloring matter to be used. (Louisiana.)

ANSWER.—What you say about divots is often true, particularly in the case of rather tough turf grasses, such as Bermuda and carpet grass. Frequently the iron club cuts the grass at the surface of the ground, no soil being taken with it. When the divot is replaced the grass is not likely to take root unless moisture conditions are favorable for some time. We believe that your suggestion to encourage the grass to cover such spots by fertilizing liberally is a good one. As a fertilizer we have had excellent results from a mixture composed of one part ammonium sulfate and three parts of cottonseed meal. We prefer the ammonium sulfate to nitrate of soda for this purpose, although the latter also gives good results. The usual rate of application of the mixture is from 400 to 600 pounds per acre. Of course, to apply the fertilizer to so small an area it would be necessary to use a considerable quantity of filler. If you can procure white sand you might mix it with the fertilizer in the proportion of 25 parts of sand to one part of the mixed fertilizer previously recommended. A good handful of the mixture should supply sufficient fertilizer for an area six inches square, at the rate recommended. We believe the white sand would serve to identify the places treated better than any colored material.

AS WE FIND THEM

A few greenkeepers decided to visit courses in their neighborhood to become acquainted and swap ideas. Stopping at one club they told the greenkeeper their purpose and were greeted thus:

"What's the big idea? Do you think I am going to let you fellows spy around here and pick up all my secrets? Guess again! Here's one greenkeeper who knows enough to keep the tricks of his trade from general circulation."

Needless to say, that man's closely guarded and fondly cherished "secrets" were an heritage from golf's "cow-pasture era." What he knows about modern greenkeeping is enough to make even earthworms laugh.

As one of the visiting greenkeepers expressed it, "How convenient it is for some men, be they greenkeepers or what not, to be able to tell everything they know about a subject simply by remaining silent."

Contrasted with this stay-at-home type we can but be reminded of the other extreme, found unfortunately in every locality where greenkeepers gather. He is that conspicuous fellow who evidently feels his chief mission in life is to be on hand at all times ready to pop up during every discussion to proclaim to the world, "That's all bunk!"

He always reminds us of the rear rank infantryman who persists in arguing "I am the only man in the company who is in step."

Both of these types are becoming more and more scarce; thanks largely to the efforts of greenkeepers themselves in obtaining information and discussing problems with open minds. In spite of limitations of the few, we have a host of first class greenkeepers in this country and their organizations can accomplish wonders for the betterment of golf courses.

Let us hope that in their discussions they continue conscious of the fact that the closed mind with an unswerving attitude of "My principles are all right, the rest of you are all wrong" will sooner or later wreck any organization whether it be in religion, world politics or greenkeeping.

Overheard this at one of the national meetings—After listening to a group of greenkeepers argue about the relative merits of brown-patch remedies, one who hailed from the North beyond the brown-patch area burst out with this illuminating information: "No, sir, I don't know what those diseases are. The reason is I don't get scared and don't done my greens with a lot of medicine. You fellows just imagine those diseases and then weaken your grass with that fool dope."

One old-timer from a region where brown-patch is far from imaginary pounced on him with this one: "If you don't know our difficulties why be so quick to pass judgment on our methods in handling them? You sound like a South Sea islander telling a bunch of Eskimos, 'No, sir; I don't know what cold is. The reason is I don't get scared and don't smother myself with thick furs. You fellows just imagine that cold and then weaken yourselves with those fool wraps!'"