cause it neutralizes acids. The acid theory, however, has never been any too well established, because the influence of nitrogen in the readily available form in which it exists in sulphate of ammonia has usually been confounded with soil acidity. Many of the benefits attributed to acidity have been observed on greens where sulphate of ammonia has been used repeatedly but where tests revealed that the soil actually was almost neutral. The residue of lime already in such soils and the use of hard water containing much more lime than necessary to neutralize the acid residue from sulphate of ammonia prevented any increased acidity of the soil. Nevertheless the enthusiastic users attributed the decided benefits to the acidifying of their soils, without further inquiry. Sulphate of ammonia has other virtues than its acid residue and these amply justify its continued use on golf courses.

There is nothing to indicate that the use of lime alone will entirely prevent brown-patch. Its use on certain soils in reasonable amounts, however, will undoubtedly reduce the extent of the brown-patch damage and will greatly lessen the amount of mercury fungicides required. To completely control both large and small brown-patch it will still be necessary to rely on the mercury fungicides.

There is no simple laboratory means for testing soils to determine exactly whether lime will prove beneficial. The degree of acidity tolerated by grass apparently varies in different types of soil. If grass fails to show the customary response to such fertilizers as sulphate of ammonia it indicates that soil conditions are unfavorable. Plugs of turf if sent to the Green Section office will be tested for acidity and suggestions will be given as to whether lime is likely to prove of benefit. In most cases the ultimate decision can best be made following some simple test such as that conducted on the Upper Montclair course as mentioned on page 91.

The use of organic fertilizers on greens apparently needs more attention than it has been given in the past. If a heavy application of such fertilizers is used and fails to produce the results that can reasonably be expected, such failure may be due to some unfavorable condition. If such be the case it should be apparent that further applications are art to be likewise ineffective. If small amounts of food can not be digested and utilized, large amounts are no more likely to be beneficial whether the user be animal or plant. Large accumulations of unused foods on turf may prove disastrous if they are suddenly broken down and released for immediate use. If slowly available fertilizers fail to give the desired results at any time it would be well to use moderate amounts of some quickly available fertilizer, such as sulphate of ammonia or phosphate of ammonia. The color of the turf and amount of clippings removed from the greens are good indicators for guidance in the use of fertilizers.

Applying Lime to Turf

In applying lime to turf it must be remembered that it, like any chemical, should be distributed evenly to prevent a mottled appearance due to overdosage in one place and shortage in another. It should be remembered also that, like any chemical, its use can be abused, and such abuse leads to burning and other injuries to turf. For those with long experience in turf work this warning is probably not necessary, since they can perhaps well remember the futility of the use of too much lime in the so-called "whitewash era" when greens regularly were coated with layers of lime. However, there

has already been evidence on many courses of blind optimism which has led to a belief that at last a simple remedy has been found for all turf difficulties, and greens have been made to look like snowdrifts. The wails of the disappointed are already heard, for not only will lime fail to benefit some greens but it may result in terrific burns, especially if hydrated lime is used carelessly.

For turf work either finely ground limestone (calcium carbonate) or the hydrated lime (calcium hydroxide) may be used. In either form the rate should not exceed 50 pounds to 1,000 square feet in any one application. In many cases more may be needed, but it is well to err on the safe side until the lime requirements of the individual soils are determined. Since hydrated lime is more apt to produce a chemical burn it is well not to use more than 20 or 25 pounds to 1,000 square feet at any one time. Lighter applications may be repeated at intervals of one to two weeks if necessary. It is probably best to use lime in the fall or early spring, but it may be used at any time if handled with proper care. Hydrated lime is especially dangerous when applied to soils heavily fertilized with sulphate of ammonia, Ammo-Phos, or some of the quickly effective organic fertilizers. It should never be used on greens within a week after using such fertilizers, and should not be mixed with the fertilizers for joint application. Lime may be distributed alone or mixed with a little soil to give enough bulk to insure more even distribution. As is the case with other chemicals, lime is more likely to burn some grasses than others. Velvet bent, for instance, is easily injured by excessive use of lime, although it shows marked response to moderate amounts.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE BULLETIN OF THE UNITED STATES GOLF ASSOCIATION GREEN SECTION, PUBLISHED MONTHLY AT WASHINGTON, D. C., FOR APRIL 1, 1929.

District of Columbia, ss:

Before me, a notary public, in and for the District of Columbia, personally appeared H. L. Westover, who, having been duly sworn according to law, deposes and says that he is the acting chairman of the United States Golf Association Green Section and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editors, managing editors, and business managers are: Publisher, United States Golf Association, 110 East Forty-second Street, New York, N. Y.; editors, managing editors, and business managers, John Monteith, Jr., and Kenneth Welton, Washington, D. C.

2. That the owner is the United States Golf Association, a corporation organized and existing under the law not for profit and having no capital stock.

3. That there are no outstanding bonds, mortgages, or other securities.

(Signed) H. L. WESTOVER, *Acting Chairman, U. S. G. A. Green Section.*

Sworn to and subscribed before me this 1st day of April, 1929.

(SEAL) (Signed) JOSEPH L. MAHONEY.

My commission expires June 13, 1929.

Drainage problems can be best studied after a heavy rain. It is then advisable to go over the entire course and examine the low or soggy spots. If there is insufficient drainage in any place it can then be observed and steps inaugurated for correcting it. In course of time poor drainage will be certain to ruin any piece of good turf.

A man of clear ideas errs grievously if he imagines that whatever is seen confusedly does not exist: it belongs to him, when he meets with such a thing, to dispel the mist, and fix the outlines of the dim vague form which is loaming through it.

—John Stuart Mill.