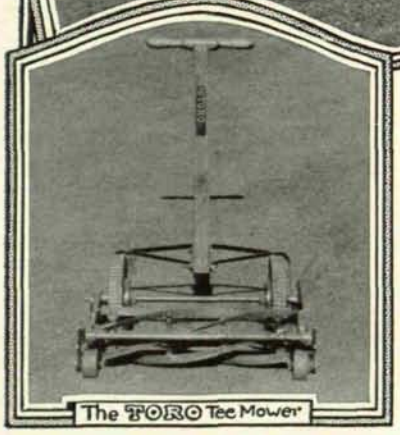
The TORO



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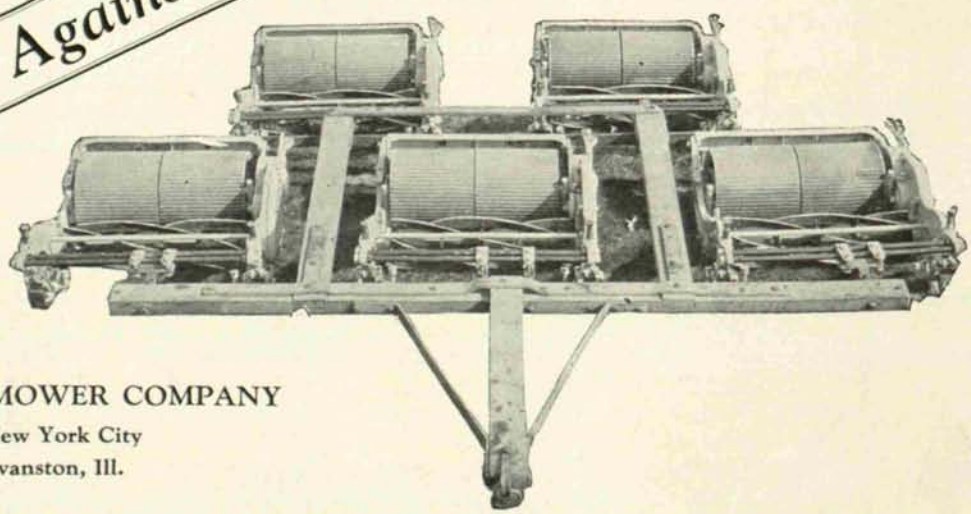

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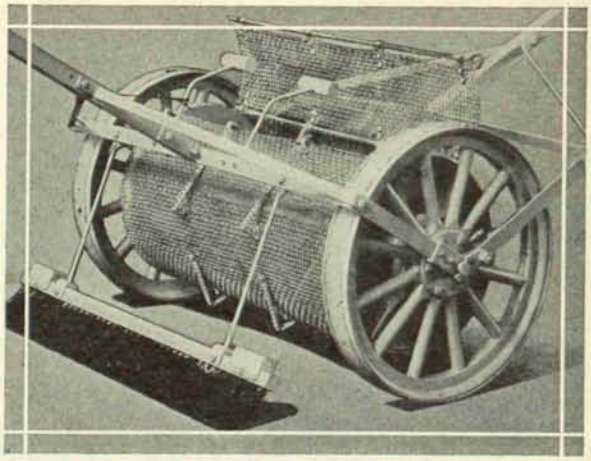

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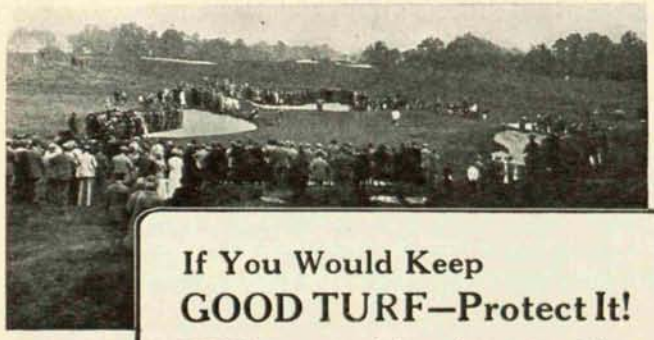

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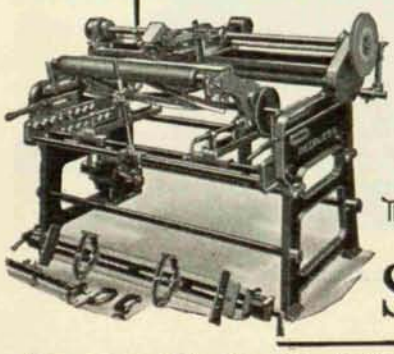

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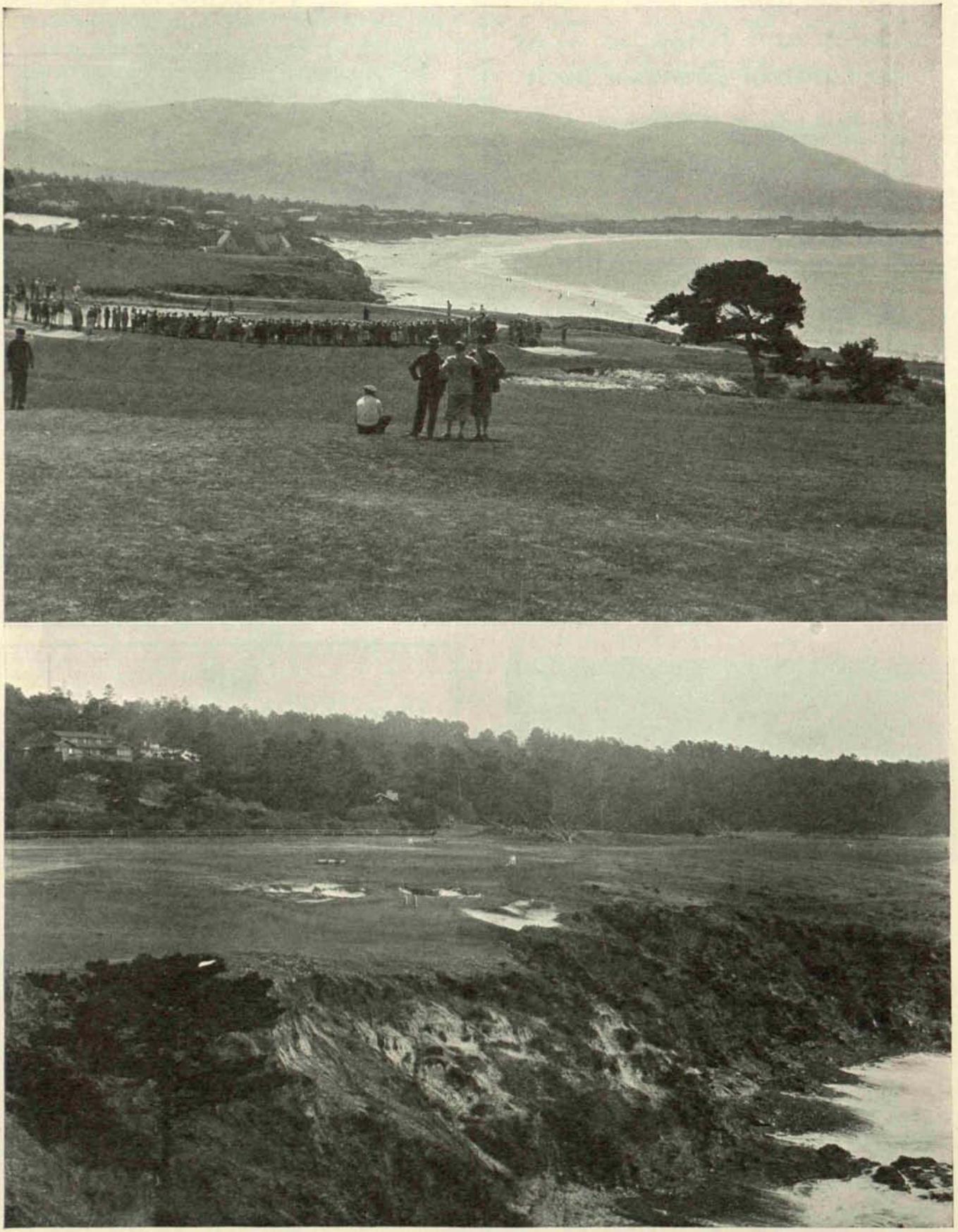

Two views of beautiful Pebble Beach Country Club. Upper shows Number 9 green, and the lower Number 8

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Brown-Patch at Pebble Beach

By JOE P. MAYO, Greenkeeper
Pebble Beach Country Club, Pebble Beach, California.

ON an average, we have no rainfall for periods of seven months, and therefore we are very dependent on a good watering system. We follow the policy of early morning watering, and although this has been done consistently for five years, we still have brown-patch.

We are troubled with this disease more on slight knolls and slopes facing south, and I agree with Mr. Monteith about moisture and temperature. We have mushrooms every month in the year, also brown-patch, and they come together. We have an average temperature of around sixty winter and summer. We can have our steaks covered with mushrooms all the time,—that is, of course, if we have the steaks. I have had a few large brown spots, but not in the last three years, all of the small.

Bi-Chloride of Mercury as Preventive

Five years ago when I first came to Pebble Beach we had worm casts, and I used bi-chloride of mercury at least once a month in solution, and I remember of no brown-patch. When the late Professor Piper was here I remarked about not having any brown-patch. The next year I used one of the powdered worm killers and brown-patch showed up. I think that is the reason that some of the older greenkeepers who have always used corrosive sublimate never had brown-patch.

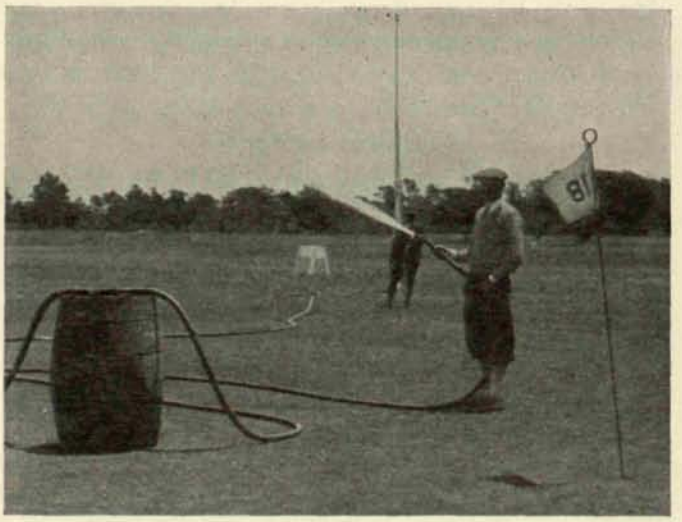
We are using corrosive sublimate at least once a month now for angle worms and brown-patch, and it is working fine except in the winter. Last winter was very wet and we could not use anything dissolved in water, and it was too wet to top dress, so just had to get along with a few spots, but I used some powdered worm killer for angle worms winter before last. We had to water greens part of the time, "not enough rainfall" and the corrosive sublimate worked fine.

Using Special Chemical Distributor

I have not tried calomel, but will as soon as I use up my supply of corrosive sublimate. I apply it in solution, also sulphate of ammonia. The accompanying photo of operation shows the syphon or distributor. It is one I have been using for three years, fool-proof. It puts on the barrel of mixture with five to ten barrels of water from hydrant according to the nozzle we use on end of hose.

We use 10 to 14 ounces of corrosive sublimate (according to size of green) to ten barrels of water. That is about as strong as we can put it on without turning green slightly brown. The last two months we have been mix-

(*Continued on page* 39)



Joe P. Mayo using his special proportioning machine at Pebble Beach

Captain David L. Rees

Club Labor for Finishing Touches

By CAPTAIN DAVID L. REES
President Metropolitan Association of Greenkeepers

THERE must be very few courses where there is no piece of work that is, strictly speaking, extraneous to both golf course construction and golf course maintenance and where such pieces of work are numerous, they will be found to be no small item of expenditure. My present courses, for example—those of the Progress Country Club, New York, which I have constructed—have presented me with an unusual number of such "odd jobs" as I refer to, notably the excavation of pond beds, the damming of three streams for a water supply, and the installation of a centrifugal pump for water distribution. Among my men I found one who had had fair experience in concrete work and another who had spent several years at carpentry, and together they built a pump-house. It is of concrete, with green shingle roofing. The men achieved a pleasingly artistic touch by utilizing for the pump-house a door and a window salvaged from a building demolished to make room for the first fairway.

The concrete work was continued in the building of retaining walls for a chain of small lakes. The photograph shows a sample of this work, a retaining wall with a central spillway which extends to a stream. The last of the lakes was formerly a wide ravine with a fast stream running through, so here a retaining wall of concrete 30 inches thick was built with a spillway into the old natural stream bed.

Rustic Bridges

The streams feeding the lakes called for bridges at several points throughout the course, and here again my own men proved equal to the task. We decided the rustic type of bridge would best fit in with the landscape, and for those we utilized timber felled at the commencement of construction. Of this, by the way, there was abundance of one kind or another for in all 10,700 trees were removed from the heavily wooded sections of this property. Where humanly possible I strained every effort to conserve the silver and the grey birches, because of their unusual beauty, but I was reluctantly compelled to uproot several of those trees and the limbs provided me with material for all the bridges. The foundations of the bridges are trunks of thirty year old trees, the "roll' was achieved over hickory logs, the floors of the bridges are of split branches of three or four inches diameter, and the railings are of the gray or silver birch. From the accompanying photograph the method of construction is plain, while half a dozen of the remaining birch trees can be seen around the bridge.

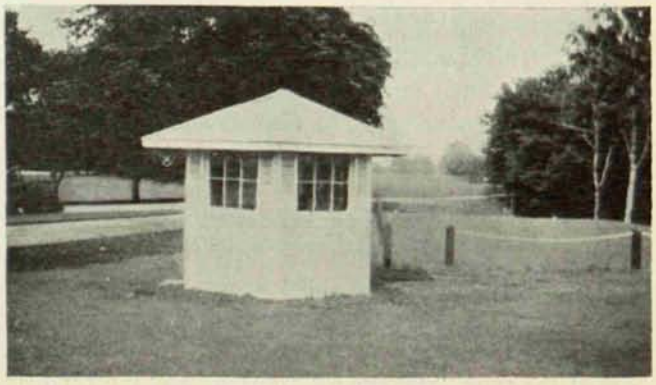
Using Stones from Fairways

On the main course here it was a necessity to provide four shelters and these again were made by the utilization of my own labor. The shelters are the usual open ones, providing against pretty well any wind that blows. The floors are of cobblestones secured from the hand-picking of the fairways before seeding. The four corner posts are rough-hewn tree trunks, the two intersecting walls are of sheathing, while finished boarding was used for the seating space. The shelters are roofed with the same green shingles as those used on the pump house.

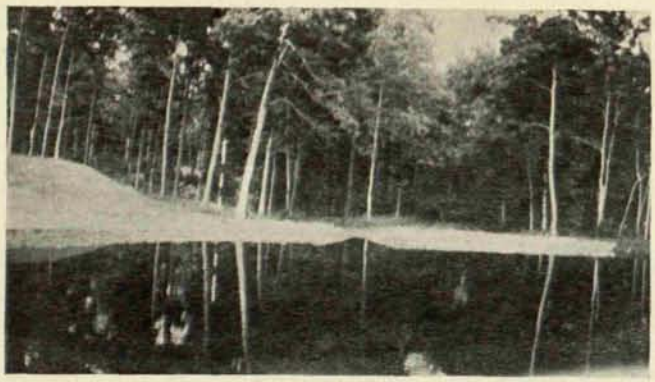
Silver Birch Fences

The fence around the first tee on the ladies' course absorbed all that remained of our silver birch timber. This fence borders three sides of the tee which is fifteen yards square, and for the upright posts we used the stout limbs, while for the rustic "pattern" of the fence the use of the thin limbs of birch resulted in a thing of thoroughly utilitarian value and real beauty. Situated as it is beside one of the charming flower gardens maintained by the club, this tee has become since the erection of the rustic fence, one of the beauty spots of the course.

The first tee of the main course had to be content with a prosaic fence of four-by-four posts supporting steel chain. These posts were trimmed, driven, and



Starter's office at Progress, built by club labor



Concrete retaining wall with central spillway

An excellent example of the beauty of a small rustic bridge

painted by one of the club laborers. In the accompanying photograph of this tee can be seen the starter office, also built by club labor. It is of clapboards, painted in light green with white trimmings, and is shingled in green.

A previous owner of this property had indulged in chicken raising and we found ourselves possessed of an exceptionally well-built brooding house, 100 feet by 30 feet, of clapboards with a roof of mottled slate. Since it stood squarely in the middle of what was to be our first fairway we had a house-moving contractor place it by the first tee, and after our men had enlarged the windows, altered the location of the door, built in counters and club-racks, and planed the floor, we boasted of an unusually attractive shop for Bobby Cruickshank, our famous little professional. The photograph shows the one-time brooding house as it now is, with some fine specimens of fir trees in front of it, which trees were removed from fairways, etc., and transplanted here by club labor.

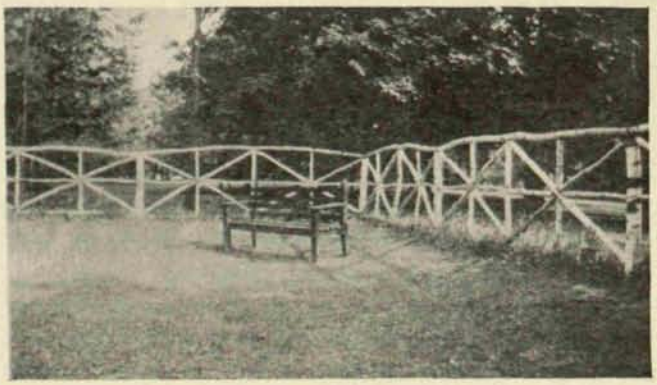
Artistic concrete pump house

Chicken house transformed into golf shop at Progress

The latest carpentry job undertaken by my men is the fashioning of twenty-seven tee benches, of which the photograph shows a sample. The benches are of very

(*Continued on page* 34)

Shelter house with cobble stone floor



Silver birch rustic fence on ladies' course at Progress

Grass Seeds in a Nutshell

By CHARLES C. CHANDERLIN

THE information contained in this article is written with the idea of setting forth in as precise a manner as possible a brief history of various grass seeds, and their general usefulness in the construction and maintenance of golf course turf. To be sure, many books have been written on the subject of Grass, but the majority are of a rather technical nature, so as to be of very little aid to the greens superintendent. In discussing the various grass seeds, we have constantly borne in mind the fact that this article has not been prepared for professional seedsmen, but greens superintendents.

It is the sincere hope of the writer that this information will meet the demands of the busy greens superintedents, and that it will be of some benefit.

South German Bent

This is an ideal grass for Putting Greens. German Mixed Bent seed, which is commonly used, comes from a small section in the southern part of Germany. Until recent years the seed has been threshed by hand, at which time the purities were not very high. Recently however, a more up-to-date method has been employed and it is now possible after rigidly recleaning the seed to obtain a purity as high as 90%. This at the same time reduces the weed seeds to a minimum, range of which is .03 of 1 per cent to 1 per cent. This seed was sold by seedsmen throughout the country as Creeping Bent seed until the Green Section pointed out the fact to seedsmen that this was a misnomer, the percentage of actual Creeping Bent seed contained in South German Bent being practically nil; only a small trace in each lot. Mixed South German Bent Seed contains several strains of Bent, as a rule Rhode Island or Colonial Bent, and Velvet Bent.

It is used in the eastern part of the United States, north of the Potomac and Ohio Rivers, and on the Northwest coast. It should be sown alone for best results. However, where a club wishes to economize, a mixture of 50 per cent Redtop and 50 per cent Mixed German Bent may be used, or a mixture of 75 per cent South German Bent and 25 per cent Redtop, for Putting Greens.

For quite a few years after the war, the price of South German Mixed Bent ruled unusually high. Recently however, price has been materially reduced and this item can now be purchased at low prices considering the general use of this seed. Like all grasses in the Agrostis family, this seed is a lover of moisture and thrives best in lowlands, and where it is possible to supply an abundance of moisture. Although it prefers moisture, it also has done very well on dry or sandy soil.

Rhode Island or Colonial Bent

Rhode Island Bent is an abundant grass on well drained soils and is found principally in New England. Wherever it is possible to obtain the true variety, it produces as fine a Putting Green as any of the Bents. Recently, in the vicinity of Charlottestown, Prince Edward Island, Canada, they have taken up the growing of Rhode Island Bent, which is known under the name of Prince Edward Island Bent seed. The seed is grown comparatively free of weeds, and it is quite creditable to the growers of this seed how wonderfully well they are producing a seed which has a purity of 95 per cent, and a germination of 90 per cent or better. It will pay the members of the National Association to look further into the use of this seed and make inquiry of the U. S. G. A.

Kentucky Bluegrass

Kentucky Bluegrass seed is produced in Kentucky and Missouri, the best seed however in recent years, has been produced in Missouri. The seed harvested in Missouri is heavier, freer of chaff, and cleaner of weed seeds than the seed grown in Kentucky. Quality of Bluegrass seed is determined by the weight per bushel as well as the purity and freeness from weed seeds. When mixed with Redtop, there is no better fairway seed than Kentucky Bluegrass. For instance a mixture of 65 per cent Kentucky Bluegrass and 35 per cent Redtop, or 80 per cent Kentucky Bluegrass and 20 per cent Redtop. Bluegrass is a limestone lover, but thrives exceptionally well on other soils. For fairways, Bluegrass has pretty well demonstrated its usefulness, and there is not another grass we could name that is better adapted for this purpose.

Red Top

Probably no grass seed has a greater range of uses than Red Top. This seed is produced in large quantities in Illinois. It has been known to produce excellent results under all sorts of climatic conditions and soils. Red Top must at all times be closely mowed, or else it has a tendency to develop coarse and thick blades. However, if it is kept closely cut, coarse blades will not have a chance to develop.

There is no grass that we know of which can be used to more advantage on golf courses. For instance, sometimes a green becomes a little worn looking from considerable hard usage, and Red Top can be used for quick results in a top dressing along with Bent seed. It also serves as a fairway grass and as a matter of fact an all around grass.

(Note: Mr. Chanderlin has been in charge of the golf grass seed department of the Philadelphia Seed Company for a number of years.)

(Continued in September issue)

The A B C of Turf Culture

Essential Plant Food Elements and How Plants Feed

By O. J. NOER

IN some respects the plant is a more remarkable mechanism than the animal. Its power to utilize simple chemical compounds and convert them into complex organic food materials is unique. The animal cannot maintain its life processes by the use of simple chemical materials, but lives at the expense of food materials originally manufactured by the plant, consuming these directly, or the flesh of other animals that originally satisfied their food requirements by the consumption of plant materials.

While the plant is a manufacturing establishment capable of producing complex materials, the individual plant units or cells resemble the cells of animals in that they require these manufactured foods for their existence. Thus the plant is a factory capable of producing complex organic food materials to supply the demands of its various parts. An understanding of the mechanism of plant growth is essential, and is the foundation upon which plant feeding is built.

O. J. Noer

Editor's Note: For the past four years Mr. Noer has investigated the value of various fertilizers in relation to golf turf at the Soils Department, University of Wisconsin, under a fellowship established by the City of Milwaukee.

Our knowledge regarding essential plant food elements and their utilization in the plant has been accumulated within the last eighty years. Prior to that time erroneous theories existed because they were not properly tested by experiment. The painstaking work of chemists and plant physiologists is responsible for our present information. While many problems still await solution, the broad principles now known are sufficient for practical purposes.

Plant Food Manufactured in Leaf

It is in the leaf that the complex organic food materials are manufactured by the process called photosynthesis. The green color of the leaf is due to the presence of a substance called chlorophyll. In its presence energy rays from the sun convert the raw materials, water and carbon dioxide into a sugar which is water soluble. The sugar is used either for the building of more complex materials, as a source of energy, or is stored for future use. When stored it is generally converted into starch which is insoluble. During photosynthesis oxygen is released as a by-product of the reaction and escapes into the atmosphere.

The raw materials carbon dioxide and water are obtained from different sources. Water is obtained from the soil. It enters the roots and passes up to the leaves through the stems. The atmosphere always contains small quantities of carbon dioxide gas. This enters the leaf through small openings, generally most abundant on the under side of the leaf, and dissolves in the water contained in the leaf.

Since the products of photosynthesis are so essential to the plant, and are produced only in the leaf, sufficient leaf surface must be maintained to insure their production in sufficient amounts. This is most important in the fall when reserves must be built up and stored in the turf roots for use in the spring while new leaves are being formed. Raising the mower blades, but not enough to impair the playing condition of the turf, increases the leaf area and insures increased sugar production. Unless closely cut, vegetatively planted greens develop a decided and objectionable nap, so great care must be exercised in attempting to build up reserves by permitting longer fall growth.

Sometimes all efforts to obtain turf on heavily wooded areas fail. Even varieties of grass supposedly adapted to shade refuse to produce turf. The dense leaf growth in the trees effectively absorbs all the light rays and the leaves of the grass below fail to receive sufficient energy rays to permit the production of much needed food.

Plants Require Oxygen

All forms of life require energy. Without it they are as helpless as the engine without fuel. Combustion of fuel supplies the energy which operates the engine. If oxygen is available plants and animals can release and utilize the energy stored in the products of photosynthesis. The animal obtains oxygen by breathing. This oxygen reacts with the carbonaceous material, sugar, releases energy and resolves the complex material ultimately into the simple substances, water and carbon dioxide, which are exhaled. These are the ultimate products produced when sugar burns. The same type of action takes place in the plant. The aerial portion of the plant can obtain an unlimited supply of oxygen from the atmosphere, but the roots also demand oxygen. This must be obtained from the air existing in the interstices between the soil particles. Most of the beneficial soil bacteria

also require free oxygen. The air capacity of the soil is dependent upon its physical condition. Good turf cannot be expected on tight or water-logged soils, because these fail to provide the roots and bacteria with needed oxygen. Tight soils can be improved by the liberal use of organic matter prior to seeding, and water-logged soils obviously need drainage.

Carbon Cycle in Nature

The cycle of carbon is an example of the remarkable balance provided by nature. It is released as carbon dioxide gas when the living organism obtains energy from complex carbonaceous compounds. Green plants under the influence of light absorb the carbon dioxide gas and again build it into complex substances, releasing oxygen which escapes into the atmosphere. Plants accumulate and store these complex materials, and hence absorb more carbon dioxide gas than is released in their respiratory processes. Animals depend upon plants for their carbonaceous food requirements. During respiration oxygen is taken up and carbon dioxide exhaled, which accumulates unless used by plants. If confined in a closed glass box an animal finally dies. Death occurs when the atmosphere becomes sufficiently polluted with carbon dioxide. In the presence of light a plant placed in this vessel purifies the air. The carbon dioxide is taken up and converted into sugar and oxygen is released. Eventually animal life is again possible. Under natural conditions this constant cycle mantains itself and as a result the atmosphere contains a relative constant though small amount of carbon dioxide. Some of the carbon in our bodies may have been a component part of some plant or animal many thousands of years ago.

Essential Mineral Plant Food Elements

Besides the carbon, hydrogen and oxygen used to build sugar, and obtained from carbon dioxide and water turf grasses, in common with all other plants, require seven other chemical elments to produce normal growth. These are nitrogen, sulphur, phosphorus, potassium, iron, magnesium and calcium.

Nitrogen, sulphur and phosphorus, together with some of the products of photosynthesis are utilized in building proteins, an exceedingly complex group of substances. The proteins are the essential constituent of the living portion of the individual plant cells. The mechanism of their formation is not clearly understood. Apparently organic acids are produced during their formation. The plant uses calcium to neutralize these acids and make them insoluble. The presence of exceedingly small quantities of iron are essential to the formation of the green coloring matter (chlorophyll) in the leaf. If absent, chlorophyll is not produced. Magnesium also appears to be an essential constituent of chlorophyll. It is also found as an essential constituent of complex substances in the seed. Potassium appears to affect production of carbohydrates, sugar, starch and cellulose. The last named is the essential constituent of the cell walls. It gives the plant form and rigidity.

All seven mineral elements are obtained from the soil. While the air contains enormous quantities of elemental nitrogen most plants cannot draw upon this inexhaustible supply. Clovers and other legumes can however utilize atmospheric nitrogen. The encroachment of clover in poor fairways is often due to this fact. The impoverished soil does not supply the grasses with sufficient nitrogen to permit active growth. The clover survives and spreads because it can get needed nitrogen from the air.

The growing turf obtains its supply of essential plant food elements from the soil. Plants can only utilize materials which are dissolved in the soil water. Dissolved materials are capable of passing through the walls of the root and thus enter the plant. The soil water at any one time never contains enough plant food to satisfy the entire demand of the growing turf. Thus the rate at which the soil water is replenished with soluble plant food from the insoluble soil materials distinguishes a fertile from an infertile soil.

Approximate Composition of Turf Grasses

Freshly cut grass clippings lose from 60 to 70 per cent of their weight on drying. Thus they contain from 60 to 70 per cent water and 30 to 40 per cent dry matter.

If the dry grass is burned the ash remaining does not exceed five per cent. The volatile matter consists principally of carbon, hydrogen and oxygen. However, nitrogen and much of the sulphur also escape during burning. The mineral constituents constitute the smallest portion of the plant material and of these nitrogen is present in largest amounts.

Practically all soils contain sufficient amounts of all mineral elements except one or more of the following three, nitrogen, phosphorus and potassium. The sources and uses of these three essential fertilizer elements will be dealt with in succeeding articles.