

the rain water coursing down them. Our gravel service roads, which likewise are used as pleasure drives through the course, and which have not been hard-surfaced due to our wish to preserve the natural effect, have also suffered from erosion.

This has called for the laying of lines of storm water pipe or sewers, and more will be required. These storm sewers are laid with surface inlets, the inlets being outside the area of play and at such frequent intervals that the surface water is collected into these underground channels before it has flowed a sufficient distance to attain a velocity to give a damaging scouring or eroding effect. In some cases it is necessary to direct surface water to a surface inlet by means of flat terraces, designed to blend into the natural topography.

Equipment to place water on a course as needed is known to be absolutely necessary. I believe it is equally important to provide means to keep water off the course when and where not needed.

### Right Drainage Great Economy

As I reflect on what erosion has cost us from the time we put the first plow-point into our new course, I am led to the belief that the ultimate cost of a completed, perfect golf course such as we have tried to produce, would be less if with the original plan of the course, a complete and comprehensive system of storm water sewers could be prepared, and this part of the work carried out before the commencement of grading, ground preparation and planting.

Fortunately, golf is now so popular and on such a sound basis financially, that many clubs can complacently face the ultimate cost in the original estimate of a competent golf course architect, resulting in much cheaper courses than were obtained in the old days of evolution from

a nine-hole makeshift planned by a "committee," which always remained a makeshift, though extended to eighteen, and remodeled time after time till the memory of man runneth not to the contrary.

Incidentally, my observation has been that the best architect can make only an



This drainage line, on the tenth hole, relieves the fairway of seepages along the hard-pan outcrops

indifferent puddling out of a warmed-over "committee" effort.

I believe a complete system of underground drainage, installed before other construction is commenced, would save perhaps many times its cost in keeping the natural top soil and expensive fertilizer on the course, that it would prevent the washing and consequent refilling of gullies in the fairways, bunker slopes and roads; and that it would reduce the cost of the drains necessary for intercepting seep water, the drains under sand traps, and the drains in low flat places, by providing convenient outlets for such drains, and thus saving the cost of extra ditching

After the course was completed and the fairways contoured and sodded, the same hole appeared as on the right. It is thoroughly underlaid with drainage tile, sufficient to keep the fairway in first class shape



and pipe required to carry each of these individual drain lines (already several score of them in our case) to a separate outlet outside the area of play.

In other words, evolution in the drainage system is costly and expensive, as it is



One of the outlets, showing the amount of water the tile lines will accommodate

in the course itself, and in this day I believe club executives would be wise in urging their associates to include the complete system in the original cost, that the ultimate cost may be lessened.

## What a Soil-Tester Will Tell the Greenkeeper

By H. S. CAMPBELL

**WOULD** it be carrying this 'scientific greenskeeping' business too far by making the following suggestion—

That a record of the acidity or alkalinity of each green be kept through the playing season? A soil test made every week and posted on a chart should be very useful.

We have been told that greens thrive in an acid soil. But how acid? Does anyone know? A soil test of a fine green should answer that question.

One course will have a beautiful, healthy greens while a neighboring course has poor, spotty and apparently ill-nourished greens, notwithstanding the fact that the care and treatment are practically identical on both courses. The following year conditions may be reversed.

And when the misfortune of brown-patch hits one or more greens, would not the exact knowledge of the acid or alkaline content of the soil of the diseased greens,

compared with the soil of the unaffected greens, help in avoiding this disease?

We are told that many factors must be considered in placing responsibility for brown-patch. Amount and kind of water and time of day applied, drainage, air circulation, weather and other factors are blamed. Yet you will find greens placed in groves of trees, poorly drained and indifferently cared for, which are absolutely free of brown-patch, while on an adjacent, well-kept course brown-patch will be found on a well-drained green out in the open with no trees and plenty of air circulation.

As Alice said, it is all very confusing.

In the business world, charts and records of the past are recognized for their full value and are of inestimable help in planning the future. And if golf course maintenance is not a business, what is it? Consider the money invested.

Making soil tests and posting results each week would be just one more job for the harried greenkeeper, many of whom are expected to produce \$20,000 results on an \$8,000 or \$10,000 budget. But I'll bet a cookie every one of them would keep this record if they were convinced it would help them to keep their greens in better condition.

Many greenkeepers make a daily visual inspection of each green at an early hour. One day every week he can take with him one of the pocket soil-testers and make an absolutely reliable reading of each green in from two to five minutes. Eighteen times five minutes are ninety minutes plus ten minutes spent back at the barn or office in posting the chart, makes a time expenditure of one hour and forty minutes per week.

The value of such a record would depend upon the individual keeping it, the regularity of the tests and the ability of the greenkeeper to draw conclusions from recorded facts.

One of the soil testing outfits that is being extensively used by some well known greenkeepers is one that is profitably employed in water testing. Tests made of the city water used at the Beverly Country club, Chicago, show an alkaline reaction of 8.0 on the "pH" scale. This necessitates use of a large amount of sulphate of ammonia or other nitrogen fertilizer to overcome the effect of the alkali in the water.

There is no set figure on the proper acidity figure. Observation of the figure on various greens that are in excellent condition determines an average that affords a safe working basis for the greenkeeper.

# Pros Who "Sell" Themselves —and Merchandise

By HERB GRAFFIS

A MAN who was an acknowledged merchandising authority long before he came into the golf field was telling me the other day his observations of the pro situation and he concluded his remarks with the statement that the pro who hasn't done a good job of selling himself to his club had better get busy pronto or get reconciled to an unhappy and unprofitable future.

This able business analyst had spent the last six or seven weeks following the tournaments on the west coast and in the south. He commented on the fact that the greater part of the money of the numerous open tournaments is split between a dozen or so pros, with the other boys getting nothing but experience and air. For the pro who is not of the stellar performing class, the tournament pilgrimages are an extravagance—all right if he can afford them, but not so good if he hasn't a club lined up for the coming season. "If some one could dope out a \$10,000 Pro Merchandising Tournament he'd be doing the greatest thing that could be done for the pros," commented my friend.

Department store competition, the bugbear for many pros, may not be the unmitigated evil it seems when it gets tough enough to make a pro realize that he has to become a merchant himself to buck the department store successfully. If the pro is a quitter you can see the plain symptoms when you hear him bellyaching about department store inroads on his business and not using his noodle and some energy to fight for his own.

## Get Your Club Wised Up

You have to hand the devil his due. The department stores have put enough emphasis on their golf departments during the last two years to identify golf as the national game. They will continue this year to put the loud pedal on their golf departments stronger than ever before. If that scares you, you'd better look for a good job in another field, but if the threat simply makes you plan and merchandise better, you're the kind of a fellow who is worth a lot to any golf club.

In the February issue of *GOLFDOM*, reference was made to the inflated idea of the professionals' profits that most club members entertain. There's no wisdom in talking "poor mouth" to your members, or getting in any begging attitude, but it's plenty dangerous for you to let this perilous and false notion of your income to go undenied until members think you have so much money you don't need shop business.

If you're making any "New Year" resolutions about operations at your club this season, let the first one be to talk and act business. Don't forget you're a business man and a teacher. If you are the "boy-wonder" as a tournament performer, you may not have to worry much about the business-angle of your employment. And even if you happen to be a star sharpshooter, you can't get away from the fact that the steady good money in professional golf is made by the fellow who balances his operations so his shop gets some push behind it. We know, for we've seen several of the famous tournament players trying their level damndest this winter to get lined up with clubs where the shop gives a good chance for profit, instead of trusting to the fickle fortune of the tournaments.

## Pro Boss of the Business

Right now the pro is in control of the golf merchandise situation. The player buys on the recommendation of the pro, or follows the buying lead of some friend who has relayed to the buyer the advice or endorsement of the professional. The department store hasn't this selling force, so the pro golfers had better make the most of it. The department store policy is cut-price all the way through and that, of course, is a policy that is bound to grab a good part of the cheap business. But, since there isn't much profit for the pro in his cheap business, why worry about who gets it. Keep your clutches on the quality market—the price difference in golf merchandise is not great enough to beat you out of business if you are any kind of a merchant at all.

There always exists a chorus of complaint from pros about the way some manufacturers at times apparently favor the sharp-buying department stores at the expense of their steady professional trade. At the risk of drawing down the divine wrath of some prospective advertisers, I'll say that I believe there are times when some manufacturers throw a curve into the pros who have built up the golf business.

### Cut Out the Whining

But why howl about it? It's something that brings about its own punishment. If you know anything about other lines of merchandising you can see what a ruinous effect the price-slashing stores have had on a lot of makers of standard merchandise. The drug trade is one conspicuous example. It is devoutly to be hoped that the substantial makers of golf goods won't let their price-structure be demoralized by giving the stores, at the expense of the pros, the inch that soon is made a mile.

The pros, before they set up their wail, should realize that, in a lot of these cases, the manufacturers have had something slipped over on them by the store-buyers, preceding the cut-price orgies. But, at any rate, the pro has to concede the manufacturer the right of self-preservation just as much as the manufacturer must grant it to the pro.

### They Mind Their Business

It isn't a bad idea for any pro to meditate and take an inventory of himself. He must merchandise his personal stock to his club members just as much as he must merchandise his shop stock, and he might well consider which of his qualities are marketable most profitably to his members, and which traits had better be eliminated and kept out of sight.

I've just been talking to a golf enthusiast who has done considerable traveling around the country and has belonged to a number of clubs. I told him that I was batting out something that I hoped would help pros make more money. I said to him, "Everyone thinks the pro is filthy with jack and the result is he doesn't get regularly the deal he ought to get from his members and his club officials, if he is a competent and conscientious fellow."

There was no profound commiseration in his reply. "I haven't a hell of a lot of sympathy for a lot of pros," he said, "but take fellows like Howard Davis (Ridgemoor C. C.) and Alex Gourley (Glen Oak G. C.) and I'll give them a hand. They are

two opposite types, but both of them good business men by any standards. Young Davis is naturally effervescent; it's not put-on "bull" with him. He is enthusiastically and genuinely interested in his members and has a pleasant word for all of them. Alex has a more reserved temperament, but he is so interested in his job and obviously so earnest about doing everything he can for his club and its members that they all think mighty highly of him. Pros of this order are priceless to a club. It wouldn't take long for any club to see the difference in value between fellows like these and the half-baked birds who jumped from caddie to pro jobs simply because they were willing to take a pro job for next to nothing.

"The lesson, as I see it, is for the pro to keep himself on dress parade all the time before his members. If he has lost \$50 in a crap game the night before, it doesn't help his chances of recovering the dough to give any evidence to his members of his load of woe.

"Some of these birds hold a penny so close to their eyes that they can't see the \$150,000 clubhouse ten feet away, and that's fatal to any kind of salesmanship. I was in a pro shop last year when a member came in with a little job of winding a string around a grip. The pro couldn't resist the temptation to get 15 cents for the job. What a lost chance! Any smart merchandiser would have done that trivial job of a minute or so for nothing, given the member a friendly little bit of patter about being glad to do it, for the pro shop is always at the member's service. He'd have had the member feeling that the pro shop was a pleasant place to buy; there was no chance of being stung."

That is the comment of an average member. Draw your own conclusions.

### The Level Is High

Citation of horrible examples in GOLF-DOM must never lead to the inference that such horrible examples are typical. We are convinced that the professional golfer as a class has not had the opportunity to study merchandising methods, yet, even so is far superior to even the better class of smaller retail merchants in other lines. They're improving rapidly, for the representative pro is a fellow who realizes that he will have to do his utmost to make a living that will not penalize his family and him because of his real love of the game. The pros' advancement as merchants and as more prof-



itable factors in the club scheme of things depends a whole lot on the sort of interested co-operation they get from club officials.

## They Put Over Their Stories

Ted Woolley, the pro at Maple Hills Golf club, Kalamazoo, Mich., is one of the fellows I call to mind as being on the job as a merchandiser. Before me is a booklet, *The Gateway to Golf*, written by Woolley in boosting his winter golf school. Kalamazoo's slogan is "The Gateway to Opportunity," so Woolley's title is well chosen. On the cover is a picture of the Maple Hills clubhouse. The foreword of the booklet is an invitation to visit Ted's indoor school and get the fundamentals of golf. I think the stuff is the best ballyhoo of an indoor school I ever read, so it accompanies this article. Note the significant paragraph referring to members of his own club. What golf club official or director who wants his club to be run on a business-like basis would seriously con-

sider the matter of firing a fellow who thinks of his members in this fashion, and replacing him with some incompetent kid, just because the price would be lower than that of worth-while professional services?

The book has five pages of concise high-spots of golf instruction calculated to lure the reader into Ted's school. It has two pages of "Short Putts," devoted to gossip about the Maple Hills activities and members. Woolley says he got out this little booklet because he felt his letters were being thrown away. He's had excellent reader interest and results from the book, and

I dare say it didn't set him back much money. Again the moral shines out, "Use your bean."

Dave Livie, at Cleveland, is another of the boys who advertises successfully. Dave used a half-page in the December issue of the *Cleveland Golfer* to advertise his golf

shop. It was well displayed and had good copy in suggesting Christmas gifts for golfers. The advertising copy was so intimately and alluringly real golfer's stuff that it couldn't help but pull business. Note this line from the advertisement:

"Men trained in the golf profession will aid you in making your selection; a service which is not duplicated in Cleveland." Yet some of the boys still worry about store competition. Dave, I note, can take the family to his place in Florida for part of the winter and take things easy.

Today I blotted a flock of letters with a blotter sent me by Larry Striley, pro at the Penobscot Valley Country club, Bangor, Me. The blotter is illustrated with a nifty-looking girl

swinging a club. Larry briefly lists his instruction services and shop stock on the blotter which also carries the display line "When in Maine Be Sure to Play Penobscot Valley." Simple, but it gets plenty of circulation and makes the golfers remember to play at Larry's course and buy at his shop.

When I think of fellows like those named above, I am inclined to repeat to a bunch of the boys who want to sob out their miseries on my bosom, "The fault, dear Brutus, lies not in our stars, but in ourselves."

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*Dear Golfer:*

**Y**OU, your family and your friends are invited to visit my indoor Golf School at 128 E. Water St.

The indoor golf instruction idea has been demonstrated to be basically sound; it certainly is the most practical and convenient manner in which the average golfer can improve his or her game. Practice and instruction are the best ways to keep fit. In the summer you know how hard it is to practice when the desire to get out and play is so keen.

My two nets and interesting putting course will give you a lot of pleasure and add considerably to your golfing ability. Why not accept my invitation to make use of them this winter?

To members of Maple Hills Golf Club I am offering special rates, as it is my ambition to improve the playing average of my Club. I want you to come up and have a work-out anyway. There will also be educational and slow-motion pictures of some of the leading golfers of the day. This will be free to my patrons.

*Yours for a long drive,*

TED WOOLLEY.

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# The Ten Laws of Correct Labor Management

By T. H. RIGGS MILLER

AT the beginning of the new season, it is a good time to draw attention to that part of greenkeeping whereby the greenkeeper puts into practice his knowledge of the cost of labor. It matters not the experience a greenkeeper has had in the production and treatment of turf; it is absolutely necessary to have men carry out his ideas, and it is the efficiency with which this is done that determines the cost of golf at the end of the year.

To accomplish this, it is necessary to know and to understand the laws of management, and to have daily reports of the efficiency of men and machines employed. That there are any scientific laws of management will be denied by many, but such a denial cannot be logically maintained. If there is a science of psychology, there must be a science of management; for management is a mental process that follows certain definite laws, complex at times, but none the less definite when once understood.

The management of enterprises, such as construction and maintenance work on golf courses, is still an art. Nevertheless, there are certain underlying principles of effective management of men, which may be expressed in laws. The most important of these are grouped by Gillette and Dana, under 10 general headings, which are as follows:

1. The law of the sub-division of duties.
2. The law of educational supervision.
3. The law of co-ordination.
4. The law of standard performance, based on motion timing.
5. The law of divorce of planning from performance.
6. The law of regular cost reports.
7. The law of reward increasing with increased performance.
8. The law of prompt reward.
9. The law of competition.
10. The law of managerial dignity.

The main characteristics of each of these are, briefly:

## The Law of Sub-division of Duties

Men are gifted with faculties and muscles that differ extremely. One man will excel at running a tractor; another is better at lifting loads; a third at arithmetic; a fourth is a born teacher—and so on through the whole line of human occupation. Moreover, practice helps to improve these inborn differences. It is clear, therefore, that the fewer duties one man has to perform, the easier it is to find men to do it well. But give a man many duties to perform, and he is bound to do at least one of them poorly, if not altogether bad. Hence, the following law of management. *So organize the work as to give each man a minimum number of duties to perform.*

## The Law of Educational Supervision

It is not alone sufficient to give instruction to workmen from time to time by word of mouth, but all important instructions should be reduced to written or printed form. The second law of management is simply: *Secure uniformity of procedure on the part of the workmen by providing written rules, supplemented by educational suggestions or hints to guide them in their work.*

## The Law of Co-ordination

An examination of almost any golf course will disclose the fact that some men spend considerable portion of their time waiting either for somebody else to do something, i. e., waiting for tools, or to adjust their machines, or for materials to arrive, before they can proceed. The necessary adjuncts to proper co-ordination of work are:

1. A carefully-drawn schedule of performance.
2. Regular arrivals of materials and supplies.
3. Prompt and proper repairs to equipment.
4. The proper quality of supplies.

The best method, so far, that has been devised for making things happen on time, is a TIME TABLE, and then live up to it as far as interruptions of the weather and limitations of human nature will permit. To prepare a time table properly, it is

## DAILY LABOR SCHEDULE FOR 1928

NUMBER OF MEN	6 MEN	6 MEN	6 MEN	ONE MAN	ONE MAN	6 MEN	6 MEN	FOREMAN	3 MEN	ALL MEN		
WORK TO BE PERFORMED	GREENS POLE & CUT	TEES CUT & PATCH	APPROACHES & GREEN BAND CUT	FAIRWAYS CUT	ROUGH CUT	BUNKERS & MOUNDS CUT	BUNKERS RAKED	CHANGING HOLES, TOWELS & TEE PLATES	WATERING GREENS 9 GREENS per MOUND	PREPARE & SCREEN GOLF CLEAN & REPAIR TOOLS Machinery		TOP DRESS - WORKING - FERTILIZE SPRAYING, WEEDING, GENERAL RENOVATION.
SUNDAY	8 to 8 a.m.						8 to 9:30 a.m.	8:00 to 8 a.m.	3:30 to 4 p.m.			Top dress greens every first Tuesday of the month if no tournaments are held.
MONDAY		7 to 3:30 a.m.	3:30 a.m. to 12 p.m.	ALL DAY	ALL DAY			Before 9 a.m.	3:30 to 4 p.m.	WET DAYS		12:30 to 4:30 p.m.
TUESDAY	7 to 9 a.m.			ALL DAY	ALL DAY	9 a.m. to 4:30 p.m.			3:30 to 8 p.m.	WET DAYS		
WEDNESDAY				ALL DAY	ALL DAY		7 to 9 a.m.		3:30 to 8 p.m.	WET DAYS		9 a.m. to 4:30 p.m.
THURSDAY	7 to 9 a.m.			ALL DAY	ALL DAY	9 a.m. to 4:30 p.m.		Before 9 a.m.	3:30 to 9 p.m.	WET DAYS		
FRIDAY		7 to 9:30 a.m.	9:30 a.m. to 12 p.m.	ALL DAY	ALL DAY	12:30 to 4:30 p.m.			3:30 to 9 p.m.	WET DAYS		
SATURDAY	6 to 8:30 a.m.						8:30 to 12:00	Before 9 a.m.	3:30 to 9	WET DAYS		

The week consists of 51 working hours: 9 hours on Monday to Friday, inclusive, 6 hours on Saturday. Overtime is paid as straight time. Sunday pay is double time. Work inside on rainy days.

The author has been using a schedule similar to this for the last three years. It is put into effect as early in the year as possible generally early in June and is followed religiously until at least September 15th. Before and after this period, when the growing season is not so vigorous, there is plenty of opportunity to do odd jobs.

necessary to know how fast work can be done under conditions which are to govern it. It needs no argument to show that bad equipment, a broken tractor, a wet compost pile, is a sure obstacle to co-ordination of work. When men are working separately, such as cutting greens, the time limit will help to co-ordinate. The third law of management is: *So schedule the performance of each man or gang of men that they will work in perfect co-ordination with other men or gangs of men, either adjacent or remote.*

### The Law of Standard Performance, Based on Motion Timing

This is drawing the line too fine for greenkeepers. I doubt if six greenkeepers in the Metropolitan District use the same methods. There is no reason why they do not standardize to a certain extent. There must be a best way of doing things on the golf course, but this is a subject too long for discussion now.

### The Law of Divorce of Planning from Performance

According to the old-style methods of management, each foreman, in addition to his other functions, was left largely to his own resources in planning methods. This multiplicity of duties can only be performed by a foreman with a multiplicity of talents. The modern system of management consists, as far as possible, in taking away from the foreman the function of planning the work. For this reason, a great number of greenkeepers have been acting as foremen, not giving themselves time to plan and analyze their own methods. It behooves every greenkeeper who wants to have time for self-improvement, to provide himself with a good foreman. For the minute he takes his nose from the grindstone, he will get another point of view, which will be reflected by improvement in the golf course.

The brain is an organ that requires frequent exercise in doing the same thing before it becomes proficient enough not to suffer fatigue. Thus, similar to a man learning to play golf, a half-hour lesson will tire him more than thirty-six holes after he has become proficient. Repetition develops skill, and skill gives pleasure. To a strong man, used to his work, there is actual pleasure in mowing hay. On the opposite, fatigue merges into pain, and work becomes repulsive. Another, a man, no matter who he is, can do his work bet-

ter, vastly more efficiently, when he is being coached, than when he is his own guide, philosopher and friend. This is true on the rifle range, or on the baseball diamond. The coach must know his business, of course. Summing up, we have the fifth law: *For maximum economy of performance, the planning of methods of doing the work should be the sole function of the greenkeeper, who may not be a working man himself, but who has a foreman to take direct charge of the workmen.* Of course, it is hard to make some greenkeepers see this, and very much harder to make the committee see it. Some green-committees expect the greenkeeper to cut greens, as well. What can they expect in the way of planning and development from a fatigued brain?

### The Law of Regular Unit Cost Reports

Having planned a method of performance, it becomes necessary to secure daily, weekly and monthly reports of such completeness that the chairman of the green-committee can tell, with very little effort, what the actual and relative performances are. The sixth law may be expressed as follows: *Report all costs in terms of units of such character that the comparison becomes possible even under changing conditions, and let these reports be made daily, if possible; weekly in any event, and with a monthly summary.*

### The Law of Reward Increasing with Increased Performance

All payments for work should be in proportion to the work done. This is a fundamental law of economic production. When this law is ignored, as it is practically ignored today on every class of work, the producer ceases to take keen interest in his work. Under the common wage system of payment, one man receives the same as another, regardless of his skill or energy. Individual incentive is lacking, save as it is supplied by fear of discharge. This situation is somewhat different on a golf course, on account of the varied operations which supply, to a great extent, interest in the work, provided the men are paid the same wages as are current in the district. I believe that young men are better than old men on a golf course. For this reason, I make a practice of securing men between the ages of twenty-eight and forty, and do with one man less, in order

(Continued on Page 75)



# How to Grub-Proof Established Greens

Associate Entomologist, U. S. Department of Agriculture and Consulting Entomologist  
U. S. G. A. Green Section

By B. R. LEACH

NATURE plays an underhanded game with the greenkeeper and kids him into the belief that she is co-operating. She helps him to grow and develop a beautiful green until it is a sight for sore eyes, and as a result the average greenkeeper stands off to one side, takes off his hat and says, "Aint Nature grand."

There never was a greater fallacy in greenkeeping than this idea that Nature is on the side of the greenkeeper. She doesn't help him to develop that strip of luxuriant turf because she loves the greenkeeper or the game of golf. Not by any manner of means. Nature assists in this undertaking because she has ulterior motives; because she is making a first class home for her illegitimate offspring in the shape of grubs, worms, weeds and diseases.

From the day that a green is shaped up and in good playing condition, Nature does her best to ruin it. She gives the greenkeeper a battle every day of the year and, until recent years, she periodically whipped the guardian of the greens to a standstill. As far as modern greenkeeping is concerned, the only way to make Nature respect you is to crack her over the snoot now and then with a hundred-weight of arsenate of lead or calomel. She doesn't understand this sort of fighting; it leaves her groggy and bewildered. And in the meantime, your turf is safe.



B. R. Leach

SEVERAL years of experimental work, together with large-scale treatments made under my personal direction, at several golf clubs in the East have shown that 5 pounds of arsenate of lead per 1,000 square feet of turf will render it virtually grub- and worm-proof and greatly discourage the growth of noxious weeds. I know of one club near Philadelphia where the greens were adequately protected from a heavy infestation of Japanese beetle grub by a single application of only two pounds of arsenate of lead per 1,000 square feet of turf. This instance is not given as a dosage recommendation but merely as an indication of the fact that a little arsenate of lead goes a long way in greenkeeping. Arsenate of lead is a relatively cheap chemical and there is no object in cutting the dosage so low that a chance is taken

on insuring results. On the other hand, if you want to gild the lily and perfume the rose by applying more than 5 pounds, it is quite all right. The grass will respond to the increased amount and make a luxuriant growth unobtainable from the use of fertilizers. I have grown good turf in soil containing 100 pounds of arsenate of lead per 1,000 square feet of turf.

Under the circumstances the danger of employees overdosing the turf need not give rise to undue concern. Be concerned only that each square foot of turf receives its share of the arsenate; in other words, insist on efficient and even application of the chemical.

In treating turf with arsenate of lead, it is poor business to dust, spray or otherwise apply the chemical by itself. In the first place, arsenate of lead is a fluffy, impalp-



A corner of the experimental plot at Riverton, N. J., where the arsenate of lead method of grub-proofing was developed

able powder, easily blown about by the slightest puff of wind. When, therefore, you try to dust it in, the powder blows about and is deposited everywhere but where it is intended to go. Secondly, no novice can dust a small amount of the chemical evenly over 1,000 square feet of turf. Thirdly, the chemical sticks to the foliage if the blades of grass are at all moist and may cause a surface burning. While this burning is only of a temporary nature, there is no sound reason for causing it. For this reason spraying is not advised.

### How to Apply to Turf

One of the two best ways of applying arsenate of lead to fine turf is to mix it with moist, not wet, sand or screened soil, say one or two bushels to a green, and sow

or scatter it over the green before or after topdressing. Do not use clay soil or heavy loam for this purpose as it has too great a tendency to lump, thereby causing an uneven distribution of the chemical. By mixing with soil or sand in this way, the arsenate of lead clings to the soil particles and sifts down through the blades of grass without clinging to them. In this connection, avoid applying the arsenate of lead to fine turf when the grass is wet. If you have an employee who can sow or scatter the mixture of soil and arsenate *evenly* over the turf, this method is the simplest

and easiest. Otherwise the second and following method, while involving more labor, is advisable.

### Another Method

This second method consists in mixing the arsenate of lead with the entire bulk of topdressing and applying to the green as per the usual way. From experience the greenkeeper knows just about how much topdressing he applies to each green. If the amount of arsenate of lead to be applied is mixed with the required amount of topdressing, the mixing operation being supervised by the greenkeeper, the arsenated topdressing can then be loaded on a truck, carried to the green and applied as usual by the men doing that phase of the topdressing job. This is the system which I instituted at the Pine Valley Golf club at Clementon, N. J., and which they have found entirely satisfactory with their type of labor.

At Pine Valley the arsenated topdressing is prepared in lots of one-half cubic yard each, the mixing all being done in a home-made square type churn mounted on a shaft. This churn has a capacity of one and one-half cubic yards, but only a half cubic yard is handled at one mixing, first, because of the weight involved, and, second, because the machine mixes the small quantity much better as the mass has much more room to roll around in. The manager,