The trench should be no wider than is necessary for the diggers to work in. Fifteen to eighteen inches is usually ample. There is much difference of opinion in regard to the depth the tile should be below the surface. No hard and fast rules can be laid down on this point, as the character of the soil has much to do in governing it. It is well to remember that a tile drain has no effect whatever on the soil and its water which lie below it. Most drainage engineers believe it is better to sink the tile fairly deep into the soil in order to lower the water-table (that is, the free water) as much as possible. Of course, the outlet will govern in this case. As a rule, a tile drain two or two and a half feet below the surface is more satisfactory than one not so deep.

The bottom of the trench must be on an even, uniform grade. Some tile drains have been satisfactory where the grade is but 2 inches to 100 feet of drain. It is much safer, however, to have a fall of at least 4 inches per 100 feet. It is all right to change in going down hill to a steeper grade, but a steep grade should never be changed to one less steep unless a catch-basin is put in at the junction. Neither should a lateral line be connected on to a main line that has a lesser grade than the lateral. The reason for this is because swiftly moving water will carry soil particles which will be deposited if the flow is checked and thus plug the tile.

All tile drains should have a free outlet. We have seen greens underlaid with tile which had no outlet but ended abruptly in the soil just off the green. Obviously such drains are psychological rather than useful.

Tile drains frequently become filled with sand if they have not been laid properly, and sometimes they become broken, letting the soil fall in and plug the drain. The outlets should be watched after rains or heavy watering to see if the drains are functioning. Incidentally, a good deal can be learned about the proper amount of watering to give a green if it is tiled; for there is no reason for applying water at the top if it is running out below. It is becoming more and more apparent that some greenkeepers are applying altogether too much water for the good of the grass. With an efficient indicator such as a tile drain this fault could be easily rectified.

Sheep's Fescue

MAYNARD M. METCALF, *The Orchard Laboratory, Oberlin, Ohio.*

This grass, which except on rich land, never makes good turf but grows in tufts with hollows between, is common upon American courses today, especially in the East. Last June, inspecting a number of the best courses in eastern Massachusetts, the writer found only one with fairways free from this grass, several of the best courses showing many scattered plants. I remember last summer in Vermont playing one fine little course which had even attempted to make a putting-green with sheep's fescue.

At three of the courses worst infested with sheep's fescue neither the chairmen of the green committees nor the professionals in charge knew sheep's fescue, and they were surprised when I mentioned it as an unfortunate detriment to their otherwise splendid fairways. All of these three courses have been used for national championship turnaments.

Upon all of the courses on which sheep's fescue has been found in the fairways, I have seen it in the rough going to seed; and in spite of the

testimony of the ablest agronomists that sheep's fescue will not spread from the rough to the fairway, the writer can not but feel suspicious. Twelve hundred dollars was spent last year on one Michigan 9-hole course in clearing out all the sheep's fescue from the fairways and, while at the job, getting out every root from the rough also; and we now feel safer than we would if our rough were still full of seeding plants of this nuisance.

There is no more exasperating fairway pest than this wretched grass, and greenkeepers and green committees should be more awake to its menace than they are as a matter of fact today. Wherever there is sheep's fescue there is turf which gives a large percentage of bad bounds and of penalizing lies, and this should not be in fairways unless, indeed, it be planned for certain spots as hazards; and such spots of cuppy turf are objectionable as fairway hazards unless very clearly marked so that their exact limits may be recognized at a distance. To be frank, the writer hates this grass "with a perfect hatred" and wouldn't allow it in any capacity upon a course for which he was responsible.

Sheep's fescue is so prevalent and so pestiferous a fairway nuisance that it would seem worth while to observe very closely, with definitely planned and definitely recorded observation and experiment, to learn beyond all doubt if this grass, seeding in the rough, will spread to fairways.

Red fescue seed, including Chewings fescue, often contains sheep's fescue,* and this has doubtless been the cause of introducing the grass unintentionally into many courses.

A New Service to Golf Clubs

ADAM G. MARSHALL, *East Orange, N. J.*

Formerly, when engaged as a traveling salesman, selling mowers to golf clubs, I was amazed to see the slovenly methods in caring for lawn-mower machinery when not in use. Frequently the club had a shed or a house which was too small to protect the mowers from the winter weather, and the machines were usually repaired by some shoemaker, or anyone who hung out a sign "lawn-mowers repaired" got the work to do. That is why we started in business.

We now take complete charge of all machinery belonging to a club and are held responsible for the condition of its stock. Every week we call at the various clubs, have a talk with the operator, examine the machinery, instruct him how to oil and adjust it properly, and if a machine needs repairing we immediately get an order for its repair, saving the club a new mower, because it is repaired before it is ruined. Every club has from $3,000 to $10,000 worth of machinery. When a club is in need of new machinery we advise and submit prices for its approval. We thus save the club time and a lot of correspondence. All we expect for this service is the repairing of the machinery and supplying the club with new machines. Our prices for repairing and sale are the same as factory charges.

We find that the average greenkeeper does not know the different makes of machines put out for special work on golf courses, and usually buys what his next-door neighbor has. Again we advise of our service. He buys in out-of-town markets, as a rule.

* See my article on *Experiences With Untested Seed* in this number of THE BULLETIN.