sure reproduction and the reduction of waste in lumbering and manufacture. Hickory reproduces easily; and given a reasonable chance, a new crop will start promptly after a cutting operation. It can not, however, when in the seedling state, compete successfully with fire and cattle. The supply of large hickory is being exhausted, and it will in time be necessary to depend largely on second growth from small holdings, such as farmers' woodlands. The waste in hickory is placed at 40 per cent of the yearly cut of merchantable material. The unwarranted discrimination against red hickory is accountable for part of this, and the specialized character of hickory products for more. Frequently what is waste in the manufacture of one product could be used as the raw material for another. The wood of hickory is superior to any other commercial wood in strength and toughness. For a number of special uses no satisfactory substitute has been found. It behooves all golfers to do what they can to ensure a continued supply of a material essential to the royal game.

How Course Construction and Maintenance Suffer from Poor Business Management

W. A. Alexander, Chicago

With the improvements in business the fire has again been lighted, and interest in new golf course construction and playing the game have been given a great impetus. Ninety per cent of the men having charge of construction of new courses, and thus representing their clubs, are selected by their clubs on account of their business ability. Not one out of a hundred has had any experience in the work to be done. In addition to this, not five per cent of these men have the time or can afford to take the time or will sacrifice the time to give the golf course the same personal and intensified interest that they would give their own businesses. This is the answer to the waste and apparent extravagance in the construction and upkeep of golf courses.

First, if you have secured the land and completed your organization and are to build a course, employ the best architect possible, just as you would employ the best lawyer if you had an important legal case. The value of the land of the average eighteen-hole course in this district increases about fourfold as soon as the course and clubhouse are completed. You are the trust officers of a fund of some two to three hundred thousand dollars, more or less, put into your hands by friends and acquaintances with whom you are socially to deal. Can you look them in the face while you spend their money extravagantly? Your duty is to see that every dollar of this money is as wisely expended as it would be if you had formed a corporation and were to sit at your desk and protect your stockholders. Therefore, when you have employed your architect, live on the golf course until it is completed.

Take everything out of the course that does not belong there. Put everything into the course that does belong there. Soils differ greatly in this locality; but grass is the easiest thing known to man to grow. It does not require expert knowledge to raise grass, but it does require common sense, eternal vigilance, and a realization of the fact that two or three

hundred men are watching and waiting for you to turn over to them a finished product worthy of the price paid. Each foot of your fairway should be prepared with as much care as you would prepare a flower bed, plowed enough, fertilized sufficiently, drained amply, seed selected properly and sown at the right season; and when sown and completed, from that moment thereafter the work you have done should be *watched hourly* and kept us so as to realize the *original standard* contemplated.

The supreme error of golf course management, in my judgment, is due to the fact that on ninety per cent of the courses any good thing which may have been constructed becomes immediately neglected by the change of management and by the divergent views of committees and chairmen in charge, until it becomes mediocre.

A drainage pipe is clogged up for two or three months; the crowd will tramp over a sour and ruined part of the fairway; and that part of the fairway that is ruined has cost hundreds of dollars to construct. Prompt and proper attention to the drainage pipe would have saved the loss. A poor spot of a few hundred feet on a hillside will show dead and dry. The whole crowd will prance over it, including the chairman of the grounds committee, and allow these few hundred feet to become a blot; and in the end it must be plowed up and seeded, or re-turfed. Instead of this, the moment any spot on the fairway shows under-nourishment, it should be treated just as you would treat any bad spot on a putting green.

In the construction of putting greens, except for a sandy soil, there is no hill or valley fit to put an expensive putting green on, without complete underdrainage; and it is advisable to underdrain, even with sandy soil. At least two feet of soil should be taken out of every putting green and replaced under modern, scientific methods; and when your green is completed and sown and the grass is two and one-half inches high, begin to cut it, and water it, and continue to do so as long as it is a putting green. And take out every weed that appears, not once a month or once a year, but every day. Do not allow a weed to appear in your green. Take it out immediately. Putting greens can be ruined by fungus, dandelions, chickweed, crab grass, or *Poa annua* in three weeks, under certain conditions. You had better, therefore, keep the putting greens clean, and at what will appear to be practically no expense, by the regular men who cut the grass, than to lose a putting green, which positively can not be replaced by building it from the top down instead of from the bottom up. A putting green once gone can not be made new.

For those who are confronted with impoverished old greens and who at this time can not afford to build new ones for some reason or other, there is one thing that will tide them along and keep their greens going and will better them, and that is liquid manure. Have a tremendous tank of manure, say twenty-five feet square and six to ten feet high. Fill it with the freshest manure. Have an opening, a faucet if possible, pour the water into it and let it stand until the liquid is a rich amber color, draw it off and dilute it one-half, and sprinkle your greens gently with it two or three times, and the action it will have is like that a pulmotor would have on a supposedly dead man, or a hypodermic would have on an anemic one. Don't have the idea that nitrate of soda, blood and bone, or any other sort of fertilizer, will act as quickly on that sort of a green.

I have only hit the high places in the above, so far as proper golf

course economy is concerned. Concentrate it all into one paragraph, and it should read as follows:

If you construct, do it from the bottom up, not from the top down; and when completed, keep what you have. Keep it by eternal vigilance. You can waste your entire investment by neglect of your original building. This refers especially to the putting greens, but includes also fairways and tees.

Manure Heaps in Relation to House Flies

DR. C. V. PIPER

House flies are no less undesirable at a country club than in a home. The insects breed largely in manure, and especially in horse manure, but will lay their eggs on a great variety of decaying vegetable and animal substances. Manure is, however, the great nursery. Therefore every greenkeeper should take care that his manure piles do not infest the neighborhood with flies. Each female lays on the average 120 eggs at a batch and lays about four such batches during her breeding life. On the average the egg develops into an adult fly in 10 to 14 days. So the rate of increase is very rapid.

Manure piles can easily be treated so that they will not breed flies, and the treatment does not affect the value of the fertilizer. Powdered hellebore is the best thing to use. Hellebore contains a number of chemical compounds known as alkaloids. Alkaloids are organic substances, of which quinine, morphine, and cocaine may be mentioned as examples, which act very intensely on the animal body. For the treatment of manure a water extract of the hellebore is prepared by adding ½-pound of the powder to every 10 gallons of water; after stirring this it is allowed to stand 24 hours. The stock mixture thus prepared is sprinkled over the manure at the rate of 10 gallons to every 8 bushels (10 cubic feet) of manure. From the result of 12 experiments with manure piles treated under natural conditions it appears that such treatment results in the destruction of from 88 to 99 per cent of the fly larvæ. Amounts of hellebore less than ½-pound to every 8 bushels of manure are not so effective, while stronger applications, of course, will give somewhat better results.

Bacteriological studies of the treated piles proved that the bacteria were not injured or their development retarded, and chemical analysis showed that the composition of the manure was unaltered. Furthermore, several field tests were made in growing cabbages, turnips, lettuce, potatoes, wheat, and a few other crops on plats which had been fertilized with hellebore-treated manure, with the result that there appeared no injury whatever that could be ascribed to the use of this substance. The only possible objection to the use of hellebore seems to be the possibility of poisoning farm animals, as might happen if, for example, the barrel or tank in which the stock solution was prepared were left uncovered in an accessible place. It is quite safe to say that chickens will not be injured by pecking at hellebore-treated manure. This has been tested carefully. Hellebore can be obtained both in ground and powdered form, but the powdered form gives the best results in the destruction of fly larvæ. The present wholesale price of white hellebore powder is 16 to 17 cents per pound.