THE
GOLF COURSE

A MONTHLY BULLETIN DEVOTED TO THE DISCUSSION OF MODERN METHODS AS APPLIED TO GOLF COURSE CONSTRUCTION AND UPKEEP

Turf and Golfing Turf

By Reginald Beale, F.L.S.

ALTHOUGH I have long made a study of rapid turf production in all the countries of Europe, it was not until 1908 that the enormous development of golf in America attracted my attention to the courses in that country. A successful experience at the Brookline Country Club led me to make an extensive tour of the country, with a view of studying turf conditions. This was followed recently by a second trip, which has given me a very extensive knowledge of turf requirements in America, a subject which I now propose to discuss.

In order to discuss the question of turf intelligently, it is necessary to divide it into two sections, viz., Turf for the Putting Greens, and Turf for the Fair Greens.

Turf for Putting Greens

It is well to remember at the very start that a modern putting green is artificial both in its make-up and upkeep, consequently it may not be necessary or desirable to choose grasses that are natural to, or thrive best in, a certain district under natural conditions, but rather to choose those that are best suited to the purpose for which they are to be used. This, no doubt, sounds unscientific and all the rest of it, but when all is said and done, science is a good servant but a very bad master, and the man with a good fund of common sense and knowledge of applying same usually gets the better results.

It has always been my opinion, and I state it here right boldly, that turf of the best English quality can be developed on putting greens anywhere in the sections of the country covered by my tours, provided that the greens are properly prepared, fertilized, and topsoiled, if necessary, so as to form a seed bed of rich, friable soil of a minimum depth of four inches, with all undulations fashioned with runaway surface outlets for storm water, or melting snow, in order to prevent as far as it is humanly possible any such accumulations when freezing and thawing conditions alternate, and when the natural or artificial drainage, as the case may be, is put out of commission by the frozen subsoil. The so-called Winter Kill is bound to occur if such methods are not adopted, and valuable time and money will be wasted.

A green made on these lines, and sown with a mixture of seeds, say, for the sake of argument, our Coombe Hill Mixture, should produce turf similar in all respects to that at Coombe Hill in any section of the United States and Canada that I have seen.

In support of my contention that the

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THE question of cost in building a new golf course is one which is of very great importance to those who are contemplating work of this sort. The number of items which enter into this amount are also numerous and so diverse that it is impossible to make an advance estimate of the probable cost of constructing a new course with a reasonable approach to accuracy.

As a rule the men who are back of a new golf course project are not greatly familiar with the principles of cost accounting and very seldom are lucky enough to secure the services of an expert in this line who can also take charge of the many duties of superintending the actual work. It is partly due to this reason that there are practically no available figures on which to base an estimate of the cost of a new course. In addition the construction of a golf course is not very frequently taken up as a business enterprise, but rather as a means for pleasant social intercourse. While the promoters are almost always anxious to get along as economically as possible, while keeping in view the results they desire, they are not often able to keep careful account of various expenditures.

This is a most unfortunate situation and one which THE GOLF COURSE is going to try to help overcome. Our intention has been discussed with several Chairmen of Green Committees and we have secured their co-operation in the effort. We are very glad to be able to announce for an early issue the publication of an article by the Chairman of the Green Committee of one of the prominent clubs in the Metropolitan district. This gentleman is particularly fitted to discuss various phases in the cost of golf course construction, as he is a well-known certified public accountant. This first article will not attempt to cover the whole field even in a general way, but will merely take up one feature of importance.

In order to make this series of articles of real value to the golfing world THE GOLF COURSE will have to depend on the assistance and co-operation of a large number of golf clubs. We hope that we may have this co-operation in a very large measure so that figures may be made highly accurate, and so that the subject may be extended to all parts of the country and not be confined to any one locality.

THE GOLF COURSE is very anxious indeed to have those having first hand knowledge of this subject communicate with us, so that an interesting and profitable discussion may be opened up. We feel sure that a generous response to our suggestion will result in great benefit to the entire golfing world.

PROFESSIONALS and greenkeepers frequently request us to advise them where they can secure situations. We shall be glad to furnish the names of competent men.

Speeding Up Slow Fairways

By JOHN FRANCES

AT this time of year many golf courses will find that the fairways have become very slow and dead, and the usual fast play is no longer possible. Very few green committees know the reason for this defect, and fewer still know any way of overcoming it. It is my purpose to describe a method which has given good results during my years of practice, and one which I am sure will help a great many committees to vastly improve their fairways.

The reason for the slowness of nearly all fairways may be found in the large accumulation of clippings from the mower and also the other small refuse which has worked its way into the turf. This material fills up the spaces between the grass plants, depriving them of light and air, and thereby retards their proper growth. It also forms a spongy mat on the surface of the soil, and new grass plants either do not germinate beneath it or die out through inability to force themselves through. Clippings are allowed to lie for the purpose of rotting and forming fertilizer. However, long before they do this, they have killed the tender shoots which are trying to come up. In my opinion, it is far better to remove them and let them rot in a compost pile, in which favorable conditions are made to assist the process of decay. Those who doubt this may take a few handfuls of clippings and spread them over a patch of young grass. After four or five days they may be removed. The young grass will be greatly retarded and will be yellow in color, thus proving the injurious action of clippings.

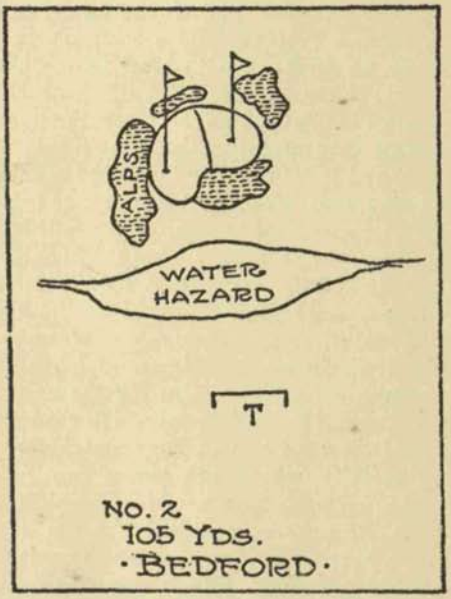
However, once the difficulty is encountered, the following method will remove the cause of trouble. In the fall, when the heavy play is about over and the fairways are beginning to get less care than formerly, procure an ordinary road sweeper (perhaps one can be hired from the highway department of an adjacent town). Sweep the whole of the course with the brush set fairly hard and at an angle of about twenty degrees. This will cast clippings up into winthrows, which can be easily gathered and carted away, to be put in a heap to form a compost. Follow up sweeper with mowing machine, and, if the accumulation of grass clippings is heavy, I advise sweeping again, until careful inspection shows that the ground is free from clippings, branches, twigs, etc. Broadcast manure, or better still, some good humus, as you will have fewer weeds next spring if humus is used. If the committee should decide to purchase seed, this will be the time to sow some good fairway mixture that will fill in the bad lies and leave the course in fair condition for the coming spring. If the fairways, after sweeping, show many bad cups and hollows, especially where the water can form into ice and thus produce frostkill, I can strongly recommend the use of a disc harrow used so that the completed work will look like a large checker board. Do not set cutters at an angle, but keep them straight. After passing the sweeper *lightly* over the whole course, to even up the spread of humus, then run a roller over the ground and let lie until ready for mowing again, when it will be found to have improved the grass and also increased the speed of the course. By opening up the soil the grass can better absorb the nitrogen and moisture, which results in still further improvement.

Besides improving the course, this operation will reduce the cost of upkeep, because the amount of rubbish which is swept away in the carting of the clippings, such as stones, broken bottles, tin cigarette boxes, etc., is surprisingly great, and all such trash causes more loss of time from the mowing machine being out of commission than most people realize.

Two Interesting Holes

THE two holes sketched are a little out of the ordinary and are good examples of modern golf architecture.

The first is a very short hole which was made at Bedford. The shot which it calls for is a delicate pitch—the wrist shot.

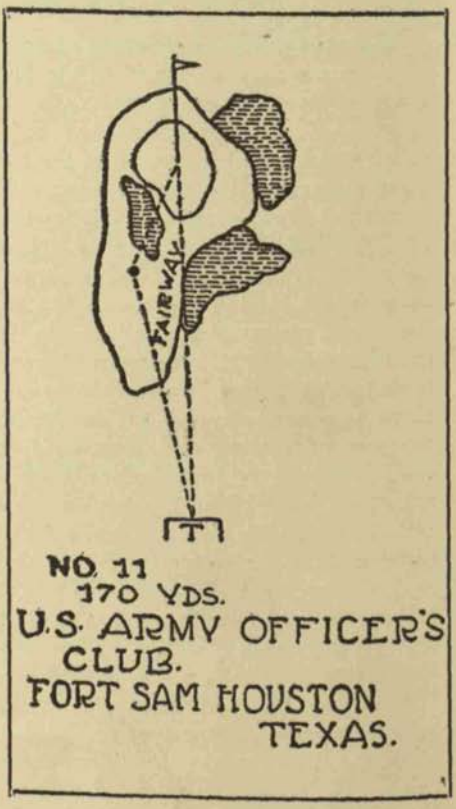


The two flags may appear confusing, but, of course, only one of them is to be found on any ocasion. But the bean-shaped green is in two sections, divided by a gentle undulation. That part on the left offers a comparatively easy problem, but when the hole is cut in the other section a most accurate and controlled pitch is necessary.

The more difficult side of the green is reserved for occasions when a field of experts are to find their strokes tested, and while unusual accuracy is demanded, it must be remembered that the distance is only a trifle more than one hundred yards.

The shape and size of any green should be regulated by the type and length of stroke which is to find it.

At Fort Sam Houston, Texas, the situation was most unusual to say the least. A remarkably attractive stretch of undulating, moor-like country was to be converted into a gulf course, but owing to the fact that the artillery and cavalry invaded the section for drill purposes sand pits were not possible. Segregated fair-ways and a scheme of grass hollows and mound work were necessary. The sketch shows one of the short holes, with the teeing-ground facing the gentle slope of a hill. The twisted fairway and rough grass hollows are illustrated.



Ordinarily it would be out of the question to conceive of a course which was not provided with substantial sand pits, but in this instance Nature had been bountiful, and she must have had golf in her mind when she created this section of the Fort Sam Houston drill ground.

Greenkeeping Notes

CLOVERS are undesirable on putting greens, so take care that you do not manure the greens with manure containing phosphates in excess. A green apparently without clovers will often produce a large crop of clovers when manured with manures containing phosphates in excess.

Artificial manures do not act equally upon all soils and usually give better results on heavy soils. In any case, but particularly on light soils, they are not to be relied upon alone. Light soils are usually deficient in Humus and artificial manures add no Humus to the soil. Humus in the soil is a very great necessity for the growth of healthy grass and strong artificial manures are apt to destroy it especially in light soil. Humus should be obtained from farm yard manure, Rex Humus, or from a good compost containing plenty of either of these two sources.

Do not use farm fertilizers for growing grass unless you are sure of what you are doing. While very good for their intended purpose they are apt to be very ill balanced for use on grass. Farm yard manure made in a covered water-tight box or pit is half again as valuable as manure made in the open. If placed in uncovered heaps it loses a large percentage of ammonia by volatilisation. If necessary to keep it in the open it should be covered with two or three inches of soil. The soil will fix and retain the ammonia.

Fall is the best time to use ground limestone.

Very frequently freshly dug land and imported soil will produce a strong crop of weeds, both annual and perennial. How the weed seeds get into the soil, and how long they will retain their germinating power, is a debatable matter into which it is not necessary for us to enter. Darwin tells us that seeds which germinated freely have been found in the little chamber at the end of a worm hole, at a depth of 8 feet. In his opinion these seeds were taken down the holes by the worms, with the object of lining the little chamber in which they winter in a dormant condition, so as to prevent their skins, through which they breathe, from coming into contact with the cold, damp soil.

There are a multitude of different ways in which weed seeds get into the ground, and the only way of making a good lawn upon foul ground is to allow it to lay fallow, and clean it by frequently disturbing the surface with a hoe for a small plot, and a harrow for a large area.

The work should be done during still, dry, bright weather, either in the fall or in the spring.

To free a lawn from tap-rooted weeds, divide the lawn into strips about 3 feet wide, take a basket to hold the weeds and a border fork with four flat prongs. Now, to remove the weed successfully, it is necessary to guess the depth of the root. Well-grown dandelions and docks will go down over a foot, the smaller ones and the rib grass about 6 inches. In the first case, force the fork into the turf as deep as it will go, and as far from the weed as the length of the prongs. By depressing the handle of the fork the turf will be forced up like a mole hill. If the distance has been guessed correctly it will crack on either side of the weed, which can then be removed easily. In the case of the smaller weeds, force the fork into the soil about 6 inches from the weed and about 6 inches deep, and go on as before. After a little practice it is possible to take out weed after weed without breaking or leaving behind any of the root, which if left might grow again. It is best to weed in this fashion when the soil is damp. Before rolling down the "mole hills" drop a pinch of seed into the hole left by the weed. Forking up the turf in this way tends to improve it. Removing the crown of a tap-rooted weed with a knife does more harm than good, as in most cases the weed will throw out several crowns to replace the one cut off. Always burn weeds, then you know for certain that they cannot give any more trouble.

Crab or September Grass

WITCH, Crab, or September grass is an annual, tender, surface-rooting plant, the seeds of which are carried from place to place by the wind, but they cannot gain an entrance or grow in turf unless it is thin enough to allow them to reach the soil.

Now, as the plant is an annual, it will die in the fall of the year, and if it is not allowed to ripen its seed it cannot reproduce itself, and if the turf is kept sufficiently close to exclude the blown seeds, greens can be kept practically free from the weed.

In our opinion, there are only two ways of dealing with this terrible pest —the first being to pluck the seedling plants out by hand as soon as they are large enough to handle (say, sometime about the middle or end of July), a laborious but efficient proposition, and then strengthen the turf so as to exclude blown seeds; the other—and, we think, taking everything into consideration, the best—is to keep the turf as dense and close as possible, with the double object of preventing the plants that are already in the turf from seeding and reproducing themselves, and making it difficult for blown seeds to find a lodgment in the turf.

In order to keep the turf in this close, dense condition, it should be treated as follows:

Water the greens regularly and keep the turf mown quite short, especially when the crab grass begins to run, at which period it must be done even more carefully, and the prostrate stems lifted with close-toothed rakes so as to bring them within reach of the machine, and top-dress the greens frequently between the early days of July, when the weed first makes its appearance, and the end of September, when it dies, with a finely sifted compost made up of equal parts of good, light soil, Rex Humus, and sharp sand, mixed with Carter's Complete Grass Manure at the rate of one to two loads of the former to twenty-five pounds of the latter per four hundred superficial yards.

If the above system is adopted, and the compost is carefully prepared, finely sifted, and watered in, no inconvenience will be caused to the players, the damage done by the weed will be reduced to a minimum, and the greens will be kept up to concert pitch.

Sand and Charcoal

PUTTING greens standing on heavy, wet, and other soft soils can be improved to an enormous extent if they are given a dressing of prepared charcoal.

Charcoal must not be regarded as a manure, but as a purifying absorbent which tends to aerate, purify and sweeten the soil, firm up the surface, and fine down the turf.

The charcoal should be applied broadcast at the rate of from fifty to seventy-five pounds per one hundred square yards, during the wettest period of the year, when the soil is in its softest condition and best able to absorb it, and well rubbed into the turf with the back of a wooden rake and then lightly rolled.

Sharp sand, sea sand preferred, is another very excellent dressing for soft, heavy, or spongy greens, especially if used in conjuction with charcoal.

It should be applied broadcast over the green to a depth of from one-eighth to a quarter of an inch, during the wettest period of the year, and rubbed in with the back of a wooden rake.

Sand, which cannot be classed as a manure, has a refining effect on the turf, renders a heavy soil more porous, and is distinctly valuable for trueing up bumpy greens and new greens made out of old grass land.

One cubic yard of sand will cover an area of one hundred and fourteen superficial yards to a depth of a quarter of an inch, or two hundred and eighty-eight yards to a depth of one-eighth of an inch.

To get the best results from sand and charcoal, the worms should first of all be exterminated, then give a dressing of charcoal, and, when this has worked in, one of sand.

The Condition of Greens at the End of the Summer

MANY greens, quite irrespective of the class of soil upon which they stand, the fertility of the soil, or the quality of the turf, are often in an extremely precarious condition at the end of the long, crowded summer season.

In many instances the greens, after a few weeks of the fall rains and dews, recover; but the recovery is generally slow, and the greens, as a rule, are in anything but tip-top condition in the early fall months, which, from many golfers' point of view, are the most enjoyable in the year for playing the game.

We have known instances of really first-class greens, situated upon good, fertile golfing soil, that were so hard hit by the drought and excessive wear during the summer months that their constitutions became thoroughly undermined, and it took them years to throw off the ill effects. All this is simply because they were not given a little help at the right moment and in the right way.

Greens in this condition after the summer season require special attention. It is of no use manuring them with slow-acting manures. They require a highly soluble, quick-acting manure, to stimulate the root action, and thus enable them to throw off the semi-comatose condition into which they have fallen.

We therefore recommend that greens in this condition should be top-dressed with from twenty-five to fifty pounds per four hundred square yards of our Complete Grass Manure, according to the condition of the green, mixed with two or four barrow loads of sifted soil for light soils, or of sharp sand for medium or heavy soils, immediately after the first fall rains. This season of the year is by far the best for using Rex Humus, and a top-dressing of this material will give very good results. It may also be mixed with sifted soil, especially for use on light soils. For heavy soils, mix with a little sand. Harrow or work the compost well into the turf, and so prevent any inconvenience to the players.

Turf and Golfing Turf

(Continued from first page)

best English, or perhaps I ought to say British turf, as there is some wonderful stuff in Scotland and Ireland, can be produced in North America more or less to order, I bring forward the Country Club at Brookline, where they sowed the greens with our Mid Surrey Mixture, and have obtained greens equal to those at Mid Surrey Golf Club, Richmond, England, which means a lot to any one who has seen Peter Lees' famous productions at the latter club.

The greens at Brookline, especially the ninth, tenth and eleventh, taking them year in and year out, are, in my opinion, the best in North America, and whilst I may claim some of the credit of obtaining such results for myself, it is only fair to say I should not get it all—I explained how the greens should be made and sown, but if that club had not seen that my instructions were faithfully carried out, nothing would have been accomplished.

Before leaving the question of greens, I may as well give a few hints on the making and upkeep in tabloid form, so that they can be easily digested.

Always, if possible, arrange for early fall sowing, and regard the period between mid-August and mid-September as the selected moment. When the first rains come in the fall, the soil is so warm that the seeds germinate very quickly, and, if sown thickly, get well established and self-protecting before the winter sets in.

In the spring the soil is cold and, in consequence, the seed not only germinates slowly but it also grows slowly, and the young grass plants have to face the heat, and, more especially, the drought of the summer when in a very young, weak state, very often with evil results. Also, in spring, weeds and other obnoxious growths are much more prevalent than in the fall.

When making or contouring a green, remove the top soil, work with the subsoil, and finish off by replacing the top soil in an even layer over the green. The separation of the soil and the replacement of the same cannot be done properly by scoops, so it is always advisable that this section of the work should be done by hand with spades and barrows.

All drains should be laid before the top soil is replaced.

In making up greens, each scoop or barrowful as it is shot down should be carefully trodden, otherwise the surface will sink later.

Always, if possible, make surface runaways from undulations, otherwise water will accumulate with disastrous results to the turf.

Water freely during droughts and in the evenings, if possible, as best results are then obtained. The water applied at that time does most good and does not evaporate as quickly as it does if applied in the heat of the day. In any case, water freely, and remember that one good soaking is worth a dozen light sprinklings.

It is hardly necessary to state that pond or stream water of a natural temperature gives the best results, but where this cannot be obtained and the water is pumped from a depth, or city water is used, some means, if possible, should be taken to get it up to the natural normal heat by exposing it to the sun and air in a shallow pond or reserve tank, or if it is pumped direct, by laying the pipes close to the surface, where they will feel the influence of the sun.

If the latter system is adopted, draining cocks should be put in all low places, so that the pipes can be emptied in the winter; otherwise they will freeze and burst.

To avoid the tired, sickly appearance that turf gets after a long period of artificial watering, give it a monthly or bi-monthly dose of Complete Grass Manure, at a rate not exceeding twenty pounds per four hundred super yards, mixed before use with at least one hundred pounds of fine soil and humus. A light fertilizing, as above, will keep the grass growing and in good heart, whereas, if artificial watering is relied

upon alone, it just keeps it alive, especially if the water is hard, low in temperature, or contains any impurities.

Eradicate and destroy all weeds as soon as they appear, do not let them multiply, and remember that wire, witch, crab and September grasses get hold best in weak or exhausted greens. If you cannot exterminate the latter, keep them, like clover, in check by lifting the creeping or prostrate stems and branches with a close-toothed iron rake and mow closely; repeat this as often as necessary and use our anti-clover manure for the drought dressings when the trefoil is prevalent.

Topdress freely with a finely sifted compost of a light, friable, porous nature, rich in organic matter and humus, so as to reduce the plasticity of the soil if it is too heavy and to add body if it is too light, and when doing so remember that a cubic yard of compost will cover 144 superficial yards to a depth of a quarter of an inch, and that sixteen dressings at the above rate spread over, say, three years, will reduce the natural top spit soil of the dressed area to the secondary position of the subsoil, so there is hope for all greens, no matter whether they stand on sand or clay. The contouring and general preparation of a green is costly and its upkeep is more so, consequently it is the worst economy to be parsimonious when seeding. In England, with our warm, genial climate, we sow one ounce to a superficial yard and expect to get a close turf in a year or less, and when we are in a hurry we sow at the rate of two ounces per superficial yard.

In America and Canada, where the climatic conditions are, to say the least of them, extremely severe and difficult, the minimum rate should be two ounces per square yard, and the maximum four ounces.

Turf for the Fair Greens

A true golfing turf is composed of dwarf creeping grasses, which form a close-soled, springy sod, which is both a delight to walk over and play on, as it holds the ball from the ground so that it sits up and looks at the player, and when a divot is taken the club cuts through the matted, fibrous roots of the grass without hardly touching the soil.

Turf which does not answer the above description is not golfing turf at all; it may cover the ground and make it look nice and green, and so mislead the casual observer, but it is worthless from a golfer's point of view, and that's all there is to it.

This sort of turf will pass with those who have not played on or seen anything better, but those who have can tell it at once by the way it feels to the foot and club.

As I have already explained, a true golfing turf is springy to the foot, and when a divot is taken the club slides through the mat of grass without hardly disturbing the soil.

Turf of the non-golfing quality, on the other hand, is uncomfortable to walk over, there being very little fibre under the foot, and it is difficult and unfair to the player, because the ball falls through it and rests on the hard, baked ground, which the club has to cut through to take a divot, a difficult and unpleasant stroke, which oftentimes jars the wrists.

Of all the clubs I visited in 1911 and this year, only a small proportion could show even a reasonably good turf on the fairways, and, as far as I know, there are not many clubs in North America that can at present boast of a true golfing turf.

This is a very bold statement, but if a golfer who knows what a true golfing turf is will make a tour of inspection in the same section as I did, he cannot but bear me out. That the results required can, however, be obtained, I stand convinced, and as proof of this would point, amongst others, to the Country Clubs of Detroit, Toronto, and Mayfield (Cleveland), where there is a young but true golfing turf—all having been sown in accordance with my system and with my mixtures.

To avoid any hair-splitting, I must say here that I have taken the courses as a whole, and have avoided all men-

tion of those that I have not seen or those that have some good or reasonably good turf and some bad.

I will now attempt to explain the reason for the lack of really good turf in America. In the first place, the best natural turf in the British Islands is found in locations that have been nibbled close by sheep or rabbits for years, and the best artificial turf where properly balanced mixtures of the finest grasses have been sown and where the turf has been closely mown from the very start.

These conditions suit the finer grasses which tiller out, mat and increase, whilst the coarser grasses die out to a very large extent. In some instances I have seen just the reverse happen; that is to say, a fine rabbit or sheep-fed turf has been saved for hay, which allowed the coarse grasses to gain the mastery.

Probably many of my readers have seen exactly the same thing happen on an abandoned green, which, I think, in conjunction with the above, conclusively proves that to get fine turf, close grazing or mowing is absolutely necessary.

Secondly, the great majority of the artificial or sown courses in America have been sown with venerable prescriptions propounded years and years ago for agricultural purposes, before golf was known out of Scotland.

I might state here, that eighteen years ago, not only was it considered impossible to produce fine turf from seed, but there was absolutely no demand for it; but when the game of golf took hold of the civilized world, I saw that the ordinary commercial mixtures of lawn grass seeds and the old methods of turf production must go by the board and new methods and new mixtures take their place.

The third reason is the antiquated idea that the indigenous or native grasses are best in their own sections or zones, because they are indigenous or native, an argument which absolutely bolts and bars the door to any sort of improvement and is as worthless as it it futile.

The fourth and last reason is the improper ratio in which the various varieties are used (even when the mixture is made up of the correct varieties), and also the thin sowing.

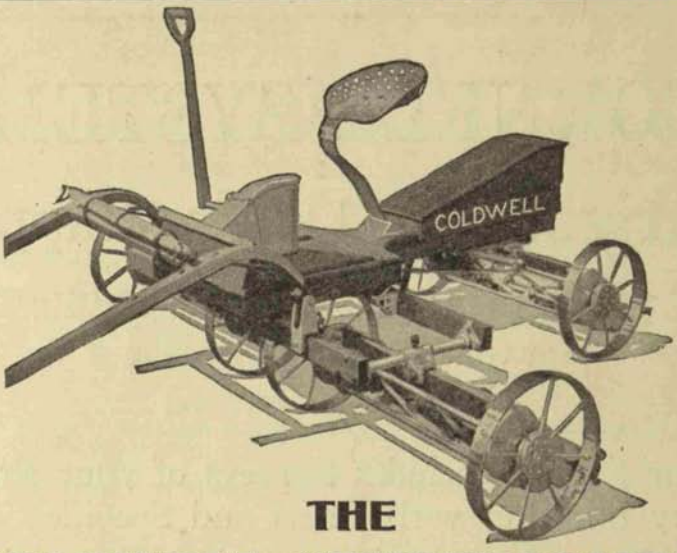
It takes years of patient observation and costly experiment before one is fitted to propound mixtures of grass seeds for a neighbor's lawn by propounding mixtures of which they really know nothing; yet quite a few persons are prepared to gamble with the prosperity of a golf club, when it is well understood that a club is, or rather should be, judged by the quality of its turf rather than by the comfort of its clubhouse.

I met one man who intended to base the prescription of grasses for sowing a course situated on raw sand from about half a dozen quaint little hand-watered trial plots, each about one yard square. He pointed out the grasses to me and asked me to note how well they stood on the sand without any fertilizer at all. The plots were barely a month old, and the expert evidently did not know that any grass seed will germinate freely and keep alive for months on a piece of cloth, or an old sack, or anything, so long as it is kept moist.

Another showed me with pride a course on which he had used almost every named grass procurable; he certainly had got a turf, but it was far better suited for dairy farming than golf, and the cost of it must have been simply cruel.

A third sent me out on a hot, dusty trip to see an "eye-opener" in the rapid production of fine turf by sowing fescues and bents, and when I arrived the perfect turf had absolutely no bottom and looked like a stubble field, as it well might, considering that the seed was sown in equal quantities of each description at the rate of one hundred and twenty pounds per acre. The significance of this will be better understood when it is known that the number of seeds that go to one ounce varies roughly in the different varieties from 14,000 to 500,000.

(To be continued)



THE
COLDWELL "THREESOME"

We call your particular attention to the features mentioned hereafter, as they are absolutely essential to a perfect machine of this type and are *found only in the Coldwell "Threesome."*

1—All gears and axles of drive wheels are run in dust proof grease cases, which only need filling once in four or five months. This means easy draft, long life to the machine and a great saving of time.

2—The **Back Rollers** are made in three sections, which insures against tearing the lawn when turning circles. These rollers are each provided with bronze bearings, turning on a hollow grease-filled shaft. This shaft, once filled, needs no further attention for months.

3—The **Drive Wheels** have malleable hubs, steel spokes, wrought-iron rims and are made fast to shafts which turn on ball bearings inside the grease case. (All wear easily taken up from inside of case.)

4—**No springs are necessary** to keep the back roller from jumping up, as the Lawn Mowers are swung from the main frame by large friction surface hangers, which hold it down.

5—A single lever at the operator's right enables him to lift all three cutting knives free from the ground at once. It also permits him to throw out of gear all three revolving cutters without leaving his seat.

6—The weight of the super-structure and operator is evenly divided over the three Lawn Mowers. The combination of the carrying frame and a very simple draw rod mechanism makes one of the most desirable features of this machine, and it is this combination that makes absolutely positive the accurate position of the rear machine relative to the two front machines, insuring at all times, and under all conditions, the proper overlapping of the cuts. This valuable feature is found only in this machine.

This style of machine is designed for cutting wide swaths on grounds that are settled and dry, also where rolling and fine cutting are not the first consideration. On fine lawns where the turf is right and where pride is taken in having fine cutting and a beautiful velvety surface, free from horse marking, streaks, etc., there is only one type to use, that is the motor-driven Lawn Mower, which rolls the lawn every time it is cut. We make several varieties of this type, including both the "Walk" and "Ride" types, circulars of which we will be pleased to furnish on application.

COLDWELL LAWN MOWER CO. NEWBURGH, N.Y.