Practical Golf Greenkeeping

BY

W. K. GAULT

BRUNTSFIELD LINKS GOLFING SOCIETY, LTD.

EDINBURGH

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PREFACE.

In this little book on the art of greenkeeping, I shall endeavour to set forth a plain treatise which is the outcome of my own practical experience, together with study and general observations regarding results of various methods in greenkeeping, on both seaside and inland golf courses, all of which were possessed of some little peculiarities worth finding out. To my mind, however, the most impressive lesson any greenkeeper can learn, is the one acquired under adversity. The real science in greenkeeping is not to be gained where difficulties in maintaining the turf are never experienced. Practical tests in overcoming trouble of any kind are the best way to obtain knowledge. So in the following remarks on the subject for each month of the year, I wish it clearly to be understood that the routine, as laid down in the book, is not intended to be binding, as the different conditions under which greenkeepers work make it impossible to go by hard and fast rules. Only careful study and experience in each individual case will bring perfection. Nevertheless, every page in the book is written in the hope that it may be useful to greenkeepers, greens committees, and others who are interested in the subject. From such a work, however, it can hardly be expected that errors are entirely absent, but I hope they are not too numerous, and readers will notify any correction they may find necessary.

W. K. Gault.

JANUARY.

The Lasting Effect of Drought on Turf.

AT this season, and except under extraordinary conditions, the putting-greens are now in their worst state. Nature has ceased to assist the grass, which accounts for some of the finer species having for the present time disappeared, and for the greens being shorn of their verdant sward, which is their wonted summer beauty. But when adverse circumstances intervene in the growing season, the fine grasses are the first to suffer. The abnormal drought of the summer 1911 made general exceptions to the beauty of golf greens. The extended period of scorching sun burned up the coast greens, and this parched state was the ultimate result with the most fertile inland ones. Quite irrespective of class, golf links on the whole suffered much from the prolonged drought—and the early autumn season brought no change in the weather. This want of rain kept away a second growth on the grass: and consequently the damage remained, which was much in excess of that in any previous year on record. On inland courses the ground remained so hard that it was impossible to lift or lay turf accurately or to prepare the soil for sowing seeds until the rain came, and it came in abundance. By that time, however, the season was too far advanced to expect much growth, and the greenkeeper's plans were for the time frustrated. I have vivid recollections of dry seasons which were

troublesome enough to greenkeepers, but the drought of 1911, with its attendant results, was a unique experience to all of us. Let us hope, however, for more favourable seasons, when all our well-tended greens will be covered with verdure new.

Work for the Month.

This month is not very acceptable for doing important work on the putting-greens, as we are now about midway between autumn and spring, the seasons in which the greenkeeper can best enrich the soil and renovate the turf thereon. There is much to be done, however, to maintain the greens in good condition—that is—if they are to remain under play during the remainder of the winter. The ordeal which the inclement weather inflicts makes careful handling necessary, but the judicious treatment of greens in the autumn will facilitate the labour and lessen the worry now, as well as later on in the season. The essential point meantime is to study carefully every little detail regarding the proper method to employ in the upkeep of greens at this particular time. With few exceptions, all inland greens are still infested with worms, and those pests do very considerable damage to the turf by burrowing up through the soil, throwing up clay casts all over the green. That evil necessitates the use of temporary greens for winter play, or as a consequence of the excessive brushing and rolling required to keep the permanent greens in playable order, much of the finer grass will perish ere the winter is out. One hears so much nonsensical theory regarding the beneficial effect that

worms have on the greens in draining the soil, and a hundred and one things quite as abstract, all of which are alleged to have been founded on theory. Personally I detest the look of a wormy green.

Teeing-Greens.

Where teeing-greens are yet to be built, the greenkeeper should endeavour to have this work done now. The old saying "as the day lengthens, the cold strengthens," is a very mild way to describe the inclement weather which we generally experience at the end of the winter quarter, and very often in the early spring as well. Consequently, greenkeepers should as far as possible be prepared for the cold, biting winds and spells of unfavourable weather which inflict permanent injury on newly laid turf, and ruin the braird of young grasses. Although work of this kind is often accomplished in the early spring, still, how much of such work is a complete success? My reference to teeing-greens means, of course, the turfing of same, as the necessary soil should be in place for at least six weeks to allow it time to sink and become equally solid. Then, before starting to lay the turf, it is necessary to prepare the surface to the desired level, and in the case of heavy clay a thin layer of sand is very desirable. When bedding turf on light, sandy soil, spread on about two inches of rich loam. Never lay turf on a bed of raw sand, as it cannot contain sufficient moisture to maintain the grass; anything in the nature of dung should not be used, as it forces a soft growth of grass which, above all, must be wiry on the teeing grounds. A tee when finished should have a rise from back to front of 1 in 144,

which incline may appear to some golfers as being too flat. It is quite sufficient, however, under ordinary conditions A cocked-up tee is very unsightly to look at, and it affords no advantage to the player even though a high obstacle has to be carried with the tee shot.

Bunkers.

This month is a very good time for facing up and making new bunkers, the old-fashioned bunkers, which were made on straight lines with almost perpendicular faces, are now being outnumbered by more artistic designs. Personally, I think the more rugged and natural-like a bunker can be made, the better it harmonizes with the general contour of the ground on a good links. Mounds of various sizes and shapes are, to my mind, the best kinds of hazards yet devised, as such are, in most cases, cheaper to construct than dug bunkers filled with sand ; and on an inland course the maintenance of sand bunkers is an expensive item. It would be a mistake, however, to replace all the sand bunkers by mounds, but the latter might easily take the place of pot bunkers around the greens with the addition of two well-made mounds, one at each side to narrow the approach to the green. Where the soil on a golf course is sufficiently dry to insure against water lying in dug-out pits, then any form of bunker desired may be made ; but on wet clayey soil or low-lying ground, the raised-up hazard, of whatever type, is best. Indeed, such is indispensable on many courses. But where the seaside links are imitated by the construction of sand bunkers on inland courses, the sand bed

should be made deep and a good supply of sea sand kept therein. Shallow pits on exposed places are liable to be emptied out by wind, and the contents scattered all over the surrounding turf, leaving nothing but clay with a thin layer of sand to annoy the golfer who is unfortunate enough to have to play from such a place.

Snow and Frost.

On many links the one set of greens is played on all the year round, and that without ever having a day's rest, save on the occasion of a snowstorm, the only thing which makes golf impossible; and as the snow carries down with it from the air a quantity of nitrogen, and has otherwise a fertilising effect on the grass, it should be allowed to lie on the greens until it melts. Brushing or scraping snow off a green is far too risky to be attempted, as frost may set in and ruin the cleaned greens for the whole summer. During winter the holes should be kept to the sides and corners of the greens. These places, being seldom used in summer, require tramping, and will regulate the traffic on to the green, as well as cause the players to take an unfrequented path to the next tee. Sand boxes on the latter should be moved every morning and so save much needless wear.

The Use of Rollers.

The error of using heavy rollers for what some people term hardening the surface of a green, has done enough damage in the past to cause the intelligent greenkeeper not to use such rollers except when absolutely necessary, as their constant use bakes and

seals up the soil to the extent of killing the fine grasses. A light wooden roller is quite sufficient on inland greens to keep a true surface, excepting after frost, when the turf is much improved by being heavily rolled. The green must be moderately dry, however, and all the frost out.

Seaside greens require more heavy rolling in winter. The surface soil on such is of a light, loose nature and is easily affected by frost or much rain, after which light rollers are of no use; moreover, the soil will not bind like the clay, so heavy rolling is a benefit to this class of soil in every respect, and more so if the turf has a tendency to grow moss.

Top Dressings.

During this month, few kinds of dressings can be recommended for immediate use, as it is between times for applying fertilisers, but for improving the surface on inland greens, sand has taken first place all along. I think most clay greens have had their initial dressing with the old-fashioned remedy. And the same thing has been found necessary ever since. The sand is of no value as a manure, but when judiciously applied, it counteracts and reduces the organic matter which rich soil contains in excess of the amount required for growing fine grasses. Sand makes a firm, porous surface on a green, and encourages the finer grass to sprout up, and it has also a refining effect on the coarser growing kinds, as well as making the plants of a hardier substance; yet, after all these attainments, it is necessary to use sand with discretion, because, as in other things, one must be careful not to overdo

the right amount. Far better to use too little and be on the safe side, than to put on too much. Just apply it in small quantities; allow the turf time to absorb one dressing before putting on another. Three or four dressings at suitable intervals are better than applying all at once. I don't know if old Tom was an advocate of the use of sand on all sorts and conditions of turf. I think, however, his familiar dictum, "use plenty of saun'," has been voiced on almost every golf course. Indeed, I had that same advice from the Grand Old Man himself in the year 1903. At that time I was busy making the new course for the Glasgow Golf Club at Killermont; and although the course had been laid out and the work in its construction well under way, the High Priest of golf was asked to come and grace the place by his presence, which he did, and he walked as far round the course as his then failing strength would permit. I don't remember if he suggested any minor alterations on the round. He had no doubts, however, as to the suitability of the ground for golf, as he declared when viewing the landscape that Providence had intended the place for a golf course; which expression by the Grand Old Man was considered a high testimony of its worth. I understand Killermont was the last course old Tom visited, or had the credit of laying out. I assured him at the time that I would use plenty of "saun'." I did not use it to excess, however, and had the course not been a new inland one, I would most likely have forgotten to use much of the old-fashioned remedy, as I think it is extremely erroneous to topdress sandy soil with sand. A little sand is useful on some mossy surfaces of coast greens; but if the

practice is persisted in until sand meets sand, where is the turf? It is then ruined and cannot be restored.

Don't Experiment on Greens.

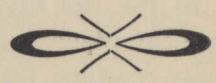
Nowadays, the struggle for supremacy in greenkeeping requirements has induced far too much experimenting, not the least of which is new-fangled top dressings. Such things are many and varied. I have no intention to comment on any of them, but would strike a note of warning to greenkeepers not to be induced to try manures they know nothing about on their putting-greens.

Try such things elsewhere on the course, but treat your greens with what is safe, and with what you had previously used. Personally, I don't believe in continuing the one treatment to greens invariably for a number of years, as the grass responds more readily to what is new to the soil and, as with the sand, the continuous use of one thing is often harmful to the turf. One cannot be too careful, however, when changing the treatment, especially if the new mixture contains acids or injurious chemicals of any kind, as the tender grasses on the putting-greens are more easily damaged than the grasses which receive no nursing or care.

When inland greens are having a winter's rest, then the surface of such may be improved. A dressing of well-burned hardwood charcoal is beneficial for opening up and rendering the clay surface porous. It is best when used in conjunction with sand. Charcoal contains very little, if any,

nutriment, for the burning process which it is subjected to has reduced it to a wood cinder. Therefore, I do not recommend it in preference to other substitutes which are much cheaper and equally safe to use. A description of these dressings will be found farther on in the book. Hard-worked greens on poor sand require both stimulating and feeding manures. Where we find the surface varies, a thorough examination of the nature and depth of the soil is necessary; then treat each green, or every part of each green, in harmony with its constitution. When topdressing a green, we find the high places require more nourishment than it is necessary to apply to the low-lying parts: the latter portions have had the benefit of all the moisture which accumulated there, and which the high ground never absorbs. Besides, the higher parts are exposed to the hot rays of the sun and drought. Those are the places which require all the feeding, and the best manure for the purpose is a good organic and chemical manure mixture, to stimulate and feed the grass. A compost may be used on such places, but it must be very fine and of a rich quality. Again, some of the greens may, by reason of their situation in low places, where for years previously had grown much vegetation which had decayed there, be in perfect order and able to maintain a good close turf for years without any manure. We now come to a green which is in a poor state; it is proof against improvement by manures and it looks well only when out of play; this particular green may have the best situation of any one on the links, yet it is useless for hard wear. To discover the secret of its bad state, dig down any

distance from two inches to a foot, and in this space you are likely to turn up the original surface which has in some time past been covered up by blowing sand, and the grass has continued to grow up leaving the body of turf beneath. This green should be lifted, the ground covered with loam and good turf laid.



FEBRUARY.

Through the Green.

THE same routine of work as for last month is applicable to the present one. But the presence of favourable weather makes exceptions to the less needful work. And the advent of bright days, which we are favoured with occasionally during this month, makes other additional work practicable. Patch and topdress bare and poor places on seaside links. A well-prepared compost, to which a little artificial manure has been added, is the best dressing for such places. Apply the dressing very lightly, but evenly, over the surface, and sow grass-seeds in any seams which appear between the rows of new-laid turf. The latter work should be done immediately the turf is laid, as the seeds then adhere to the sides, and the roots join the turfs more quickly than the old roots would spread.

Roll the fairway on inland courses. If the ground is dry, a heavy roller is the best, and it may also be used on seaside links. But care must be taken to stop when frost appears. By the end of the month iron cuts may be filled up with seed and soil, but unless good weather prevails, it is better to defer the patching until next month, or perhaps later still.

Putting-Greens and Manures.

Presuming that the greens have been topdressed in the early autumn with a well-balanced manure to revive the tender grasses after the heavy play of last summer, they should now be gone over, and any visible weeds picked out. Then insert a pinch of seed, which should be mixed with fine soil, into holes where the weeds were taken out. Where weeds are growing in clumps, the best way to remove them is to cut out the lot with a hole-cutter or a turf-renovator, and replace good turf with the same implement. The old saying of "A stitch in time saves nine," is very applicable to the foregoing. By the end of the month the greens should get a light dressing with chemical manure to stimulate the grass roots and start an early growth. A very thin sanding is useful on top of manure for inland greens.

Seaside greens require close attention now. Topdress them with a highly-nutritious manure, which should be well balanced in both chemical and organic mixtures. The right class of chemicals are safe stimulants, which will revive the grass and start a fresh growth, but such should not be used alone, as they do not enrich the soil, nor do they have a lasting effect on the grass. On the other hand, organic manures, if proportionately mixed, are in themselves a complete food for grasses, and are easily applied. And if such manures are well prepared, they never put the green out of play. Some people, however, are afraid to use artificial manures, and prefer to use composts, and that

generally necessitates the greens being out of play for a long time. And this process has this drawback,—it takes the turf so long to absorb the substance from such crude stuff that a large amount of its fertilising matter will have dried and blown away.

Some greens do very well with such dressings, while others, with finer and more tender grasses, are so easily scalded that it is dangerous to use anything which will cover the grass for even a short time. All these things should be very carefully considered. It is far easier to experiment in a haphazard way than to repair the damage done to turf by the use of insoluble compounds, or by the application of poisonous chemicals. Many conscientious greenkeepers, whose chief aim is to have their greens in perfect order, imagine that this perfection can be best accomplished by sheer hard work, and many a good green has been spoiled by too much care and too little feeding. I am well aware that a large number of greenkeepers are averse to the use of artificial manures of any composition; but why such should be the case, the reader may define, as I am reluctant to cast a slur on any of them. I may be permitted, however, to remark that the extremity is reached when the responsible party refuses to use on his greens anything which would have the tendency to force a growth on the grass. The results of this latter principle have been scientifically proved and condemned, yet how many sets of greens do we see in a starved-out condition, and a constant worry to those in charge? I wonder how many readers will agree with me in saying that regular attention to manuring greens will ultimately save fifty per cent.

in their upkeep. This saving may be estimated by the disappearance of various kinds of weeds, which the manures exterminate. Weak and exhausted places can be renovated by the judicious use of manure, which saves patching by turf or sowing with seeds. The fine grasses overcome the coarser kinds, and a close, true sward of healthy grasses is assured, where the right mixtures of manures are applied.

Eradication of Moss.

The prevalence of the moss families, of whatever variety, is chiefly the outcome of the want of feeding. When, however, the moss, or fog, has overrun the grass, we are compelled to resort to the last remedy for its extermination, and that is to rake out the moss, which operation, with an iron rake, is both tedious and unsatisfactory. Indeed, greenkeepers are loth to begin such a laborious process on a large scale.

But, thanks to a new invention called the Soutar's Moss Extractor, all this extra labour is now and for ever gone. I have used this patent extractor, and found it a really good thing for tearing out moss, which it throws into a box fitted on the machine for that purpose. The chief merit in this labour-saving device is the removal of moss and other surface growths, and it never disturbs any of the grasses. By its use the surface of a green is made ready for sowing seeds, topdressings, or any other renovation necessary which the covering of moss had hitherto rendered impracticable. A boy can work the machine, and may easily do more and better work than would be possible for twelve men to accomplish with hand rakes.

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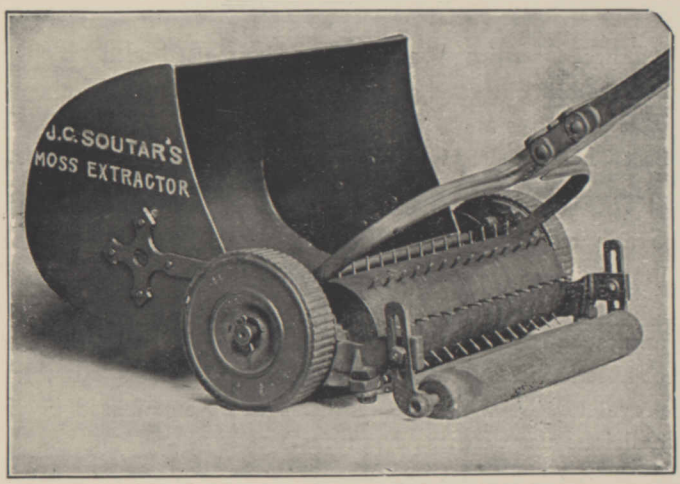

The Field.—"The invention will be welcomed by those who have the care of turf in which moss is apt to be troublesome."

Golf Illustrated.—"It will rake the surface to a uniform depth much quicker and better than an ordinary hand rake."

Golfing.—"A novel and useful tool. It will tear out the moss, but leave the grass untouched."

J. C. SOUTAR

Clutha Place, UDDINGSTON

Mr Soutar, the inventor of this useful machine, is the well-known and highly-respected representative of Messrs Ransomes, Sims & Jefferies, Ltd., of Ipswich, who were the pioneers in the Lawn Mower Industry, and whose latest productions are well worthy of the leading place they now hold in competition with firms in that particular line. Since the advent of the Motor Lawn Mower, Ransomes' machines have, to my own knowledge, come out best in several practical tests. When asked to give my opinion on which make of mowers is best for cutting putting-greens, I have no hesitation in recommending the hand machines in which Messrs Ransomes specialise for that purpose.

Artificial Manures.

In dealing with the various kinds of artificial manures, I refrain from giving the compositions of what I consider a suitable mixture for either sandy loam or inland courses, as such an explanation is uncalled for and beyond the rights of the man who wishes to mind his own business. Besides, many old-established companies are now making a speciality of manures for greens, and all of them are spending much money in research. Doubtless the practical side in greenkeeping has proved very fascinating to thousands, who happily never knew much about the hard work and worry connected with practical work on the golf course. Giving advice and prescribing treatment are things now undertaken by very many people who have only a remote knowledge of greenkeeping. But the would-be expert who gives a formula for manures is

lacking in the essential discretion which experience teaches. I was asked some years ago by a secretary of a golf club in Ireland, to prescribe or supply chemical manures which would eradicate clovers from his putting-greens. I examined the turf and discovered that some of the putting-greens were actually covered with various kinds of clover. Trefoil was predominant, however. I suggested sulphate of ammonia and other things, as a remedy for the clumps, but because I failed to apply some rank poisons, my advice was not considered as satisfactory. Indeed, I was informed that some drastic measures would be necessary, and yet the turf was to be kept in a healthy, growing state. Needless to say, I deferred treating their greens till a more convenient season—which never came. I am at all times opposed to using strong chemicals, singly or unadulterated. Sulphate of ammonia, nitrate of soda, etc., are not to be experimented with. The dread of using phosphatic manures is every year becoming more and more apparent. Why? Because such have a tendency to encourage clovers and have induced too many men to use ammoniacal manures to excess. Those latter manures are certainly the most dangerous to use. A little too much will completely alter the texture of both soil and grasses, and an overdose is sure to burn out all surface growths, which, of course, includes the finer varieties of grasses. All the nitrogen required by most soils may be applied by using good manures. Dried blood, Peruvian guanos, fish guano, dissolved guanos, etc., are all valuable manures, when well mixed with phosphates and potash, for light, sandy soil. We cannot do without potash, in a mixture for seaside

greens. Bone meal is very valuable, although it encourages clovers. Kainit is far too little mentioned, I suppose, because it is cheap and large profits are impossible. It may be used, however, in expensive mixtures. Superphosphates are very useful in their own places, but like the last-mentioned manure, they are very cheap when purchased from the manufacturer.

One hears so much wholesale condemnation of so-called chemical manures, that I should like to warn those who make rash remarks about chemicals, to find out the composition of those chemical manures. First of all, we must distinguish between artificial and chemical, by including the latter as a natural element to whatever extent we may compound numerous mixtures of really first-class manures, all of which are complete plant foods; and that without adding any artificial chemical. On the other hand, many kinds of organic manures are, of necessity, chemically manufactured. Bones and other organic substances are dissolved by acids, while others are chemically treated in the course of manufacture. Before the Act of Parliament was passed in 1906, to protect purchasers of manures by compelling the seller to give an analysis of what the said manure contained, several farmers judged the manures by the smell. It was nothing but acids and other chemicals that gave off the odour. So likewise, I fear, many of the present-day critics are even worse than the poor old farmers, as the only technicality with which they are acquainted is the name "chemical manure." Chemicals should not be used in a haphazard way, as they are only stimulants, and an overdose of such tends to leave a

lasting evil effect on both soil and grass. The action of nitrate of soda is a severe test to soil, as it affects other manures to the extent of forcing a rapid growth on whichever crop it is applied to. Sulphate of ammonia is a most dangerous chemical to use alone on grass. It should be mixed with sand or soil, save where it is intended to kill weeds or moss, which it burns out if used during dry weather. It must not be used, however, on top of lime or recently applied manures.

Natural organic manures are safe and useful dressings for putting-greens if properly manufactured. Horse manure, peat moss litter, old rotten turf, leaf mould, seaweed and liquid manure, make good composts, but all the ingredients should be built up in a dry pit and equally mixed. When the compost heap is completed, the liquid manure should be poured over the top and the stack allowed to remain at least twelve months. By that time the seaweed will begin to decay, but the lot should be turned over at intervals until the end of the second year, when all the mixture will be ready for breaking down finely, and should be made to go through a $\frac{1}{4}$-inch riddle. A little sand added to the heap will open up the other mixtures and make them more friable.

The only safe time to use composts is at the beginning of winter, and such should never be used on rich soil. Poor, sandy turf and moorland greens require a compost, but it must be used very sparingly and applied equally over the surface, and worked into the turf.

Malt columbs is another useful thing for top-dressing greens, but it is generally far too sparingly

applied. A light sowing by hand is useless, as its chief virtue for greens is the protection it affords to the grass roots, and if applied during winter the rain will wash it down and dissolve the little barley substance which it contains.

Rape meal is another similar substance, though the word meal is a little misleading to some. It is used in another form for putting-greens for a more useful and profitable purpose, however; but as the process is a secret one, the composition in which it figures largely is called by many a name.

Wood ashes are about the best thing I have ever tried for improving the grasses on the putting-greens, and where a quantity of tree branches is obtainable it is well worth taking the trouble of burning them for the ashes; this dressing should be applied in a dry state, and mixed with a little fine soil to ensure its equal distribution.

Lime is essential to a degree on all soils, but its deficiency is not nearly so common as some experts would have us believe, and as it is not required to excess for growing grass, we are quite safe to rest content without an analysis of the soil from places on the links. I have used ground or self-slaked lime for years on both seaside and inland greens.

MARCH.

Inland Putting-Greens.

THE prevalence of cold winds in March is very trying to plant-life generally, and the sudden variations of weather are most perilous to putting-greens. This blighting time comes at the end of the winter period, at which time the grass is in its most delicate state, and requires careful nursing. The tender grasses are now opening up to send forth their young shoots, which, if cut away by the cold, frosty winds, are sure to be backward in growth throughout the early spring, at which season you wish the grass to be vigorous. Those drawbacks, however, can be insured against if the greens are carefully handled. They may be summarised: Don't brush the greens in frosty mornings, or use a heavy roller in such weather; keep the holes in the sides and corners of the greens (although the ground is now dry, the greens suffer much from traffic, and guarding against the usual unnecessary tramping will save much wear on the parts of the greens which we wish to preserve for summer play). On inland courses where winter greens are still in use, the summer ones must not be neglected. The greenkeeper should avail himself of every opportunity to improve the surface by working in the topdressing of whatever kind used

Where charcoal has been applied to greens in winter it now requires much labour to get it worked into the turf. The back of a rake, to rub it in, is the best thing, as brushing is sure to lift the charcoal which is already settling down. After such operation with the rake or any other suitable tool, the green should be rolled; but where there are wormcasts, rolling must not be done during wet weather, or when the surface is in a soft, sticky state. During dry days, however, a heavy roller should be used frequently. When the topdressing has disappeared, and a smooth surface has been obtained, the greens should be cut and kept as if in play until they are opened, which, if given favourable weather, should be by the end of the month. Where manuring of such greens has so far been neglected, they should now get a light dressing of good manure to start an early and lasting spring growth on the grass; but it is far better to have the effects of the manure showing before starting to play on the greens. When the actual play begins on such greens, the holes on same should be cut at the back and shifted round the sides to ensure the greens being equally trampled. The position of the next teeing-green will in all cases indicate how best to proceed with the hole-cutting. Indeed, those apparently trifling things should be kept in view by every greenkeeper. Golfers generally make a bee-line from the hole to the next tee, and where there is much play, this beaten track will soon show the effect, especially so on seaside links, and during a spell of drought. I may again remark that attention should be given to shifting the tee or sand boxes every day, as by doing so we prolong

the life of the turf on those hard-worked, and often recklessly-used teeing-greens. I am glad to say those little things are now having more attention given to them than has been bestowed on turf heretofore. Before the advent of the rubber-cored ball, the tees on some courses received very little repair: it was no unusual thing to see the teeing space between the disk and box worn into a hole, and the turf ruined on the space occupied by the sand-box itself. So I think, when we look back and recollect the routine of greenkeeping as practised not so very many years ago, we cannot deny that the methods of producing and maintaining turf have vastly improved, and we admire the conscientious way in which the various duties are now performed.

Seaside Putting-Greens.

No amount of explanatory writing or lecturing can define fully the difference between the up-keep required for the real sandy turf at the seaside and the inland greens. The man in charge of the former is best able to discover the many little peculiarities of which such soil and turf is possessed, and if he be competent to undertake the work efficiently, then I think he should be allowed to proceed with his own methods. When a Golf Club Committee presumes to prescribe treatment for some trouble which has presented itself on a poor, sandy green, and which the greenkeeper is endeavouring by himself to put right, then the end is in view, but not as anticipated.

It is very bewildering to read articles written by cranks on how to maintain the coast green in its natural or old-fashioned state—these men forget to

compare the amount of play which the popular coast greens are now subjected to, with the occasional round indulged in when only a few played the game. Fortunately, however, the golfers of the present time are accustomed to the improved conditions, and adhere to the rule of having their greens in good order. And to achieve this improved state of greens, it is to the greenkeeper's advantage to keep his turf in a healthy state. It is now well known to golfers and greenkeepers that sandy soil is deficient in organic and vegetable substances to maintain a sufficient growth on the grass, and at this time of year the turf is in a very exhausted state. The judicious use of some fertilisers is just what is wanted to force a growth on the grass.

It may be thought that I deal too much with this particular point: to my mind, however, it is of vital importance in greenkeeping, therefore I hope the reader will forgive my persistence in uttering repeated warnings against what some critics are likely to regard as a grossly exaggerated account.

Through the Green.

On seaside links it is often necessary to begin now to fill up the iron cuts with seed and loam mixed; or the seeds may be put down first, and then covered with the prepared soil. Personally, I have tried both ways, and found no advantage of the one method over the other, only in the deeper cuts it is a better plan to use the mixture. When doing this work, it is a more satisfactory plan to lift out any apparently dead

bits of turf which, although in place, are not growing, and will ultimately have to be removed and the places renovated. This being the first time the cuts are being filled up since last autumn, many bare and thin places are likely to be discovered, which cannot possibly be covered with the seed mixture. A second party of workmen should be sent to patch the bare places with turf, and to topdress the thin or worn parts with compost. Greenkeepers should always have a heap of this valuable manure ready for use, and those in charge of coast greens cannot afford to be without the right stuff, while those with greens on poor or thin soil will find it a matter of economy always to have some at hand.

Inland courses should also be gone over, and the cuts filled up as on the seaside links. Some people rely on the deep-rooted, inland grasses coming up through the cuts, and they therefore use soil alone for filling up these places; but I like to have seeds mixed in the soil for all such purposes. One bushel of seeds goes a long way in filling up cuts, and seeds seldom fail to grow well in those places.

Different Types of Seaside Greens and their Keeping.

If any person were to ask me to give my opinion on which class of links was the most difficult to keep in good condition, the question, of course, would include the maintaining of eighteen greens in uniform putting order.

I should say the links which varied from pure sand to loam and clay were by far the most troublesome to keep with a uniform surface of turf, and that may be partly accomplished by varying the treatment and the labour, which means a great deal of trouble and extra attention from the greenkeeper. Even if the man do his best, the physical nature of those soils remains diverse, and the turf likewise. On a course such as I refer to, the putting-greens which are situated on the clayey or loamy soil will require much more cutting all through the growing season, than the others which have a sandy surface soil with no organic substance to encourage the grass or to resist a long spell of drought. Then the clay greens are during that time growing abundance of grass and altering the putting conditions out of all comparison. Then during the winter season the sandy greens are fit for play, and can, as a rule, resist as much hard wear as would ruin the others, especially if the worms are allowed to remain on the clay greens. A course so contrasted in its soils should, to my mind, be avoided. A good nine-hole course on the sand is better, or at least more pleasant to play on, than eighteen holes when the full round extends inland. But how few really good sandy links we see which are not characteristic of clay in some part. Personally, I have seen only a few real sandy courses, and I had the good fortune to be greenkeeper on one where the semblance of clay was never discovered, and that was on the far-famed Portmarnock links. There the surface soil varied from very light sandy loam to pure sand, which in many places was almost devoid of decayed

vegetation or other substance to sustain plant life; and those poor parts were not confined to the high ground. Indeed, the greenkeeper who wished to study how to overcome the intricacy of such soil, and how to treat same in order to maintain a uniform and otherwise desirable covering of grass on the putting-greens had much food for thought. One was fully compensated, however, for all the trouble and energy expended as the turf responded readily to treatment, and when in the pink of condition a more beautiful set of greens can never be seen. The quality and texture of the grasses there were mostly of the very fine varieties only to be found at the seaside; but some years previous to the club finding a supply of water for their greens, the prevalence of dry, scorching summers had killed off some of those fine grasses which were replaced by a few coarser growing kinds; and although the latter grasses would not in themselves complete a square yard of turf for each green, their presence is seen by the critically inclined. Only a few of the putting greens are a little on the flat side—the others are all beautifully undulating. To my way of thinking, Portmarnock Links is well to the front as a championship course, and for nature's gifts it has few equals. What a pity that such a fine course is separated from the mainland by a narrow, yet treacherous, arm of the sea. The photograph herein shows the Irish jaunting car crossing the Channel at low water, where the journey is not always accomplished without the risk of a ducking, or of having to be taken aboard one of the club's boats, as the tide rises very rapidly in this arm of the sea. The air at Port-

A picturesque view of the ferry from Baldoyle to Portmarnock Golf Links. The Author was formerly Greenkeeper at Portmarnock.

marnock is delightfully pure, and the views to be obtained from the links are unsurpassed. Although the journey from Dublin to Portmarnock is only about six miles, the golfer is obliged to travel there by rail, road, and sea, and most golfers enjoy the varied modes of travelling the short distance. To return to the course, I am sure readers who have played there, will agree with me in saying that if such a links was in England or Scotland, it would certainly be selected as one of the championship courses. Indeed, I have heard English golfers remark that if a course like Portmarnock could be obtained around London, it would prove a veritable gold mine.

Illustration of the earliest Lawn Mower.

The first lawn mower was made in 1837 by Ransomes of Ipswich, under "Budding's" Patents. Some years later Green of Leeds and Shanks of Arbroath each brought out a hand machine.

APRIL.

EARLY spring is an anxious as well as a busy time for most greenkeepers. As at this season we expect to see results for our winter's work, it behoves the greenkeeper to have his interest centred on how to obtain perfect turf on his putting-greens. Sometimes one thinks one is not compensated fully for the energy expended on some particular kind of work; nevertheless it pays in the long run to do one's best. Any reserve knowledge one may possess, is sure to be required under some adverse circumstances. One never knows how soon the lesson learned by adversity may be required to extricate one from some similar perplexity.

I think the summer of 1911 has taught a lesson to greenkeepers generally, and it also proved the advantage which the carefully cultivated turf had, as compared with the impoverished greens elsewhere: the former kept on growing, and resisted the ill effects which the continuous strong sun had already made conspicuous on the poor, uncared-for turf. Indeed, the greens which were left to nature's ways, received many an ugly scar in the combat, many of which are not yet quite healed. A light dressing of manure may still be applied to back-

ward greens, but it must be applied during a dull, damp day, as most manures have a tendency to burn or brown the grass a little if used during a hot or dry day.

On inland courses where temporary greens have been used in winter, they should be abandoned at once; indeed, I presume that everywhere summer greens are now in use, and if not, I would advise that they be got ready for immediate play. My reason for saying this is, that putting-greens which have been lying idle all winter, require a great deal of trampling to make them firm, in addition to cutting and rolling. The greens are now ready for cutting, and for this purpose I advocate the use of a lawn mower which will cut very close, as cropping the grass close by the ground clears away all the coarse or creeping stems, and admits light and air to the finer grasses which we want to cultivate. In addition to keeping the greens well cut with a mower, they should be cut occasionally with a low-set scythe. Never allow grass on a green to creep or become rank. The more close cutting a green gets, the better it becomes. And this applies to all putting-greens, whether they are on clay or sandy soil. Roll the greens regularly with a light wooden roller, changing to a heavy iron one occasionally. There may still be on highly-situated golf links a touch of frost in the morning, but never fear that the frost will kill the new-cut grass. The growth is forced from the roots. Do not be influenced by any advice to stop rolling the greens until a uniform playing surface is obtained. Remember, I don't advise you to overdo rolling or force a surface on the greens. And those remarks refer to greens

that have been out of play all winter. Where the one set of greens is in play all the year round, the damage done to them by rolling is done in winter when the growth is stopped, and when the existing grasses are then in a dormant state. The greatest care should be taken to get all weeds out of the greens now. Where daisies are so thick as to make hand weeding impossible, one of the various preparations for killing them should be applied.

Seaside greens should be watered when necessary, and otherwise kept in a healthy growing state. I think I hear some critic saying, when reading the above: "What can he mean by such a silly remark as keeping greens in a healthy growing state?" Well I will here give a few points to be attended to, which, if carried out, will help very materially in maintaining the turf in good condition. A handful of manure applied to a weak place at a suitable time, will help to revive same. A careless player might damage the turf when having his revenge for missing a short putt: the greenkeeper must repair this at once, although he would prefer to retaliate by damaging the offender's nose.

A weed should be pulled out as soon as it is seen. Several other things common on golf greens might be mentioned, all of which could be put right by the greenkeeper on his morning round.

Through the Green.

Proceed with the filling up of iron cuts and holes on the course. Get over all the lines of play now.

Where holes are too big to fill with loam and seed, don't hesitate to patch such places with turf, which will knit and grow better now than it will later on in the season. Attend to turf nurseries by weeding and sowing seeds where required, etc. Rake the surface of bare places, then sow them with seeds. Roll and topdress afterwards.

On light, sandy soil difficulty is experienced in producing turf from seeds. I found it a better plan to select a plot of old turf. This I cut, topdressed and kept well cleaned of weeds. By that method I had always a supply of good turf ready for any purpose required. When one plot is finished have another ready to start on.

New Ground.

Seeding should be finished this month where additional ground is wanted for play. Do not neglect this ground, but keep it cut and rolled, for the turf will be improved thereby. Now that we have passed the vicissitudes of winter, and the welcome springtime has arrived—a time to which golfers look forward with pleasant anticipations of the delightful games to be engaged in on the full-length summer course—which extra length gives the swiper so much advantage over his weaker brother. But the slogger may be a very poor putter. So if the short driver has been fortunate enough to steer clear of the many pitfalls by the way, he may yet retrieve the hole. Golf is a game

of many departments, in each of which science is required. But the part which wins or loses most matches, is the putting. It is therefore essential that the putting-greens are kept as nearly perfect as it is possible to have them. And it is the duty of the greenkeeper to do everything he can to justify his profession by presenting the greens in the very acme of condition.

Golf Grass Seeds.

To procure good seeds which will produce turf of the particular texture required, is in some cases an extremely difficult task. The expert finds that some of the fine species are a puzzle to distinguish. Indeed, some of the finest Fescues as well as the Poas are sometimes confounded with less valuable seeds. I have frequently tried testing seeds to find their purity and germinating energy. Some of the various methods I tried were successful to a degree, but I may say the best test was a trial in prepared soil; all other plans were none other than an experiment. I have tested as many as twenty different varieties of fine seeds which I sowed side by side in strips of prepared soil. The seeds were supplied by several establishments, but some seedsmen sent me samples of special mixtures, which, when the contents were nameless, proved a useless blend for my purpose. No doubt many respectable seedsmen are loth to reveal the names of seeds which they themselves select to blend for

special purposes. And the Government seed-testing stations refuse to examine mixed seeds, which means, of course, that the purchaser of such is unprotected. Consequently, the man who is unable to judge the quality of the seeds which he buys, is anxious to obtain a guarantee regarding purity and germination; when this warranty is refused him, he naturally feels like having bought a pig in a poke. He therefore decides to deal with some highly respectable seedsman, whose repute is a sufficient guarantee of the goods he sells. And I would add that the seedsman who has made a good name for himself by his honest dealings, must needs maintain and increase his popularity. We must not forget the pioneers of the real golf grasses, which grasses were the forerunners of the present-day perfect putting-greens. Personally, I give a few of the seedsmen due credit for many of the improvements accomplished on the golf links generally; although many and varied are the agents at work in that direction, the outstanding feature on any golf green is the presence of fine grasses.

Everybody knows the old saying which Professor Ward repeats in his book on grasses. "All flesh is grass, and the man who can make two blades of grass grow where one grew before, deserves well of his country." The latter remark is very applicable to greenkeepers who endeavour to increase and multiply the grasses on their putting-greens. I would add, however, that the additional grasses must be of the right texture before the greenkeepers deserve well of their clubs. For reliable seeds, and true to name, Stewart's Stronghold Grass Seeds are amongst the best I have ever tried; and this, I

venture to add, is a common remark by green-keepers who know good seeds, and who know where to make their selections when wishing to purchase some for any purpose required on their links. This subject—grasses—must be considered by many people as being the most important of any relative to the game of golf, as the nature and condition of greens affords a never-ending interchange of views. The expert botanist who understands the subject is sometimes brought into conflict with the man who thinks he has mastered the science of growing grass to perfection, and who possesses so little knowledge of the cultivation of turf, as to compel him to avoid practical or educative points. Such would-be experts can with safety act as critics so long as they avoid practical points, and continue to ridicule imaginary evils. The state of many teeing-greens deserves severe criticism, as the coarse grasses growing thereon, may easily be obtained from any seedsman at a cheap rate. The rank grasses which are grown on teeing-greens, and such seeds as are sold by the leading seedsmen to produce such rapid growing grasses, might be improved upon by obtaining the seeds from a farmer's hayshed. I don't wish to insinuate that seedsmen should be condemned for selling such mixtures, because they, no doubt, think such coarse grass will withstand hard wear, drought, etc., better than the fine varieties. In that opinion, they are mistaken. In all my experience I have never found coarse grass possessing any virtue to compensate for its expensive maintenance and its degenerate habits, nor does it spread to produce a close bottom, and when cut,

the coarse stems are like hay stubble. Indeed, the fine grass should be extended to the teeing-greens where it is sure to acquire a more rank habit in growth than it would acquire on the putting-greens.

But why not have tees to compare in turf with the putting-greens, minus the artificial surface which it is found necessary to apply to the latter? And there is nothing in the game of golf to justify the existence of coarse grasses anywhere on the links save the margin which is left uncut, and there it should be encouraged to grow as it serves as hazards. For what reason rough, deep-rooted grasses are sown on tees, I have never found out. Nailed boots are a severe test on grasses, and many wearers of such are reckless enough, when on both tees and greens, but here the thick carpet of turf sustains much less damage than the same usage would inflict on the rank tufty kinds.

An old golfer once said to me that it was quite unnecessary to replace turf which was lifted by play on an inland course. He thought trampling the ground level was sufficient, as the roots of the grass remained in the soil; he was one of the old school of golfers, and for that reason, together with the nature of the offence, much turf was left for the greenkeeper to replace. The natural instinct in some golfers is to leave the cut-out turf for somebody else to replace. But as on teeing-greens a level surface is essential, and cut-out turf on these places is necessarily substituted by fresh turf from the nursery, where are the benefits derived from the deep-rooted grasses? or why leave the tees in such

an unsightly state until the grass springs up in the bottom of these cuts? And to patch tees which are in constant play with seed and soil is only losing seed and labouring in vain, as the steady traffic is sure to prevent the young grass from brairding; and indeed, a common mistake when patching with seed and soil, is the economising in the quantity of seed to apply. The same might be said about the sowing down of putting-greens and tees. Where seeds are spared, or sown on a badly prepared surface, the grass carpet is sure to be of an inferior character and lacking in texture, such as a thick sowing would produce. Fine grass seeds, when sown, should be touching one another, or in other words, covering the entire surface of the soil. One should never be led, when sowing grass seeds, to use a specified quantity. Always allow for weaklings, for the birds, etc., etc.

Vermite for Killing Worms.

Readers who are interested in the extermination of worms from putting-greens or lawns should try Vermite. It is a new remedy, but a very effective one. I have used two samples of this valuable preparation on a putting-green, and immediately after watering it in, the number of worms which came up to the surface and died was really astonishing. I spread the second sample over more ground than directed, yet the stuff had the same deadly effect on the worms. From results

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obtained I can confidently recommend Vermite as a complete exterminator of worms from turf, and I may say it has proved to be harmless to the turf. The preparation should have a large sale when fully advertised.

MAY.

State of Putting-Greens.

GIVEN favourable weather the greens should now be in good condition. From personal observation as well as from general reports I know that many greens in May 1912, at which time they were only recovering from the previous summer's drought, had to undergo a severe test by a second visitation of dry weather, and that gave grass a severe blighting and changed the texture of the best turf, while on seaside links it necessitated turfing, seeding and general renovating to regain a true surface for putting. I fear in many cases this object was only partly accomplished, as some of the finer grasses had died out, and the coarser varieties, lacking in habits of growth, never formed into a true or lasting sward. When coarse grasses have once formed into tufts, a fine surface is impossible. The cold winds, with sharp frost, which we often experience in mid-April have a tendency to affect the growth for a time on established turf. And the prevalence of such weather accounts for much of the blighted appearance on the spring-laid turf. The young braird of grass resists the inclement weather in mid-winter far better than the cold, frosty blasts of March or April. Repeated spells of frost succeeded by cold east winds in May,

have proved to be a complete exterminator of young grass which has struggled against a severe winter. Fortunately, however, cases of this kind are not of common occurrence, and we may surmise that the complete failure has been assisted by some chemicals applied at the time, which only burned out the grass or acted in conjunction with the weather to this end When one recalls how far a prolonged period of drought penetrates the soil, one need not be surprised at very unfavourable results, especially on good greens where fine and shallow-rooted grasses are predominant.

Watering Putting-Greens.

A spell of dry weather with scorching sun in this month does more damage to good turf than a much longer duration of drought later on in the season. It is therefore a better plan to begin during the dry weather to water the greens as a preventive, than to wait until it is found necessary to use the water as a remedy. When the grass is burned, a severe injury is inflicted on the roots, and their recovery, despite regular watering, is slow, while some of the finer grasses may have already perished. Opinion differs very much as to when and how the watering should be done, and as to the quantity of water. Everyone interested is entitled to have his own opinion, which is doubly welcome when practical, and this particular subject is better to be referred to and backed up by results practically obtained, than by conjecture. My experience has taught me that greens on sandy soil may be watered at any time, day or night, except in the

early morning, as the whole day's sun would dry up the water much more quickly than in the afternoon. It is needless, however, to wait for watering until the sun goes down. Any time in the afternoon is quite suitable, as an early start ensures more greens being watered every day. One should never defer one's purpose, or otherwise mind the would-be expert who expresses his wrath by calling the greenkeeper a d——fool—not to the latter's face, of course—for spoiling the good greens by watering them under a strong sun. Where there is a pipe-supply of water with a hydrant at each green, then the work can be carried out much more expeditiously than by any pump-system. It is not possible, however, for every club to have an adequate supply of water, and consequently a limited supply has often to be distributed by a laborious process.

From now onwards, through the summer, the greens which were overdosed with sand in winter will prove a constant source of worry to the greenkeeper, as the sand tends to confine the roots to the surface where the strong sun is sure to burn both stems and roots. We must not forget that when manufacturing a porous surface on clay greens, we are, at the same time, transforming much fibrous turf into a brittle substance which we require to study, and we must stop using sharp gritty matter on the greens before it is too late.

Side Hazards and Cross Bunkers.

Now that the golfing season is in full swing, with all the fair-weather golfers in evidence, many of the popular links are already thronged. Some

players who confine their golf to spring and summer seasons may criticise the alterations and improvements which have been carried out on the course during the winter months, and those players may say hard things about those who were responsible for the changes. And they may condemn, without reason, every effort to improve the course—particularly so if extra length has been added, or if some additional bunkers have been made since their last visit. All the adverse criticism soon blows past, however, as golfers are generally fairly tractable to new ideas of course construction; in fact, the majority like changes occasionally. Ever since the advent of the rubber-cored ball it has been found necessary to lengthen and make many alterations on most courses. And in order to keep pace with the ever-improving ball, it is part of every winter's work to stretch out holes, and re-arrange bunkers. The cross-hazards so common in the days of the gutta ball are now generally condemned by players as being unfair. On account of the difficulty of placing such a bunker, side hazards are the order of the day. For several reasons I think the cross bunkers are indispensable, especially on flat courses where there are no obstacles on the fairway to trap or deter the run of a topped shot. New ideas of course construction are constantly being put to the test, and all manner of bunkers are being constructed, from the straight-faced, unattractive-looking thing which represents a regulation jump on a race-course to the imitations of the natural undulations, some of which look more like little grass-covered mole-hills. I once accompanied a Civil Engineer on a bunkering expedition, and the equipment

we carried for measuring and marking off the ground was symbolic of some great fortifications, instead of that required for making traps for badly-played golf balls. When measuring-tapes, rules and levels are used to measure the ground for bunkers, and their construction carried out accordingly, then I say the appearance of the links is so far spoiled. The more rugged a bunker can be made, the better it represents the original golf links by the seaside—where natural hills and hollows defy man's best efforts to improve on them.

Sheep.

On inland courses where the grass grows very quickly, the presence of a fixed number of sheep on the course in the spring and summer seasons may be reckoned on as additional assistance to the work of the lawn mowers. But when unlimited numbers of sheep are allowed on a golf course, more especially in the late winter or early spring, they do extensive damage in a hundred and one ways, as not only do they keep the course dirty, which state spoils both play and comfort, but they are constantly getting in the way of balls, spoiling many good shots, and becoming a perfect nuisance on the putting-greens. Of all the damage that sheep are capable of doing to golfing turf, their scalds on the putting-greens are the worst; and in a dry season these scalds remain throughout the summer and keep the greens conspicuous by an evil which may be misrepresented by those who don't know the actual cause of the trouble. Sheep's

manure should not be allowed to lie on the lines of play, as it keeps the turf in a filthy state. Besides, this crude manure forces a rapid growth of soft, undesirable grasses. Yet, after all, those are drawbacks some of which are unavoidable on a course where sheep are kept; and we must acknowledge the benefits derived by their presence: their mode of closely cropping the grass has a very refining effect on the growth of the latter, and sheep's feet help considerably in keeping away moss from the turf. Daisies and other weeds are eaten off by the roots and thereby kept from spreading. We may not reckon on the sheep saving much labour in cutting the grass on the lines of play or tees, but they are sure to keep the faces of bunkers, banks of tees and around trees sufficiently short cropped.

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JUNE.

THE keeping of the putting-greens in perfect order should now be the chief consideration of every golf greenkeeper. Green Committees are anxious to have their course and greens in a state of perfection at this time of year. I have frequently been asked by club secretaries to write a treatise expressly defining the work of the greenkeeper as practised at this season, but while anxious to afford information to all interested in the work of greenkeeping—and there is nothing better for the science of greenkeeping than the expression of various opinions—I have always been impelled to refrain from setting down any hard and fast rules regarding many of the details pertaining to successful greenkeeping. In this way, what is done actually on one course may not be suitable on another, even though the links may be in close proximity. One point, however, I urge should be practised on all without exception, and that is the keeping of putting-greens closely cut; but for the other work it may be summarised: In the first place, we have the vast difference between the seaside and the inland links. Then, again, special treatment applied to one green need not be beneficial to another, and one has always to have the deep, practical knowledge of the peculiarities of the soil; and it is only when

that knowledge is possessed that special treatment can with safety be applied to a green. Haphazard treatment will often do more harm than good.

The various situations, and all the different kinds of soil, call for special care and suitable treatment in each individual case, and all of those points are best to be considered locally. If all putting greens could be kept in good order by one definite system, or if a standard treatment had the same effect on all classes of greens, then greenkeeping would become a simple matter indeed. Fortunately, however, for the profession of the greenkeeper, and the pleasure of his vocation, such is not the case.

Care of Greens.

Even in this enlightened age of much literature on the work of greenkeeping, how few people will believe the amount of nursing and care required to be bestowed on a putting-green in order to have it up-to-date. The nursing process, even at this season, consists of more than cutting and rolling the greens, particularly so where greens are formed on the original surface of old turf, as then the sward of grasses requires to be improved on, both as regards habits of growth and quality of grasses thereon. The natural surface soil on a clay field does not lend itself favourably to the production of a desirable turf, nor will such soil absorb in one or two years a sufficient quantity of dressing to open it up and render it porous. It is often found necessary to repeat the topdressings for several years, and that before the surface of

heavy soil is manufactured to the grist required. Where existing turf is refined into a green it should be of a suitable quality. If not, it is not worth trying to improve by nursing. It is better to dig or plough it over and prepare the soil for laying down good turf or for sowing down the green with grass seeds, and the seeding is preferable on heavy soil. Turf produced from a suitable mixture of fine grasses is closer, more easily kept, and resists hard wear better than the common field turf. Of course the preparation of the soil has much to do with the wear of the turf as well as the maintenance of the greens. When preparing soil, either for turfing or for sowing with seeds, the work should be well done in every detail, but the soil must not be mixed with dung to excess. Only hardy grasses are wanted, and those cannot be grown to advantage on too rich a soil, or on any soil which has recently been heavily treated with organic manures. The result of a green thus treated is a strong growth of soft grass which, while vigorous, is far too stiff to putt on; and a long spell of drought, accompanied by hard wear, will affect such herbage to the extent of exterminating all but the coarse roots; and those, when allowed to remain unaccompanied by finer grass, are sure to become ranker in growth each year. The great trouble on clay soil, is how to improve the texture of the turf, by dwarfing the growth on the grass; and we cannot obtain this end by starving the turf, as poor soil is sure to hinder the fine grass from growing. It is better, however, to use no manure on the greens, than to use strong farmyard dung.

Work for the Month—Watering Greens.

During May 1912, many greenkeepers were anxiously waiting for rain to water their greens, which were dried up by the east winds that we experienced in April and May; and the hopes entertained of a growing season to remedy some of the evil done to the turf by last summer's (1911) drought, were reduced to despondency. And indeed, greenkeepers in charge of dry, hilly courses and seaside links had much cause for anxiety as such links were then lacking the renovation which the water from the clouds can best accomplish. The effect of our endeavours to assist nature is seen to the best advantage when the general conditions under which we labour are favourable.

Dry, sandy greens require plenty of water to keep the turf in good playing condition, and as we have no control over the clouds, we can only bear with the inevitable spells of dry weather and distribute as much water over the greens as time and equipment will permit. If all the greens cannot be watered, the most necessitous places may be attended to, and before starting to water the worn places on a green, I make a practice of sowing a little soluble manure on those, watering it in immediately afterwards. The artificial manure serves a double purpose, as it softens the water as well as stimulates and feeds the grass roots. The water dissolves the manure and renders it harmless to the grass. Sheep scalds on the putting-greens should be watered frequently. Work the water well into the turf.

Mowing and Mowing-Machines.

Most of the time is now occupied in mowing the lines of play and putting-greens. On inland courses where the grass grows very rapidly, this work must necessarily be carried on vigorously. Any delay in starting to cut a vigorous growth of grass means double work, as well as general dissatisfaction to players. Long grass makes bad lies and hinders the run of the ball. Where grass is allowed to grow rank in the beginning it gets into a natural creeping habit, in which state it remains throughout the season. Moreover, the ordinary mower is not meant to cut long grass. Every time the mower goes over the turf it improves the lies. The close and regular cutting is still most essential on the putting-greens ; and in order to prevent creeping or irregular growths, the grass should be cut in different directions each time. By the latter plan, the lying stems are more likely to be cut ; but to make sure of making a good job the mower requires to be fitted with a very thin soleplate and a good set of sharp knives. Many and varied are the improvements claimed for some of the present-time lawn mowers. Practical tests in mowers, like everything else, prove their worth. I have used many mowers of all sizes and I consider Ransomes, Sims & Jefferies are leading the way with reliable machines for golf courses. I have this season tried two of their perfected motor mowers, and can now say, without fear of contradiction, that those mowers are unrivalled where actual tests count.

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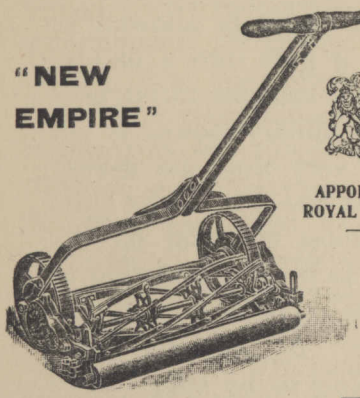

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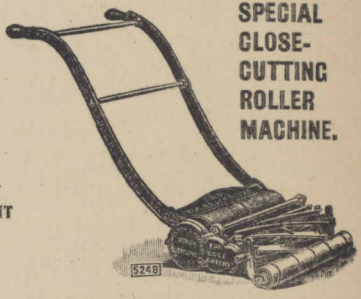

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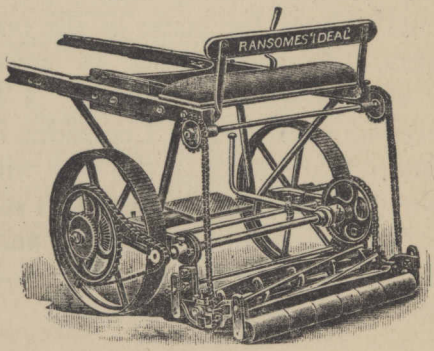

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JULY.

THE old saying "a drying May and a leaking June makes the farmer whistle a merry tune," was applicable to the greenkeeper in those months of last year, as the excessive rains which fell intermittently during June 1912 did much good to putting greens and golf links generally. Seaside greens were then restored to their normal condition. But the same rainfall was more than enough for inland courses. I don't know if the heavy rain was general. One thing certain is, the effects of the moisture were soon evident, and the nursing of greens, which was necessary during the dry weather, soon ceased. Notwithstanding all the good which this natural fertilizer from the clouds had done by changing the soil from its almost barren state, and relieving the plant foods which lay dormant through the drought, the drought hindering the gases from passing through the soil to the grass roots, still some varieties of fine grasses died, and other plants, hitherto foreign to the soil, sprang up after the rain. The most common substance to lodge and grow in bare or sparsely-covered ground is clover, which, when once established, is difficult to exterminate. This creeping weed will cover large patches of turf, even before its presence is detected. Personally, I prefer a bare place on a

green to a patch of clover. My reasons for preferring to deal with the bare soil are—such places require immediate attention, as, when the patching is successfully accomplished, we have the assurance that the evil is removed, whereas, in the case of clover making its appearance in isolated clumps on a green, it is invariably allowed to remain to a more convenient season, or perhaps the thought of removing it at any time has never been entertained. We hear of many so-called remedies to exterminate existing clovers from putting-greens, but to be successful in this, we must be very patient, and persevere in the use of manures, which has a tendency to injure rather than encourage clovers. Therefore, in order to accomplish our object, we must guard against using injurious chemicals on the soil which will be detrimental to plant life generally. We can guard against introducing clovers, to a great extent, by the judicious use of manures, but to get rid of the existing plant without doing any injury to the grass is in itself a difficult matter, and one attended by risk if attempted in a hurry. Daisies, plantains, or other weeds should be plucked by the roots. An occasional hour spent at this job will prevent the weeds from spreading, and save a bigger job afterwards. When doing this work one should never forget to put in a little pinch of seed where the weeds were taken out.

General Work for the Month.

Most greenkeepers on inland courses are now having a busy time keeping the grass down on greens, tees, and through the green. Putting-greens on such courses should, during this time of

rapid growth, be cut daily, and rolled with heavy rollers, that being found necessary to keep a firm, true surface on the turf. One need never fear doing damage by rolling while the grass is growing, and while the surface is moderately damp. Teeing-greens should also be kept well cut and rolled. Wormcasts and cut grass should be brushed off the tees, as too much decayed vegetation softens the surface and renders it brittle. Indeed, if we wish to retain a clean, hardy turf in good condition, or to improve on a soft, undesirable grass, the first and last essential is, keep it clean. Feed it in season, if it requires feeding, but do not allow all the cut grass to remain on the tees. The foregoing applies to inland courses and greens only.

Lines of Play.

The closer we cut the lines of play the better for the turf, and the good golfer will appreciate the close-lying ball in a position similar to that which he finds at the seaside; and where sheep are kept, the best way to remedy the evil of their constant presence on the fairway is to have it close cut. If sheep cannot find enough to eat on the proper course, then, and only then, will they thin out the rough, and keep the bottom so that a ball may be found. When the latter is accomplished, it is better than cutting the rough with a reaper, which plan is so commonly practised. The cutting away of the long grass means the removal of a useful hazard for a pulled or sliced ball, and the obliteration of the true line of play. I think the traditions of the Royal and

Ancient game should be maintained, regardless of petty annoyances or losses, at least so far as allowing those natural hazards to remain. And long grass, of whatever kind, is a natural hazard, which calls for more science in playing from than do most of our present-day artificial sand bunkers. We seldom see the rough trimmed on seaside links. Bents, bracken, whins, and other rank growing plants are allowed to remain as hazards and ornaments. Why not leave the rough on inland courses?

Patching.

Patching with turf during the summer season is generally considered by greenkeepers as out of place, yet many seaside greens are infested with rabbits, the scrapes of which must be patched all the year round; and while the soil contains a little moisture, we need not fear the turf dying. The patches should be put in very firm, but not beaten hard. I don't recommend making alterations such as lifting turf and relaying it now. Where a little turfing is necessary, however, to improve the look of some bare place, or to fill up holes, why hesitate? We cannot leave every little thing over until the autumn, as that season is too short to enable us to accomplish all the work which we then find necessary. From now onwards is a very good time to fill up iron cuts with seed and soil. If the grass seed can draw enough moisture to germinate, the after growth is pretty sure to continue, except, of course, during a prolonged spell of drought. We have to risk many things in

order to obtain what we desire, and better to try and fail, in anything, than fail without attempting to succeed. I have patched with turf, as well as seed and soil, during a moderately dry summer, with very good results.

How to keep Lawn Mowers.

The general care of mowing machines is a secret to some greenkeepers, while many, I may say, take a commendable interest in the proper care of their favourite mowers. In the first place, a lawn mower must be kept clean when not working, and all the bearings should be kept well oiled when in use. Experimenting on mowers by under-greenkeepers is a practice which should not be allowed. I have had experienced workmen, who, with the desire of improving on their machines, would break any part—from the main shaft of a horse machine to the most delicate part in a motor lawn mower—and all by way of finding out some defect which they themselves could put right, with the aforementioned result. When a mower is working satisfactorily, leave it alone until it requires altering; and when change of set or screwing up is wanted, do it gently—don't try to work some radical change, and on no account allow workmen to remove parts which they think are useless or cumbersome to push about.

Motors.

With the increased popularity of golf, and the improvements achieved in all other departments of the game, the motor mower is the only

additional implement which has been added to the greenkeeper's equipment that is worth speaking about. The present advanced state in which the motor for golf links is presented, shows a decided improvement, both in construction and in simplicity of working, as compared with the same class of machine only a few years ago. In 1912, the Golf Exhibition was held at Muirfield during the week of the Open Championship, and the Scottish greenkeepers had a good opportunity of studying the latest in machinery as applicable to golf links, a great number of greenkeepers being present. The various stalls presented an animated appearance. It is needless to mention the number of exhibitors, suffice to say they were all there. But while complimenting the several lawn mower manufacturers, we should not forget to mention Messrs H. Pattisson & Co.'s specialities for the golf course. Their patents are many and varied; all are necessary aids to successful greenkeeping. Although Messrs Pattisson supply all kinds of tools and machines required by the greenkeeper for the various kinds of work on the links, some of the ordinary implements can be purchased at any ironmonger's. But the Pattisson's patents appeal to me as being just what is wanted. I have used the Pattisson horse boots, bogey holecutters and turf renovator for a number of years, and I have complete confidence in recommending these necessaries in preference to any other make—besides other things which Messrs Pattisson specialise in.

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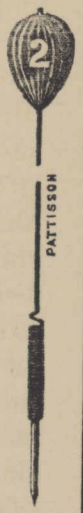

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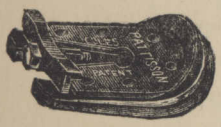

Illustrated Price Lists, with Testimonials, from the Makers—

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AUGUST.

GREENKEEPERS on most courses are confronted with ample work in keeping the grass cut and in maintaining a true surface on their putting-greens. The present time entails much extra work, which, when well done, leaves the greenkeeper little time or desire to undertake improvements. It often happens, however, that at this time one gets suggestions from members for alterations, with the hint that these alterations would be appreciated if carried out forthwith; but the earnest worker knows very well they cannot be carried out until a more convenient season, when more time can be given to study how to accomplish the task successfully. We should always endeavour to confine our various duties to their proper season, as by doing so, we will have more general satisfaction. Personally, I prefer to arrange my work beforehand, but am averse to doing things out of season. I have no desire to make adverse criticism on any greenkeeper's work, but I have seen enough of disappointing results, both from work being badly done and from important alterations being effected at the wrong time, to cause me to take many things into consideration. A

word of warning, when taken in the true spirit, may prove useful on many occasions; for golf greenkeeping, as a separate profession, is not such an old institution that any of us, although we steadily practise it, may as yet say we have mastered all the science to be gained thereby. We have all of us much to learn of Nature's ways. The man who thinks he knows all that may be learned about the commonest of plants—grass—and how to grow it, wants a simple lesson on some common mistake, just to show him how little he does understand the ways of Nature, even in a blade of grass. We have the theorist to combat with who wishes to draw comparisons between the ancient or natural putting green and the modern lawns. The only comparison I would ask is a practical test of hard wear, and I venture to assert that well-kept greens, which have been carefully tended and fed, will resist hard wear better, and recover after drought much more quickly, than will turf in its natural or unnourished state. In the old days, when the game was played by only the leisured few, the general conditions then were not to be compared with the present, as, nowadays, golf is the favourite pastime, and keen rivalry exists between the clubs as to which have the best links and putting-greens. Enthusiasm in that way has, within the last few years, gone a long way to advance and aid the science of greenkeeping. Golf links in the old days were few and far between; such chiefly existed at the seaside, and there the natural contour of the ground was allowed to remain. But now all sorts and conditions of soils are acquired to make into golfing greens, and many of them are not in ideal places

for the game. On account of mountainous ground some of the new courses are artificial from the first tee to the eighteenth green. The craze for making tees has probably reached the limit when each hole is provided with two or three tees, built up, and all at different lengths from, and at angles to, the hole. This varying of length and direction is the best point in modern golf course planning, as, every time the tee is changed, some fresh interest is added; but when the existing obstacles, many of which could be utilized as hazards, are removed, and new sandbunkers are placed, then I think the features of the course are not improved upon. As a general rule old ditches, trees, etc., are first removed, and the space carefully levelled up and turfed over. Then a new bunker is made in close proximity to the place which the old hazard had recently occupied. Why is this double expense undertaken when so little advantage is to be gained? The repetition of a few such alterations is a heavy drain on a club's money, and as a consequence the necessary improvements and general upkeep are, in some cases, curtailed. Many inland courses are spoiled by too many sand juts, and by the absence of mounds, or other traps, which would be quite as effective and much less expensive, both as regards the initial cost and the upkeep. The cost of keeping a necessary supply of sand in inland bunkers is very considerable; and where sheep or cattle graze, it is found practically impossible to keep such bunkers in playable condition. Those who have tried to dislodge a ball from the bottom of a hoof mark, in sand, can best describe how difficult a task this

outside agency has created. I would suggest for every inland course a trial of rugged mounds and hollows, turfed over in an irregular and undulating fashion. Indeed, a trial of such, instead of bunkers, has already proved their worth on some seaside links where sand blows so much and curls up in sheltered corners, necessitating its being brushed up and the bunker levelled in the bottom after every blast of wind. I have been told that the ground level around mounds, and the bottom of grassy hollows, would, in a short time, get so badly cut up as to become unplayable; but I would say, never can turf cut by clubs be so hopeless to play from, as sand is when trampled through by cattle or sheep.

Work for the Month.

During this month it is incumbent on greenkeepers to push forward their work, as by doing so we are making ready for the various requirements which are necessary on all courses in the early autumn. The vigorous growth of grass must be cut, and putting greens require very careful attention. Daily cutting is necessary on some greens, and frequent rolling is required to keep the surface firm and true. We may execute part of what we may term part of the autumn work by pulling out any weeds which may appear. Their removal now will not damage the turf so much as it would in autumn or winter. The growth of the grass will soon fill up any scars left by digging up weeds. Much rain during this month is sure to bring up the worms on inland

greens. I think it a great error to use bamboo canes to break the wormcasts—better to use a birch broom for brushing them clean off the greens; and when necessary, this brushing should be done previous to cutting the greens, thereby saving undue wear on the lawn mower. Brushing should also be done before rolling the greens. When the wooden rollers came out first, they were fitted with a scraper and trough to collect the casts which had adhered to the wooden roller. And, indeed, the chief merit claimed for wooden in preference to iron rollers was their efficiency in lifting mud instead of bruising it down as the iron rollers did. However, the wooden roller's suitability for rolling established turf on putting greens is its lightness on the turf, and not as a mud gatherer. A wormy green rolled without brushing presents a very unfinished appearance, as then a number of wormcasts are left sticking up, *i.e.*, the wood lifts the cast, which, in adhering to the grass, fails to come away.

Turf nurseries should be kept well cut and rolled. The absence of traffic on such turf makes rolling with heavy rollers necessary. By the end of the month, if the weather is then favourable—I mean sufficiently damp—seeds may be sown to form new nurseries, or for the purpose of thickening the existing grass. Bare places on the course may also be sown now. A great deal, of course, depends on the season for the amount of bare or thin places on the greens or lines of play. Careful attention to those small things at this time cannot be too urgently recommended, as keeping the turf in a healthy state with a uniform coating of fine grasses is the first

step in the direction of having good greens for next year.

Although we may have had more than enough rain for inland greens, the sandy greens at the seaside get dried up very soon, and watering during dry weather is necessary to keep the grass growing. This operation is generally given up as unnecessary at a time when the full benefit would be derived.

SEPTEMBER.

WE have now arrived at the proper season for renovating the putting-greens and golf courses generally. I may here remark that the condition of the weather has everything in common to do with this work, as will be seen by the following comments on the contrasts between the summer of 1911 and the weather experienced during the summer of 1912. In the latter we had almost incessant rains which did much good by renewing the worn and exhausted turf on seaside greens, in which state many greens on light sandy soil remained from the effects of the drought experienced in the former summer. On the other hand, the wet summer of 1912 gave rise to a complication of troubles on inland turf by forcing a too luxuriant growth on the grass. And this state of affairs, when accompanied by an extraordinary amount of wormcasts, made the work for the greenkeeper very exacting, and added much more worry to an already troublesome calling. Besides, the results of all the extra work were less satisfactory than what the normal upkeep of a dry season would have given. However, we must not consider these adversities as permanent drawbacks to the future welfare of the turf. Without doubt, the summer of 1911 was too dry for any kind of soil or turf, but the following season was truly an ideal time for the seaside greens only.

Now is the proper time for feeding the putting-greens, and I would advise those who are in charge of golf greens, on any soil, to keep up the growth on the grass by feeding their greens with mixtures of manures which contain all the various foods required to build up and maintain the fine grasses in good condition throughout the inclement weather of the winter season. From now onwards, until the end of October, is about the best time to use artificial manures. And as established turf can be fed only from the surface, and fine grasses are easily burned and otherwise damaged by unsuitable mixtures or strong chemicals, great care should be taken to buy manures which have proved themselves to be beneficial to the grass. I hope none of the golf greenkeepers who happen to read this book are so ignorant as one I met. When the subject was broached about manures, he expressed himself as being quite satisfied that bone meal is the most equally balanced manure in the market, and malt columbs is a complete fertilizer of soil. I may say this same greenkeeper is at a loss to know what is meant by chemical manures, or the necessary effect to be expected from their use.

Repairing Work and Seeding.

The greenkeeper who may have ample time on hand at this season to do the necessary repairs to his greens and tees cannot be better employed. Where new putting-greens are to be made, either from seed or from turf, the work should be carried out without delay. Seeds sown now on a well-prepared surface of soil will form a much closer

and better braird of grass in one month than a much thicker sowing will grow in two months in the springtime. And turf laid now is sure to knit and become a solid body sufficiently established to defy the variable weather generally experienced in the late winter and early spring. Where large areas are to be turfed the work should be started much earlier, say, in the end of August or the first of the present month. Of course, we must have the weather conditions as well as the state of the turf favourable. We must not attempt to lift turf when it is dried up, or when the weather is too hot or droughty. We are rarely troubled with excessive drought at this time, and every opportunity should be embraced to get work of this kind done. On no account should the greenkeeper risk turfing in a cold or dry spring.

Lifting and Laying Turf.

Like other matters pertaining to the upkeep of a golf course, there is a diversity of opinion on this matter. We are all of us staunch to our own views as to how the work should be done, and the size that turfs should be cut. Well, the size of a turf is generally gauged by the quality of the soil, fibre and grasses of which it is composed. On sandy soil, the turf is brittle, as a rule, so turfs of twelve by fifteen or sixteen inches are a common size. The thickness of a turf is necessarily determined on such by the depth of the surface soil. Where sand comes so near the top as to form part of a two-inch turf, then such turf is useless for re-laying. But when we find a suitable substance

to the depth of two inches I consider it quite thick enough to export for re-laying. Such turf should be laid down on rich loam; to this it will adhere, and the grass will draw nourishment to strengthen the roots. In no case do I recommend a turf more than two and a half inches thick and twelve inches wide. Before starting to lay turf, one should make the required levels and undulations in the soil, so as to ensure a firm, consolidated body, but as the turf laying proceeds the surface must be kept well raked. Turfs should be kept very close up to one another, but not beaten hard; as it is better to level by taking out or adding soil, than to attempt beating to a level surface. Most practical turfers are aware that the joints in the rows should be broken. This can be done by starting every alternate row with a half turf. When the turfing is completed the joints should be carefully sown with a suitable mixture of grass seeds. I mean seeds to produce grasses which will correspond in texture with the other turf. In about a week after sowing seeds the entire green should be dressed with a mixture of good manure, which should be mixed with about four parts of sand to one of manure for inland greens, or same quantity of well-prepared loam and manure for sandy soil.

Patching Holes and Iron Cuts.

Patching small holes and iron cuts with seeds and soil is a very important detail which had better be done this month, as by this process the lines of play are renovated for the winter months, where old scars and sheep scalds are still bare, or perhaps

some of these places are hollowed out since the grass ceased to grow on them. And the cheapest way to renovate such patches, is with a mixture of the above, in which mixture a more liberal amount of seeds should be used. Scalds are not so likely to recover and grow the former grass as cuts are. It is therefore necessary to put in sufficient seeds to form a complete turf. When the holes are large, or deep, it is better to patch those with turf, as grass seeds don't spring up through a thick body of soil. About a quarter of an inch of soil is quite enough to cover fine grass seeds with.

Preparing Winter Greens.

On soft inland courses where temporary putting greens for use in winter are a necessity, it is always better to have those greens prepared and ready for play before they are required. An occasional cutting and rolling will improve and firm the turf, as well as make a much truer surface on the green than would be possible if left uncared for until the time it was required for play. A light dressing with sand, before starting finally to prepare such greens for putting, will be found very beneficial; and if the winter greens are on the approach to the summer ones, the working and topdressing is sure to have the lasting effect of keeping the approaches much firmer and of improving the turf for run-up shots to the summer greens. Many people are in favour of reversing their course in winter, and preparing winter greens anywhere, but I think golf links, and inland courses in particular, require

all the trampling that it is possible to give them in winter; and I consider the amount of labour required to make ready lines of play from the rough grass and preparing putting-greens in remote corners, is lost work, as well as spoiling the pleasure of the game. Moreover, the parts of the regular course which are not occupied for winter play, are for that period being neglected.

The Greenkeeper's Holidays.

As a general rule, the greenkeeper's sphere in life is a narrow and confined radius of only a few miles, which includes a weekly visit, perhaps, to the nearest town. But on his summer holidays, most of those greenkeepers can look forward to having a tour beyond the narrow limits. Most of us like to visit other golf courses and meet other greenkeepers, who, as a rule, are glad to entertain the visitor, and to discuss golfing topics generally; but the weather and its effect on the respective greens are sure to be the most interesting and instructive subject to both parties, and the visitor might happen to grasp some new ideas which are of interest to him; and out of some little detail a vast improvement to his course or putting-greens might be forthcoming. All those little things are worth looking out for. Indeed, the conversations at those times are a reliable help, and the mutual friendship arrived at, is a great pleasure to the man who thinks there is yet something to learn.

I cannot, however, class all greenkeepers as social and agreeable fellows. As in every other calling in life, we meet the narrow-minded and bigoted man

occasionally, who has allowed trade jealousy to get such a grip of his intellect as to make him reticent on matters relating to his own experience, and unreasonable to other people's views. When a man of that calibre is pressed for a reason why he won't confer with his fellow greenkeepers, his answer is invariably to the effect that he has no intention of imparting to others, what he himself has had to find out by hard study, or much physical labour. We often find such an opinionative man guided in his daily work by a rule-of-thumb principle. The repetition of his ancient specified routine is all the reserve knowledge which he pretends to possess. I am glad to say, however, that such men are greatly in the minority in greenkeeping circles.

OCTOBER.

THE various kinds of work which the greenkeeper finds necessary to accomplish in the early autumn would, if fully given, occupy a good-sized volume. I will, therefore, refrain from entering upon minor matters of commonplace order, although some of the trifling things are indispensable on the well-kept golf links; but such as I omit are well known, and generally attended to practically. I presume all greenkeepers are aware that the initial work required to produce turf on the many different soils is not so varied as the treatment to maintain it in good condition afterwards. The wear and tear which a putting-green is subjected to in one week by nailed boots would reduce a beautiful lawn into a very unsightly state indeed. Why? Simply because the surface soil on a lawn is allowed to remain in its natural state; and any putting-green which is worthy of the name has necessarily an artificial surface, which must be porous as well as firm. Regular cutting and the necessary rolling will in themselves keep turf beautiful to look at, but the wear-resisting surface must be added. The nature and condition of the soil, together with the added substance which forms a desirable turf and feeds the

grass, determines its resistance to hard wear, drought, or other adversity. We don't expect to produce reliable turf on a rich, organic soil, nor do we ever find a dense sward of grass growing on a bed of raw minerals. From personal experience, gained by forming and maintaining greens on many different kinds of soil, I can confidently assert that by the judicious use of topdressings, composts, and manures, any kind of soil may be improved and enriched, or reduced to the right grist for growing reliable grasses. But in order to carry out that proposition, we must avoid extremes, such as starving the rich soil by adding nothing but carbon and minerals, and overfeeding light, sandy soil with farmyard manure. Either course would bring about disaster in either case. We require to apply a sufficient amount of sand or carbon to new greens on clay soil to render the surface friable. Old dung may be used for dressing greens on light soil, but such should be mixed with other ingredients and applied as composts.

Autumn Turfing.

This month is the best time for much of the extra work which confronts the greenkeepers at this season. Doubtless many have already started what they consider the most necessary jobs in their autumn list, and seeding, turfing, weeding, and topdressing greens should be accomplished by the end of this month. I don't mean to infer that a whole winter's turfing must be executed in the early autumn, but patching greens, tees, or the laying

down or sowing of new greens are things which the conscientious greenkeeper endeavours to have done before the winter sets in; and when he gets such work successfully carried out at the right time, he can calculate on obtaining the best possible results.

Weeding must be Done.

The necessity of weeding putting-greens is another matter, which some try to pass off as a job to be carried out when other work is done, while others think it is a loss of time and money to trouble about picking out weeds. They make the error of waiting until the weeds spread, and then they are presented with an almost impossible task to eradicate them. The use of lawn sand or other chemicals must be resorted to then in preference to hand weeding. I have already dealt with this work, as I think it cannot be too earnestly impressed on those responsible—the importance of having weeds removed as soon as they appear. Such work on some links is only possible on rare occasions, as many golf clubs employ so few hands that all the time is taken up with other duties. Nevertheless, it is a great mistake to allow weeds of any kind to spread. How many weedy greens do we see, and hear other people commenting on owing to the dirty state of the turf on such and such a course, some of which are allowed to remain in their ever-increasing weedy state, until, as a consequence, the only remedy is returfing the entire greens.

Worms and Wormcasts.

To comment further on this already thoroughly settled subject will appear to some as being unnecessary on my part. However, it seems only right to condemn the existence of worms on putting greens. Although many plausible theories are vouched in their favour, I have so far failed to find any benefit derived from worms burrowing through the soil and distributing clay casts all over the greens. If worms are to remain on the treasured confines of turf known as putting-greens, can any enlightened person tell me in what way a golf club is compensated for the extra labour involved by keeping eighteen greens which are infested with worms, as compared with the same number of greens which are free from worm casts? Having to brush greens every morning before they are either cut or rolled means double work, and the persistent brushing during the autumn months has the effect of opening up the turf and leaving the greens unfit for winter play; not to mention the unsightly state of such greens during wet weather when the slimy casts adhere to the grass and the brushing off of this mud blackens the entire green. To those who wish to eradicate the worms, the right time to do the execution is from now onwards till the end of November, as at this season the worms are near the surface and less of the wormkiller will be more effective than a greater quantity at a time when the worms are deeper down in the soil, which is generally the case in frosty weather.

A Word about Wormkillers.

Some of us can look back to the days in our greenkeeping experience before scientific preparations for killing worms were invented. We had, then, the lime water and several other remedies, and indeed I can assure any one interested in the destruction of worms that lime water did its work well and was beneficial to the soil. It had to be very closely studied in strength, however, to prevent it from injuring the grass. Paraffin oil was frequently used in those days. So was common salt. But it is not of the past I mean to refer, and something of the present time is more eagerly looked for. Of the present-time advertised wormkillers, I have tried many, and have been specially careful about noting the effect each had on the turf, as well as the amount of worms which the various samples had killed. I was also very much interested in comparing prices of the various preparations, together with the time and appliance required to apply each. The best and most economical of all I tried was the wormkiller which the Boundary Chemical Company of Cranmer Street, Liverpool, manufactures and sells in a liquid state which so far renders it easy of distribution. The liquid has only to be diluted with water and applied with an ordinary watering-can to which a fine rose is fixed. The effect of this preparation is really wonderful, as the worms come up immediately after the stuff is applied, and, by the time a whole green is treated, I venture to say there are very few worms left there alive. The saving of labour in using the foregoing

ARE YOUR GOLF GREENS PERFECT

If the grass is poor, weedy and full of worm casts

? We can help you!

We are specialists in the renovation of unsatisfactory golf courses. Our preparations have been used with complete satisfaction on some of the largest courses in the kingdom.

WEEDY GREENS ARE ENTIRELY . . . TRANSFORMED BY THE USE OF OUR

"CLIMAX" LAWN SAND

which, in addition to killing daisies, plantains, dandelions and other weeds, also possesses all the necessary elements for fertilising and promoting the growth of the finer grasses.

PRICES (carriage paid): 1 cwt. (to dress 400 sq. yards), **20s.** 5 cwt., **90s.**

IMPOVERISHED AND NEGLECTED GREENS
will renew their life after a Dressing of our

"PREMIER" LAWN MANURE

A highly-concentrated, quick-acting Fertiliser, especially prepared for Golf Greens, etc. . .

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"KILLET'S" EARTHWORM DESTROYER

Kills Worms on Lawns, Golf Greens, etc., without injury to the Grass.
Certain in Effect. Economical in Use.

One gallon of the diluted solution for use covers about three square yards; a 7/6 bottle, therefore, will cover, roughly, 300 square yards.

Directions for Use.—Apply with an ordinary watering-can, fairly saturating the ground; in a few minutes all the worms will come to the surface, and most of them die—sweep them up and roll down the lawn. Apply in the evening when the ground is damp and the worms are near the surface.

PRICES—Carriage Paid.

Sufficient Destroyer For	9 Gallons of Water,	**1/6**	
,, 25 ,,	,,	**2/6**	
,, 50 ,,	,,	**4/6**	
,, 100 ,,	,,	**7/6**	
Sufficient Destroyer For	200 Gallons of Water,	**14/6**	
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Fuller Particulars of the above, together with Testimonials, forwarded on application.

BONE MEAL, CHARCOAL, AND OTHER MANURES
PRICES ON APPLICATION.

BOUNDARY CHEMICAL CO., Ltd., CRANMER ST., LIVERPOOL.

remedy, is the chief merit. Very few clubs have ready at hand an enormous amount of water to dissolve dry powders and carry the added chemical to within reach of the worms. Where water must be carted from a distance it proves a very expensive operation to extirpate the worms from eighteen greens, when each green requires about ten tons of water. I have also tried the Boundary Chemical Co. weedkiller and found it very effective, and their lawn sand was the best I ever tried for killing daisies.

(This company, I am glad to say, are advertising their specialities in this book, in which advertisements are select, and deal with different specialities for the Golf Course.)

Manures and Topdressings.

In order to prolong the growth of grass on the putting greens, it is necessary to give them a little assistance by topdressing them with a mixture of soluble manures. It is quite useless to apply crude ingredients or insoluble manures at this season, as such take so long to dissolve, that the grass roots are not stimulated in time to prevent their natural termination of growth for the season. And artificial manure applied in autumn has lost its fertilizing effect before next spring. It is therefore best to use that which is both economic and beneficial. I am not prejudiced towards any particular brand of manures as being the only one of merit for this particular purpose at this season. I may remark that using the right manures now, will tend to

reduce the trouble generally experienced in trying to keep turf in good condition on the greens during the winter. And the possibility of retaining in use the summer greens for a great part of the winter play is worth considering. Golfers are attracted to play more frequently where the putting-greens are good in summer; but the indifferent greens on most inland courses in the winter season have a deterrent effect on the most ardent followers of the game. We cannot convert a clay course into a seaside links, but it is quite possible to attain better greens for winter golf, if the right methods are adopted. The grievances to combat with in reaching this improved state are many, and of varied character; yet most of the difficulties are of a minor nature, and easily surmounted. Let us try for the betterment of inland golfing greens in winter.

NOVEMBER.

Effect of Rain on Turf.

WE, all of us, like to experience a dry autumn like that of 1912. It must have been particularly gratifying for greenkeepers to experience such a long spell of very fine weather, as that which succeeded the almost incessant rain of the summer months. The welcome change to bright sunshine and a dry atmosphere, came in time to reclaim the then sodden turf on inland courses, and the greenkeeper was enabled to proceed with his work in comfort. Doubtless, the former rains proved the salvation of many seaside links, but contrary to general opinion, seaside turf is damaged by a very wet autumn. Why? Well, I say that as rain fertilizes the soil, and thereby forces the grass in its season, it also encourages a dense growth of moss, and very poor soil will, from the same cause, show a growth of several varieties of fungus, which will appear immediately the grass stops growing. All those undesirable growths, however, seem to thrive best on the very poorest soil, which, if wet, is sure to give much trouble, and those growths will ultimately overrun the grass. I have seen golf greens transformed from a surface of moss and fungus to a perfectly fine, healthy turf.

I have also noted the result on other greens which were in much the same bad way, but in the latter cases they were allowed to remain, rather than apply anything to grow grass, or give to the green the appearance of what was termed the "inland type," or "putting-lawn," as some critics put it.

Work for the Month.

Presuming the first part of the work defined in the autumn programme has been in hand for some time, I think the most important details should be completed at an early date. Personally, I consider the chief details in a greenkeeper's diary for the start of the autumn season are—all necessary seeding, patching with seed and soil, patching with turf, weeding, topdressing as required, together with the preparation of winter greens, where necessary, on inland courses. If, however, from any cause some of the foregoing have so far been neglected, the work should be proceeded with at the earliest possible moment. With one exception, that of manuring the putting-greens is an operation which it is imperative should have been performed in October at the latest. Unless the weather is open, and the grass still growing, it is better to defer the application of manure until next February; as it is dangerous to revive grasses which are now dormant, and which are situated on exposed places. By the timely use of manure we can with safety, and indeed to much advantage, renew and prolong the growth on grass; but a wholly forced growth at this time is not to be depended upon.

Lifting and Laying Turf.

A few hints regarding the above might help to avoid error. From the futile efforts at handling turf by some hands who take on a job as practical workmen, I surmise they have never learned how to accomplish such work successfully. When marking off turf which is intended to be laid in successive rows, both the length and the breadth should be exactly measured to the size desired. The mark or cut with the edging-iron should be made on the same side of the line every time, as cutting inside and outside the line alternately varies the size of the turfs, which must be cut off to equal lengths when down, and such paring is both a waste of turf and time, as well as disarranging the edge of newly-laid turf. Always keep a plumb edge on turf; sloping edges are no benefit, and such fit one way only. When lifting turf the spade or turfing-iron should be kept running level. A badly lifted turf requires to be pared to a uniform thickness, and if not done, the turfed ground is sure to become irregular.

Don't lay turf on a hard-beaten surface. Prepare the soil and allow it time to solidify, but keep the surface loose by raking. Don't lay turf of a heavy clay nature when it is very wet: it will shrink when dry and leave unsightly seams.

Don't beat soft turf, as beating spreads it, and bakes the surface, which the after-drought will harden, and so hinder the grass from spreading. Don't expose lifted turf to the weather for a long period, or build turfs on top of one another.

Never lay turf on raw clay. Nothing will grow there even though it is broken up fine, therefore it is better to cover over the clay with well-prepared sandy loam. And before laying turf on sandy soil, you should cover the sand with rich soil to a depth of two inches.

Don't try to beat badly-laid turf to a uniform level. It is better to lift the turfs and re-lay them aright.

Topdressing Thin or Sandy Soils.

From now onwards, during the winter, top dressings such as prepared composts, old turf-mould, seaweed or dung, mixed with light soil or moss litter, should be applied to thin gravelly or light sandy soil. Any bad places on the lines of play which are deficient of grass in the summer time should be attended to in this way. Great care is necessary, when using soil or composts, as topdressings, not to put them on too heavily, because over-dosing delicate turf with any solid matter may damage the grass seriously.

Moss-Killing.

Lime may now be used to advantage for killing moss on the putting-greens. Like other things, however, it must be sparingly applied; and as old lime is of no use for killing out moss or fungus, only new lime should be used. It should be sown by hand, and not allowed to lie in lumps.

Where lumps fall from the hand such places must be brushed over with a birch broom. Select a dry, calm day for sowing the lime, which then serves a better purpose by lying on top for a time. Lime for the above purpose should be purchased in shell, emptied down, and covered over with damp soil, which will slake it into a powder. Water should not be used to slake.

DECEMBER.

THE short days, together with a goodly share of inclement weather at this season, have already impeded the working facilities in a number of ways on golf courses. Indeed, the forbidding conditions generally experienced in late autumn and early winter, place a stumbling-block in many a greenkeeper's way, not by his misconception of how to proceed, but by reason of short days and such variable weather. Many green committees are naturally averse to having an augmented staff employed on the links at a time when they, no doubt, think their club are paying a double price for the work which can possibly be accomplished at any season, and that it will be money saved if the work be deferred until the long days of next spring. Well, all this delay only means a very slight saving on the initial cost of doing the work, which, if completed in a dry, cold spring, will be sure to prove unsatisfactory, if not so unsightly as to cause all the work to be done over again. One cannot ignore the fact that the proper season for turfing and general repair work on golfing greens is from September up to the following February; the important details to be carried out first, and the rough patching and bunker work

left to the end. I advocate the carrying out of all work necessary in its season, and as golfers are less in evidence during the first half of the winter, the greenkeeper can make better use of the course for alterations and repairs than he would be able to do in the spring, when the members begin to play again in large numbers.

Rolling the Fairway.

The amount of rolling must be determined by the state of the weather, and the weight of rollers to use now is best decided by the nature and condition of the soil. It is bad policy on the part of any greenkeeper to roll a clay course while it is in a wet state. It is better to wait until the ground gets sufficiently dry to prevent it from being baked, and the surface from getting caked by the roller. Indeed, a new course should not be rolled, with the view of making a level surface, during wet weather. We don't expect to manufacture a perfect surface on a new golf links in one or two years. It is possible to succeed in forcing down irregularities and making the ground smooth, but it is generally done at the expense of killing the best grasses, which those in charge are otherwise trying to encourage and maintain. It is far better to allow the surface to become a little irregular, and the wormcasts to remain for a time, than to plaster up a muddy surface by heavy rollers.

Rolling and Brushing Putting-Greens.

Few people who have not had the actual experience of greenkeeping on various soils can fully

comprehend the amount of labour expended on brushing and rolling inland greens at this time of year, as compared with such work on seaside greens where only occasional rolling is necessary to keep the surface firm ; and where brushing is not required, save where the droppings of sheep or rabbits have to be cleaned off the greens. The daily repetition of brushing and rolling is detrimental to good turf. Where worms abound, however, this daily monotonous routine is necessary to keep a putting surface on the greens, and without this work, putting would very soon be impossible. I fully intended to leave out all reference to worms in this month's treatise, but in doing so either a false report of the labour required to maintain greens would be given, or the subject would be very misleading. Indeed, I think the evil which worms cause in turf should be fully described, and printed in bold type, and hung on the walls of every clubhouse, together with the photograph of a green which has been successfully cleaned of worms.

I never expect to find a first-rate turf on greens which are infested with worms. But where the evil is allowed to remain, there the greenkeeper must try to adopt the best way to remove wormcasts without doing further damage to the turf. Bamboo canes are now much used for breaking up casts, and the wooden roller which follows is expected to collect the mud ; but much of the mud remains on the grass, where it serves no good purpose. Personally, I think the best way to deal with clay casts is to brush them clean off the greens, brushing all the mud into heaps, and removing it to the most convenient ditch, as when such soil is left

on the edge of a green it tends to keep the turf in a bad, sticky state.

Where the presence of worms necessitates the resting of summer greens for the winter months, I think the off season should be a short one. While the greens are in use they are having daily attention by brushing and rolling, which keeps them in playing order, whereas, in a short time, when out of play and work, the good greens are apt to get lost in a multitude of little worm hills, and if left standing for a length of time, those mounds increase in numbers as well as in size, at the cost of the fine grass, and the removal of those accumulations proves a severe test to the turf. Every opportunity should be taken to break down the casts, but a dry day is the only time for such a job.

Various Soils and Grasses.

The different kinds of soils to be found on one golf course are a revelation to those disposed to study or experiment as to which varieties of grasses are best suited for their various constitutions. Indeed, we often find a medium-sized putting-green composed of an inexplicable mixture of soils. We find patches of very fine turf growing on soil which remains dry throughout the winter, and is to a great extent impervious to water, while beside that place it is possible to find a soft, brittle turf, which covers a heavy, sour soil. Then another spot, only a few yards distant, may show a gravelly soil. It is easy, however, to judge by the state of the grasses on a green which has received little or

no topdressings, by what nature of soil they are maintained. The soil referred to first will at all times grow a thick bottom of fine grasses, whereas most of the other kinds will only grow a thin bottom of the natural grasses. Of course, I refer to soil in its natural state. Even on old greens, which were first formed from the natural sward, the bright green patches appear in contrast to the other places where the grass is at this season showing a pale or sickly yellow colour. Sour soil is sure to affect the grass to the extent of making the trouble visible. Some of our best grasses lose colour during the winter, but those varieties are seldom confounded with the other species. In reading some reports by botanists, regarding experiments with turf which had been subjected to a long spell of drought, the chief point of instruction wanted, was to find the species of grasses which had retained sufficient vitality in their roots again to sprout and come back to prominence; and, if I mistake not, the only grasses to show life in the old turf, when transplanted, were the coarser varieties. Had it proved otherwise, I should have been much surprised. I have diligently watched the welfare of grasses during very dry weather, and found the best quality of grass to be the first to succumb to the drought.

Work for the Month.

Bunker-making and repairing old bunkers, together with the building of new teeing-greens.

Where surplus soil is left from bunkers, it should be carted to form the tee, leaving the soil for a time

till it gets into a solid state for turfing over. Several jobs should be kept open now to ensure work in case of frost. Select frosty weather to cart sand or other material over the links. Collect manure and soil for compost heaps. Give finishing touch to winter greens if not already playing on same. When leaving off the summer greens, topdress them immediately with whatever is best suited for their constitution. Greens having received their annual dressing of charcoal or other-like substance, should be rolled occasionally. Don't allow the dressing to lie too long without working it into the turf. The back of a rake is about the best tool for this purpose, and by its use wormcasts are kept broken down. The green is also kept in a fit state for rolling on the first suitable occasion.

Drains.

Protect greens out of play from being needlessly walked over. Drain soft soil. Keep the drains shallow, and cover the pipes with ashes. Allow the filled-in drains time to settle to their own level before turfing them. On wet ground the drains should not be more than five or six yards apart, and must be made to run in herring-bone fashion into the main drain thus ⋙. Six-inch pipes are the best size for mains, and three-inch pipes for subsidiary drains. A lesser size is much used, but I don't recommend them, as a pipe less than three inches is too easily choked. Give all drains as much run as the lie of the ground will permit, but never run straight down a hill a drain which is intended to dry the surrounding ground.

Place the drains at suitable angles across the hill, where they are sure to draw the water as it oozes through the soil. There is no necessity for drains on a golf course being more than eighteen inches deep at the deepest part, and that is where they enter the main. If by reason of flat ground the incline has to be made in the drain track, it is quite safe to start with a depth of eighteen inches, and finish at the close end with nine inches. When draining near trees you must take care to prevent the roots from entering the pipes and forming a mat, which would in time completely fill the pipes. I remember when searching for an obstruction in a drain, finding tree roots so closely embodied in the pipes that the latter had to be broken. These small roots had, in this particular case, forced their way through the pipes to a distance of about four feet, and collected sufficient grit and soil in this small channel to sustain and encourage growth. The only way to prevent tree roots from entering drain pipes is to keep the latter close up at the joints, and cover over with ashes, or cement some of the joints. The cementing is not a practical plan, and the ashes are preferable for drawing water.

Extract from the "SPORTS TRADES JOURNAL" for April 1913.

THE BIG GOLF HOUSE

"It is indeed a curious thing that a big business can be started and developed whilst a very large proportion of the dealers are practically unaware of its real scope. So great is the amount of business now being done in the golf trade that the enormous new golf club-making factory owned by Messrs J. P. Cochrane & Co. was started, and speedily obtained a vast amount of trade, without any effort being made to secure publicity. It is certain that very few dealers have any idea what a big club-making factory there now exists in Murano Place, Edinburgh, immediately adjacent to the famous golf ball works. It was generally known that this firm were dealing in clubs, but certainly it was not comprehended that they were actually manufacturing everything on so large a scale that many old-established golf club-making concerns seem very small in comparison. However, this is a fact, and a privileged visitor will see here a most complete plant and a small army of men engaged in club-making pure and simple. At Murano Place there are forges for the cleek-makers and sawmills for the timber. Everything is actually made from the raw material, and most beautiful work is being turned out. All this has been brought about in less than two years, and so admirable is the organisation that a large trade has been secured without having to spend a penny on publicity. We have had an opportunity of inspecting the clubs made by Messrs J. P. Cochrane & Co., and can without hesitation award them very high praise ; in fact it is no exaggeration to say that for finish they leave one or two of the old-established makers far behind. The Cochrane business is undoubtedly by far the largest thing of the kind in the world, and we hardly think its scope is at all realised. Quite apart from the ball-making and club-making carried on by this firm, the factoring business they do is obviously also enormous. They are now supplying absolutely everything for the trade, and have a stock which is unparalleled. Dealers can easily get everything they want from this one house, and will be well served. Apart from their own productions, they also supply all other makes of balls at makers' prices, and this, of course is most valuable to dealers."

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The "Challenger-King" ball you gave me to try is a very fine Ball, better than the ————————. Instead of sending me 2 dozen, send 4 dozen. You will have a large sale for them, as I think it is the best Ball I ever struck for all parts of the game. I think it will be specially good in summer when the ground gets hard, as I find I can stop it quicker than some other Balls I have tried, and it is a beautiful putting ball.

Yours truly,

ALEX. HERD.

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