

courses, as it is much too likely to encourage weeds and worms.

"Something of the nature of Peruvian guano, fish guano, meat guano, malt culms, or dried blood, together with artificials, should be used in its place. If humus is necessary it may be added in the form of peat moss litter, minced seaweed, etc., and the box should seldom be used on the mowing machines.

"It must be borne in mind that the turf required on a golf course is entirely different from that required from a farming point of view."

Some Errors Persist

Some of these mistakes are equally applicable today. Errors in greenkeeping not infrequently arise from a misconception of what is required for a golf course.

Agricultural experts, green-committees and greenkeepers often make the mistake of treating turf for playing fields on similar lines to that required for feeding cattle. Even Doctors Piper and Oakley, who did so much to put greenkeeping on a scientific basis in their earlier experiments, as is evidenced by their book, made this mistake.

The truth is that golf courses and other playing fields require grasses with a thick, matted root growth and dwarf leaf growth—grasses that require little mowing and provide a firm, springy carpet that is a pleasure to walk on.

On the other hand, from an agricultural point of view the most desirable grasses have a small root growth and a large succulent top growth. The former grasses grow naturally on virgin soil, preferably of a sour, sandy or peaty nature, whereas agricultural grasses require a rich, sweet soil of an alkaline reaction.

It is an easy matter by means of lime, basic slag or alkaline fertilizers to convert soil which is producing the finest golfing turf into that which is favorable to the growth of rich, succulent agricultural grasses, clover and weeds, but it is amazingly difficult to reverse the process.

On scores of occasions I have known magnificent golfing turf ruined by the expenditure of a few dollars on alkaline fertilizers. An alkaline condition of the soil also encourages worms and their resultant evils.

To restore the finer golfing grasses which have been destroyed by injudicious use, requires years of labor and the expenditure of thousands of dollars in weed and worm killers, nitrogenous fertilizers, top-dressings and seeds.

Most golf clubs have enough money to destroy existing turf but few, if any, have sufficient to restore it again.

Alwoodley an Example

Twenty-six years ago I was the founder and architect of the Alwoodley golf course. For twenty years the course was kept up by five men or less and the greens and fairways were considered unequalled in England. The grasses on the fairways were of a slow growing variety.

In the early stages of the existence of the course, part of the land consisted of rich agricultural grasses, daisies and weeds which have gradually disappeared and been replaced by dwarf golfing grasses. This has been due to constant mowing and leaving the grass on to nourish the soil.

In this connection it is remarkable how few greenkeepers realize that the best fertilizers for the finer grasses is grass. When the Alwoodley course was constructed, although I had some slight knowledge of chemistry, I knew little about the science of agriculture or even botany. I felt instinctively, however, or was it perhaps by observation of Moorland, public commons, or links land that when grass was treated by agriculturalists the turf invariably became unsuitable for playing fields. I therefore determined to resist any attempts by the green committee or greenkeeper to fertilize Alwoodley unless there were some definite reasons for doing so.

On several occasions attempts were made by some member of the club who owned a farm or garden to persuade us to use lime, basic slag, kinit or some alkaline fertilizer, but up to the present time we have successfully resisted them.

It is important that greenkeepers realize the fundamental principal of successful greenkeeping is the recognition of the fact that the finest golfing grasses flourish on rather poor soil and that harm is done by over-fertilizing.

If Good, It Stays Good

It is true that owing to the fact that grass cuttings are continually being removed from the greens, some compost or other fertilizer is necessary to replace their loss, but provided there is already a good carpet of turf seeding is rarely required on fairways. Getting that good carpet is the difficult task. It is not even necessary that the fairways should consist entirely of grasses. There should be a freedom from clover, daisies, plantains,

dandelions and other weeds, but others such as yarrow, chickweed, pearlwort, moss and in Britain patches of closely cut heather make excellent fairways. It is also more pleasing to the eye to have varying shades of green instead of one uniform tint.

It is possible to have too high a degree of perfection.

I remember many years ago at Sunningdale, a fussy, oily individual coming up to Harry Colt and saying: "I really must congratulate you, Mr. Colt, on your fairways, they are perfect." Colt, who objected to this type of man, answered somewhat testily: "I don't agree with you at all." "Why not, Mr. Colt?" he said. "The lies are too damned good," was his reply.

Answer to Some Complaints

There is a certain amount of truth in this. If we never had a bad lie we are not likely to appreciate a good one, and moreover the ability to play from a bad lie differentiates between a good player and a bad one. I might incidentally remark that bad lies also differentiate between good and bad sportsmen.

In in the old days in Scotland the best golf courses were kept by the rabbits. When these courses became popular and attracted English and American visitors, they sometimes deteriorated in proportion to the additional amount of money expended on them.

One of the first principles in greenkeeping is never to expend a penny on a golf course unless you are absolutely certain that the money expended is going to do good and not harm to the course.

Similar principles apply to any new construction work on a golf course. No new hazards should ever be added to a golf course unless you are satisfied that they are going to make the course more interesting and more exciting.

In my lectures of twenty years ago I pointed out that on most golf courses there are far too many bunkers and that the only object of bunkers is to make golf courses more interesting, in other words, more popular. Since then, I am more convinced than ever that no bunker should be constructed unless one is convinced it will make a course more pleasurable.

For example, on Bobby Jones' new course, the Augusta National, I had originally planned 36 bunkers. I took my map to Bobby, who thoroughly agrees with my ideas, and I suggested to him that some of the bunkers had no meaning and might

be eliminated. We reduced them to 22 and yet Bobby Jones thinks we have made the most interesting test of golf in America.

Suggest Permanent Committees

It would be wise for every club to have a permanent green-committee. The history of most clubs is that new green-committeemen are appointed who make a lot of mistakes and just as they are beginning to learn from experience of their mistakes they are replaced by fresh members who make still greater ones.

On the other hand, some of the clubs I have been associated with have, in their early stages, passed a resolution that no changes will be made to the course except on the advice of the original architect or one of equal reputation and as a result these courses have continued to improve year by year.

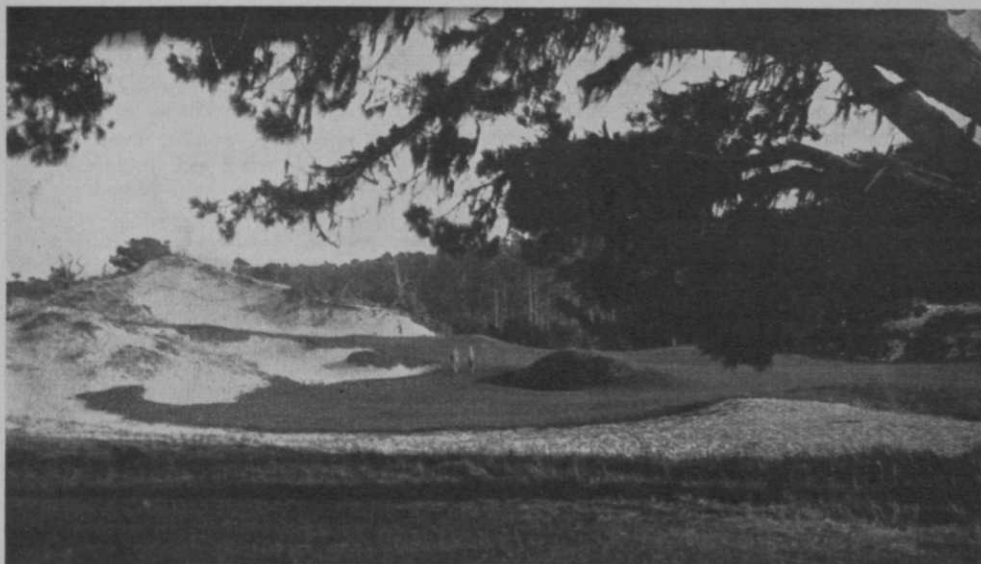
Only a short time ago I was playing a course owned by perhaps the richest club in Northern California. Extensive alterations were being made to it on the advice of the local professional. If these alterations had been made from the point of view of annoying and harassing the average member of the club they would have been most effective but from the standpoint of interest it would have been better if the money expended had been thrown into the sea.

If a course on real links land comes into your hands, leave well alone and do not make any alterations except after the most careful consideration and expert advice.

One cannot emphasize too frequently the importance of leaving God's gifts alone.

The researches of the advisory Green Section of the USGA have simplified to an amazing extent the problems of greenkeeping but the Green Section would be the first to admit that greenkeeping is a subject which is still in its infancy and that the Section is continually learning through its mistakes, varied experience and scientific research.

I have already stated that at first mistakes were made of treating golf turf on similar lines to that required for feeding cattle. Views have changed and it is now recognized that it is essential to treat golfing turf with fertilizers which tend to create an acidity in the soil. The result of this treatment was to produce turf consisting of delicate dwarf grasses and more remarkable still to create a soil in which daisies, plantains, clover and many other



The approach and green of Cypress Point's ninth hole, as seen from the left of the fairway. An interesting example of picturesque hazards blended with golf's requirements.

obnoxious weed seeds refused to germinate. The Green Section, if my memory is right, went so far as to advocate as high a degree of acidity as pH 4.5 and stated time after time that lime was poison to grasses required for golf.

Because of the increase of brown patch and other diseases owing to greater acidity of the soil the Green Section has again changed its view and is now advocating the use of lime. I am not casting any reflection on the Green Section but am simply relating this as an example of the difficult problems with which we have to deal.

Scientific research and the experience we have gained from our mistakes is the only way we shall solve these problems so that the more money provided for the Green Section to continue its researches the sooner we shall arrive at the truth of the matter.

Greenkeeping World-Wide Study

The Green Section should be allowed sufficient money not only to conduct experimental stations in different parts of America but also to enable them to study and play courses all over the world.

If the members of the Green Section had the opportunity of playing and absorbing the spirit of golf on some of the old classical courses such as St. Andrews, Scotland, it would do much to enable them

to view the requirements of the game in true perspective.

They would find, for example, that the treatment of the approaches is almost as important as that of the greens and that one of the most fascinating shots, if not the most fascinating, is the run-up approach we get so frequently on old seaside courses like St. Andrews.

An approach of this kind cannot be made successfully if there is a defined margin between the approach and the green, or if the approaches and greens are kept so soggy with water that no other shot is possible except an inartistic pitch. They also would find that not only is a complete sward of grass on the fairways unnecessary but not even desirable. Certain weeds and mosses make excellent fairways and there is great beauty in scarlet pimpernels and other dwarf flowers. Even bunches of the white flowers of the despised chickweed make a beautiful setting to the edge of bunkers.

I have an old friend who is perhaps the greatest authority on public parks in America, who is frequently expressing his preference for grass that is green. The best golfing grasses vary in color, they may be red, brown, blue, dark green, light green, yellow, or at times even grey or white. A golf course that consists entirely of one shade of green would be merely ugly. There is great charm and beauty in

the varying shades of color of a golf course.

Twenty years ago I stated that muddy golf courses were largely due to insufficient drainage and that the cheapest method in clay soil was mole drainage. Since that time I have modified my views and now consider that drainage will not entirely cure mud and that it is essential to worm muddy fairways.

In California there is not much trouble in this respect, but in Britain and eastern America worming is often essential and by modern methods can be done as cheaply as \$10 an acre. Further investigation and experience has on the whole confirmed my views on fertilizers expressed so many years ago.

Injudicious use of sulphate of ammonia or any other fertilizer, not only may cause irreparable damage to a course but in any case will require some other chemical to neutralize its ill effects.

In this respect the treatment of golf courses is similar to that of human beings. The best physicians are those who only prescribe poisonous drugs after the most careful consideration.

Dr. MacKenzie's article will be continued in an early issue.

GRASS TRAVELS FAST

Green Section's Shipment to South Wales Arrives in Good Condition

IN ITS efforts to assist American golf courses, the Green Section of the USGA is in close touch with other turf research bodies throughout the world and exchanges seeds and stolons with them.

Work of this kind is seriously handicapped by difficulties in transporting sods so they will arrive in condition to propagate. Particularly in exchanging specimens with Australian golf course authorities has the Green Section met with problems connected with storage facilities, lack of light, time in shipment and heat.

Earlier this year the Green Section dispatched a sample of velvet bent turf with care and speed that established a record. The sample was rushed from the Green Section's Midwest turf garden to the United States Department of Agriculture Bureau of Plant Quarantine at San Francisco.

There the container was opened and

placed on the roof on the north side of the building where the temperature was approximately that of the vegetable cool room of the SS *Monterey* in which the sod later was shipped to Australia.

The sod was kept at San Francisco a week without showing any indication of extensive new growth, and looked in excellent condition when it was shipped to the Director of the Botanical Garden at Sydney. In accordance with instructions from headquarters of the Matson Steamship line, the chief officer of the *Monterey* saw that the sample received proper care during transportation.

At Sydney, the sod plugs were planted as the Green Section suggested and immediately made healthy growth, according to A. M. G. Woodie, asst. agrostologist of the New South Wales Department of Agriculture. Shipments of Metropolitan and Washington bent previously sent by the Green Section to New South Wales developed sufficiently to supply golf clubs with stolons for their own propagation purposes. Further information from R. J. Withycombe, secretary of the New South Wales Golf Council to the Green Section stated that two of the velvet bent samples received (Kernwood's strain and No. 14,276) look particularly promising.

The New South Wales government and golf officials enthusiastically expressed their pleasure with the manner in which the Green Section supplied the samples in condition for healthy growth.

In reciprocating, the New South Wales Department of Agriculture has sent the USGA Green Section samples of grasses which it is hoped will arrive in condition for propagation and test in the United States. One of these grasses, *digitaria didactyla*, is believed to have great possibilities for fairways and perhaps for greens in the southern part of the United States.

If this grass does work out well in the south this solitary incident of Green Section world-wide activity in behalf of American golf will have justified far more than the expense of Green Section's operations during the entire history of that organization.

DON'T forget the turf nursery needs weeding periodically even more than the greens do, since you want the turf used in patching to be as healthy and dense as possible.



The burying ground of the Morrisses, where American golfers recently paid tribute, lies behind the ruined Abbey of St. Rule.

Yank Golfers Pay Tribute to Memories of the Morrises

St. Andrews, Scotland (Special to GOLF-DOM).—The twilight of the long Scottish evening was softening into that mellow dusk which in midsummer is the night light of Scotland. The cathedral city of St. Andrews was settling to sleep. The ancient places—the University, the College church, the stately homes which were once the great houses of the Cardinal, the tall towers of St. Regulus—all seemed strangely hushed when the writer, taking a late stroll on a favorite walk by the vast age-blackened walls of the ruined Abbey, was startled by the swift rush of six or seven large motors which drew up at the iron gateway entrance of the graveyard of St. Rules.

Quickly from the cars descended a number of men, mostly in their dinner clothes, and a few ladies with wraps thrown over their evening dresses. What could be the meaning of this unusual visitation to the secluded precincts of the cathedral at so late an hour?

Soon I observed the bronzed face of

Walter Hagen and the massive form of Olin Dutra and then the other members of the American international team, together with the remaining players from the United States who were taking part in the British Open championship. On inquiring the reason, I was informed that the party were fulfilling a unanimous desire to pay homage and respect to the memory of Old Tom Morris and his son, Young Tommy, who were buried in the cathedral grounds, and gladly accepted an invitation to be of the party. Precautions, however, were taken to prevent any publicity and professional photographers, who seemed to spring from nowhere, were informed by Walter Hagen that he would have no pictures, and, consequently, when the verger had admitted the American party and their friends to the cathedral grounds the gates were locked against all others.

The extent of this great Abbey, which was destroyed at the time of the Reformation—a period of religious fervor in



The inscription on Young Tommy's headstone reads as follows:

In Memory of TOMMY, son of Thomas Morris, who died 25th December, 1875.
Aged 24 years.

Deeply regretted by numerous friends and all golfers. He thrice in succession won the champion's belt and held it without rivalry and yet without envy, his many amiable qualities being no less acknowledged than his golfing achievements. This monument has been erected by contributions from sixty golfing societies.

Scotland when the Presbyterians in a few nights wrought irretrievable wreckage throughout the country upon the Catholic work of countless ages and put to the flame incomparable and irreplaceable gems of architecture, glass, tapestries, and furniture—may be realized by the walk of nearly 300 yards before we came to the burying ground of the Morrisises. At the grave a massive headstone was erected in 1876 in memory of Young Tommy. Old Tom lived for another 32 years and when he was buried a less imposing memorial was placed on the grave.

The solemnity of the occasion was intensified by the stillness of the evening air and the footsteps echoed from the tower-

ing walls. Walter Hagen carried a wreath of lilies of the valley and forget-me-nots. The great champion reverently laid the wreath at the stone dedicated to Old Tom and the party stood with bowed heads while a bugler, who had been brought by motor from the Royal Air Force garrison at Leuchars, eight miles from St. Andrews, sounded the Last Post, the notes of which echoed and re-echoed in the silent air. When the final appealing notes had died away Walter Hagen, who showed considerable emotion, took up his position at the head of the grave and all the golfers and their friends walked slowly past.

Americans' Unsullied Sportsmanship

Mr. D. M. Mathieson of the Royal Burgess Golfing Society of Edinburgh then briefly addressed the assembled company. He said he was deeply touched by the sincere and reverent tribute which the Americans had so thoughtfully and spontaneously paid to one who was the head-piece of golf and who had lived a life which was a model for every professional golfer. He had known the majority of professional golfers who had come to Great Britain to take part in the Open championship since the first challenge made by McDermott; he had admired them for their steadfastness of purpose, their high integrity and unsullied sportsmanship, and could not but think they had taken Old Tom Morris as their example.

There were many strands in the web woven at the loom which was called America, and there was one of them a Scottish contribution. It was the game of golf and America through her professionals had never been slow to acknowledge her indebtedness to the home of the game. When it was known throughout the world of golf what they had done that night it would touch a chord in every golfer's heart and rebound to the credit of American professional golf and add lustre to its records.

The Morrisises

It was a tragic thought that looking across the sea from the point where they were standing was the place where Young Tommy had played his last great game. He won the Open championship in 1868, 1869, 1870, and made the Belt his own. There was no championship in 1871, but when the cup—for which they were at St. Andrews competing—was presented in

1872 Young Tommy was again the winner. That achievement of four successive victories had never been equaled and there was no doubt that Young Tommy was the finest golfer of his time. In partnership with his father in 1875 he was engaged in a match at North Berwick against the two Parks for £400—a stake almost equal to the record amount played for by Walter Hagen and Abe Mitchell. As the match was finishing news was brought to Young Tommy that his wife was dangerously ill.

A yacht was put at the services of the St. Andrews party and they were about to embark for home, a distance of about twenty miles across the Firth of Forth, when a second telegram was handed to Young Tommy containing the sad intelligence that his wife had died. It was a mournful party that made the voyage home to St. Andrews. The brilliant young golfer never recovered from the shock and he died on Christmas Day of the same year, 1875, at the age of 24. Old Tom lived on to be the grand old man of the game. He was honored by princes and peers and respected by golfers throughout the world. His portrait was painted by an eminent artist and hangs in the great smoking room of the Royal and Ancient Golf Club, beside those of Lord Haig, Whyte Melville, Freddie Tait, and other great golfers of a bygone period, and the home green at St. Andrews is named after Old Tom.

After the ceremony the party silently left the precinct of the cathedral. Those present included Walter Hagen, Gene Sarazen, Denny Shute, Olin Dutra, Craig Wood, Paul Runyan, Billy Burke, Johnny Farrell, Joe Kirkwood, Horton Smith, Leo Deigel, Ed Dudley, George Dunlap, J. Ezar, Robert Harlow, and Walter Hagen, Jr.

Glens Falls Fifth Open Entries Close Sept. 5

ENTRIES for the fifth annual Glens Falls (N. Y.) Open close Tuesday, Sept. 5, with the Glens Falls Open committee, Box 410, Glens Falls, N. Y. The tournament will be played Sept. 7, 8 and 9 on the course of the Glens Falls CC., eighteen holes each of the first two days, with the first 60 and ties playing the final 36 on Saturday, the 9th. Entry fee is \$5. Tournament headquarters will be the Queensbury Hotel.

Billy Burke won the tournament in 1929

and 1931, Tony Manero in 1930 and Denny Shute in 1932. Denny has advised the committee he will be back to play in this year's event. First prize money is \$1,000; second, \$600; third, \$350; fourth, \$250; fifth, \$150; sixth, \$125; seventh, \$100. Twenty prizes in all, down to \$20, are awarded. The winner also gets the E. W. West cup. Amateurs winning will be given plate. Amateur entrants must have handicaps of 6 or under.

The Glens Falls Open is one of the best and most pleasantly run fixtures of the season and always attracts a great field. It's pretty much "old home week" for the boys and they are advised to make their plans and entries early to give the fellows who have established and maintain this fine event a demonstration of pro appreciation and business conduct.

Golf Club Buyers Organized in England

THE Golf Club Buyers' Association, Ltd., 19 Berkeley St., London, W. 1, is interested in purchasing direct, acting as agents, or manufacturing under license, American golf innovations.

Another feature of the organization is an information bureau which handles introductions to golf clubs, advises on golf tours and on requisites, clothing, etc., for golf tours in the British Isles.

Directors of the organization are Captain A. Newman, Commander J. N. Farrell, G. A. Philpot and John S. F. Morrison.

The Buyers' association also acts as a central purchasing bureau for course and clubhouse supplies, excepting foodstuffs, but does not supply articles usually handled by a club professional. The organization's brochure says: "Under no circumstances is it proposed to market any article which forms part of the professionals' livelihood."

FOR boosting interest in golf, try a Father-and-Son tournament. Make it 18 or 36 holes, medal play, each pair using one ball, driving alternately off each tee and alternating in playing the ball between tee and cup of each hole. Make it a handicap event, with a gross and a net prize. Both father and son do not need to belong to the club, but one of them must.

We Changed Our Greens to Bent Without Closing the Course

By HENRY McKEEN, JR.

NEARLY EVERY course at some time is up against the problem of replacing a green or two or by inculcating a better grass strain on greens where existing growth has gone bad. This is particularly true of older courses whose greens were built before the best strains of green-grass were developed, and as well in some newer ones where foolish attempts to save money were made, resulting in poor original planting. It is to those green-chairmen and greenkeepers who have such problems that this article is particularly directed.

My own club, in Pennsylvania, presented both of these situations when the green-chairmanship was wished on me. Most of our greens were built and planted over thirty years ago. Bents and other fine grasses were then practically unknown. As far as could be ascertained from fragmentary old records and by consultation with some of the older players, the original planting had been fescue and redtop.

Redtop makes a nice surface for a year or two, but later coarsens and soon disappears, crowded out by hardier growth. It is an excellent grass to sow in mixture with seed bents as a "nurse," or in sparse stolen plantings as a filler. Fescue also gives a fair temporary surface, but does not stand up well in summer season and has a tendency to "bunch" in circular patches as does velvet bent in mixed bent plantings. Velvet patches are uniform and smooth and do no harm to surface, but we found the fescue bunches objectionable as they usually are tougher and higher than surrounding areas. If fescue is kept close clipped it loses its sturdiness particularly in hot weather, and inferior strains gradually eliminate even growth, leaving the patches referred to.

In addition to bad grass our greens were improperly built both as to soil structure and as to drainage. The grass was about 50% poa annua, 10% fescue, 10% bent (no one knows why), 10% clover and 20% what-have-you. That was about the pro-

This article is not written to discuss all of the types of grass suitable for putting greens. For those about to build a new course or to completely rebuild an existing one, a wise plan is to visit State Agricultural or Green Section Experimental Plots. There can be seen in actual growth the various more successful types of fine grass, and choice can be made of the strain which has the greatest appeal.

portion in the spring. At crab grass season cut all of the above in half and add 50% crab grass. The reader can see why no one in our club was anxious to be green-chairman!

Obviously the easiest thing to have done would have been to plow up all 18 greens and start over. Such action would have closed the course for at least a year, perhaps longer. After a very careful analysis, backed by independent outside advice, a definite rehabilitation plan was evolved, to extend over a period of several years. Several of the worst greens which needed complete reconstruction were plowed up, rebuilt and re-planted. By a change in fertilization and upkeep program the others were improved so they were at least playable. Four or five of the best we figured could stay as they were structurally if it were possible to get some better grass on them. How we succeeded in this will later appear.

New Greens Without Plowing

When an entire green or two goes bad it will usually be found that the fault does not lie with the grass on it, but rather with soil structure or drainage. Obviously the remedy is a correction of the structural fault. When all greens start to go bad the first thing to check is their fertilization and care. Not finding the trouble there, look next into soil structure and drainage and finally into grass strain itself.

Having ascertained that our grass, soil and everything else was wrong we were

in a position where heroic measures were called for. After passing on and approving our definite policy, we then had to decide how best to do it with the least interruption of play. And then came the momentous question of the type of grass to use.

Choosing Grass to Use

There are many types of grass fine enough for use on a putting green. A most important question is wearing ability. Obviously a grass which will bruise easily and die is not suitable, no matter how fine and silky. The present-day golfer demands a good-looking green, well kept and of a pleasing color and soft "feel." This rules out some of the sturdier types. This appearance must be kept as nearly perfect as possible during the whole time of play, the greater part of which falls within nature's dormant season. This makes it impossible in some climates to use certain types of otherwise excellent grasses. And in our particular case we had to bear in mind that we needed a grass for entire planting of some greens and also one which we could successfully incorporate in existing grass on other greens.

After considerable study we narrowed our initial choice to two seed strains, seaside and mixed German bent, and one stolon type, the Washington strain.

In my opinion, seaside and Washington are much alike in appearance. Both are creeping bents of pleasing color. Mixed German is also a very satisfactory grass. Some people object to it because being a mixture it presents to close view a rather spotty appearance, particularly if there is a considerable percentage of velvet bent in it. Its champions claim that its mixed strain helps to keep condition in summer, as in a mixture only certain plants are dormant at any given time.

By careful tryout we finally chose the stolon type Washington as most likely to fill our requirements. Using this for our new greens we could as well incorporate stolons in existing greens, thus, in time, making the renovated and the new greens all of the same strain, texture and appearance. We were distinctly unsuccessful in attempts to get any great amount of new strain seed growth on established greens. The hardy plants already there gave very little opportunity for any appreciable percentage of the new seeding to grow.

Having determined on the type of grass best suited to our use, the next problem was how to make the change with the least inconvenience to play. Several of the greens were so bad that it was no hardship to use temporary greens. These we plowed up and built structurally correct early in the fall, planting during growing weather. By the following Decoration Day they were in excellent condition.

Play Continued During Change

Those greens on which we wished only to change strain received their first treatment at this time also. Our method was as follows:

We lined the green with cord (as is customary in weeding) spaced a foot apart. With curved edging tools incisions were made along these lines. The tool was worked from side to side before withdrawing so there remained a sizable gap. Following each workman cutting the soil was another with a bucket of fine loam in which was mixed a small amount of balanced fertilizer. His duty was to fill the cut to about one-quarter inch of the surface. Immediately following him was a third workman with a basket of fresh-cut long stolons and a bucket of loam. His job was to string the stolons along the incisions and cover with loam, stepping on the plantings as he went along to firm down.

We found long cut stolons better in growth than short cut ones, although a little more difficult to distribute. We learned, too, that a sparse planting is better than too thick. It is advisable also to permit some of the stolons to protrude above the surface. We found it well also to do only half of a green at a time so as to permit rolling and thorough wetting down before stolons could dry out. Before cutting the incisions, the green was cut very close—as close as possible without scalping—and not cut again for a week. This gave an opportunity for stolon growth to begin without danger of disruption by blades of the mower. Members were requested not to pull up the protruding stolon ends—otherwise some of those fussy boys who are looking for fly-specks and bee-buttons that might deflect a putt would surely have pulled them out.

After a week's omission of cutting, blades should be set high and grass kept longer than normal until growth is apparent from the stolon planting. The

green should be kept moist (not wet) at all times just as in other stolon planting, or the new grass will burn up. In two to three weeks' time—often less—new grass growth should show clearly along the incision lines, the marks themselves having disappeared within a few days. Play was not interrupted except for the days of planting, but because grass was allowed to grow longer and no topdressing done, the putting surface naturally was not at normal smoothness. Topdressing cannot safely be applied, as stolons are apt to be dislodged. As soon as actual growth is observed, the green may again be cut to usual length, topdressed and cared for in the usual way. It is well to be careful that the green does not get really dry even after new plants show until they are well developed.

Change Completed in Three Years

By the following summer our thin plantings spread to ribbons of solid bent, each about two inches wide, crowding out the poa annua and coarser grasses. In another year they almost joined, and by next year will have completely covered the surface. If through soil composition or greater resistance of established grasses new growth does not gain as rapidly as might be expected, incisions and plantings could be made the year following, making same at right angles to the original rows. As an aid to elimination of coarser grasses we changed our fertilizing program so as to more greatly acidify the soil, and gave a bit more superphos than our usual practice to encourage dense and hardy new root growth.

Where Sodding Was Needed

Our program called for sodding the remaining greens, to avoid the long period of shutdown required where plowing and re-sowing is done. This sounds like a tremendous undertaking; actually, it was not. We carefully planned in advance and determined to sod six greens, taking two seasons to do it—three greens each year.

We then figured the required total square yardage of each group of three and added 20 per cent for possible errors or for parts of sod not perfect. An area of the size of the three greens and the one-fifth excess was plowed up in the rough and kept carefully cultivated to eliminate weed growth. An overhead oscillating water system was erected at small cost (we will use it later in our repair turf-nursery) and

deep furrows dug around to the plot to check surface wash and possible washing in of weed seeds. For ten feet on all sides the high grass was kept cut close to minimize danger of wind-blown seeds. After the period of cultivation, the top two inches of soil were hand screened to remove all sizable stones. Other than this no particular attention was given to the soil, either for fertility or for drainage. We figured that artificial fertilization would take care of necessary nutriment and that drainage, even if not proper, would do little harm in the short time the sod would be there.

In such a sod nursery, planted in the fall and not to be used until the following autumn and when transplanted not to be actually treated under putting green requirements until the following spring, it is not necessary to take the meticulous care called for under playing conditions. To encourage hardy development ours was allowed to grow to almost fairway length, great care being taken to keep weed-free and to prevent excessive graining. Several weeks before transplanting time it was kept strenuously raked and brushed and gradually cut closer. If sod is to be laid for early play the conditioning and closer cutting would have to be started earlier.

Preparing Green for Sod

A few days before sodding time the old green was stripped of its turf. Soil structure, drainage and contour were changed as required, bearing in mind that the finished surface would be 1½ inches higher than soil green level because of the thickness of the sod to be laid. Then 25 lbs. per 1,000 sq. ft. of a fertilizer containing considerable superphos and a large percentage of slow acting ingredients was well worked into the top inch of soil. The whole surface was then wet down, heavily rolled and, when well dried out, roughed with rakes as if about to be seeded.

Then, and only then, was the sod in the nursery cut. And never more at any one time than could be immediately laid. We found that pieces 3 ft. by 1 ft. and 1½ ins. thick permitted easiest handling and least chance of breakage. To make certain of even thickness (most important) we built a receiving board 36x12 ins. inside with 1½-in. flanges on three sides. Pieces were laid root-side up in this receptacle and an old scythe blade, detached from its handle, smoothed each piece to exact thickness and cut ends square.