

as are built on sandy soil. Some years the watering of fairways is not necessary, and in most seasons the turf is not killed in the absence of watering. Nevertheless watered fairways are distinctly better than fairways which are allowed to remain unwatered throughout the season. When the ground begins to get hard and dry we keep fairway sprinklers going on some part of the course 24 hours daily. We use a number of types of portable sprinklers with $\frac{3}{4}$ -inch hose. We have found that a sprinkler which throws a small amount of water and can be left in one location for several hours will keep the turf at that place green for more than two weeks even in the driest season. This is on a clay soil.

We water our greens and tees in the morning. When for any reason it is desirable to be through with the watering at an early hour in the morning, we begin to water before the usual work hours. We do not approve of night watering if it can be avoided. In the first place, it is difficult to get dependable men for night work; in the second place, even a good man can not see to work to best advantage at night. We use sprinklers with $\frac{3}{4}$ -inch hose for all routine watering, having found this to be the most efficient method, the ground being more thoroughly watered in this way. Hand watering is likely to be superficial.

Under our conditions the most important feature of a sprinkler is that it have no small outlet holes to become readily plugged with the dirt which is in our water. This is a feature which is likely to be of considerable importance where surface water is used. Gears or rapidly moving parts in a sprinkler are also a potential source of trouble.

We have no standard length of time during which we water, having found it impossible to work out any such standard, due to the wide variation on our courses in soil condition, areas to be covered, sprinkler volumes, and water pressure.

Golf Course Irrigation in Florida

By Joseph P. McAloon

Fortunately for golf courses on the eastern coast of Florida, irrigation does not present a problem as serious as in most other sections of the country. St. Augustine Links are operated only four months in the year, from December 15 to April 15, and during that particular time our fairways, which consist of Bermuda grass and carpet grass, seem to require little, if any, watering, since these grasses are dormant during that period. In fact, it seems that the only occasion for watering our fairways is when we are renovating them or establishing a turf. After the turf on the fairways has been established the normal rain supply during the year seems to take care of the situation nicely. During the eight months the course is closed there is very little watering done on the greens and tees, other than what is necessary whenever renovating the turf. During the playing season the greens and tees are watered practically every day with regular $\frac{3}{4}$ -inch sprinklers, and for this we are using two-purpose sprinklers, which are proving satisfactory. During the operating season we use $1\frac{1}{2}$ -inch hose fitted with a home-made galvanized iron sprinkler for drenching the greens after they have received an application of top-dressing or commercial

fertilizer, and about a half-hour's watering with this size hose on each green seems to be sufficient. All watering during the operating season is confined to the late afternoon, in order to avoid interference with play. During the winter, however, greens and tees, and fairways if necessary, can be watered any time of the day without injury to the turf. We have no accurate data as to the quantity of water used during any given period on the fairways, greens, and tees, as the quantity of water applied and frequency of application necessarily depend on weather conditions, and consequently more watering is required some years than others. For instance, last winter was unusually long, extending well into May, and as a result we were able to maintain perfect greens with only two applications of top-dressing and about four light applications of commercial fertilizer, and very little watering was necessary outside of drenching the greens for about one-half hour after the application of the top-dressing or commercial fertilizer.

The source of our water supply is two 6-inch wells located about 1,000 feet apart and connected. These wells are driven to a depth of about 255 feet, producing a head pressure of about 14 pounds. The water from these wells is the regular hard sulphur water generally obtained and used in this vicinity.

For pumping purposes we have a 25-horsepower oil engine connected to a 3-inch split-case, centrifugal, belt-driven pump. This pump, of course, is connected to the wells with a by-pass, pumping the water direct from the wells into the entire water system throughout the golf course and giving from 65 to 70 pounds pressure. The connection is by-passed so that we can shut off the pumping unit and use the water direct from the wells whenever we have only light watering to do. Of course, when we are watering all over the links it is necessary to have the pumping unit in action.

The water is distributed through galvanized pipes, starting from the wells with 4-inch mains, with 3-inch, 2½-inch, and 2-inch branches up to the greens and tees. On the boundary lines of each fairway we have 2½-inch and 1½-inch standards with 2½-inch and 1½-inch valves located about every 100 feet, with one such size standard located conveniently for every green. In addition to this we also have from one to two ¾-inch standards for ¾-inch hose located close to each green as well as one ¾-inch standard located conveniently for each group of tees. All pipe is laid to a depth of about one foot. The clubhouse supply is obtained from a separate 2-inch well, which takes care of the clubhouse exclusively and is not connected with the ground water system.

I might add that our water system as originally installed seems to be taking care of the entire situation adequately, and no important changes in the system have been necessary.

Bare, steep banks may be made attractive with a covering of vegetation. Japanese honeysuckle is excellent for the purpose. It spreads rapidly, but is difficult to eradicate if allowed to spread into turf. It is found growing wild over much of the country. The Wichurian rose is also excellent for the purpose, and has most attractive foliage; it is easy to handle and not difficult to destroy. The common periwinkle and English ivy are most attractive plants, especially for shady places, but are rather slow in getting established.