

## Efficiency in Golf Course Construction

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The fairways at Eastward Ho, the new course at Chatham, Cape Cod, presented the combined difficulties of a thick growth of pitch-pine, a heavy carpet of bunch-grasses beneath, and numerous glacial boulders from 2 to 6 feet in diameter. The soil is a sandy loam. The pines were from 3 to 10 inches in diameter, and were pulled with double steel blocks and horses, one hitch taking three to five at a time in sequence. A week's preliminary test of this method and a 20-horsepower tractor of standard make resulted quickly in the latter being discarded; time out for repairs was the trouble.

The boulders were "mud capped." Sufficient 50 per cent dynamite was laid on the flat surface of each, and detonated, after having been covered with enough wet mud to offer preliminary resistance. No drill was employed.

In order to remove the surface mat of vegetation and to use it as green manure, the fairways were plowed. They were then disced twice at right angles with a 12-inch cutaway disc-harrow, to break up the sod, which was left to rot during the winter.

The teams and men engaged in this work were then turned to grading the greens, digging bunkers, making compost heaps, and were busy at this during the winter months, the whole idea being to keep the same number of men steadily at work during the construction period.

At the opening of spring the fairways were gone over with a spring-toothed harrow to pull out the roots, which were raked up with a farm horse-rake and burned. In places where grading made necessary the removal of the top soil, raw fish from the fish traps nearby was plowed under, and winter rye planted. This was again plowed under in July, and proved very valuable, the fish-oil acting as a fine soil-binder on the sandy soil that was exposed.

During the growing period the entire fairway was disced as often as was necessary to keep down weeds, with the additional effect of softening the contours of the ground and firming it for a seed bed. The only hand work that was done on the fairways was by a gang of stone-pickers that followed a screen of dump-carts.

As soon as the contours of the ground assumed their final shape, finely ground limestone was applied by a lime-spreader at the rate of 2 tons per acre. So insufficient are Cape Cod soils in this element that it was deemed wise to employ it in limited quantities—not to produce an alkaline reaction, which red fescue does not need, but to reduce the general poverty of the fairways. To assist in securing a good catch of grass in a district where heavy downpours are frequent, sheep manure was spread by the same means at the rate of 1½ tons per acre. Only one lime-spreader was used for both operations, and it spread its contents at the rate of an acre an hour.

The lime and sheep manure were harrowed in together with a spike-toothed smoothing harrow, going both ways across the field, and this was followed by a heavy iron two-horse roller. The teeth of the smoothing harrow were set forward only enough to raise the harrow frame off the ground, and it was sent after the roller. By this method the surface, now

thoroughly compacted, was not disturbed, but only roughened to hold the seed when sown.

Seeding was done at the rate of 12 bushels per acre on fairways and tees, and 20 on the greens.\* All were seeded by the same method, a one-horse lime-sower hauled by two men, adjusted on a measured acre to a delivery of 6 bushels of seed per acre where fairways were concerned, and 5 for greens. By cross-sowing on the former the requisite quantity was evenly distributed without the nuisance of weighing or measuring in the field, and by double cross-sowing the greens were accurately covered in an average of less than one-half an hour each. On the fairways, where fewer turns had to be taken, the average rate of seeding was two hours to the acre, this including time consumed in filling the machine.

No wind we encountered was too severe to hinder the action of this machine, although at times there was half a gale blowing. The delivery spouts were within two inches of the ground, and when the seed fell in the light furrows left by the smoothing harrow, it stayed there, and did not blow.

The harrow with teeth set back was now employed to distribute the seed so sown as well as to cover it, and was sent across twice at right angles. Cross-rolling with the two-horse iron roller followed to firm down the ground, and the job was done. The seed most deeply covered, sometimes to depths of an inch, was the first to germinate. No sign of the striations that might be expected from this method of seeding are to be seen, and the horse-drawn smoothing-harrow seems to have done adequately, and cheaply the work of rakes. Needless to say, the putting-greens were hand-raked and hand-rolled with the utmost care.

It will be observed that, except for the picking up of stones, the fairways were not touched by hand-labor. Three varieties of ordinary farm-harrows prepared the seed bed and did the light grading, but no rakers were employed. The only sign of farm methods having been employed are footmarks of horses, which the first rain will obliterate in this sandy soil, and there is nothing to indicate that the surface will not be first rate in a few weeks, given rain, which is badly needed.

On this eighteen-hole course of 6,350 yards, ten fairways were plowed and seeded, and trees removed from 17½ acres thereof. The total labor cost, including horse and farm machinery hire, has been less than \$40,000 to date, with greens, tees, and fairways finished. A not inconsiderable item of this total is the 10,000 two-horse loads of green compost moved twice, and the heavy grading necessary on some greens as well as fairways, for which the Cape Cod "sand plow" proved a highly efficient instrument.

An interesting sidelight on the exactness of the seeding method employed, is the fact that after estimates were made and the seeding machine set, but one three-bushel bag of red fescue, our chief ingredient, remained in the barn after all greens, tees, and fairways were seeded.

The caddy-master of one of our leading golf clubs recently remarked, "I wonder if business men would not be more considerate if thier own boys were caddies."

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\* The rate of seeding used was very heavy, at least four times as much as was really necessary on the fairways. Money spent in very heavy seeding could better be invested in fertilizer.—*Editor.*