tending along the whole length of the north and south boundaries there are three thoroughfare tracks with double-track "Y" connections at each end to the belt lines. Bisecting the yard on an east and west line is a central through track known as "track No. 25." In the plan showing the general arrangement it will be seen that there are two sets of classification tracks, known as the "classification yards." The tracks in these yards are 2,400 feet long, and they extend the full width between the thoroughfare tracks. Midway between the two classification yards is an artificially-constructed gravity mound and on each side of it and parallel with it on the level plain are sets of receiving tracks which are from 1,600 to 3,200 feet in length. The gravity mound has an elevation at its summit of 21½ feet above the general level of the yard. For a short distance each side of the summit there is a grade of 1½ per cent, and then for a distance of 1,800 feet a grade of 0.9 per cent, which finishes in a grade of 0.5 per cent for a distance of 300 feet further, the foot of the gravity mound tracks being several hundred feet beyond the apex of the classification yards.

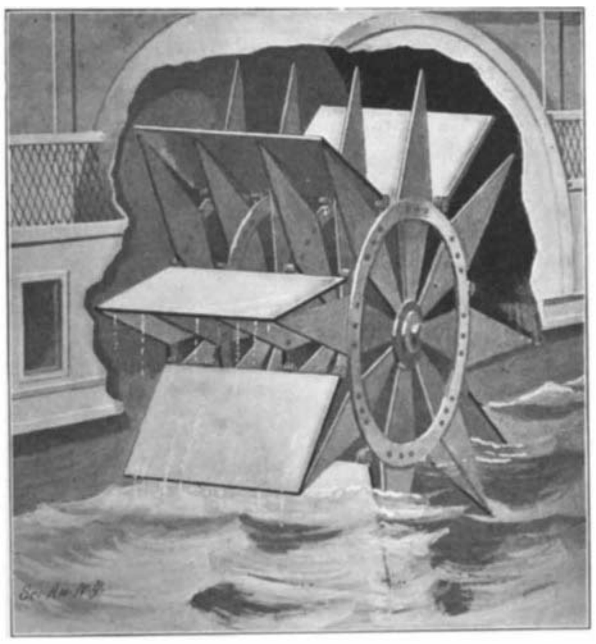
Running diagonally across the classification yards there are double ladders, and east and west of the classification tracks there are parallel overflow tracks which extend parallel with the classification ladders at the outer end of the classification yards. Parallel with the double ladder, at the inner ends of the classification tracks, are two tracks, the one next to the ladder being a "poling" and the outer one a "drilling" track. The double ladders, which connect by switches with each track in the classification yard, converge at a three-throw switch into the central track No. 25, already mentioned, which extends through the center of the whole yard. Consequently there extend over the summit of the gravity mound five parallel tracks with leader tracks and crossovers.

The object of the gravity mound is to allow the transfer of the cars to the various classification tracks to be accomplished by gravity and save a great amount of engine mileage which would be necessary if the cars had to be pushed onto the various tracks by switching engines. The method of operation is as follows: A train coming in at either end of the yard will be run into one of the receiving tracks, where the engine will be uncoupled and will take back a made-up train from one of the classification tracks, taking it out by means of the outer ladders of the classification tracks. One of the clearing yard switching engines will then couple onto the train, back up and push it over one of the drilling tracks, which we have mentioned above, as lying alongside the classification ladder. The drilling tracks and the whole V-point of the classification yard are on the grade of the gravity mound. As the train is pushed up to the summit, the couplers are disconnected at the proper places in the train, and as the cars go over onto the down-grade on the other side of the summit, they separate from the train and run down on the central track No. 25 to the three-throw switch at the apex of the classification ladder. Here they are switched to either side of the double ladder and finally into the desired track of the classification yard. Switching can be carried on simultaneously in both directions, that is, into both classification yards. The object of the "polling" track between each classification ladder and the drilling track is to allow an engine to assist the cars when a heavy wind is blowing against the grade or when there is snow upon the tracks.

The brakemen who ride on the cars down the gravity tracks are brought back by a light engine and car, which run to and fro either on the center track or on one or both of the tracks at the side of the classification tracks. The motive power of the yard will consist at first of six engines, four of them consolidations weighing 185,000 pounds and two of them six-wheeled switching engines weighing 120,000 pounds each. It is expected that from 5,000 to 8,000 cars can be switched and handled at this yard daily. For our illustrations and particulars we are indebted to A. W. Swanitz, chief engineer of the company.

A SELF-FEATHERING PADDLE-WHEEL.

The ordinary type of paddle-wheel encounters considerable resistance as it is submerged, and lifts no small quantity of water as it rises to the surface. As a result of these defects in construction, the engine must perform considerably more work than is actually required in propelling the ship. Mr. David W. Horton, of Petersburg, Ind., has designed a paddle-wheel which feathers itself both on entering and leaving the water,



THE HORTON PADDLE-WHEEL.

so that much of the power now unnecessarily expended is used in propelling the ship.

To the paddle-wheel shaft a series of parallel, radial, lozenge-shaped arms are secured. For the purpose of securing rigidity, a stay-ring is bolted to each circular series of arms at the widest part. Between the radial arms the paddle-blades are hinged to the stay-rings, in such a manner that they can be supported against the inclined face of either of the extending portions of the arms.

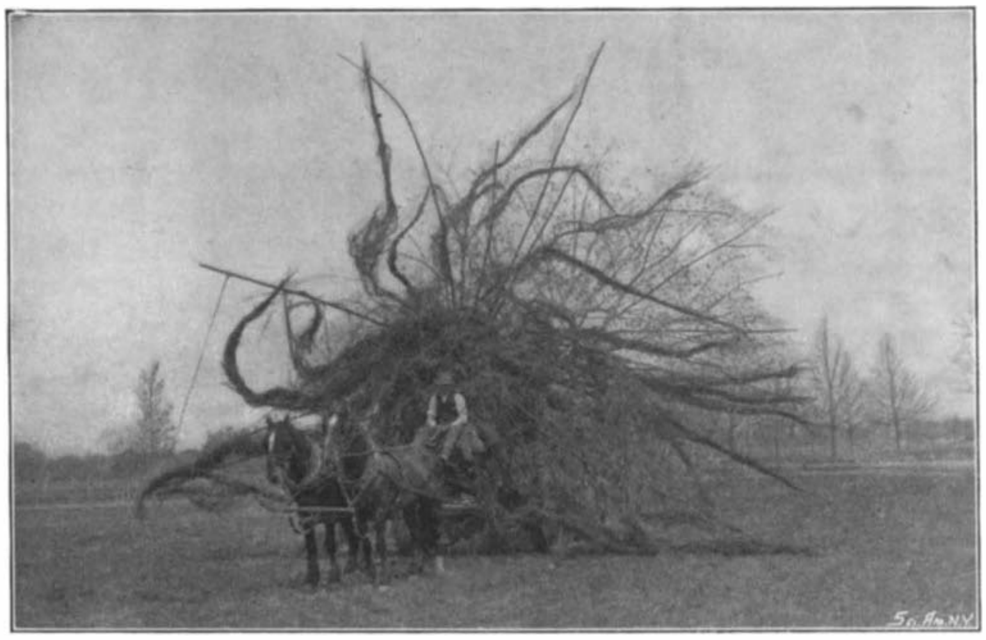
The paddle-wheels, as they successively pass the center of the wheel while it is rotating in either direction, will incline forwardly, and will thus be presented at or near a right angle to the surface of the water. The blade approaching the water will be submerged edgewise with a minimum of resistance. When fully immersed, the pressure of the paddle-blade and the immobility of the water when subjected to sudden impact, will rock the blade back until it impinges upon the arms immediately behind. The successive rearward movement of the blades will cause them to engage the water throughout their areas, when submerged, so that they will exert a maximum pressure. Each paddle-blade, by reason of its rearward inclination, will leave the water edgewise. Thus the paddle-blades are feathered while entering and leaving the water, and thus the tendency of ordinary wheels to lift a mass of water is prevented.

SCIENTIFIC METHODS OF MOVING TREES.

BY DAY ALLEN WILLEY.

The transferring of trees is at present so scientifically conducted that it is not necessary to wait ten or fifteen years for shade trees to grow for one's grounds or to ornament the landscape with large specimens of trees. In fact, parks and the surroundings of country seats can be made to order these days, the grounds about the residence being beautified and shaded while the home is being constructed. At a number of villages on Long Island can be seen fine specimens of forest growth ranging from twenty-five to fifty years old, moved various distances and replanted, yet are growing vigorously and to all appearances are in perfect health. They include such specimens as silver maple, Norway maple, beech, birch, linden, fir, hemlock and cherry.

Apparently it would seem impossible to transplant a tree fifty feet in height, with a trunk varying from one to two and one-half or three feet in diameter at the base, for even a novice realizes the extent of the roots which spread through a wide area of ground in all directions, yet the operation is being performed with complete success. What is known as a tree mover, the invention of Mr. Henry Hicks, of Westbury, N. Y., has been adapted for the purpose. In operating with this apparatus, the tree, if of 14 to 26 inches diameter of trunk, is dug by starting a circular trench with a diameter of 30 to 40 feet. An undercut is made beneath the roots with a light prospecting pick, and the soil picked out and caved down with a spading fork or picking rod, the points of which are rounded to avoid cutting off the roots. The lose dirt is shoveled out of the bottom of the trench and the roots are uncovered, tied in bundles with lath yarn and bent up, out of the way of the diggers. If the roots are to be out of the ground even for one day in dry weather, the bundles are wrapped in clay mud, damp moss and straw or burlap. When the digging has progressed within from 4 to 8 feet of the center, the tree is slightly tipped over to loosen the central ball, which cleaves from the subsoil near the extremities of the downward roots. On sand or hardpan subsoil this is at a depth of 2 to 5 feet. In deep soil it may be necessary to cut some downward roots. A ball of earth is left in the center from 5 to 12 feet in diameter, or as heavy as can be drawn by four to eight horses. This ball is not essential with deciduous trees, but it is easier to leave it than to remove and replace the soil. With fine-rooted trees like the red maple, it is difficult to pick out the soil, while with coarse-rooted trees, like the beech, in gravelly soil the ball drops to pieces.



ROOTS WITH 35-FOOT SPREAD BEING TRANSPLANTED AFTER BEING TIED TO BRANCHES.

LOWERING THE TREE INTO HOLE AFTER POLE AND SEAT ARE REMOVED.

In loading for removal, the cradle of the mover, which is pivoted above or back of the axle, is swung over to the tree, the trunk first being wrapped with cushions and slats. It is thus clamped to the cradle by chains and screws without injuring the bark. By means of a screw 9 feet long operated by a ratchet lever or hand-brake wheel, the cradle lifts the tree from the hole and swings it over in a horizontal position. Pulling in the same direction by tackle fastened in the top of the tree aids the work of the screw. After the tree is loaded, the roots on the other side of the axle are tied up to the perches. The front wheels are on pivots, therefore