and made a spurt, finishing in 34 minutes 18 2/5 seconds, with Christie some 3 minutes behind him in 37:24 3/5.

The final and most interesting event was the "two-miles-a-minute" race. The only competitors were the 8-cylinder, 200-horse-power Darracq, and the Stanley steamer. As recorded in this journal last week, the steamer had previously covered a mile in 28 1/5 seconds, at the rate of 127.65 miles per hour. In the "two-miles-a-minute" race both machines were obliged to make two trials. These attempts were made separately. The first one, which was made by the steamer, resulted in the comparatively slow time of 1:03. The Darracq did much better than this, although one or two of its cylinders were missing fire, and on its first trial it consumed only 3/5 of a second over a minute. The second attempt of the steamer resulted in 59 3/5, or 29 4/5 seconds to the mile, which was a rate of speed of only 120.8 miles per hour—7.85 miles per hour less than the steamer had previously done in the mile trials. A third attempt at the record was not allowed. The Darracq machine made a slightly faster showing. It covered the two miles in 58 4/5 seconds. This is equivalent to 29 2/5 seconds to the mile, or 122.46 miles per hour. This machine, like the Stanley, was especially constructed for the "two-miles-a-minute" race. Its engine is twice the size of that in the 80-horse-power racer which won the Vanderbilt Cup race last October. The eight cylinders are set at an angle of 90 deg., forming a V. They are 170 millimeters (6.692 inches) bore by 140 millimeters (5.511 inches) stroke, and they have a total piston displacement of 1,551.68 cubic inches. The present racer has the radiator arranged to form a sharp prow, and the cylindrical water tank is also pointed. While this may make some difference in the air resistance, the fact remains that, roughly speaking, it has required a doubling of the horse-power to make an increase of one-third in the speed. If the same ratio holds, to obtain a speed of 150 miles per hour with a gasoline machine, at least 350-horse-power would be required. How these figures compare with those of the steam racer may be seen from the following facts regarding the latter which have been sent us by the inventor, Mr. F. E. Stanley.

The wheel base of the racer is 100 inches and the tread 54 inches. The rear or driving wheels are fitted with 34 x 3½, and the front wheels with 34 x 3-inch standard G. & J. clincher tires. The wheels are of the wire spoke type, the tires being bolted to the rims with eight tire bolts and being so perfectly balanced with counter weights that there was no vibration when the wheels were making upward of 1,200 revolutions per minute. The running gear is the same as that used on the Stanley touring car with the exception of the wheels, which have wire instead of wooden spokes. The body of the car is built entirely of wood, and mounted on four full-elliptic springs. The springs are placed on the inside of the body, so as to reduce the air resistance to a minimum. Ball bearings of the two-point type, with ¾-inch balls, are used in the running gear.

The body is 16 feet long and 3 feet wide at the widest part. It is pointed in front, and terminates at the rear in a circle with 8-inch radius, tapering to 3-foot width and to the point in front with cycloidal curves, or curves with constantly diminishing radius. The bottom of the car is perfectly straight and smooth. It has a clearance of 10½ inches. The sides are vertical to a height of 18 inches, and from that line the removable top is oval, curving both transversely and longitudinally. The largest cross section, including the wheels, amounts to 9 square feet.

The power plant consists of a boiler 30 inches diameter and containing 1,476 tubes of 33-64 inch outside diameter and 18 inches long. The boiler contains 285 square feet of heating surface. The steam was superheated, by passing it through tubes surrounded by the contents of the boiler and through coils of pipe in the fire box, to a temperature of about 700 deg. F.

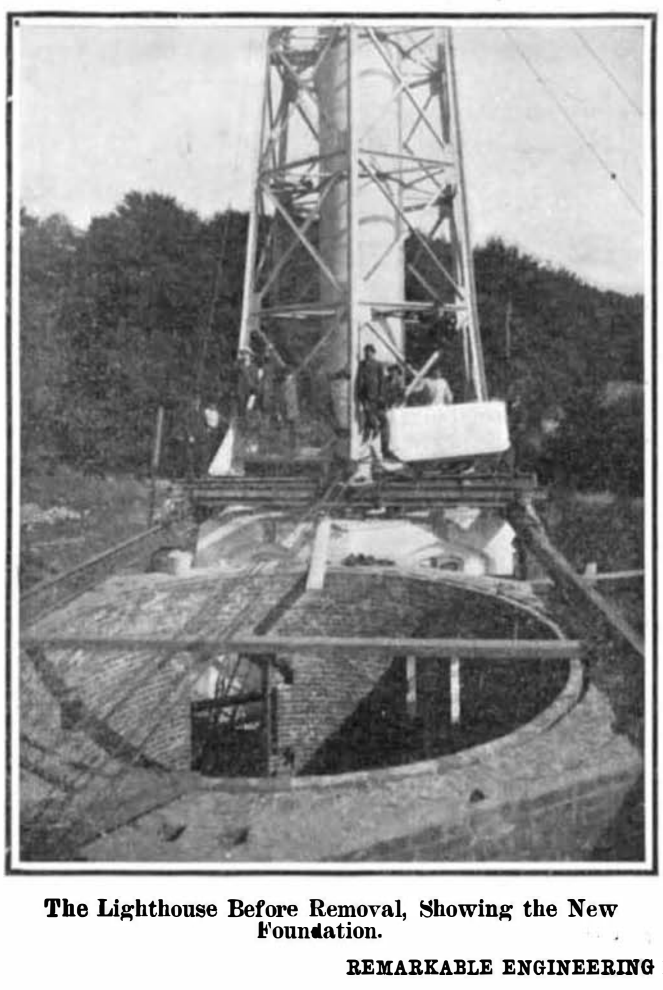
The engine is of the two-cylinder double-acting type, with cylinders 4½-inch bore by 6½-inch stroke. It is fitted with Stephenson link valve gear and D slide valves. The engine makes 350 revolutions to the mile, while the 34-inch driving wheels make 600 revolutions to the mile. Linked up as the engine was in forward gear, the cut-off was about one-third stroke, and the mean effective pressure about one-half the steam-chest pressure. The engine therefore develops 6 horse-power for each 100 revolutions per minute, and each 100 pounds steam chest pressure. The boiler will furnish steam for 50 horse-power continuously, and more than twice that amount for three minutes or more. About 275 pounds to the square inch steam pressure is carried.

The arrangement of parts of the power plant is as follows: The boiler is placed just back of the center of the body, the water tank between that and the rear axle. The engine is geared to the driving axle by spur gears, and is placed horizontally at the rear of the axle, so that the driving force of the engine tends to lift the front axle and transfer the load to the rear axle, thus giving the greatest possible traction to the driving wheels.

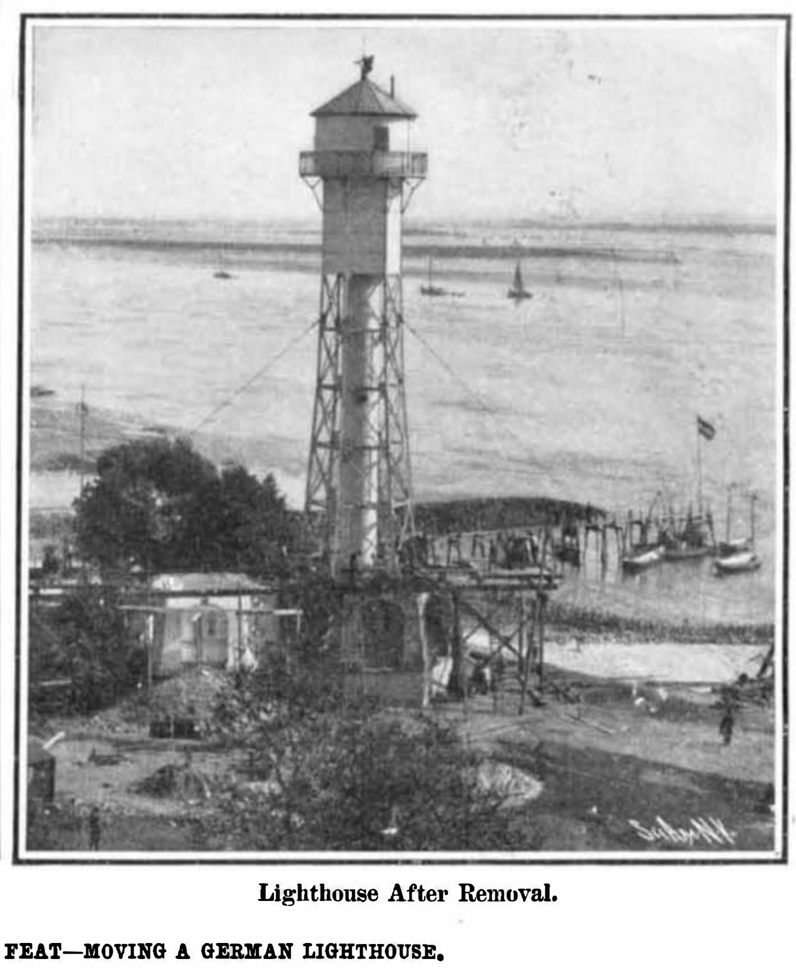
In making the record of 28 1-5 seconds for the mile, the power developed was probably about 120 horse-power. The engine made 750½ R. P. M. and the 34-inch driving wheels 1,286½ R. P. M.

The total weight of the machine was 1,675 pounds. The boiler weighed 525 pounds; engine, 185; burner and fire-box, 75; pumps, tanks, etc., 50 pounds; making the total power plant 835 pounds, or less than half the total weight of the machine.

Lighthouse During Removal.



The Lighthouse Before Removal, Showing the New Foundation.



Lighthouse After Removal.

REMARKABLE ENGINEERING FEAT—MOVING A GERMAN LIGHTHOUSE.

MOVING A GERMAN LIGHTHOUSE.

BY DR. ALFRED GRADENWITZ.

Though the removal of buildings has long been a commonplace matter in American engineering practice, the readers of this journal will doubtless be interested in the following description of a removal work fraught with greater difficulties than the removal of even considerable masses, owing to the comparatively great height and small ground surface of the building, which was a lighthouse tower. In fact, even the slightest inaccuracies in preparing the slideway might result in considerable oscillations of the tower, while oscillations due to storms had to be prevented by lateral props. It should also be borne in mind that these lateral props had to uniformly follow the motion of the tower. This was effected by installing, in parallel to the sliding props, some girder constructions carrying crabs, and attaching to the latter the steel wire ropes propping the tower.

The Hamburg Department for Commerce and Navigation recently ordered the Wittenbergen lighthouse tower to be displaced with a view in future to avoid the continual dredging work necessitated by the alluvial sand. The width of the channel having to be increased from 142 to 200 meters, the Wittenbergen lighthouse was removed southward by about 9 meters. In order not to interrupt the operation of the lighthouse, arrangements had to be made that the tower might immediately find a solid foundation in its new position. The new foundation with all the necessary mooring, etc., was therefore made at a convenient location some 30 feet distance from the old place. The sliding way from the old to the new foundation was made of heavy ingot iron girders on which double coupled steel rollers moving the tower were allowed to run. The motion was effected with a strong hand-driven winch by means of a wire rope, while another winch was installed at the rear (with regard to the direction of motion) with a view to avoid any displacement of the tower in the case of storms. In addition there was a winch installed in front and another behind, the wire ropes from which were fixed on the top of the tower to avoid any oscillations. A special point was made of synchronism in the working of each of the winches. In order to protect the tower against oscillations due to lateral thrusts, two wire ropes connected to crabs were arranged on each side, these crabs running on girders mounted in parallel to the sliding way.

The whole of the removal work occupied 32 minutes. The lighthouse tower weighs about 60 tons, and is 115 feet high. The cost of the removal work proper, which was carried out by the contractors themselves, amounted to about 7,000 marks, exclusive of the masonry and carpentry work, executed by the Hamburg Hydraulic Engineering Department.

Liquid for Sanitary Spraying.

A liquid for sanitary spraying, for use in the chambers of the sick, is composed of 10 parts of eucalyptol, 3 parts of thyme oil, as much lemon oil, and the same quantity of lavender oil, in 110 parts of alcohol of 90 deg. To a pint of water add a teaspoon of this liquid. —Jour. Parf. et Sav.