NEW TEN-WHEELED PASSENGER ENGINE.

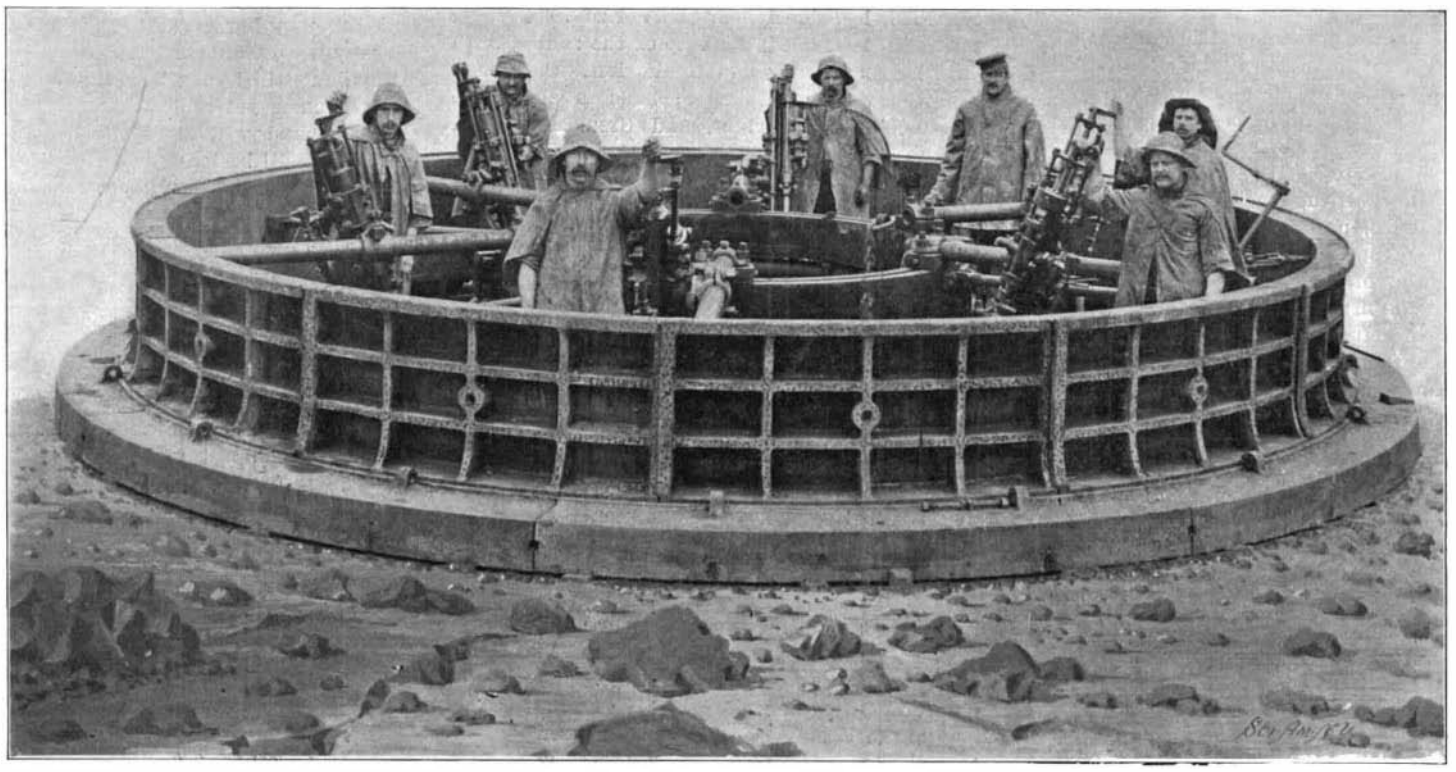
There have lately been built for passenger service of the Central Railroad of New Jersey twenty-five powerful and handsome locomotives. It will be seen from our illustration that No. 624 (one of the consignment) is of the six-coupled, ten-wheeled type, with wagon top, wide-firebox boiler, and a standard two-truck tender. There are a great many points of excellence in the design of this engine for the service in which it is to be engaged. The peculiarity of its contour, with two separate cabs, one for the engineer forward of the firebox, and another for the fireman in the customary position at the back of the boiler, is due to the fact that the boiler carries the wide firegrate designed to burn fine anthracite coal, and the great bulk of the firebox renders it advisable to place the engineer forward over the barrel of the boiler, where he has an unobstructed view. The unusual area of the grate, 67.7 square feet, is obtained by carrying the firebox out laterally over the rear pair of drivers. Its dimensions are: Length, 109 inches; width, 91 inches; depth at the front, 59½ inches, and at the back, 46 inches. It is provided with both rocking and water-tube grates, and the box is radially stayed to the outer shell.

The barrel of the boiler is 60⅞ inches in diameter at the front and 69⅝ inches at the throat. It is built of steel varying from ½ inch to 11-16 inch in thickness. There are 282 charcoal-iron tubes, 2 inches in outside diameter, the length over tube sheets being 13 feet 10⅛ inches. The heating surface in the firebox is 156 square feet and in the tubes 2,031 square feet, making a total of 2,187 square feet. The weight on the leading wheels is 41,000 pounds and on the driving wheels 120,000 pounds, making a total weight of 161,000 pounds. The weight of the tender loaded is 106,000 pounds. The cylinders are 19 inches diameter by 26 inches stroke and the drivers are 69 inches in diameter. The steam ports are 24.2 inches in length by 2 inches in width, and the least area of the exhaust is 65 square inches. Piston valves are used. They have a greatest travel of 5⅜ inches; a steam lap (inside) of 1⅛ inches, and a lead in full gear of 1-32 of an inch. The working pressure is 210 pounds to the square inch. The engine is of a decidedly handsome and imposing appearance, which is due partly to the great height of the boiler, whose center is 9 feet 5½ inches above the rail. We are indebted for our information to the American Locomotive Company, at whose Brooks Works this handsome engine was constructed.

A NEW SYSTEM OF SINKING SHAFTS.

FROM OUR ENGLISH CORRESPONDENT.

A short while ago we described in the SCIENTIFIC AMERICAN the ingenious freezing process for boring shafts through sandy soil. We illustrate herewith another method applicable to all kinds of soil from sand to rock, which has been devised by the Hardy Patent Pick Company, of Sheffield, England, and which has already been submitted to practical tests with highly satisfactory results.

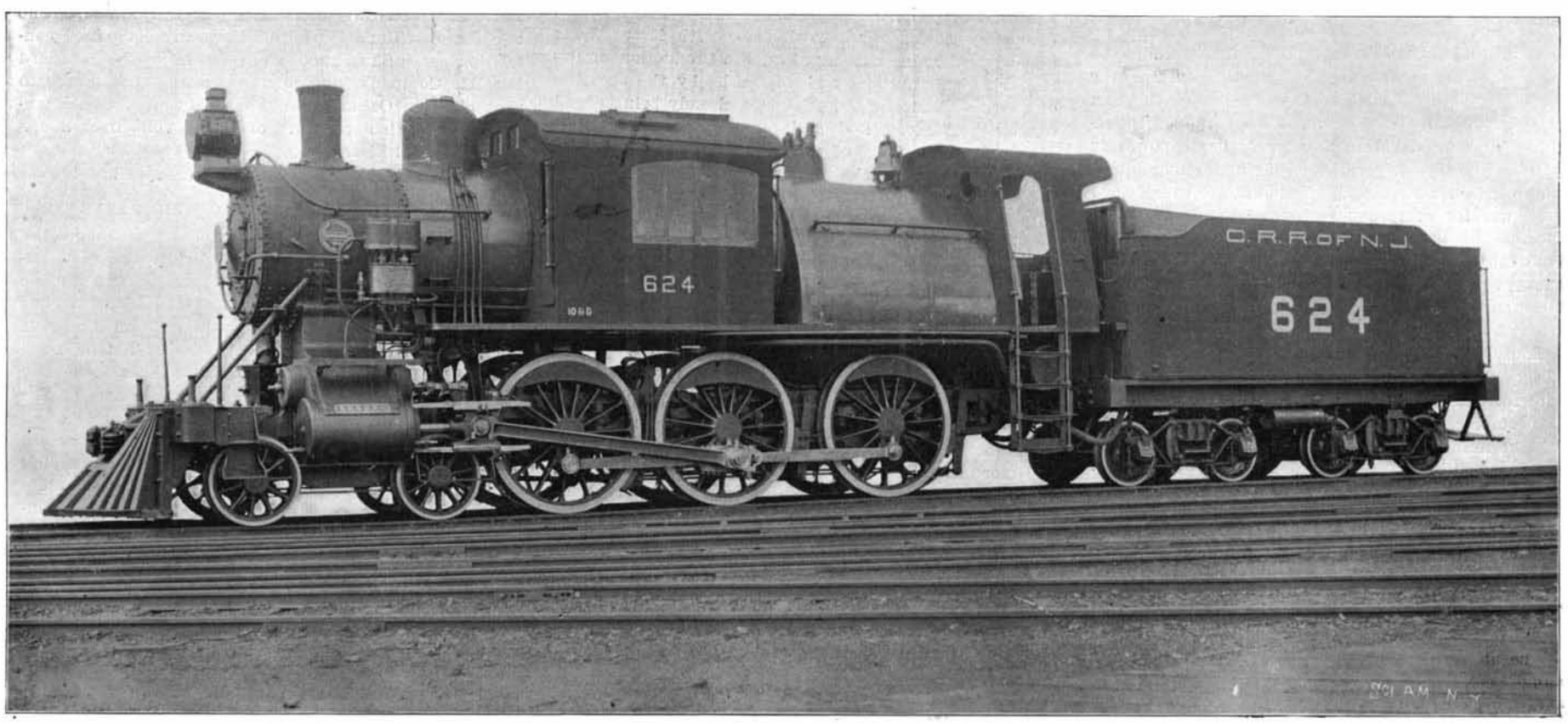


A NEW SYSTEM OF SINKING SHAFTS.

It is a curious fact that there have been comparatively few developments in the process of shaft sinking, either to minimize the cost of the undertaking or to expedite its progress. Yet the sinking of shafts must always necessarily be accompanied by enormous initial expenditure, such as the installation of surface plant. The process of sinking almost universally adopted, however, is either by the hammer and pick system, or by boring machines, and as a matter of fact under certain circumstances even now the latter process, although slow, cannot be equalled; but where rock or hard ground is encountered even the machine boring process becomes a very expensive and protracted operation. The appliance illustrated herewith is a decided improvement, in the way of utilizing a mechanical plant for shaft sinking, and in the north of England where it has been employed it promises to supersede all other methods of shaft sinking. The three most noteworthy characteristics of this invention are the speed of boring, the comfort and absolute immunity of the men working within the shaft from accident, and a decided minimizing of the risks generally incurred in such work.

Our illustration will supply a very comprehensive idea of the general appearance of the appliance. Two shafts each 25 feet 6 inches in diameter are at present being bored by this machine at a colliery at Mansfield, Yorkshire, and a description of the plant being used will supply a very good idea of its operation.

A circular steel frame, 8 feet in diameter, has cast in its entire circumference an annular tee-slot. Fitted in this slot are suitable clamps, each carrying telescopic arms, projecting so that the diameter over such arms corresponds approximately with the diameter of the shaft to be sunk. Upon these arms are mounted an improved form of compressed air drill, preferably two on each arm. This plant is put together complete on the bank and lowered by means of winch and guide ropes to the bottom. It will, therefore, be seen that the whole of the drilling plant can be lowered at once, and raised again after the completion of the boring, thus abolishing the slow and tedious methods of clearing the pit bottom. In fact, from the time of rapping to the lowering and starting of eight drills in the bottom, less than ten minutes have elapsed. This, however, is not the only feature in connection with the frame. Its circumference is so indexed that any number of holes may be drilled mathematically correct without the trouble of marking out, an item which has hitherto been of very serious moment, involving loss of time. Reducing this to actual figures, it may be taken that a round of 60 holes, 6 feet deep, can be drilled through hard limestone (25 feet 6 inches diameter) and the gear raised to the bank in two hours and a half, a result which we venture to think has never before been approached. In combination with the sinking frame a new form of scaffold has been introduced, by means of which bricking, or tubbing, can be carried on at the same time as the sinking. After a suitable spot has been found for the first



Cylinders, 19x26 inches. **Drivers,** 69 inches. **Heating Surface,** 2,187 square feet. **Weight,** 161,000 pounds.

NEW TEN-WHEELED PASSENGER ENGINE FOR THE CENTRAL RAILROAD OF NEW JERSEY.