

**THE CHALLENGE REVERSIBLE ROTARY HOISTING MACHINE.**

A novel application of the rotary engine to purposes of hoisting or elevating has recently been brought to our notice, which in some particulars appears to be, in point of simplicity, compactness, portability, and usefulness, an improvement of considerable merit. It is claimed that the engine runs the same number of piston feet per minute as a reciprocating, and, from its construction, at a higher speed than the latter. Hence, and for other reasons to be noted as we proceed, it is believed that the ground of the objection generally true to rotary engines as a class, namely, lack of economy, is here materially decreased, and in some forms of the machine perhaps obviated altogether.

In justice to the apparatus it may be stated that, so far as our investigation has extended, it has given general satisfaction; and although from our individual knowledge we are of course unable to make confident assertions as to its merits as compared with devices of like nature, we nevertheless have been informed by credible engineers, and others by whom it has been actually employed over a sufficient period for reasonable tests, that it is, in point of relative advantage, superior to many other well known machines with which they are familiar.

In order clearly to comprehend the operation of the apparatus, an explanation of the interior working mechanism of the engine is necessary, and this will be rendered plain by a reference to the sectional view represented in Fig. 1. B is the spider which is keyed fast to the shaft, C, and set eccentrically to the outer cylinder, A, forming an abutment at the top and leaving a steam space, D, which is traversed by the three pistons, E. The latter are held out by a loose interior ring and a spring ring, and can move with the inner cylinder or remain at rest. A regular and steady power, it is claimed, is gained at all points from the fact that each piston acts for one third of the circumference of the outer cylinder, and the steam expands by increase of area until cut off by another piston. The point, however, to which we desire to call more direct attention, is the valve, which, of the usual D shape, slides over the steam ports of the engine and by its position allows the entrance of steam into one or the other side. At the

tional Line, the apparatus is used for hoisting in and out cargo, coal and freight. An apparatus rated at fifteen horse power by the manufacturers, we were told, under a pressure of 60 lbs. of steam, easily lifted 4,800 lbs. 200 feet per minute, raising, lowering, or holding its load at any point with equal facility. The same machine also elevated 460 tons of coal to a height of 20 feet in eleven hours. At a warehouse in Washington street in this city, where the handling of heavy goods is often necessitated, an engine rated at

hoisting, and intended for use in the regular removal of coal from the mines. One or both engines may be employed, the valves being so arranged that a single lever governs both. From the engravings a general idea may be gained of the mechanism of the hoisting engines above referred to.

Not the smallest merit in the invention is its freedom from clutches, brakes, complicated reversing gear, etc., necessitating the frequent stoppage of the machine, and the constant supervision of the engineer. The load is held suspended at any point, by shutting off steam entirely, excepting from a very minute hair space, so that just sufficient is admitted to maintain the necessary opposing pressure. This is quickly and easily accomplished without jarring or racking. A natural inference, from the facility with which the motion of the device is controlled, is that it may be advantageously applied to steering gear on vessels. This we find has already been done, and the steamer Rhode Island, of the Stonington line, is now thus fitted. A simple device throws the main steering wheel out of action. The rudder is then governed by a small hand wheel in the pilot house, which, by a simple rack and pinion, communicates with the governing lever of the engine. We were assured that the helm is easily managed by a single pilot, even in the roughest weather, and that there is no wrenching of the mechanism due to heavy seas striking the rudder. We may add that this application of the device appears one of much value and to be superior to the more complicated arrangements usually employed.

Many other uses to which the apparatus is applicable will at once suggest themselves. Its portability and compactness render it a convenient device for elevating stone and other material in the construction of buildings. It can be permanently placed on the decks of steam vessels as a substitute for the ordinary form of winch, and will doubtless prove of

FIG. 1.

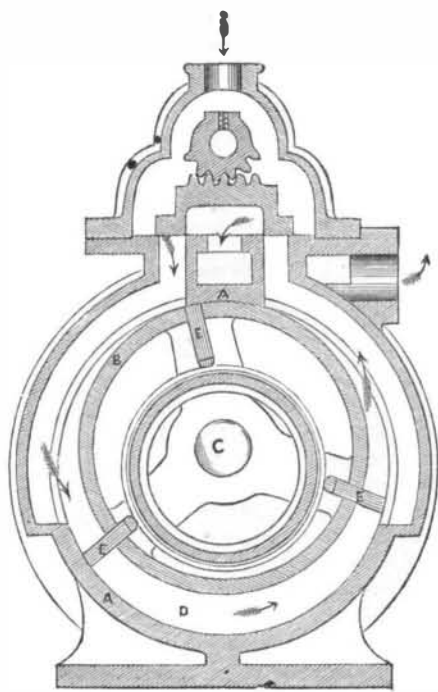
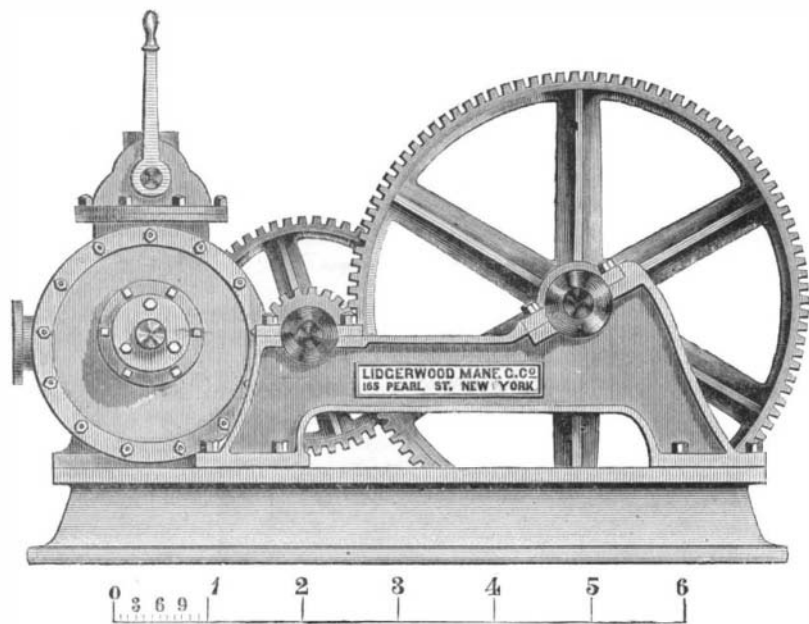


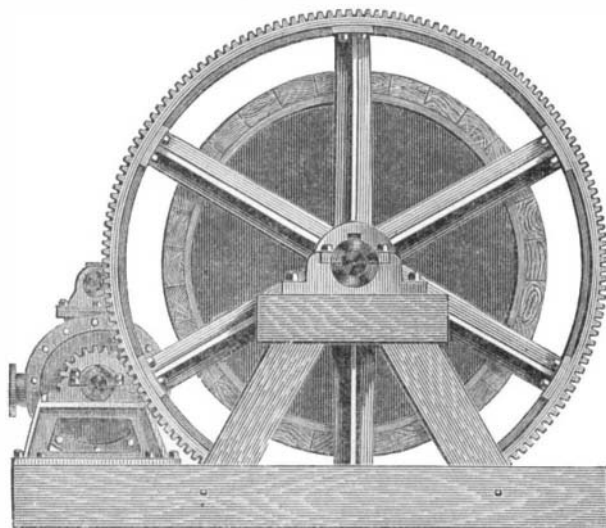
FIG. 2.



**THE CHALLENGE REVERSIBLE HOISTING ENGINE AS APPLIED TO MINING PURPOSES.**

upper part of this valve is a rack into which work the cogs of a segment pinion, which is vibrated by means of a hand lever extending upward. It is clear that by this mechanism the valve can be readily moved so as to admit steam as above noted, causing the engine to travel in either direction or

FIG. 3.



seven horsepower, we were informed, would hoist one ton 150 feet per minute. The boiler in this case was of the type supplied with the machine, and of the upright tubular pattern, containing 56 two inch tubes, each 4 feet long. The diameter was 34 inches. We understood from the owner that six tons of coal lasted on an average three months, using the machine almost continuously.

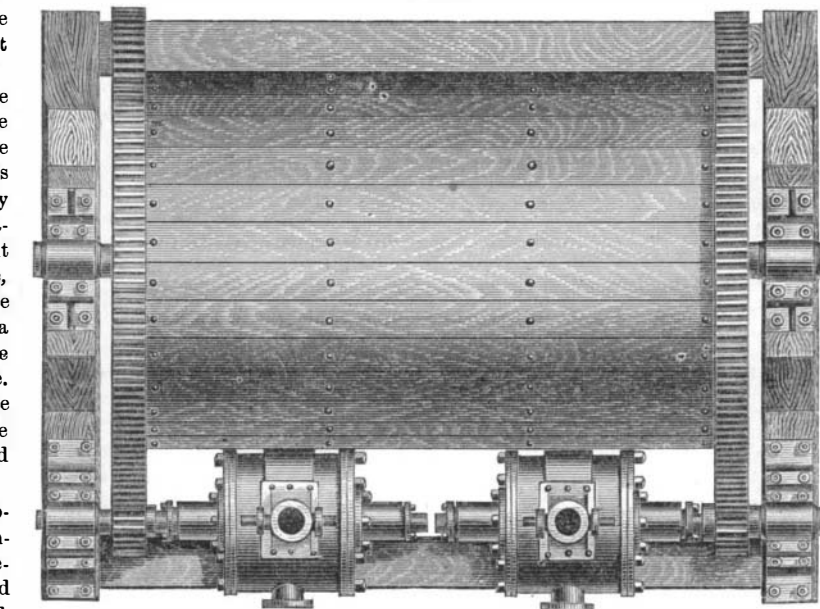
Various other illustrations of the capabilities of the apparatus were submitted to us, but the above are sufficient to give a general idea of its working. The smaller forms may be mounted on trucks and thus readily transported from point to point wherever any hoisting is to be done, it being merely necessary to secure the machine to the ground, attach a hose conducting steam from the boiler, and it is ready to operate. The lever is easily governed by the hand of the engineer, or may be arranged with cords to be regulated from a distance.

One of the most important applications of the apparatus is in connection with mines, and its arrangement for such purpose is represented in the engravings hereto annexed.

The first operations in the excavation are designed to be accomplished by the machine shown in elevation and plan in Figs. 2 and 3. This is a single powerful engine geared to a drum so as to lift heavy weights at a low speed. The dimensions of the various parts may be judged from the scale of feet and inches accompanying. Figs. 3 and 4 are similar views of an arrangement of two engines of equal capacity, in connection with a single drum geared for more rapid

value in lifting blocks from quarries. Its arrangement is such, it is claimed, as especially to fit it for outdoor labor, as its working parts are all within the cylinder, and hence protected. We are informed that it is made of but ten pieces,

FIG. 5.



exclusive of bolts; and finally that it rarely requires repairs, and then but such as are easily and inexpensively effected. For further particulars, address the Lidgerwood Manufacturing Company, No. 165 Pearl street, New York city.

COAL has been discovered in the diamond fields of South Africa, and is sold there at \$11 per bag of 200 lbs.

stop. The motor thus constructed is, by a simple arrangement of cog gearing, connected with a large spur wheel on the hoisting drum, so that the movement imparted to the latter may be either rapid or slow.

We were quite recently afforded an opportunity of inspecting several of these machines in actual employment, and from conversations with engineers the following information was obtained. At the pier of the steamers of the Na-