R. W. Thomson,

Rotary Steam Engine.

No. 55,030. Patented May 22, 1866.

Fig. 1

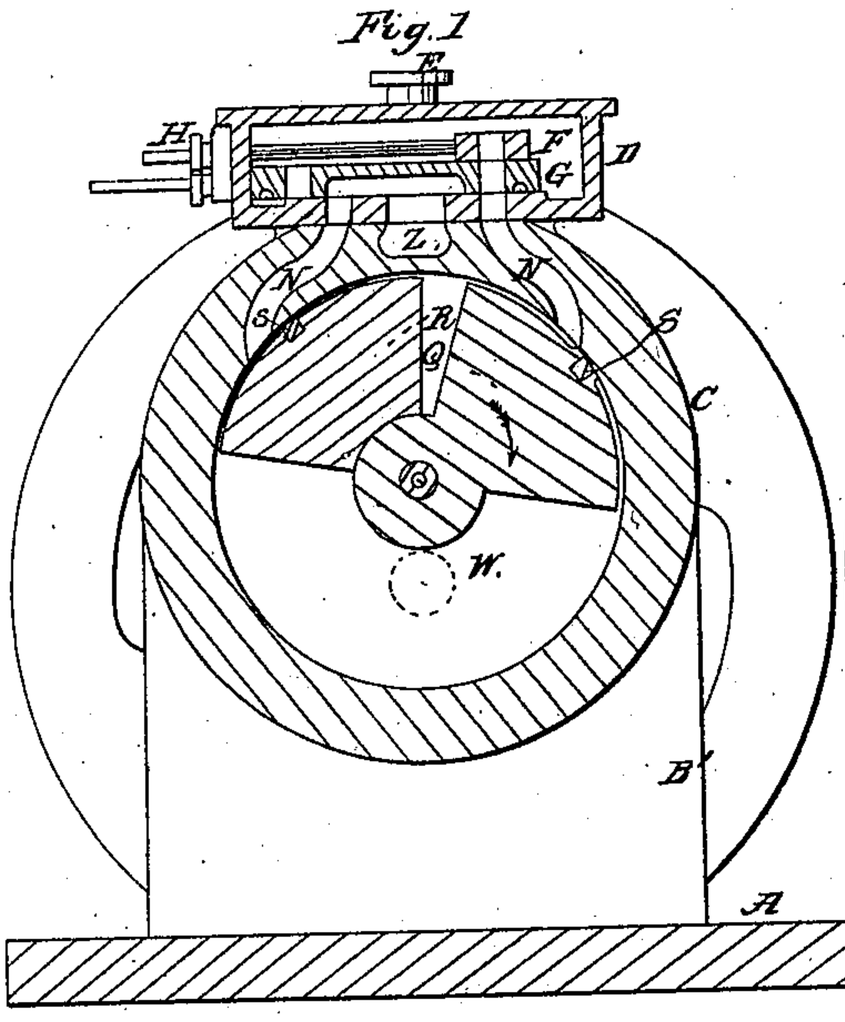


Fig. 3

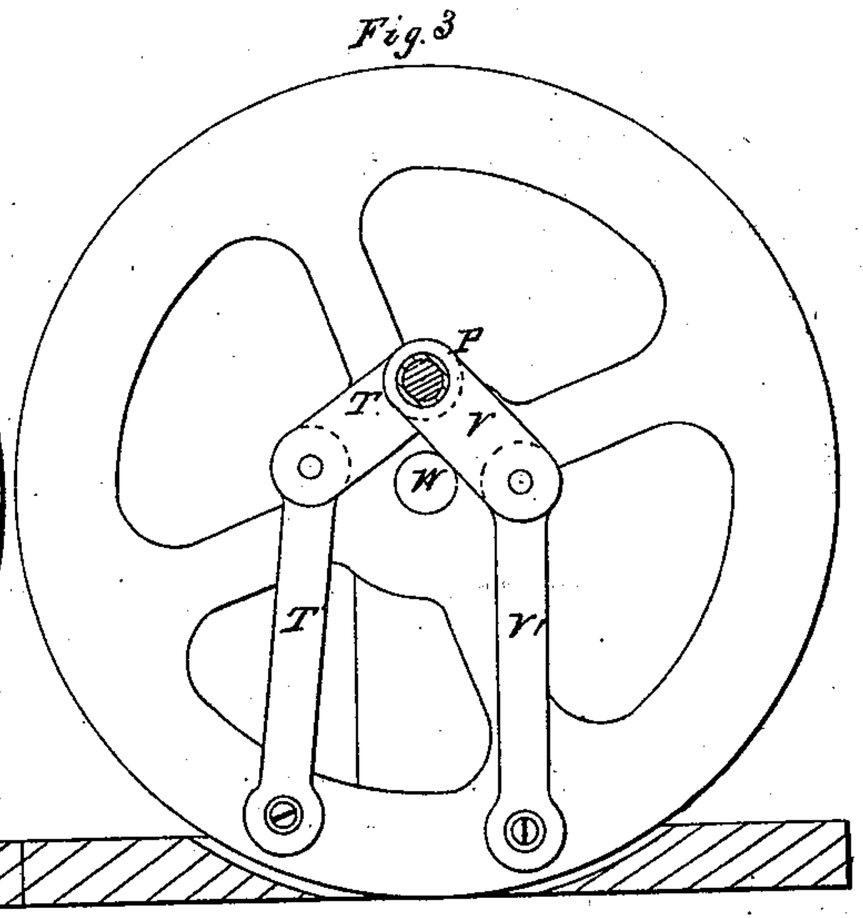
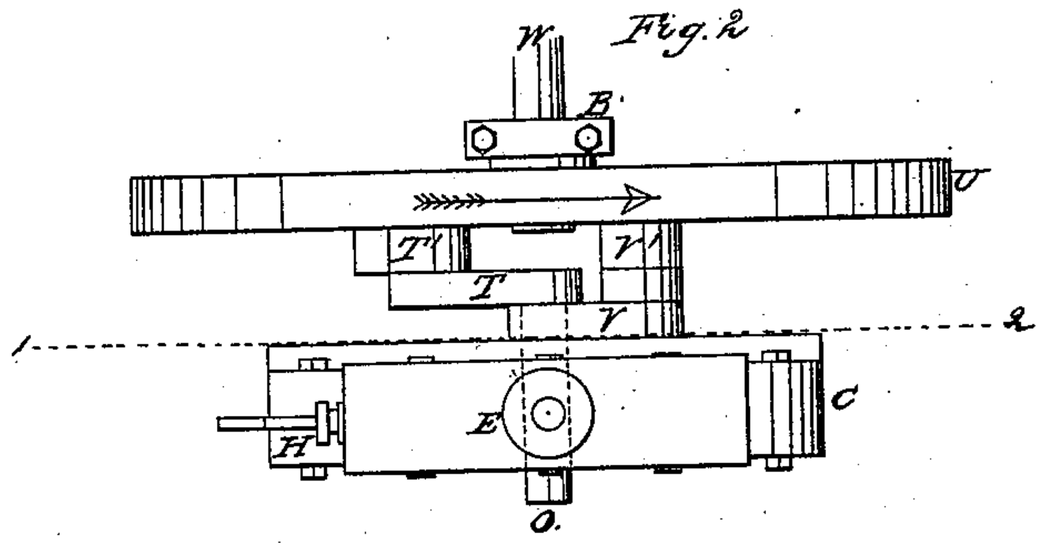


Fig. 2



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UNITED STATES PATENT OFFICE.

ROBERT W. THOMSON, OF EDINBURGH, SCOTLAND.

IMPROVEMENT IN APPARATUS FOR OBTAINING MOTIVE POWER.

Specification forming part of Letters Patent No. **55,030,** dated May 22, 1866.

To all whom it may concern:

Be it known that I, R. W. THOMSON, of Edinburgh, Scotland, have invented certain Improvements in Apparatus for Obtaining and Applying Motive Power; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to the arrangement and construction of an improved rotary steam-engine, which consists of a cylinder or steam-chamber with a horizontal axis containing within it two diaphragms or pistons. One of these pistons or diaphragms is keyed upon a solid shaft passing through the axial line of the cylinder, while the other is similarly keyed upon or attached to a tubular or hollow shaft, through which the solid shaft is passed, both the said shafts being connected to the driving-shaft, which is disposed eccentrically as regards the steam-cylinder, the whole being constructed and operating as fully described hereafter.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

On reference to the accompanying drawings, which form a part of this specification, Figure 1 is an elevation, partly in section, of one arrangement of a rotary engine constructed according to my improvements. Fig. 2 is a plan view of the same, and Fig. 3 a sectional elevation on the line 1 2, Fig. 2.

A is the base-plate of the machine, to which are secured the standards B and B′, the latter supporting the steam chamber or cylinder C. On the upper part of this steam chamber or cylinder is arranged the valve-chest D, into which the steam-pipe E, leading from the neighboring boiler, opens. In the valve-chest D is fitted a slide-valve, F, which moves to and fro by the action of an eccentric over one of the ports of the two-way valve G, by means of which the action of the engine is reversed when required. The steam, after it passes through the valves F and G, enters the cylinder C by one of the ports N or N′, and as the valve G is delineated in the drawings it is in the position to admit the steam by the right-hand port, N. The steam passes into the cylinder C, and here it acts on two pistons which form a species of diaphragm occupying nearly one-half of the interior of the cylinder. These pistons are fitted in the following manner: A short horizontal shaft, O, extends across the center of the cylinder and out through the end covers. Upon this solid shaft O is fitted a secondary tubular shaft, P, Fig. 3, which extends out through one of the stuffing-boxes in the end cover of the cylinder. This tubular shaft P extends from the inner stuffing-box of the cylinder half-way along the shaft O, so as to admit of one portion of the duplex piston being fitted to the uncovered part of the shaft O and the other portion to the shaft P. Each part of the piston is in the form of a sector, as shown in Fig. 1. The part Q is keyed to the solid shaft O and the other part, R, is keyed to the tubular shaft P. These pistons fit loosely in the cylinder C, so that the steam has access between the periphery of each part and the inner surface of the cylinder, excepting at the part where a packing, S, is fitted in a groove which extends across each piston. The inner end of the shaft O which extends out beyond the hollow shaft P, terminates in a crank, T, and the pin of this crank is connected by the rod T′ to a stud in the rim of the fly-wheel U. In like manner the hollow shaft P has keyed to it the crank V, which is connected by the rod V′ to the fly-wheel U. This fly-wheel is keyed on the main shaft W of the engine, which shaft turns in suitable bearings secured to the base-plate A, the axial line of the shaft being eccentric to the center of the shafts O and P. On the shaft W is fitted an eccentric which gives motion to the slide-valve F.

Let it be supposed that the engine is to be moved in the direction of the arrows shown in Fig. 1. When the fly-wheel is moved round a little by hand, so as to open the port N, the steam flows in and moves round the piston Q. The steam acting upon the surface of the piston R tends to force it in the opposite direction to that of the piston Q, but the piston Q will move through three-quarters of a revolution while the piston R moves only through a fourth of a revolution, in consequence of the manner in which they are connected to the fly-wheel on the eccentrically-disposed main shaft, their velocities changing in a gradual manner, and this differential movement is made available as motive power. Thus, if the fly-wheel U starts when the moving parts are in the position shown in Fig. 1, when it has made one-fourth of a revolution the piston Q will

have made about three-eighths of a revolution, while the piston R will have traveled through only one-eighth of a revolution, and when the fly-wheel has made one-half of a revolution the piston Q will have traveled round to the position in which the piston R is shown. Thus for each half revolution of the fly-wheel U the pistons Q and R make alternately three-fourths of a revolution and alternately one-fourth of a revolution. In this way, during each complete revolution of the fly-wheel U each of the pistons will traverse through three-fourths of a revolution, making together a traverse of one and a half revolution of forward movement. Against this is to be placed one-half of a revolution in which the pistons have to be dragged against the pressure of the steam, and this being deducted from the amount of forward movement just referred to, leaves for each revolution of the fly-wheel one complete revolution of the pistons available for power. The movement of the piston R opens the eduction-port N′, and the steam, after doing its work, passes through the eduction and away by the exhaust Z. The valve G has its spindle connected to a hand-lever, by means of which the valve may be readily shifted so as to cause the port N′ to be the induction-port, and thus reverse the motion of the engine.

The system of connecting the cranks by means of rods may be dispensed with, and in lieu thereof the crank-pins may enter into slides which traverse in a slot formed on the face of the fly-wheel. If desirable also, elliptical eccentric cog-wheels may be used in lieu of the cranks.

Having thus particularly described my said invention, I have to state that I do not restrict myself to the precise details herein described, and shown in the accompanying drawings, but that I claim as my invention and desire to secure by Letters Patent—

The obtaining and applying of motive power by means of pistons or diaphragms revolving in a cylinder in a continuous manner, but connected to an external shaft having a different axis from that of the cylinder, so that their velocities vary, that of one or more increasing while that of the other or others decreases, and vice versa, the parts being constructed and arranged and working substantially in the manner herein described.

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