S. P. Ruggles,

Rotary Steam Engine.

No. 112,853. Patented Mar. 21. 1871.

Fig. 1.

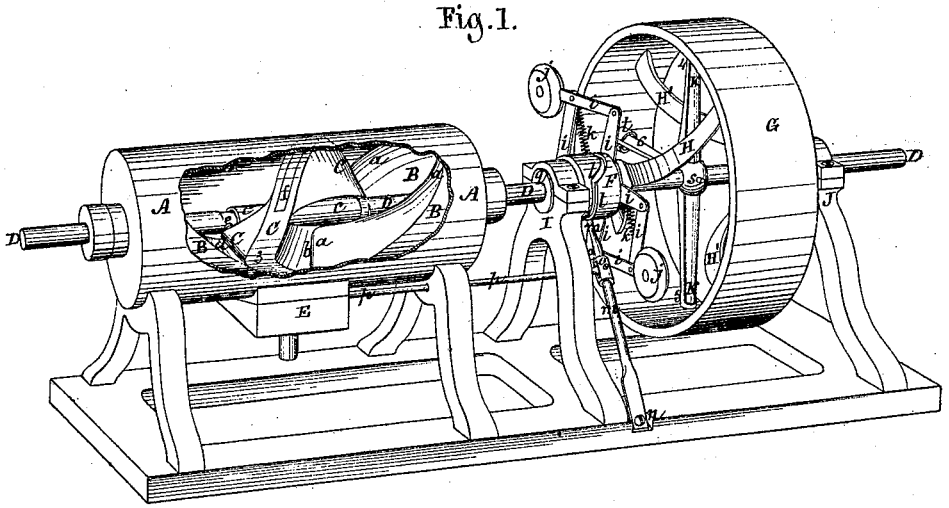


Fig. 2.

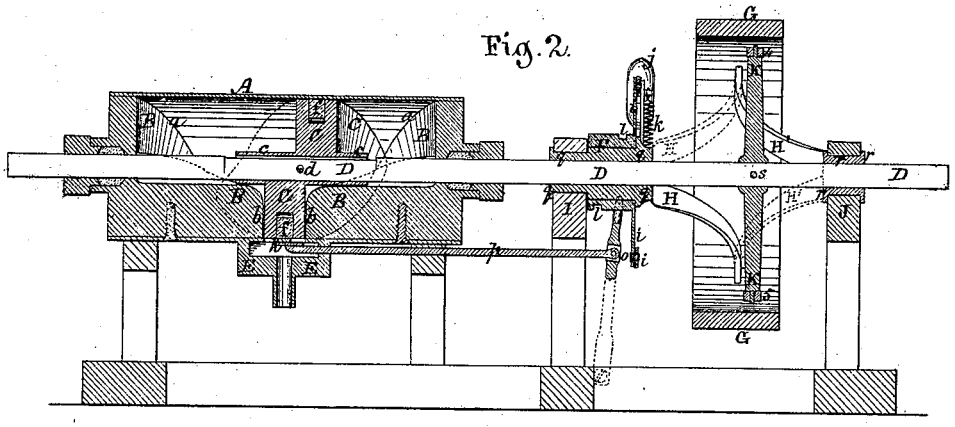


Fig. 3.

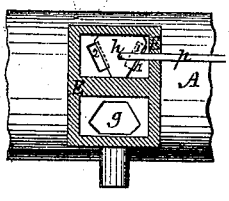
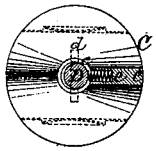


Fig. 4.



Witnesses.

H. C. Henderson

Edmund Masson.

Stephen P. Ruggles.

By atty A. B. Stoughton.

United States Patent Office.

STEPHEN P. RUGGLES, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 112,853, dated March 21, 1871.

IMPROVEMENT IN STEAM-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, STEPHEN P. RUGGLES, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 represents, in perspective, so much of a steam-engine as will illustrate my invention, the steam-cylinder being represented as broken away, to show the parts working therein.

Figure 2 represents a longitudinal vertical section through the cylinder, piston, and the several co-operative parts thereof.

Figures 3 and 4 represent detached portions of the steam-engine, which will be more particularly referred to in the specification.

Similar letters of reference where they occur in the separate figures denote like parts in the drawing.

My invention relates, in general, to a steam-engine, in which the piston has a combined rotating and reciprocating movement; and further relates to the details of the engine, which will be more especially and particularly pointed out in the claims, and set forth distinctly in the description.

In addition to the peculiar motion of the piston in the cylinder, I mention as among other characteristics of my invention the following:

The steam acts upon one side only of the piston; the piston, through certain devices, acts as a valve to let in the steam at each end of its stroke, and is fastened to its rod by a pin, which allows it to be forced against the cylinder, to make a close joint; the inlet, and more particularly the exhaust-ports, are underneath the steam-cylinder, so that the water of condensation may flow out of the cylinder; the regulator or governor operates on a horizontal shaft.

To enable others skilled in the art to make and use my invention, I proceed to describe the same with reference to the drawing.

A represents a steam-cylinder, in which, and at each of the ends thereof, there are abutments B, that have cam-shaped planes *a a* thereon, against which a cam or spiral-shaped piston, C, on the piston-rod D works and turns, so that said piston and rod, as they move back and forth in the cylinder, receive a rotary movement also, through or by means of said cam planes. The piston at every forward and every rearward movement through the cylinder, receives a semi-rotation, and thus two reciprocations of the piston give it one entire rotation.

The cam-planes *a a*, at each of the ends of the cylinder, unite in a wedge-shaped edge, *b b*, at the under side of the cylinder, leaving just space enough between them for the piston C to pass through.

The hub *c* of the piston C is slipped over or upon the piston-rod D, and is fastened thereto by a pin, *d*, and so that the piston may have a slight rocking motion on said pin; the object being that the spring *e*, at each end of the piston, may, by its own force, or in connection with the steam in the cylinder, push out said ends against the cylinder, and thus make a close joint between them.

The piston C is packed with metallic packing, *f*, behind which there is a spring, of any kind, to hold it out against the steam-cylinder.

The steam-chest E is arranged underneath the steam-cylinder A, and has at one side or end the inlet-ports 1 2, and at the other side or end the exhaust-port *g*.

The inlet-ports are, at one side of a line, drawn vertically and centrally through the cylinder and piston-rod, for the reason, as above stated, that the steam acts only upon one side of the piston, viz: that side where the inlet-ports are placed.

The inlet-ports 1 and 2 are controlled by a cut-off valve, *h*, which is worked from a grooved collar, F, or hub, to which are connected toggle-arms *i i* and balls or weights *j j*, as also controlling springs *k*, by means of which and the velocity of the engine, said collar or hub F is turned upon the horizontal shaft or rod D, and so change the position and throw or beat of the cam-groove *l* in the perimeter of the collar or hub as to work the cut-off valve *h* variably.

A lever, *m*, pivoted at *n*, at its upper end enters into the cam-groove *l*, and by the rotation of the collar or hub F, with the shaft D, vibrates said lever.

To this lever *m* is pivoted, as at *o*, the valve-rod *p*, which carries the valve *h*, and so operates said valve variably.

The object of placing the steam-chest underneath the steam-cylinder is that all the water of condensation in the cylinder may flow off or be forced out by the reciprocation of the piston.

The exhaust-port *g* on the other or opposite side of the cylinder and piston is always open, except at the instant that that part of the piston where the two sectional screw or spiral portions of said piston unite, as at 3 in fig. 1; then the exhaust-port is closed, and as instantly disclosed again.

The piston does not make a partial rotation first in one direction and then back again; its rotation is continuous in one and the same direction, in connection with its reciprocating motion, and is turned by the contact of the spiral or cam surfaces of the piston bearing against similar surfaces on the abutments,

and aided by the pressure and action of the steam upon one side of the piston only.

The balance-wheel G has arms H H′ connected with it, the set H curving toward a center and outward from the balance-wheel, where they unite with and terminate in a hub, *q*, that is supported and turns on a pillar-block, I.

The shaft D passes through this hub, while the collar F passes around it, so that the collar may move independent of the hub *q;* and while the hub *q* and shaft D revolve together, yet said shaft reciprocates through the hub.

The other set of arms H′ curve toward a common center, and outward in an opposite direction from those H, and unite with and terminate in a hub, *r*, that is supported and turns on a pillar-block, J, and through which, also, the shaft D reciprocates, while at the same time they rotate together.

To the shaft D is fastened, as at *s*, a cross-head or bar K, to each end of which one end of a three-armed lever, 4 5 6, is pivoted, while the third arm 6 of said lever extends loosely into a socket and opening, *t*, on and in the rim of the balance-wheel G, and plays through said socket and opening as it is carried back and forth by the shaft D and cross-head K, fastened to said shaft.

This arrangement and construction allows the piston-rod to have its reciprocating motion, and impart to the balance-wheel or band-wheel a rotary motion alone, without reciprocating it.

Having thus fully described my invention,

What I claim therein as new, and desire to secure by Letters Patent, is—

1. In combination with the spiral or cam-shaped piston, the spiral or cam-shaped stationary surfaces in the cylinder, for the purpose of imparting to the piston and its rod a rotating motion in addition to their reciprocating motion, substantially as and for the purpose described.

2. The combination, with a reciprocating and rotating piston, of inlet-ports, constructed as described, and so arranged as that the steam shall act upon one side only of the piston, substantially as described.

3. In combination with the piston and its rod, the pivoted connection *d* and springs *e*, for the purpose of allowing the steam to force the ends of the piston against the cylinder, substantially as described.

4. In combination with a reciprocating and continuously-revolving piston, the spiral-spring packing *f*, as and for the purpose described.

5. The combination of the regulator, cam-boss or sleeve F, rods *o p*, and cut-off valve *h*, for the purpose of operating said cut-off variably.

6. In combination with the balance or band-wheel G and the reciprocating and rotating shaft D, the cross-head and three-armed lever, so that, while the balance or band-wheel may rotate with the shaft D, it shall not partake of the reciprocating motion of said shaft, substantially as described.

Witnesses: STEPHEN P. RUGGLES.

JOHN JEFFRIES, Jr.,

F. O. PRINCE.