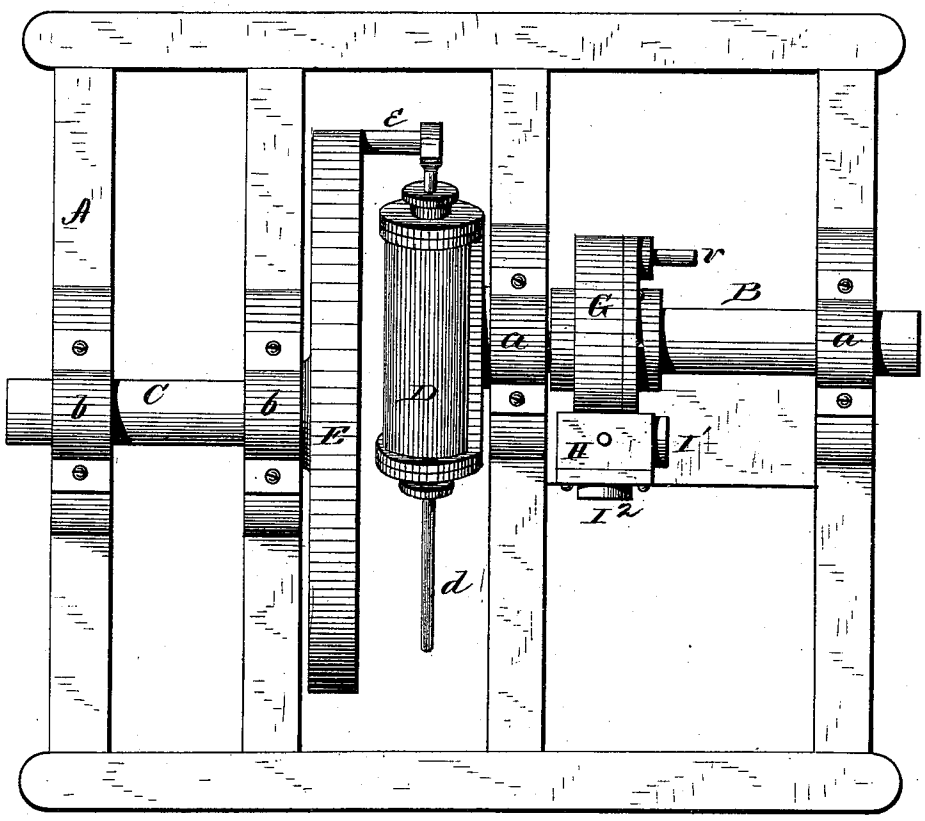
(Model.) 2 Sheets—Sheet 1.

J. CURTIS.

Steam Engine.

No. 230,245. Patented July 20, 1880.

Fig. 1.



WITNESSES

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(Model.)

2 Sheets—Sheet 2.

J. CURTIS.

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Fig. 2.

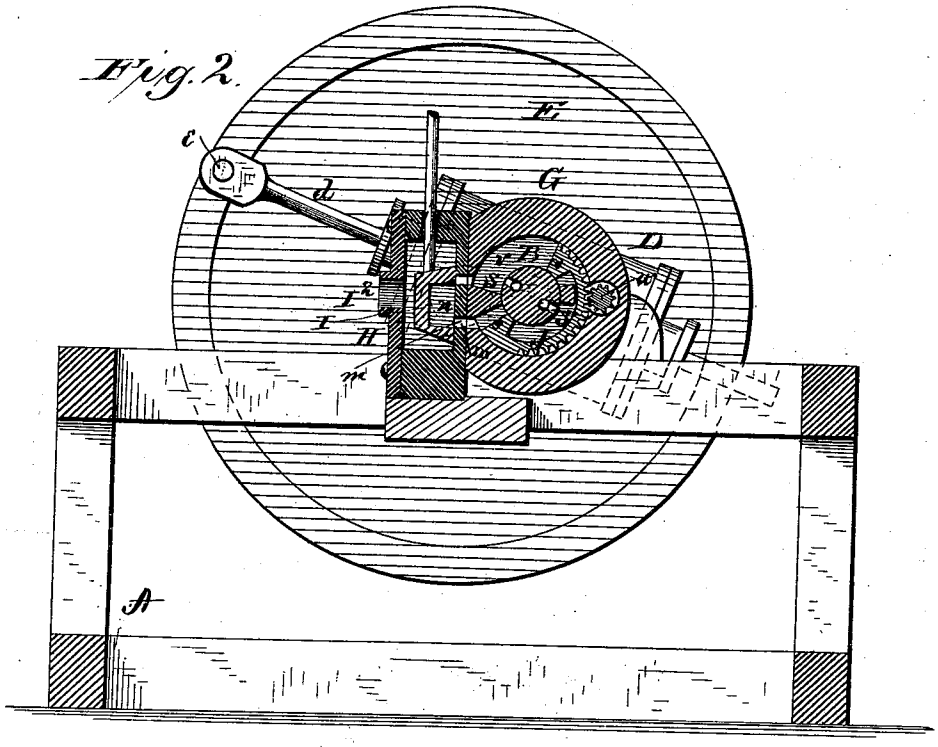


Fig. 3.

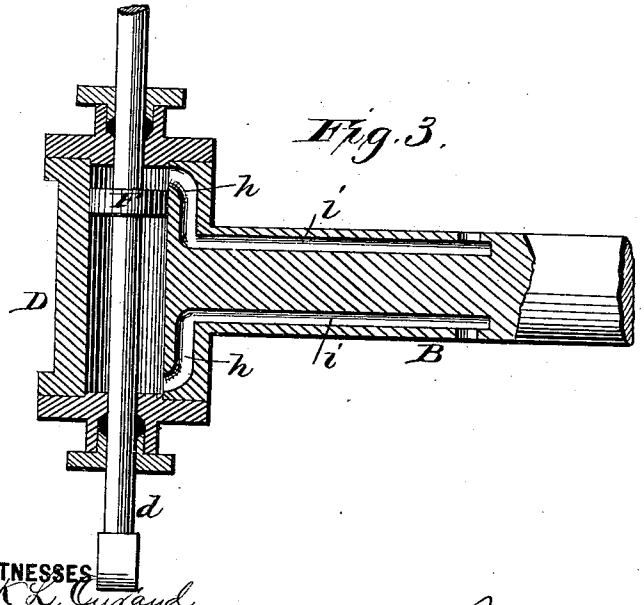
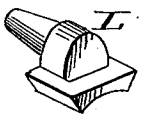


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

JOHN CURTIS, OF NORTH DORSET, VERMONT.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 230,245, dated July 20, 1880.

Application filed April 3, 1880. (Model.)

To all whom it may concern:

Be it known that I, JOHN CURTIS, of North Dorset, in the county of Bennington, and in the State of Vermont, have invented certain new and useful Improvements in Steam-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

The nature of my invention consists in the construction and arrangement of a rotary steam-engine of the class in which the steam-cylinder rotates, as will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a plan view of my improved rotary steam-engine. Fig. 2 is a vertical section through the steam-chest and the cylinder surrounding the rotating shaft. Fig. 3 is a section of the steam-cylinder and its shaft. Fig. 4 shows the stop or piece L.

A represents the frame-work of the engine, constructed in any suitable manner, and provided with suitable bearings *a a* and *b b*, for the two shafts B and C to rotate in, said shafts being not in the same but on parallel lines and their inner ends a suitable distance apart, as shown. On the inner end of the shaft C is secured the fly-wheel E, and on the inner end of the shaft B is secured the steam-cylinder D.

F is the piston in the cylinder D, secured on a piston-rod, *d*, which passes through stuffing-boxes in both ends of the cylinder, and one end of said rod has an eye, which is placed on a wrist-pin, *e*, in the side of the fly-wheel.

The cylinder D is provided with the usual steam-passages *h h*, leading from opposite ends toward the center, and communicating with two corresponding passages, *i i*, in the shaft B. These passages *i* run longitudinally in said shaft beyond the first bearing *a*, and then open on opposite sides in the surface of the shaft. Surrounding this portion of the cylinder-shaft B is a stationary casing, G, communicating through two ports, *m m*, with the stationary steam-chest H, within which is the valve I for reversing the engine. This valve I is provided with a suitable rod and handle for moving the same, so that the steam can pass from the steam-chest through either of the ports *m*, while the exhaust-steam will pass through the other port into the hollow *n* in the valve, through the side port, *p*, and out at I′ from the steam-chest. The live steam enters the chest at I^2.

Between the two ports *m m*, within the casing G, is an abutment, *s*, extending from the inner periphery of the casing to the shaft B, as shown in Fig. 2. Directly opposite this abutment is another abutment, *s′*, extending from the shaft B to a certain point distant from the inner periphery of the casing. Between the abutment *s′* and the casing is placed a curved bar or segment, J, having cogs upon its outer edge, and provided at each end with a projection, *t*, which fits between the shaft and the casing, as shown. This segment is movable by means of a pinion, *w*, on a shaft, *v*.

In engines of this class the cylinder is generally hung upon trunnions; but instead of doing this I hang the cylinder on the shaft B, the same as the fly-wheel; and instead of admitting and exhausting the steam in a line with the axis of the shaft, I extend the ports or passages *i* in the shaft and bring them to the surface beyond the bearing, and the steam is admitted and exhausted at this point, not in a line with the axis of the shaft, but at its surface and at right angles to its axis.

By this arrangement I prevent any action of the steam in the lineal direction of the shaft, and thus obviate the necessity of having a hollow fly-wheel shaft with a stationary bar to support a trunnion upon the side of the cylinder nearest to the fly-wheel. In short I obviate the necessity of having any support or arrangement whatever upon that side of the cylinder to prevent it from being forced or driven nearer to the fly-wheel. Thus I am enabled to place the cylinder much nearer the fly-wheel, and at the same time greatly simplify the construction and correspondingly diminish the expense of building the machine.

The steam is admitted and exhausted, as be-

fore stated, through the ports *i*, entering the shaft at right angles to its axis, the steam being held to the shaft on the one side in the semicircular space *v* in the casing, the other half of the circular space being used for the exhaust. There are no valves to be operated, but the steam-ports pass around from the steam-space into the exhaust-space, and from that into the steam-space again, one port always being in the exhaust-space when the other is in the steam-space. The ports are therefore not steam-ports only, but steam-ports and exhaust-space, according as they are in the steam-space or the exhaust-space.

The cogged segment J forms a cut-off by which to shorten or lengthen the space occupied by the steam through which the steam-ports pass. In this adjustable cutting-off apparatus are valves *x x*, which will prevent the steam from passing in one direction, but offer no special resistance to its passing freely in the other direction.

It will be understood that there are to be stuffing-boxes at each end of the cylinder, where the piston-rod passes in and out, and around the cylinder-shaft each side of the apparatus, through which the steam is admitted to and exhausted from the cylinder, as well as around the valve-stem at the top of the steam-chest.

This engine may also be used for other purposes. By removing the cut-off J and the pinion operating the same and inserting the piece L, (shown in Fig. 4,) to fill up the space occupied by said pinion and up to the abutment *s'*, the machine, with the passages enlarged, becomes a perfect hydraulic engine to be operated with water under pressure. It would also become, by applying power to propel it, a most perfect double-acting hydraulic or pneumatic pump, combining within itself all the capabilities of both a suction and force pump, and all without the use of any valve.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the steam-chest H, with valve I, casing G, with ports *m m*, abutments *s*, and the shaft B, with ports *i i*, opening on the surface thereof at right angles to its axis, substantially as and for the purposes herein set forth.

2. The cogged segmental cut-off J, operated by means of a shaft and pinion, in combination with casing G, having abutments *s s'*, substantially as and for the purposes herein set forth.

3. In a rotary engine, the combination of the shaft B, having passages *i*, cylinder D, with passages *h*, shaft C, fly-wheel E, steam-chest H, with valve I, casing G, having ports *m m* and abutments *s*, and the cut-off J, operated by the pinion *w*, all constructed and arranged substantially as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 11th day of March, 1880.

JOHN CURTIS. [L. S.]

Witnesses:

AUSTIN LADD,

JOHN W. COOK.