2 Sheets—Sheet 1.

N. B. FASSETT.

Steam Engine.

No. 81,763. Patented Sept. 1, 1868.

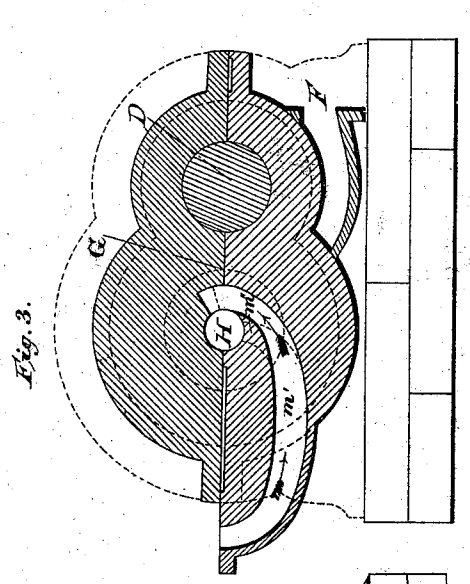

Fig. 3.

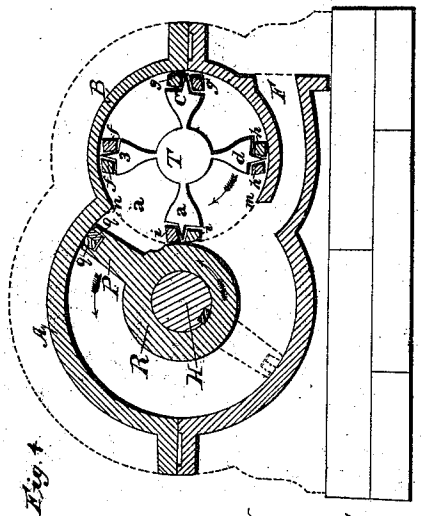

Fig. 4.

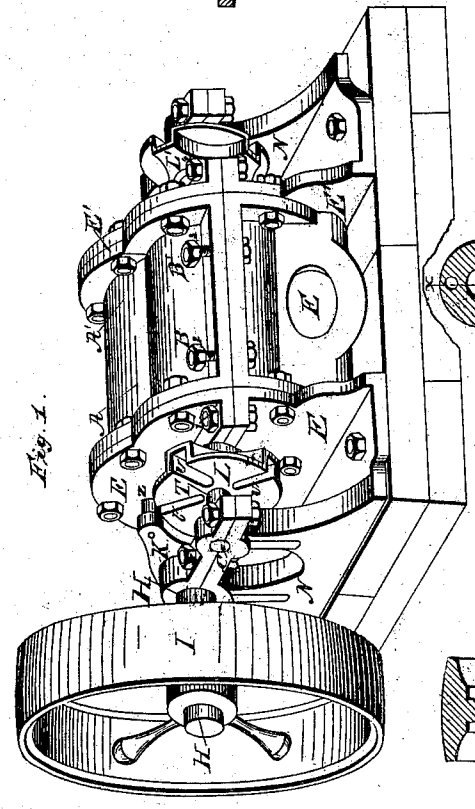

Fig. 1.

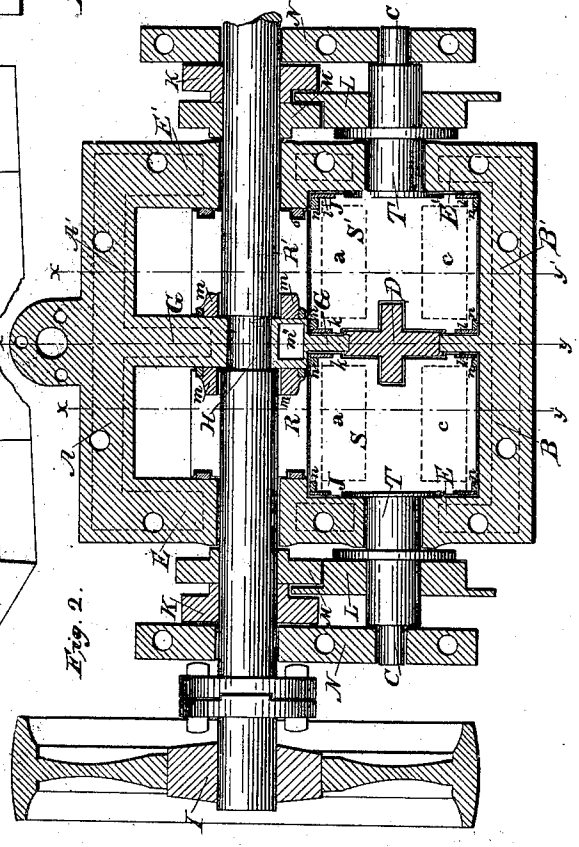

Fig. 2.

Witnesses.
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Edmond Richardson

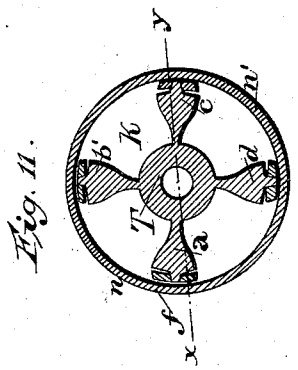
Inventor:
Nelson B. Fassett

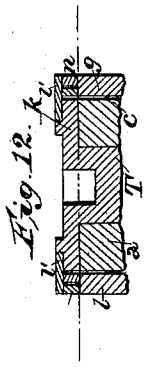
2 Sheets—Sheet 2.

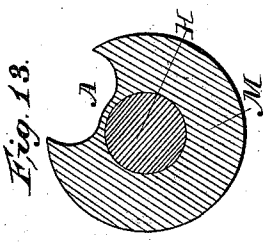
N. B. FASSETT.

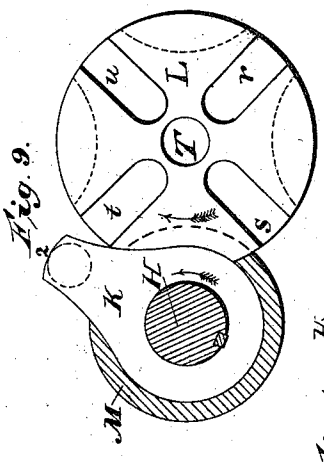
Steam Engine.

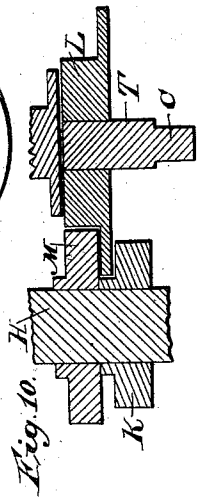
No. 81,763. Patented Sept. 1, 1868.

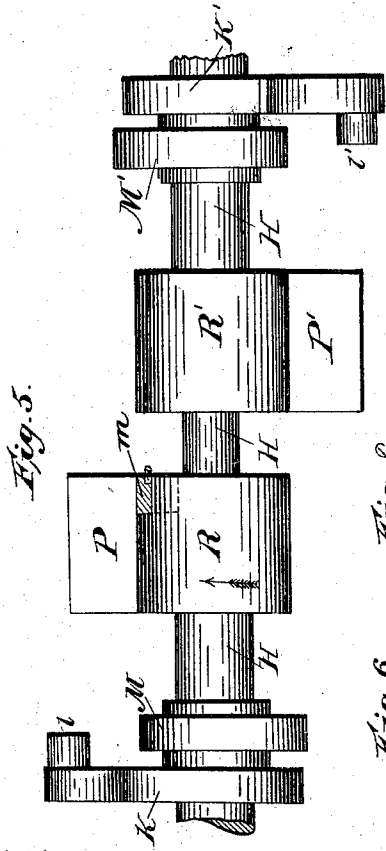


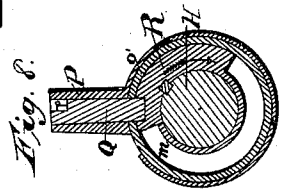


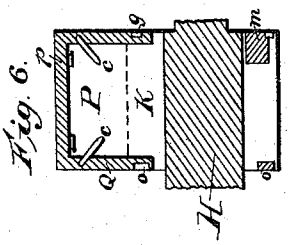


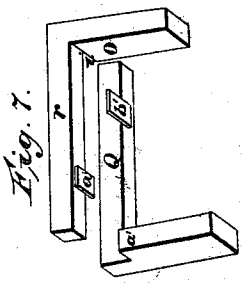












Witnesses:
James H. Cole
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Inventor:
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United States Patent Office.

NELSON B. FASSETT, OF ADRIAN, MICHIGAN, ASSIGNOR TO HIMSELF AND WILLIAM HUMPHREY, OF SAME PLACE

Letters Patent No. 81,763, *dated September* 1, 1868.

IMPROVEMENT IN ROTARY 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, NELSON B. FASSETT, of Adrian, county of Lenawee, and State of Michigan, have invented a new and useful Improvement in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view of a rotary engine embodying my invention.

Figure 2 is a horizontal section.

Figure 3 is a transverse section, passing through the line *x y* in fig. 2.

Figure 4 is also a transverse section, passing through the lines *x' y'* in fig. 2.

Figure 5 is a view of the main shaft and its attachment, when separated from the rest of the engine.

Figure 6 is a sectional view of the piston-wings, with packings.

Figure 7 is a perspective view of the piston-packings.

Figure 8 is a view of the end of the pistons.

Figure 9 is a side view of the slot-wheel, crank-arm, and stop-wheel, taken in line of the main shaft.

Figure 10 is a horizontal section of the parts represented in the last preceding figure.

Figure 11 is a vertical section of one of the steam-backers.

Figure 12 is a plane section of the parts represented in fig. 11.

Figure 13 is a side view of the stop-wheel.

H represents the main shaft.

A B and A' B' are the two cylinders.

E and E' are the cylinder-heads.

G is the centre-piece or partition between the two cylinders.

I is the driving-pulley.

K and K' are crank-arms.

L and L' are slot-wheels.

M and M' are stop-wheels.

N and N' are journal-abutments.

R and R' are rotary pistons.

P and P' are radial pistons.

The rotary pistons are two in number, one in each cylinder, (see figs. 2, 5, and 8,) each consisting of the following parts, to wit:

First, of a cylindrical thimble keyed to the main shaft.

Second, of two packing-rings, *o* and *o'*, one in each end.

Third, of a steam-channel, *m*, in one end.

The radial pistons are also two in number, and are cast or otherwise made solid to the rotary piston, each consisting of the following parts, to wit:

First, of a wing attached to the rotary piston, the ends and outer edge of which are grooved, to admit of packing.

Second, of two pieces of packing, *q* and *r*, each in the form of the letter L, figs. 6, 7, and 8, shown separately in fig. 7.

Third, of the two steady-pins *c c*, fig. 6, driven into the ends of the radial piston, on an angle of about forty-five degrees, and extending into the packings *q* and *r*, so that, by the force of the steam behind these two packings, they are pressed outward in the direction of the pins *c c*.

The projections, a^2 and b^2, and the two shoulders, a^1 and b^1, fig. 7, admit of only a longitudinal movement of the two packings, *q* and *r*, against the centre-piece, G, and heads of the cylinder, while the steady-pins *c c*

admit also of an equally opposite or outer movement of the packings against the periphery of the cylinder, thus keeping the radial piston always tightly packed.

S and S′ are two steam-backers, each consisting of the following parts, to wit:

First, of a shaft, T, turning on the two journals C and D, and having four radial wings. *a*, *b*, *c*, and *d*, set at equal intervals.

Second, of four packing-bars, *f*, *g*, *h*, and *i*, fig. 4, with their outer faces rounded, to fit the periphery of the cylinder.

Third, of four packing-bars, *f′*, *g′*, *h′*, and *i′*, with outer faces hollowed, to fit the circle of the rotary piston.

Fourth, of two circular disks, *j* and *k*, fig. 2, which are designed to be cast or otherwise made solid to the ends of the four radial wings, in order to strengthen them and make them steam-tight, the disks being recessed into the centre-piece and head of the cylinder.

Fifth, of two rings, 1 1′, that are screwed to a projection on the outside of each circular disk *j* and *k*.

Sixth, of two rings, *n* and *n′*, that fit the periphery of the recesses, and encircle the disks *j* and *k*.

The two steam-backers S and S′ are precisely alike, both turning at one end on the journal D, which is separate from the centre-piece G.

The packing-rings *n* and *n′* are somewhat larger than the circular disks *j* and *k*, so as to allow the steam to press in between them, and, being stopped by the rings 1 and 1′, force them against the periphery of the recesses, and thus prevent the escape of steam.

In the same manner, the packing-bar *f*, fig. 4, is forced against the periphery of the cylinder B, by the steam pressing between the former and a shoulder of the radial wing *b*, and in like manner the packing-bar *i′* is forced against the rotary piston R, thus preventing the escape of steam in those places.

The rings 1 and 1′ are made to screw on to a projection of the circular disks, as shown, merely for the purpose of facilitating construction.

The rotary pistons are also similar to each other, excepting that they are what may be called right and left handed, as regards the steam-channel, *m*.

This channel is a circular groove, cast in one end of the rotary piston, and is to be of as many degrees in length as is required for the steam, at each stroke, before it is to be cut off.

It is intended that the steam shall back the rings *o* and *o′* and the packings *q* and *r*, and thus keep them pressed against their respective surfaces, the steady-pins *c c* preventing them from flying out of their grooves while passing the steam-backers.

The packing-bars *f*, *g*, *h*, and *i*, and *f′*, *g′*, *h′*, and *i′*, have tenons extending under the rings *n* and *n′*, and touch the rings 1 and 1′, (see fig. 12.)

These tenons prevent the packing-bars from becoming displaced while revolving from *m* to *n*, fig. 4, in the direction indicated by the arrow.

The two cylinders, A B and A′ B′, are moulded in two sections, an upper and a lower section, and bolted together by their horizontal flanges, and each head is also moulded in two parts, which, in like manner, are bolted together by their flanges and to the cylinders, as shown in the drawing. The upper face of the lower section is grooved out, both in the heads and cylinders, to receive a strip of rubber, or other suitable packing, to prevent escape of steam.

The slot-wheel L, figs. 1, 9, and 10, is made fast upon the shaft T of the steam-backer, and, as represented, has four radial slots, *s t u v*, cut in the outer face, leaving a portion of the inside face solid, for the purpose of strengthening the wheel.

On the inside and edge of the wheel, between the slots, the wheel is circled out a portion of its thickness, as shown in fig. 1, and by the dotted lines in fig. 9, and the stop-wheel M, revolving in these circles, prevents the slot-wheel L, and consequently the steam-backer S, from turning, except at certain intervals.

The crank-arm K is provided with a crank-pin, and around it a friction-roller, *z*, equal in length to the depth, and in diameter to the width of the slots in the slot-wheel.

The crank-arm and stop-wheel M, moulded in one piece, are keyed on to the main shaft, the two crank-arms being turned on exactly opposite sides of the main shaft, corresponding with their respective radial pistons, as shown in fig. 5.

Having thus described the construction of my invention, I will now proceed to the description of its operation.

I will begin by supposing the main shaft, H, to be turned, so as to bring the crank-arm K in the relative position represented in fig. 1.

It is now evident, upon the theory of construction, that the rotary and radial pistons R and P, in the cylinder A B, will occupy the relative position represented in fig. 4, and, in the cylinder A′ B′, the position exactly opposite, as shown by the dotted lines; and if we suppose the steam-backer S to be prevented from turning by the stop-wheel M, and the steam-channel *m* to be in communication with the conduit-passage *m′*, we shall form an unobstructed passage into the space *a*, formed as shown in fig. 4, and if we let in a current of steam, it will act against the radial piston P, and force the main shaft H into revolution in the direction indicated by the arrow, and, having forced it past the point of cut-off, (which is the terminus of the steam-channel *m*,) will escape through the exhaust-opening F.

At this point, the friction-roller *z* enters the slot *s* of the slot-wheel L, and causes the wheel to revolve one-fourth of a circumference, thus permitting the rotary piston P to pass by the steam-backer S unobstructed. The notch A of the stop-wheel M, fig. 13, which had prevented the slot-wheel L from turning during three-fourths of the revolution of the main shaft, allows it to turn when driven by the crank-arm K.

In precisely the same manner does the steam act against the radial piston P′, in the cylinder A′ B′, and

the crank-arm K′, with the slot-wheel L′, both sides operating alternately, and imparting a continual rotary power to the main shaft.

In case it should become necessary, from any cause, to get to the interior of the engine, it is only necessary to unscrew the several nuts 1 2 3 4, &c., when the whole upper section of both cylinders may be removed; and by further unscrewing the nuts on the caps of the journal-abutments N and N′, the main shaft and steam-backers S and S′ may also be removed.

I have designed opening a passage for the steam into the steam-channel *m*, through the lower section of the centre-piece G, at the point *m*′′, fig. 3, instead of conducting the steam up into the upper section, as shown, in which case the steam-channel *m* will have to be moved around accordingly.

I design, also, using either metal or other suitable material for the packing-rings *n* and *n*′.

I design, also, (if it shall be found desirable,) to couple together in one piece each set of packing-bars *i* and *i*′, *f* and *f*′, &c., and to groove the under side of each couple, and have a tongue on the radial wing, extend into it, to prevent displacement.

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

1. The two steam-backers S and S′, in combination with their respective radial pistons P and P′, constructed and operating in the manner substantially as set forth and described.

2. The circular disks *j* and *k*, in combination with the radial wings *a*, *b*, *c*, and *d*, shaft T, and rings 1 and 1′, constructed in the manner set forth and described.

3. The combination of the convex-faced bar *f* and concave-faced bar *f*′, for packing against the concave case B′ and rotary piston R respectively, in the manner set forth and described.

4. The combination of the slot-wheel L with the crank-arm K, friction-roller *z*, and stop-wheel M, constructed in the manner set forth and described.

5. The steam-channel *m* and *m*′ or *m*′′, in combination with rotary piston R and centre-piece G respectively, as set forth and described.

NELSON B. FASSETT.

Witnesses:

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J. L. EWIN.