No. 614,107. Patented Nov. 15, 1898.

J. HOLT.

ROTARY ENGINE.

(Application filed May 9, 1898.)

(No Model.)

Fig. 1.

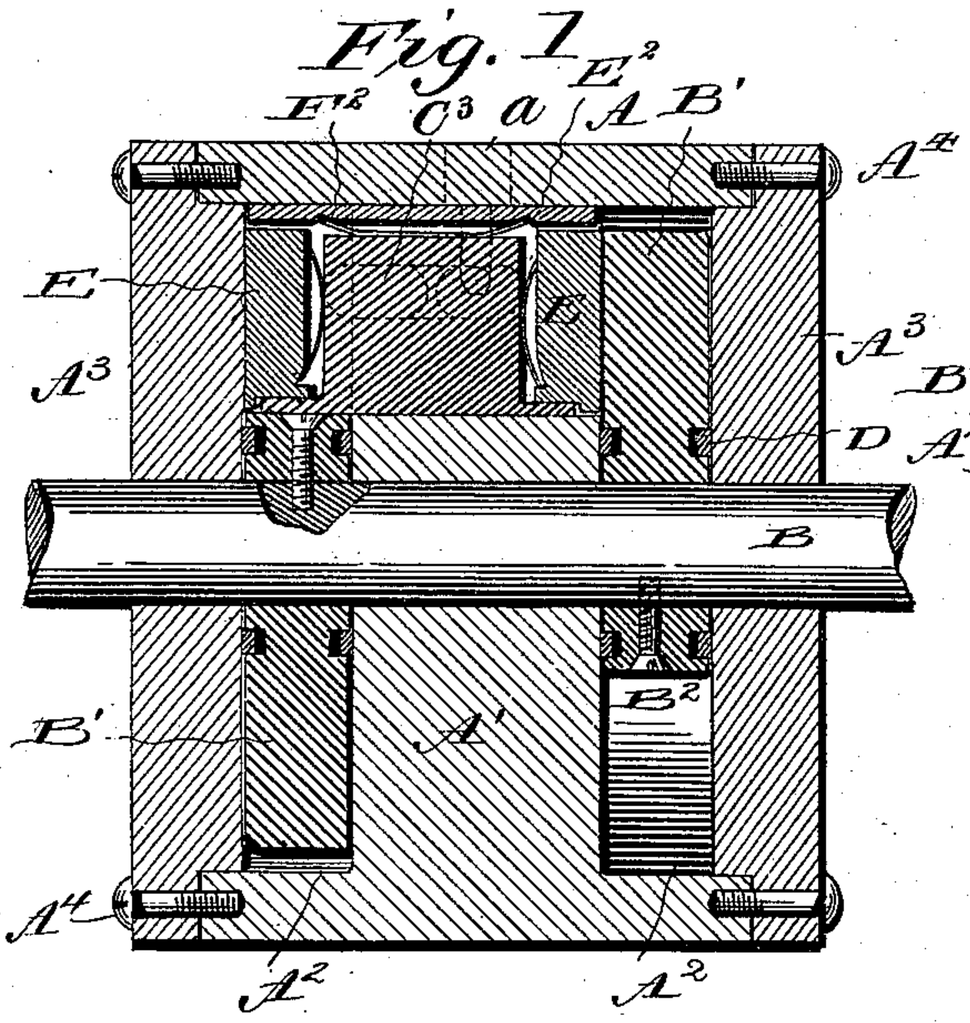


Fig. 2.

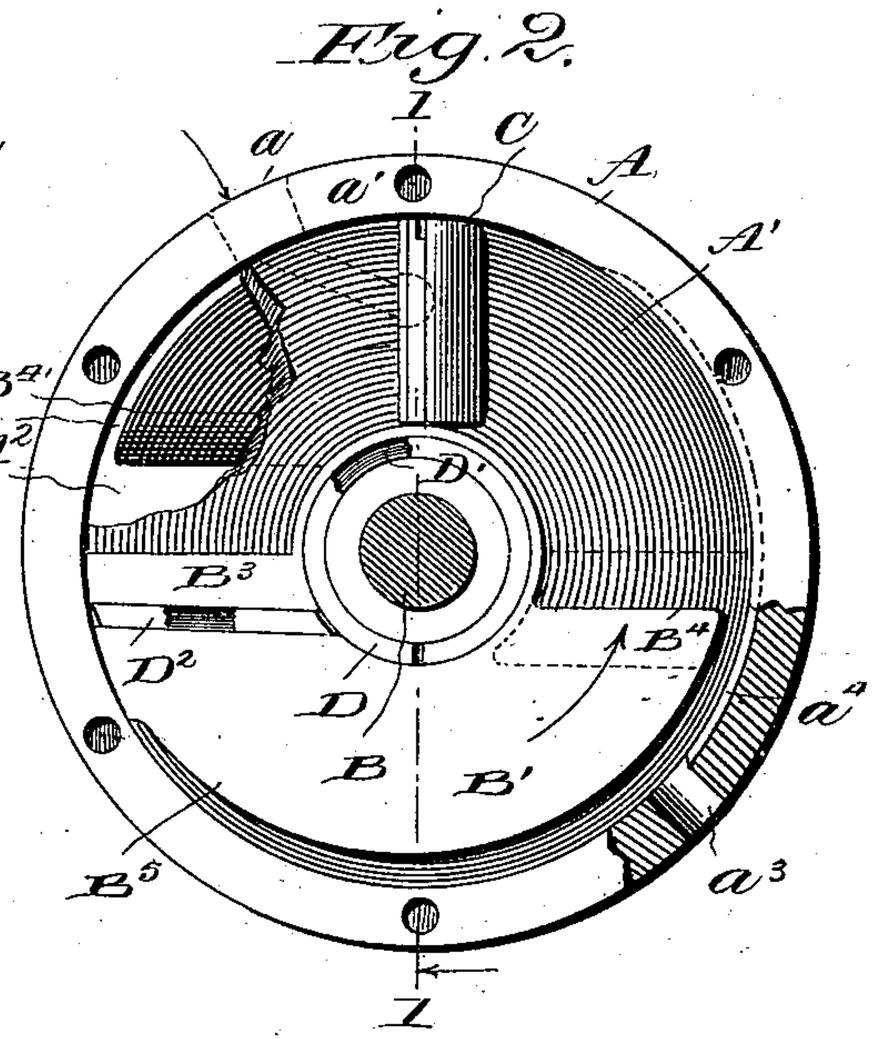


Fig. 4.

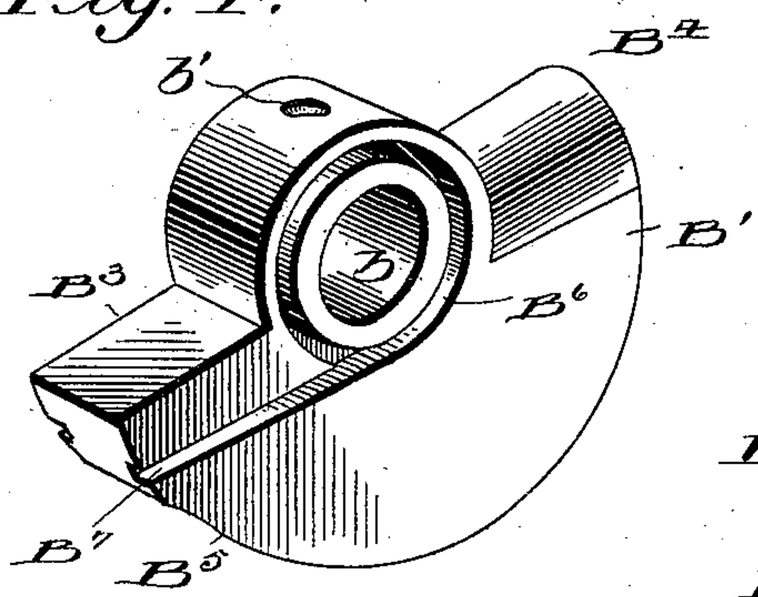


Fig. 3.

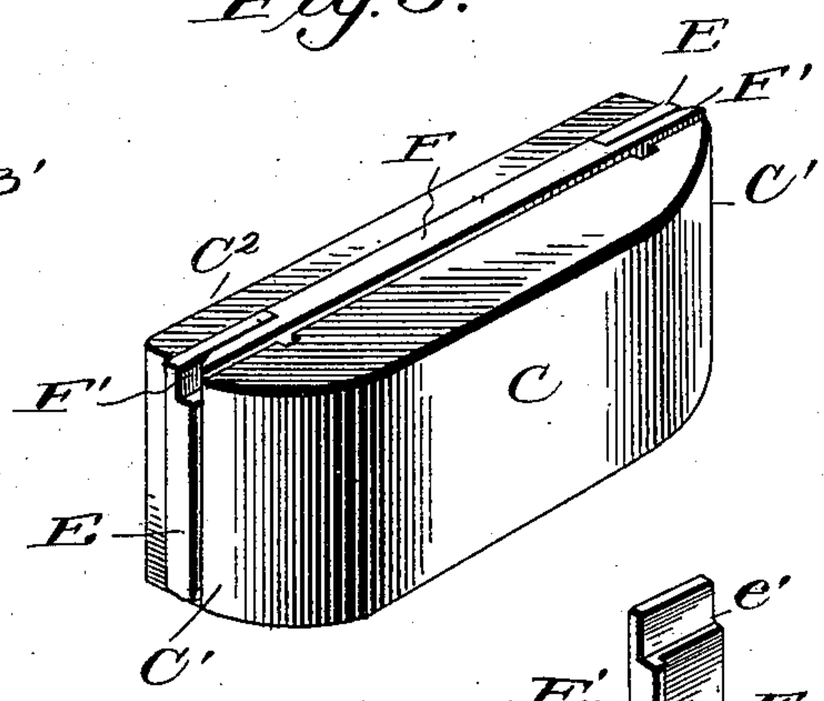


Fig. 5.

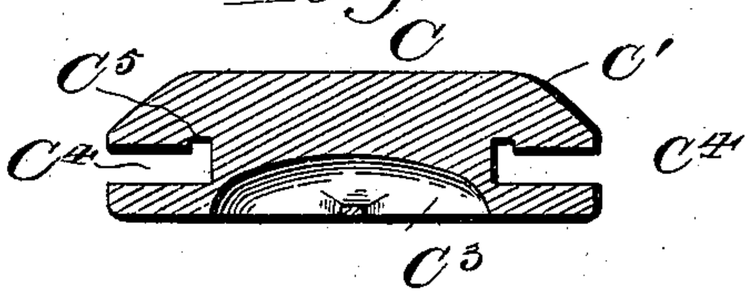
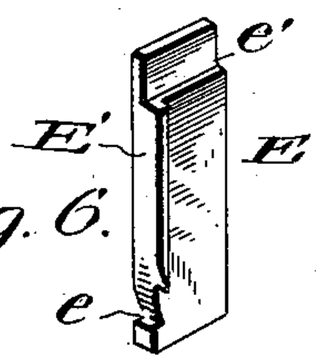


Fig. 6.



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UNITED STATES PATENT OFFICE.

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ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 614,107, dated November 15, 1898.

Application filed May 9, 1898. Serial No. 680,185. (No model.)

To all whom it may concern:

Be it known that I, JAMES HOLT, a citizen of the United States, residing at Hutchinson, in the county of Reno, State of Kansas, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to rotary engines, and particularly to that class of engines embodying separate cylinders, each having a piston therein and a sliding abutment adapted to operate in each cylinder.

The invention has for its object to provide an improved construction of piston and sliding abutment by means of which the abutment will be positively operated by engagement with the pistons in each of its movements, so as to alternately extend into each of the cylinders.

The invention has as a further object to provide an improved construction of this abutment by means of which steam, air, or other motive agent may be introduced through the abutment alternately into the cylinders.

A further object is to improve the construction and arrangement of the packings both for the abutment and pistons, so as to insure substantially steam-tight contact between abutting parts, while reducing the friction of said parts to a minimum.

Other objects and advantages of the invention will hereinafter appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a vertical cross-section through the engine on the line 1 1 of Fig. 2. Fig. 2 is a side elevation of the same with parts broken away and one of the casing-heads removed. Fig. 3 is a detail perspective of the sliding abutment. Fig. 4 is a similar view of one of the pistons with the packings removed. Fig. 5 is a horizontal section through the sliding abutment with the packings removed, and Fig. 6 is a detail perspective of one of the end packing-strips carried by the abutment.

Like letters of reference indicate like parts throughout the several figures of the drawings.

The letter A designates a casing provided with a central partition or wall A′, which forms at opposite sides of the casing cylinders A^2, which are suitably closed at their outer ends by means of steam-tight heads or covers A^3. These are secured in any suitable manner—for instance, by means of bolts A^4, threaded into the body of the casing A. Extending through the opposite heads and the intermediate partition A′ is a power-shaft B, to which pistons B′ are keyed by any suitable device—such, for instance, as a set-screw B^2. One of these pistons is located in each cylinder A^2, and they are oppositely located upon said shaft relative to each other, as illustrated in Fig. 1. The pistons are of similar construction, and therefore only the details of one will be described. The piston B′ is provided with a central aperture *b*, through which the power-shaft B passes, and a threaded aperture *b*′, through which the set-screw B^2 passes in order to engage a suitably-threaded recess in the shaft B. The piston is segmental in shape and provided with a working or steam-contact face B^3 and with a beveled or inclined abutment-shifting face B^4 for actuating the shifting abutment C. The periphery of the piston is in contact with the wall of the cylinder for a small portion of its length and beyond that point is cut away, as at B^5, so as to provide a steam-exhausting space between the periphery of the piston and the cylinder.

The partition-wall A′ is provided with an angular recess, within which the sliding abutment C is placed. This abutment is free for movement in either longitudinal direction and is provided at its ends with beveled or inclined faces C′, against which the beveled faces of the opposite pistons alternately act to shift the abutment, the said faces of the pistons being located next the partition-wall and abutment, and the pistons rotate toward the inclined face of the abutment. The opposite positions of the pistons upon the shaft will thus alternately shift the sliding abutment into each of the cylinders, whereby the steam, which may be admitted to the cylinders by any suitable means, will act upon the face C^2 of the abutment and the face B^3 of the piston, thus forcing the piston forward toward the point of exhaust. When this point is reached, the inclined face of the pis-

ton just mentioned will shift the abutment into the opposite cylinder and repeat the operation in that cylinder, so that the opposite cylinder will be positively driven to carry the first-mentioned piston from the point of exhaust until it again receives steam at the inlet-port.

It is obvious that numerous means of admitting steam to the cylinders may be employed; but I have shown in this application a very desirable construction in which the cylinder A^2 is provided with an inlet-port *a*, which communicates, by means of a channel *a'*, with the space or chamber within which the sliding abutment C is located. The casing is also provided with an exhaust-opening a^3 at a proper point relative to the pistons, and communicating with this opening a channel or way a^4 is provided which permits the exhaust of any steam which may remain adjacent to the piston after it passes the point of exhaust. The sliding abutment C is provided with a channel or recess C^3, which communicates with the channel *a'*, formed in the partition. By reference to Fig. 1 of the drawings it will be seen that the steam entering through the port *a* and channel *a'* enters the recess C^3 in the abutment, and when the latter is in the position shown in Fig. 1 this recess will communicate with the chamber at the left, and thereby supply steam to the same. At this time the opposite or right end of the abutment is in contact with the wall of the chamber in which it is located, and thus the steam is cut off from the chamber at the right. When the left piston has reached the point of exhaust, the abutment will be shifted into the right cylinder and steam communication established therewith and simultaneously cut off from the chamber at the left. By this structure the abutment performs the additional function of a shifting valve for the admission of steam and permits the location of all of the operating parts of the engine within the casing, whereby they are protected against injury and the structure materially simplified both in construction and in operation, as the numerous valve-shifting connections for the steam-inlet and the spring devices for operating the abutment are dispensed with and the functions of all of these parts embodied in a single positively-moved device.

Suitable packings will be provided for both the abutment and the pistons, and the preferred form of such packings is illustrated in the drawings. In this instance the packings carried by the opposite faces of the pistons B' are composed of metallic rings D, beneath which one or more springs or cushioning devices D' may be located. Metallic springs have been found preferable for this use, but elastic material, such as rubber, may be used, although the latter is liable to be affected by the heat within the engine. These packing-rings D are located within an annular recess B^6, surrounding the opening *b* through the piston, and extending radially from this annular recess is a similar recess B^7, adapted to receive the packing-strips D^2, similar in construction to those heretofore described. The sliding abutment is likewise provided upon both its sides and ends with similar packing-strips. The ends of the abutment are provided with recesses C^4, having at their inner ends a lateral shoulder C^5. Within these recesses a packing-strip E is located, which at its inner end is formed with a rib E', adapted to abut against the shoulder C^5 to limit the outward movement of the strip E. This strip E is normally forced outward by means of a spring E^2 bearing against the end wall of the recess C^4 and resting in a seat *e*, provided in the strip E. The springs hold the packing-strips in contact with the piston to provide a steam-tight joint, and when the pistons have passed the abutment the rib or projection E prevents the same being forced from the recesses C^4 by the springs E^2. The upper portion of the strip E is also provided with a seat *e'*, within which rests the reduced end portions F' of the top packing-strip F. This strip is located in a suitable recess provided in the upper surface of the abutment and normally forced in contact with the casing by means of a spring F^2, lying between the strip and the body of the abutment.

The engine illustrated is adapted for operation with air, steam, or other motive power, which may be admitted through the ports and abutment, as heretofore described, so that the opposite pistons are alternately positively actuated to shift the abutment and to drive the piston which has passed the exhaust-port into position for receiving steam-pressure at the opposite side of the abutment. When the piston has passed the point of exhaust, any steam which may remain between the periphery of the same and the cylinder will be exhausted through the channel a^4, leading to the exhaust-opening and the cylinder. Likewise the cut-away periphery B^5 of the piston reduces the frictional contact of the piston with the cylinder to only the necessary area sufficient to constitute a steam-tight contact for the working face B^3 of the piston.

It is obvious that changes may be made in the steam-inlet means and the mode of packing the several parts and also the configuration of the pistons and abutment without departing from the spirit of this invention as defined by the appended claims.

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

1. In a rotary engine, the combination with a casing provided with independent cylinders separated by a partition, a shifting abutment located within said partition and provided with inlet-ports communicating with said casing, a power-shaft, and oppositely-disposed rotatable pistons carried by said shaft

and having faces adapted to alternately engage and shift said abutment; substantially as specified.

2. In a rotary engine, the combination with a casing provided with independent cylinders separated by a partition, a shifting abutment provided with ports communicating with said casing and having inclined faces at opposite ends, a power-shaft, and oppositely-disposed rotatable pistons carried by said shaft and provided with inclined faces adapted to alternately engage and shift said abutment; substantially as specified.

3. In a rotary engine, the combination with a casing provided with independent cylinders separated by a partition, a shifting abutment provided with ports communicating with said casing and having inclined faces at opposite ends, a power-shaft, oppositely-disposed rotatable pistons carried by said shaft and provided with inclined faces adapted to alternately engage and shift said abutment, and metallic packing-strips for said pistons located within recesses provided in the sides of the pistons; substantially as specified.

4. In a rotary engine, a casing provided with independent cylinders and exhaust-ports communicating therewith, a partition intermediate of said cylinders and provided with an inlet-port, a shifting abutment having a recess therein communicating with said inlet-port, a power-shaft, and oppositely-disposed rotatable pistons provided with inclined surfaces to alternately engage said abutment; substantially as specified.

5. In a rotary engine, a casing provided with independent cylinders and exhaust-ports communicating therewith, a partition intermediate of said cylinders and provided with an inlet-port, a shifting abutment having a recess therein communicating with said inlet-port, a power-shaft, and oppositely-disposed rotatable pistons having a portion of their periphery adjacent to said cylinder cut away; substantially as specified.

6. In a rotary engine, the combination with a casing provided with independent cylinders having exhaust-ports and a channel extending from said exhaust-ports, a partition intermediate of said cylinders and provided with an inlet-port, a shifting abutment having a recess therein communicating with said inlet-port, a power-shaft, and oppositely-disposed rotatable pistons having a portion of their periphery adjacent to said cylinder cut away; substantially as specified.

7. In a rotary engine, the combination with a casing provided with independent cylinders separated by a partition, a shifting abutment located within said partition and provided with inlet-ports communicating with said casing, a power-shaft, oppositely-disposed rotatable pistons carried by said shaft and having faces adapted to alternately engage and shift said abutment, metallic packing-strips located in recesses formed in said abutment, and springs to force said strips outward; substantially as specified.

8. In a rotary engine, a casing provided with independent cylinders separated by a partition, a power-shaft, oppositely-disposed pistons provided with inclined surfaces facing said partition, a shifting abutment provided with ports communicating with said casing, metallic packing-strips located in recesses provided in said abutment, springs to force said strips outward, and a flange on said strips to limit their outward movement; substantially as specified.

9. In a rotary engine, a casing provided with independent cylinders and exhaust-ports therefor, a partition intermediate of said cylinders and provided with a chamber, an inlet-port communicating therewith, a shifting abutment having a passage in communication with said inlet-port and provided upon opposite ends with inclined faces, a power-shaft, and oppositely-disposed pistons located upon said power-shaft and provided with inclined faces adapted to alternately engage the inclined faces upon said abutment; substantially as specified.

10. In a rotary engine, a casing provided with independent cylinders and exhaust-ports therefor, a partition intermediate of said cylinders and provided with a chamber, an inlet-port communicating therewith, a shifting abutment having a passage in communication with said inlet-port and provided upon opposite ends with inclined faces, a power-shaft, oppositely-disposed pistons located upon said power-shaft and provided with inclined faces adapted to alternately engage the inclined faces upon said abutment, metallic packing-strips upon the opposite sides of said pistons, spring-actuated packing-strips upon the opposite ends of said abutment, and means to limit the outward movement of the packing-strips upon said abutment; substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES HOLT.

Witnesses:
WILLIAM H. HEDGES,
W. H. LEWIS.