

(No Model.)

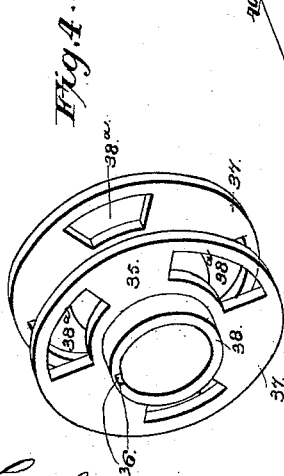
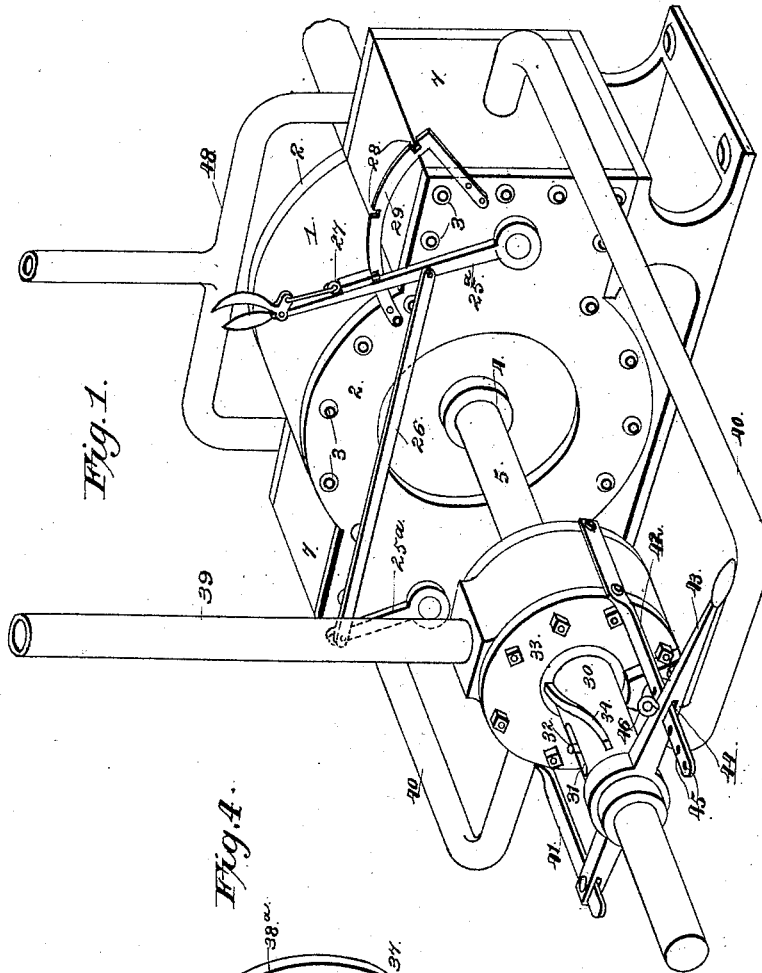
3 Sheets—Sheet 1.

J. R. HART, C. F. CURREY & C. F. BRIDGE.

## ROTARY ENGINE.

No. 419,770.

Patented Jan. 21, 1890.



Witnesses

M. E. Fowler  
Wm. Bagger

By Their Attorneys,

Inventors

John R. Hart  
Charles F. Currey  
and Charles F. Bridge

Chas. Snow & Co.

(No Model.)

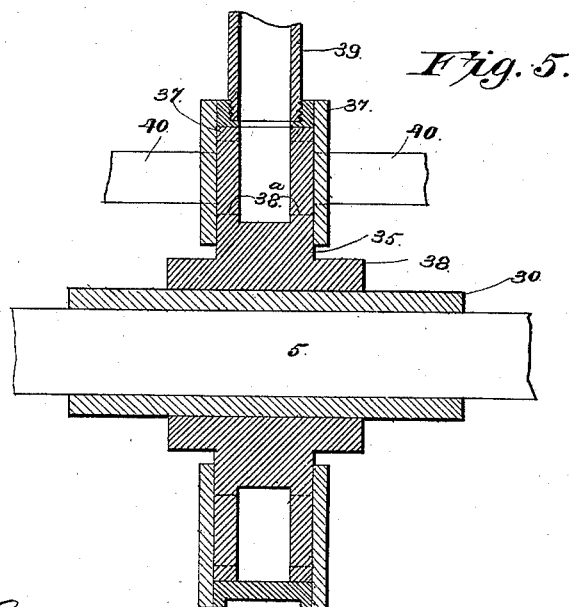
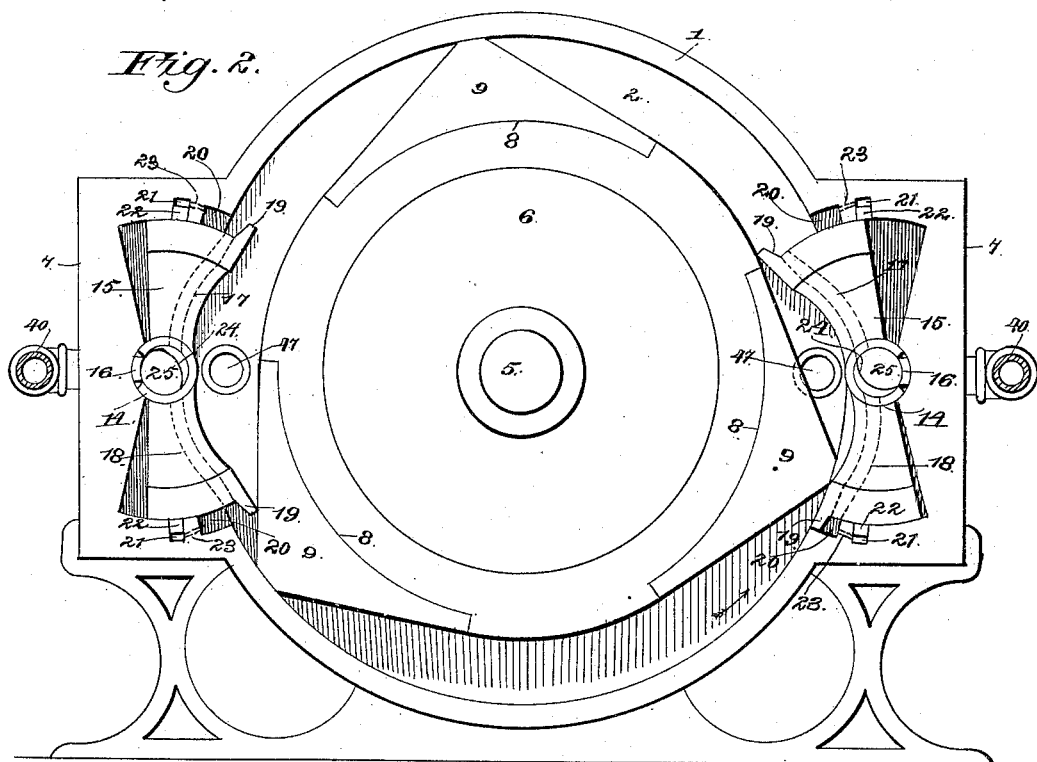
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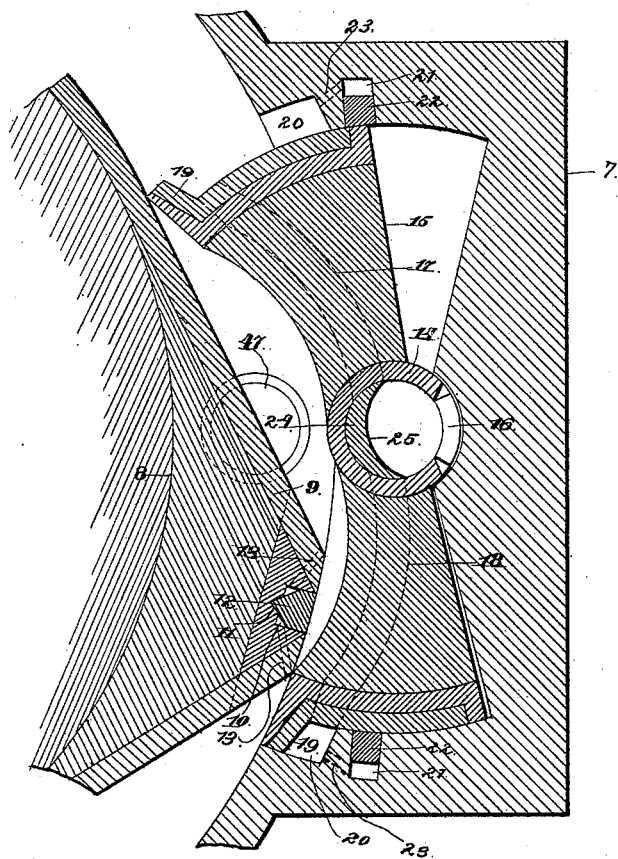


Fig. 3.

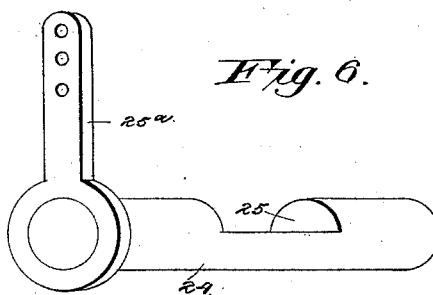


Fig. 6.

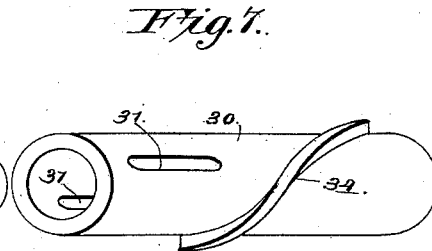


Fig. 7.

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# UNITED STATES PATENT OFFICE.

JOHN R. HART, CHARLES FREMONT CURREY, AND CHARLES F. BRIDGE, OF  
NORTH TOPEKA, KANSAS.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 419,770, dated January 21, 1890.

Application filed August 29, 1889. Serial No. 322,281. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN R. HART, CHARLES FREMONT CURREY, and CHARLES F. BRIDGE, citizens of the United States, residing at North Topeka, in the county of Shawnee and State of Kansas, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to rotary engines; and it has for its object to provide a machine of this class which shall be simple in construction and in which the power of the steam will be utilized fully and without waste.

A further object of our invention is to provide improved mechanism by which the engine will be quickly and effectively reversed when desired.

A further object of our invention is to provide improved mechanism for making the supply or flow of steam intermittent.

With these ends in view our invention consists in the improved construction and arrangement of details which will be herein-after fully described, and particularly pointed out in the claims.

In the drawings hereto annexed, Figure 1 is a perspective view of our improved rotary engine. Fig. 2 is a side view of the same, the head of the cylinder having been removed for the purpose of exposing the interior construction, which is shown partly in section. Fig. 3 is a sectional view on an enlarged scale of one of the oscillating abutments. Fig. 4 is a perspective detail view of the valve for regulating the supply of steam. Fig. 5 is a vertical sectional view taken through the said valve, the main shaft, and adjacent parts. Figs. 6 and 7 are detail views.

Like numerals of reference indicate like parts in all the figures.

1 designates the cylinder or casing of our improved rotary engine, which is provided with the heads 2 2, attached in the usual manner by means of stud-bolts 3. The heads of the casing are provided with bearings 4 for the main shaft 5, which carries the rotary disk or hub 6. The casing 1 is mainly cylindrical in form, and is provided on diametrically-opposite sides with laterally-extending chambers 7 7. The rim of the rotary disk 6 is provided with equidistant recesses 8, in

which are mounted the triangular pistons 9, the apices of which bear against the inner side of the cylindrical casing, as shown. The apices of the said triangular pistons are provided with transverse grooves 10, having V-shaped depressions 11, formed in the bottom thereof, and forming seats for the packing-strips 12, having V-shaped under sides, as will be clearly seen in Fig. 3 of the drawings. The corners of the grooves 10 are connected with the outer faces of the pistons by channels 13, through which steam will be admitted to press against the V-shaped under sides of the packing-strips, forcing the latter in an outward direction against the cylindrical casing and forming perfectly steam-tight joints.

The wings or chambers 7 7 of the casing are provided with bearings for the transverse tubular shafts 14, upon which the oscillating abutments 15 are securely mounted. The rear sides of the said tubular shafts are provided with ports or openings 16 for the admission of steam, and steam ports or passages 17 and 18 extend in opposite directions from the tubular shaft 14 through the wings or flanges of the said oscillating abutments. The outer ends of the latter are segmental in shape and are provided with lips 19, adapted to enter recesses 20, formed in the casing for the reception of said lips. The casing is further provided with grooves 21, in which are seated packing-strips 22, bearing against the ends of the oscillating abutment. The bottoms of the grooves 21 are connected by channels 23 with the recesses 20, for the admission of steam into the said grooves 21 for the purpose of forcing the packing-strips in an outward direction against the ends of the oscillating abutments.

Through each of the tubular shafts 14 extends a valve 24, consisting of a solid shaft having a cut-away portion 25, adapted to connect the steam-port 16 with either of the ports or passages 17 or 18, according to the position to which the valve 24 is adjusted; or the latter may be turned to such a position as to close the ports 17 and 18 simultaneously. The shafts or valves 24 extend through the front head of the cylinder-casing, and are provided with levers 25<sup>a</sup>, which are connected

by a rod 26, and one of which is provided with a latch 27, adapted to engage any one of a series of notches 28 in a segmental bracket 29, suitably secured to the casing. It will be seen that by this mechanism the valves 24 may be simultaneously adjusted to any desired position, for the purpose of admitting steam from the inlet-port either through the passages 17 or 18 or for the purpose of closing both of said passages.

Upon one end of the main shaft 5, which extends through the head of the cylinder-casing, is mounted a sleeve 30, which is provided with longitudinal slots 31, to receive a pin or key 32, passing transversely through the main shaft, upon which the said sleeve is thus adapted to slide longitudinally.

33 designates a cylindrical casing the ends or heads of which have bearings for the main shaft, and through which the sleeve 30 is adapted to slide longitudinally. The said sleeve is provided with a spiral rib 34, forming a key to retain in position the valve 35, which is mounted loosely upon the said sleeve, and the hub of which has the spiral seat 36 for the said key. The valve 35 comprises a pair of disks 37 37, mounted parallel to each other upon the hub 38, and each provided with a series of slots 38<sup>a</sup>, corresponding in number to the number of pistons 9 upon the rotary disk 6 of the engine. The slots 38 in the disks 37 are, moreover, so arranged as to break joints with each other, as will be clearly seen by reference to Fig. 4 of the drawings. The outer sides of the disks 37 are ground so as to fit snugly against the heads of the casing 33, forming steam-tight joints with the latter. Packing of suitable construction may also be arranged at any point where it shall be found necessary. The steam-supply pipe 39 is connected to the top of the casing 33, and the opposite heads of the said casing are connected by steam-pipes 40 with the inlet-ports 16 of the main casing. The casing 33 is provided with forwardly-extending brackets 41 42, to the former of which is pivoted a lever 43, which is suitably connected with the longitudinally-sliding sleeve 30, which, by means of the said lever, may be moved longitudinally upon the main shaft 5. The free end of the lever 43 has a slot 44, to receive the bracket 42, which is provided with vertical perforations 45, to receive a pin or key 46, by means of which the adjusting-lever and the sleeve 30 may be retained in any position to which they may be adjusted.

It will be seen that when the machine is in operation the sleeve 30, carrying the valve 35, rotates with the main shaft. The steam-supply is admitted into the casing between the disks 37 37 of the said valve. By the slotted disks 37 the exit-openings in the opposite heads of the casing 33, which are connected with the steam-supply pipes 40, are alternately closed and uncovered, thus giving an intermittent supply of steam to the engine. The working parts of the engine will,

of course, be so proportioned as to cause the said steam-supply to take place at proper intervals and at the right season. When the engine is reversed, the sleeve 30 is moved longitudinally upon the main shaft, thus reversing the position of the valve 35, thus reversing the steam-supply and causing the engine to rotate in the opposite direction.

Exhaust-openings 47, formed in the rear head of the casing, are connected with the exhaust-pipe 48, as shown in the drawings.

The operation of this invention will be readily understood by those skilled in the art to which it appertains from the foregoing description, taken in connection with the drawings hereto annexed. When the valves 24 are so arranged as to connect the inlet-ports 16 with the ports 17, as shown in Fig. 2 of the drawings, the disk 6 will rotate in the direction indicated by the arrow in said figure. The steam entering the main casing through the ports 17 will expand between the pistons 9 and the oscillating abutments 17, one of the lips of which will bear against the pistons as they pass successively under the said oscillating abutments. The steam will expand between the said pistons and the lips 19 of said abutments, which are thus kept closely in contact with the said pistons, forming steam-tight joints and separating the live-steam spaces from the spaces in which the exhaust takes place. By reversing the position of the valves 24 the steam will be admitted through the ports or passages 18, and the direction of rotation will be reversed.

It is obvious that the valves 24 and 35 should be operated simultaneously, and they may, when desired, be connected by suitable mechanism by means of which such simultaneous adjustment may be effected.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a rotary engine, the combination of the casing having laterally-extending wings or chambers, the oscillating abutments mounted in said chambers and having lips at their outer ends and steam ports or passages extending in opposite directions and terminating adjacent to said lips, and the rotary disk having triangular pistons, substantially as and for the purpose set forth.

2. In a rotary engine, the combination of the casing having laterally-extending wings or chambers, the tubular shafts mounted in said chambers and having inlet-ports in their rear sides, the oscillating abutments mounted upon said tubular shafts and having steam ports or passages extending in opposite directions and provided with lips at their outer ends, and the rotary disk having triangular pistons, substantially as and for the purpose set forth.

3. The combination of the casing having laterally-extending wings or chambers and recesses at the upper and lower ends of said chambers, the oscillating abutments mounted

in said chambers and having lips at their outer ends, and the rotary disk having triangular pistons, substantially as and for the purpose set forth.

5 4. The combination of the casing having laterally - extending chambers, the tubular shafts mounted transversely in said chambers and having inlet-ports in their rear sides, the oscillating abutments mounted upon said  
10 tubular shafts and having steam ports or passages extending in opposite directions and provided with lips at their outer ends, the rotary disk having triangular pistons, and the valves consisting of shafts mounted in  
15 the transverse tubular shafts and having cut-away portions adapted to connect the inlet-ports with either of the passages through the oscillating abutments or to close both passages through the latter, substantially as set  
20 forth.

5. The steam-supply-regulating mechanism, comprising a sleeve mounted to slide longitudinally upon the main shaft of the engine and having a spiral rib, a valve, the hub of  
25 which is provided with a spiral seat mounted upon said sleeve, said valve consisting of a pair of disks provided with equidistant slots arranged to break joints with each other, a casing inclosing the said valve, a steam-supply  
30 pipe connected to the top of said casing, and feed-pipes connecting the heads of the casing with the steam-ports of the engine, substantially as set forth.

6. The combination of the casing having  
35 laterally - extending chambers, the tubular shafts mounted transversely in the latter and having inlet-ports in their rear sides, the oscillating abutments mounted upon the said tubular shafts and having steam-passages extending in opposite directions, the rotary  
40 disk having triangular pistons, a sleeve

mounted to slide longitudinally upon the main shaft and having a spiral rib, a valve mounted upon said sleeve and having a spiral groove to engage the rib of the latter, a casing inclosing the said valve, a live-steam  
45 pipe connected to the top of the casing between the disks composing the said valve, and feed-pipes connecting the opposite heads of said casing with the steam-ports of the engine and adapted to register alternately with the slots and the solid portions of the disks forming the said valve, substantially in the manner and for the purpose set forth.

7. The combination, with a rotary engine,  
55 of the herein-described valve adapted to regulate the steam-supply, said valve consisting of a pair of disks mounted upon a suitable hub and having slots or openings arranged to break joints with each other, substantially as  
60 and for the purpose set forth.

8. The combination, with a rotary engine constructed substantially as described, of a valve mounted upon the main shaft of the same and consisting of a pair of disks having  
65 slots arranged to break joints with each other, mechanism for reversing the said valve, a casing inclosing the said valve, feed-pipes connecting the heads of said casing with the steam-ports of the engine, and a live-steam  
70 pipe connected to the top of the valve-casing, substantially as herein set forth.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in presence of witnesses.

JOHN R. HART.

CHAS. FREMONT CURREY.

CHAS. F. BRIDGE.

Witnesses:

W. R. BUNTING,

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G. B. PAYNE.