(No Model.) 3 Sheets—Sheet 1.

F. H. CATHCART.

ROTARY ENGINE.

No. 495,303. Patented Apr. 11, 1893.

FIG. 1.

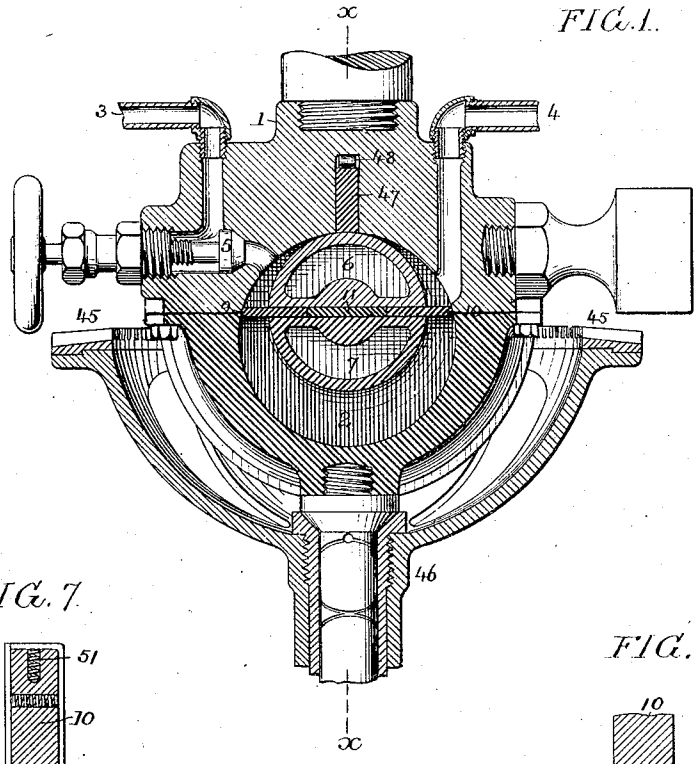


FIG. 7.

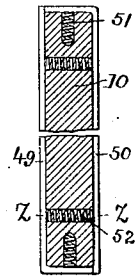


FIG. 8.

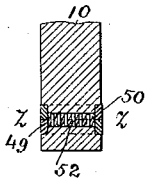
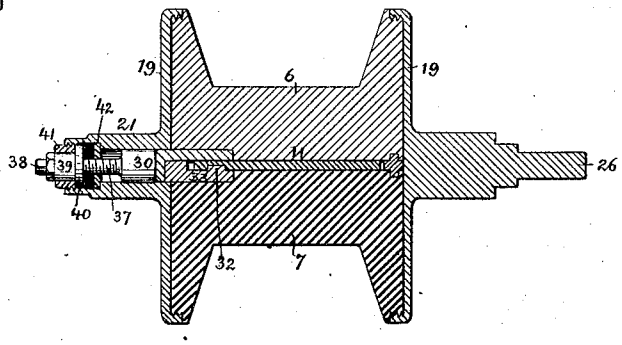


FIG. 4.



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(No Model.) 3 Sheets—Sheet 2.

F. H. CATHCART.

ROTARY ENGINE.

No. 495,303. Patented Apr. 11, 1893.

FIG. 2.

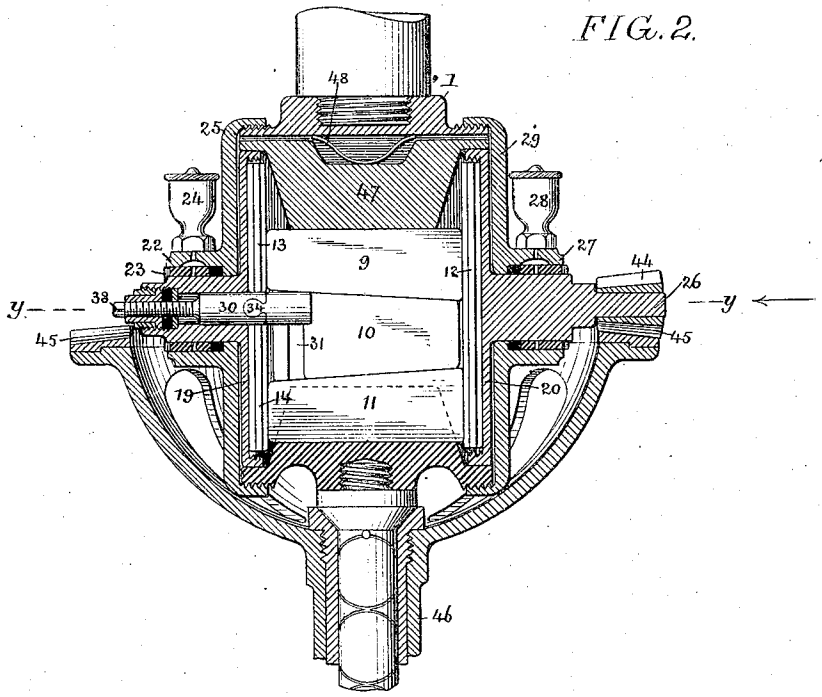
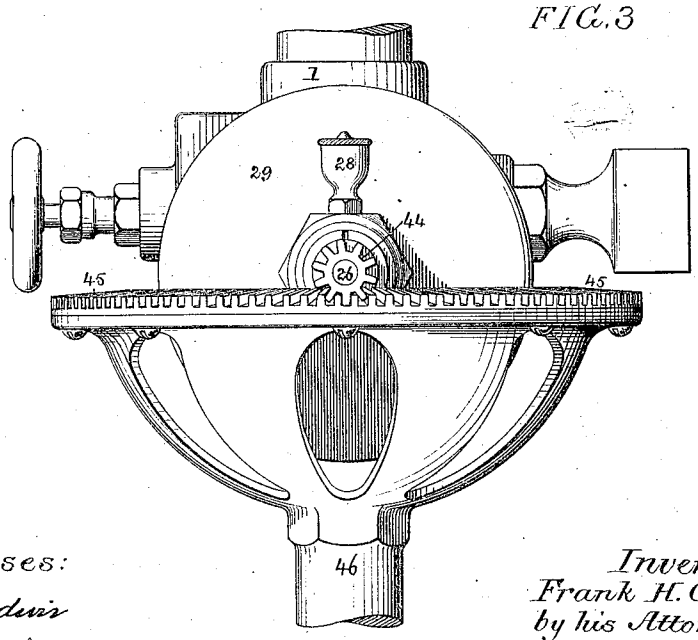


FIG. 3



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(No Model.) 3 Sheets—Sheet 3.

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ROTARY ENGINE.

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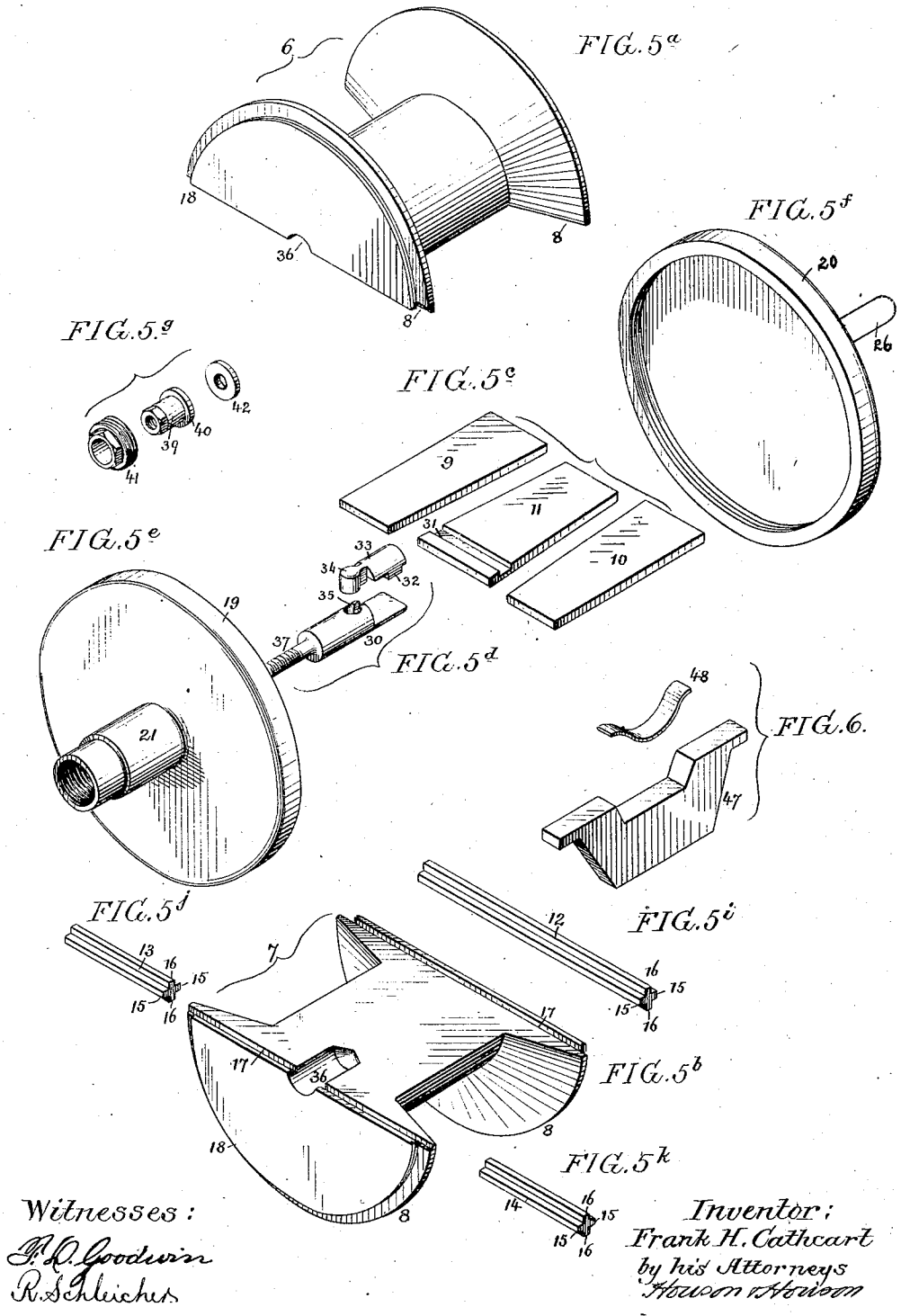

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UNITED STATES PATENT OFFICE.

FRANK H. CATHCART, OF LOWER MERION, PENNSYLVANIA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 495,303, dated April 11, 1893.

Application filed June 24, 1892. Serial No. 437,885. (No model.)

To all whom it may concern:

Be it known that I, FRANK H. CATHCART, a citizen of the United States, and a resident of Lower Merion township, Montgomery county, Pennsylvania, have invented certain Improvements in Rotary Engines, of which the following is a specification.

The object of my invention is to construct an engine or pump of the rotary type with a view of attaining a greater degree of efficiency than devices of this class which have been hitherto constructed, and which may be readily taken apart for necessary repairs, as more fully set forth hereinafter.

In the accompanying drawings:—Figure 1, is a sectional view of a device of this kind constructed in accordance with my invention, and showing its application as a motive power for a rotated tool. Fig. 2, is a transverse section of the same on the line x—x, Fig. 1, but illustrating the parts in a different position. Fig. 3, is an end view looking in the direction of the arrow Fig. 2, to more clearly illustrate the application of the device as a motive power for a rotated tool. Fig. 4, is a sectional view of the piston on the line y—y Fig. 2. Figs. 5^a to 5^k, are perspective views illustrating the essential parts of the engine or pump detached from each other. Fig. 6, is a detached perspective view of a detail. Fig. 7, is a sectional plan view on the line z—z, Fig. 8, of a piston blade, showing packing which may be employed. Fig. 8, is a transverse section of the same on the line Z—Z, Fig. 7.

Referring to the drawings 1 represents a suitable two part casing in which is contained a chamber 2, the central portion of which is preferably in the form of an ellipse and communicating with this chamber is an inlet passage 3 for the operating fluid and an outlet-passage 4 for the exhaust, the passage 3 being preferably provided with a governing valve 5 of any desired construction.

Rotated within the chamber 2 on an axis eccentric to the center of the chamber 2 is a piston body of a construction more clearly illustrated in Figs. 5^a to 5^k, and comprising two main sections 6, 7, which, when placed together, form a spool-like body reduced in diameter at the center and having opposite end flanges 8 tapering in cross section from the center to the outer edge. These two sections 6, 7 are held a sufficient distance apart to permit of the entrance of the sliding piston blades 9, 10, (Fig. 5^c) and a longitudinally adjustable wedge block 11 the three parts 9, 10 and 11 forming a diametral piston which slides to-and-fro between the parts 6 and 7 under the control of the elliptical chamber 2, the outer edges of the blades 9, 10 being at all times in contact with the inner periphery of the chamber. The elliptical portion of the chamber is that in which the blades and reduced central portion of the piston body operate, while the end portion, in which the tapered flanges 8 are placed, is circular in form, its center being coincident with the center of rotation of the piston body. The two sections 6, 7 are held apart by spacing blocks or strips 12, 13 and 14, (Figs. 5^i, 5^j, 5^k) placed at the extreme ends of the piston body and these spacing blocks or strips are preferably of cross like form in cross section having spacing ribs 15 of a slightly greater height than the thickness of the piston blade so that the piston blade may work freely as dictated by the elliptical chamber 2. At right angles to the ribs 15 are ribs 16 adapted to slots 17 in the opposite ends of the sections 6 and 7, the ribs 16 entering the slots 17 and keeping the parts in proper relative position and at the same time preventing the escape of the operating fluid used as a motive power for the engine. The opposite ends of the sections 6 and 7 are provided with screw threads on shoulders 18 projecting from the ends of the sections and slightly less in diameter than the diameter of the flanges 8 and connecting the two sections together are end disks 19, 20 (Figs. 5^e and 5^f) having projecting flanges adapted to the threaded shoulders and the whole forming, when in position, a compact structure which rotates on journals formed integral with the disks 19 and 20, the disk 19 being provided with a journal 21 adapted to a bearing 22 on the casing and between the box and the journal 21 is a bushing 23 of suitable anti-friction metal which is perforated to admit of a supply of lubricant to the bearing, the latter being provided with a chamber which is constantly kept filled with lubricant from an oil cup 24. This bearing 22 is formed integral with a head 25 screwed to the main casing 1, so that it may be removed when necessary

and the parts be examined or repaired. The opposite head 20 is also provided with a journal 26 adapted to a similar bearing 27 supplied by an oil cup 28 and on this end of the cylinder is a head 29 similar to the head 25.

The journal 21 is hollow and contains a circular stem 30 suitably shaped at its inner end and adapted to fit under the wedge shaped adjusting block 11, the upper surface of which is provided with a transverse groove 31 to which is adapted a tongue 32 projecting from a piece of hardened metal 33 which is provided with what might be termed a circular dovetailed projection 34, adapted to a suitably shaped recess 35 in the stem 30, so that when these parts are in proper position any longitudinal displacement will be effectually prevented, while lateral displacement is guarded against by fitting the joined ends of the parts within a recess 36 formed partly in the portion 6 and partly in the portion 7, the main body of the stem 30, however being fitted within the hollow journal 21 and being provided with a threaded stem 37 and a squared end 38 to which a key may be applied when adjusting the nut 39 to which the threaded stem is adapted. This nut 39 has a flange 40 against which presses a gland nut 41 adapted to a threaded opening in the journal 21 and between the flange 40 and a ring 42 I insert packing 43 which effectually prevents the escape of any of the actuating fluid. By this means the wedge block 11 may be adjusted longitudinally against the inner inclined edges of the piston blades 9 and 10 and force said blades out a greater or less distance to compensate for the increased diameter of the cylinder 2 as it wears by the friction of the blades, and the wedge block, sliding to-and-fro is at all times under the control of the adjusting stem 30 and at any time may be adjusted to any desired extent. The opposite hub or journal 26 preferably serves to transmit the rotations of the piston to any desired point and in the drawings is shown as being provided with a pinion 44 gearing with a bevel gear 45 on a tool shank 46 although of course, it will be understood that the device may be applied to any desired use where a rotary motion is necessary.

At that portion of the chamber 2 where the piston blade is caused to descend wholly within the space between the portions 6 and 7, is placed what may be termed a fixed abutment, 47 (Fig. 6) made of a separate piece of hardened metal and so arranged as to fit the contour of the piston body exactly, the tapered flange 8 being inclined at the most suitable angle for automatically taking up any wear which may occur, and with a view of having all portions of the fixed abutment exposed to the same, or nearly the same amount of wearing friction. This abutment may be fixed, if desired, but preferably to avoid uneven wear I place at the back of the abutment a spring or springs 48, which tend to move the abutment in a radial line toward the center of rotation of the piston so as to insure at all times a perfect contact.

It will be understood that this device may be used either as a pump or engine with very little modification and I do not desire to limit the device to either use.

The advantages resulting from the use of a chamber in the form of an ellipse will be readily apparent. The even and regular wear of the inner periphery of the chamber and the gradually increasing space allowing for the expansion of the actuating fluid, being those of the greatest importance.

In some instances it may be desirable to pack the piston blades to prevent the passage of steam from one side of the piston to the other and this I accomplish by recessing the blades and placing in such recesses L-shaped strips 49, 50 which overlap each other to form break joints and are forced out from the recesses by end springs 51 and transverse springs 52 as shown in Figs. 7 and 8.

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

1. The combination of the two part piston body, threaded flanged ends on the said piston body, spacing blocks between the two parts and adapted to hold the same in proper position, threaded disks adapted to said threaded end portions, journals on said disks and piston blades carried by said piston body, substantially as specified.

2. The combination of the two part piston body, recesses in the adjusting faces of the two sections, spacing blocks adapted to such recesses, and opposite end disks adapted to hold the parts of the piston body in position, with piston blades carried by said piston body, substantially as specified.

3. The combination of the two part piston body, recesses in the adjusting faces of the two sections, spacing blocks of cross-like form in cross section having ribs adapted to such recesses, and opposite end disks adapted to hold the parts of the piston body in position, with piston blades carried by said piston body, substantially as specified.

4. The combination of the piston body, the radially sliding piston blades therein, said blades having their inner edges inclined from each other, the wedge shaped adjusting block between said blades and adapted to slide radially therewith, and devices for effecting the longitudinal adjustment of said block, substantially as specified.

5. The combination of the piston body, the radially adjustable blades thereon, said blades having their inner faces inclined from each other, an adjustable wedge shaped block between said inclined faces, a longitudinally adjustable stem and a projection on said stem engaging with a transverse groove in the wedge shaped block, substantially as specified.

6. The combination of the piston body, the radially adjustable blades therein, the inner faces of said blades being inclined from each

other, the wedge shaped adjusting block between such inclined faces and the longitudinally adjustable stem having a dovetailed recess, a block having a dovetailed projection adapted to such recess, and a projection on said block adapted to a transverse groove in the wedge shaped block, substantially as specified.

7. The combination of the piston body, the radially adjustable blades thereon, said blades having their inner faces inclined from each other, the wedge shaped adjusting block between such inclined faces, the adjustable stem a threaded shank thereon, an adjusting nut engaging with said threaded shank and a gland nut, substantially as specified.

8. The combination of the piston body, the radially adjustable blades therein, the wedge shaped adjusting block between such blades, the adjustable stem, a threaded shank thereon, the adjusting nut carried thereby and having a flange, a gland nut, a ring and packing between said ring, and the adjusting nut, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK H. CATHCART.

Witnesses:
JNO. E. PARKER,
CHAS. H. HAESELER.