No. 630,588. Patented Aug. 8, 1899.

F. H. CATHCART.

ROTARY ENGINE.

(Application filed Mar. 16, 1897. Renewed July 3, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. I.

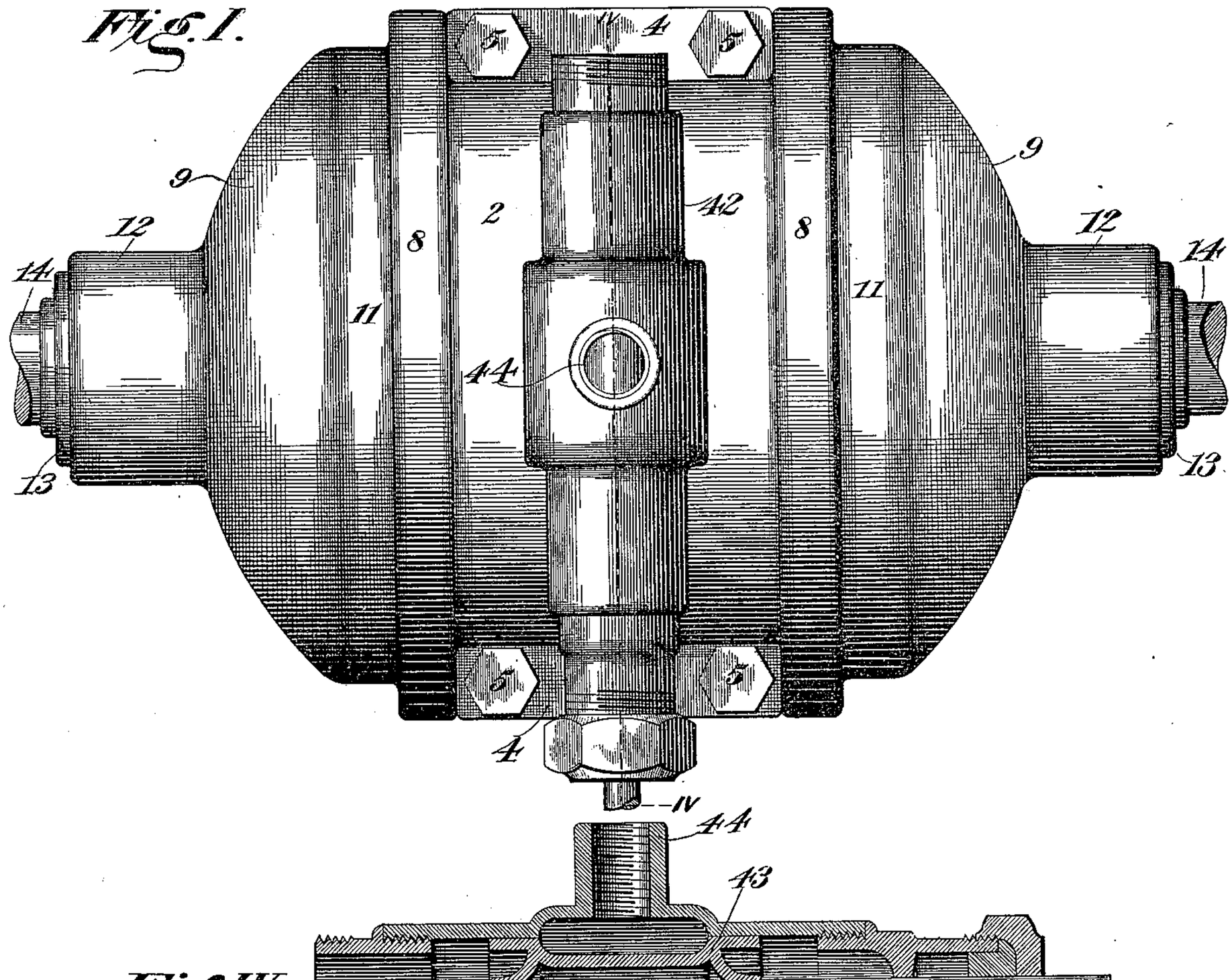

Fig. IV.

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Fig. II.

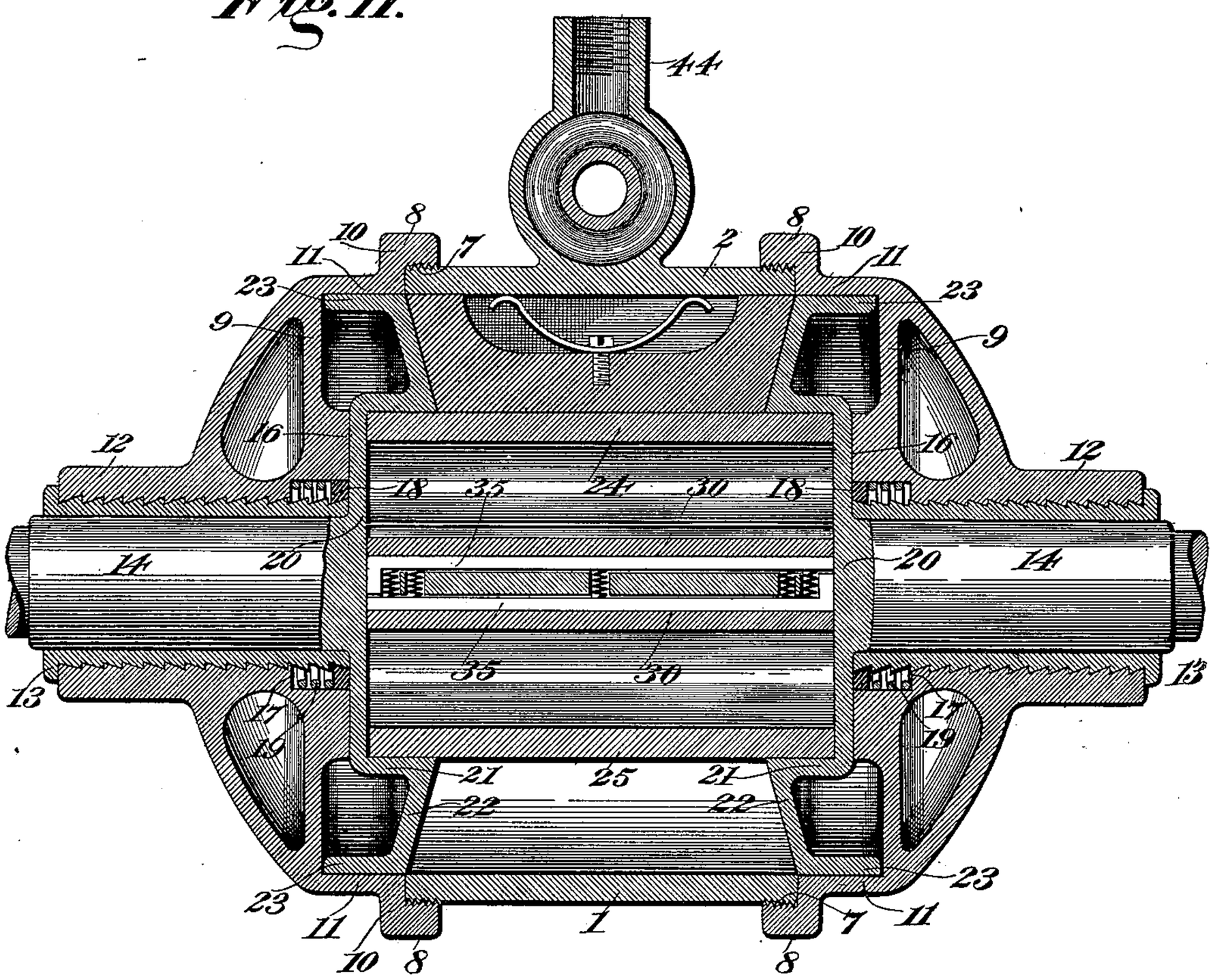

Fig. V.

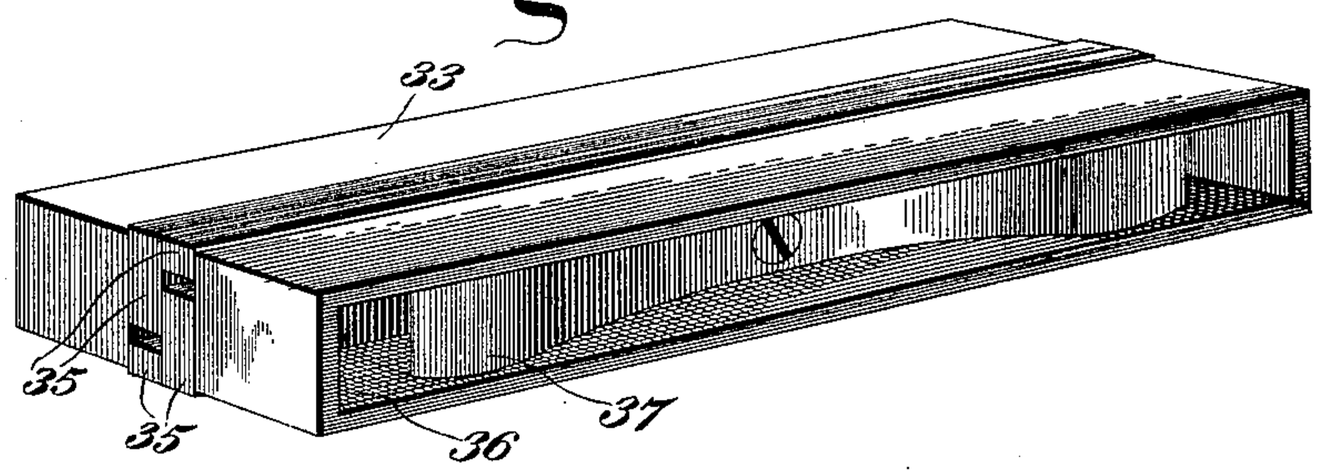

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Fig. III.

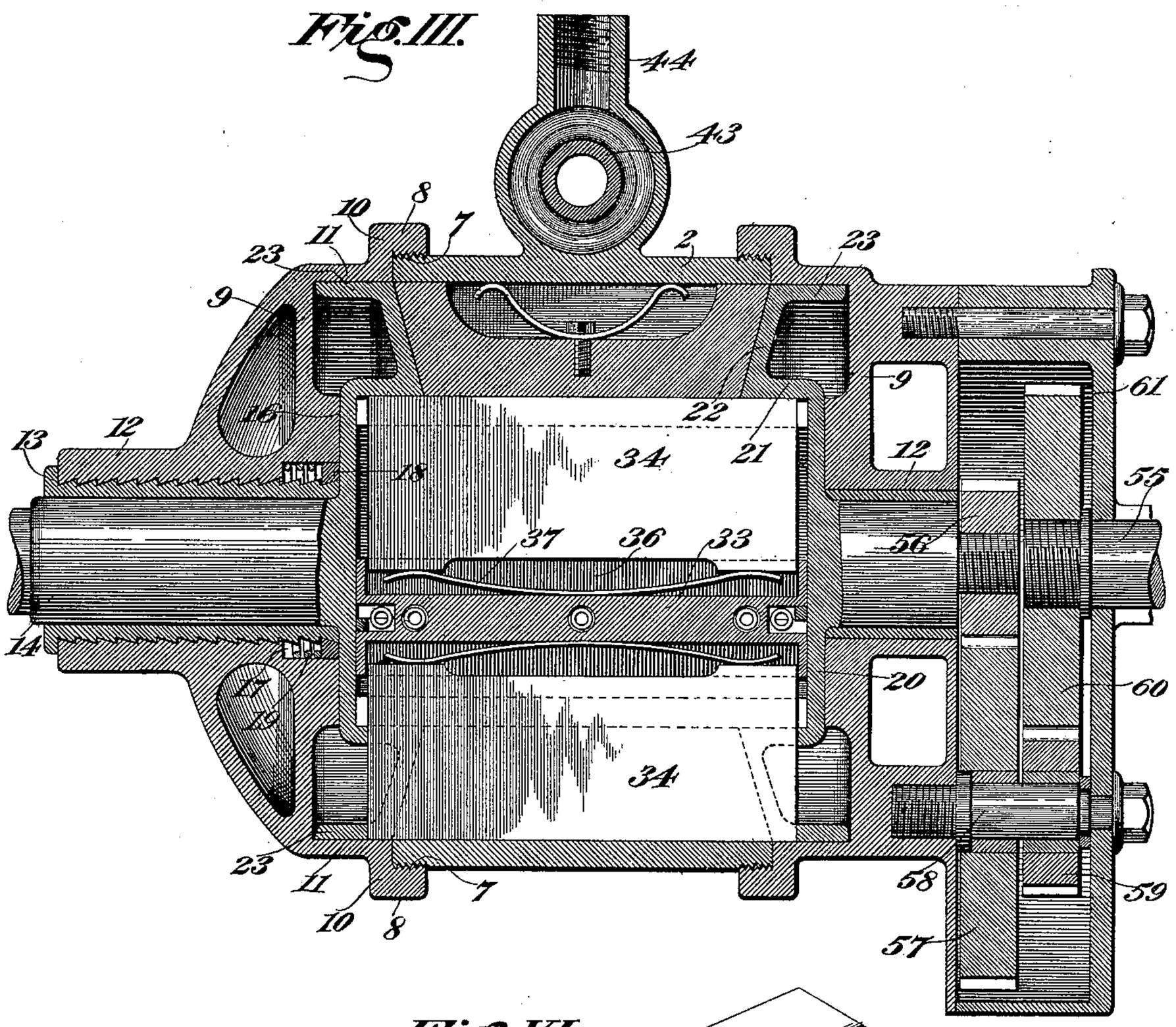
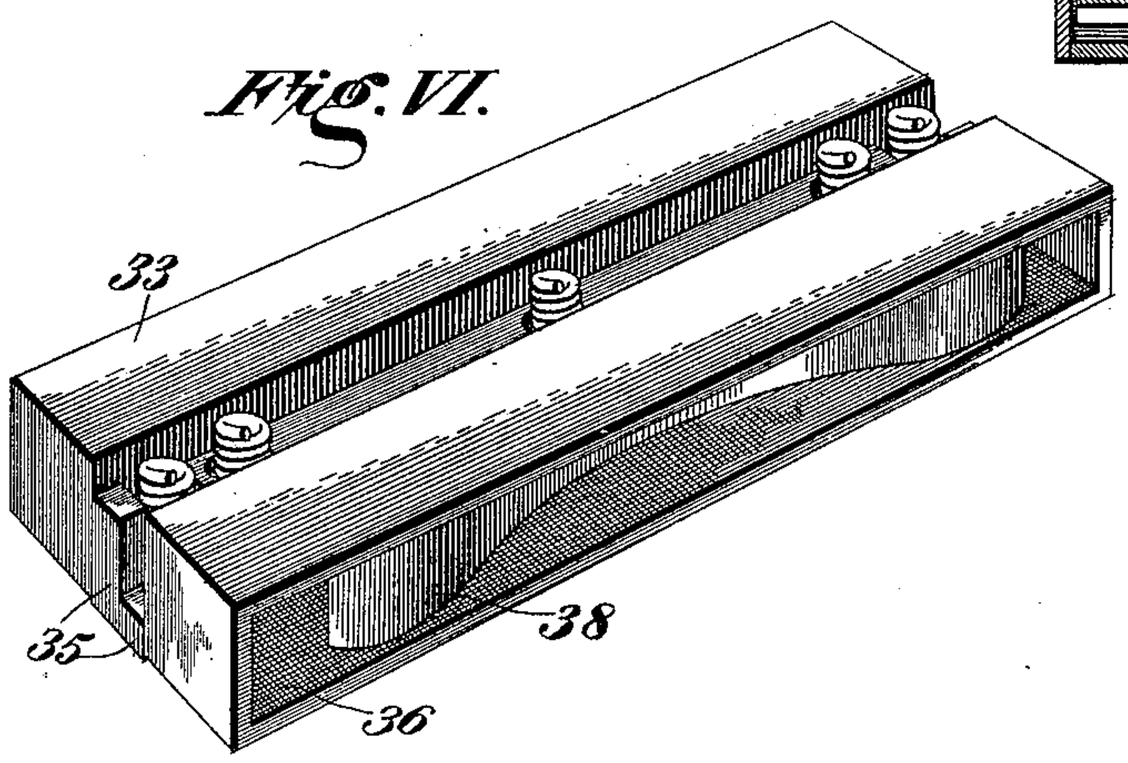


Fig. VI.



Witnesses
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UNITED STATES PATENT OFFICE.

FRANK H. CATHCART, OF ALEXANDRIA, VIRGINIA, ASSIGNOR TO THE EMPIRE ENGINE AND MOTOR COMPANY, OF NEW YORK, N. Y.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 630,588, dated August 8, 1899.

Application filed March 16, 1897. Renewed July 3, 1899. Serial No. 722,696. (No model.)

To all whom it may concern:

Be it known that I, FRANK H. CATHCART, of Alexandria, in the county of Alexandria, State of Virginia, have invented certain new and useful Improvements in Rotary Engines, of which the following is a complete specification, reference being had to the accompanying drawings.

The object of my invention is to produce an engine or pump of the rotary type of that class to which belongs the subject-matter of my Patent No. 495,303, dated April 11, 1893, whereby the structure and operation of the machine are simplified and facilitated and its efficiency and durability increased.

In the accompanying drawings, Figure I is a side elevation of my engine complete. Fig. II is a central vertical longitudinal section thereof transverse to the blades of the piston. Fig. III is a similar view showing the blades in side elevation and the intermediate packing member in section. Fig. IV is a section on the line 4 4 of Fig. I, the piston being in the position illustrated in Fig. II. Fig. V is a perspective view of the intermediate packing member detached, with the packing-strips in position. Fig. VI is a similar view showing the same with the packing-strips detached and the packing-strip-actuating springs in place.

1 indicates one portion of a two-part cylinder, and 2 the other portion thereof. Each portion is provided with opposite longitudinal flanges 3 and 4, respectively, which are constructed to make close joints one with the other and when united, as by screw-bolts 5, to complete the cylinder. The flanges 3 and 4 are shorter than the length of the cylinder-sections, as clearly shown in Fig. I, in order to provide space upon the opposite ends for exterior screw-threads 7. (See, for example, Fig. II.) The screw-threaded ends of the completed cylinder are adapted to accommodate internally-screw-threaded flanges or rims 8, that extend, respectively, in opposite directions from the cylinder-heads 9. The rims 8 are of required diameter to fit the complete cylinder and are carried, as by flanges 10, upon cylinder-head cylinder-sections 11. The term last employed is used to designate hollow portions of the cylinder-heads, which, being of equal diameter with the cylinder and exactly coaxial therewith, constitute when the respective heads are secured to the cylinder-sections extensions of the cylinder within which the concentric portion of the piston rotates.

The construction of the cylinder-sections within the opposite heads embodies an important structural feature of my invention, constituting, as it does, desirable means for taking the machine apart when required and also facilitating the production of that degree of nicety and exactitude of fit that is essential to the perfect operation of the machine.

The cylinder-heads 9 are provided with opposite coaxial bearing-pieces 12, within which are respectively secured bushings 13, that support, respectively, piston-shafts 14. The inner end of each head 9 is provided with an annular flat-faced projection 16, that in the two heads are designed to abut, respectively, against the ends of the piston. Around the interior end of each of the bushings 13, within the bearings 12 and the projection 16, I provide an annular recess 17. Each recess carries a suitable packing-ring 18, of any ordinary, simple, or compound structure, and which, being projected outwardly, as by a spring or springs 19, constitutes a suitable packing working against the head of the piston.

Each of the shafts 14 is secured to, or, preferably, made in one forging with, a piston-head 20, and each piston-head includes an annular flange or rim 21, from which projects an oblique annular wall 22, that carries upon its extremity an annular bearing-flange 23, which preferably works in a cylinder-head cylinder-section 11. The employment of the flange 23 and wall 22 is preferred on account of lightness; but that particular structure is not essential, the object being to employ, in connection with the flange or rim 21, an exterior flange 23, that projects well into and fits the interior of the cylinder-head cylinder-section. As clearly shown in Fig. II, for example, of the drawings, a preferable construction is illustrated, in which the flange 23 extends outwardly beyond the face of the piston-head 20. The rims or flanges 21 are designed to fit

over the ends of, and thus to accommodate and properly assemble, the two sections 24 and 25 of a two-part rotary piston, which may be provided, respectively, with lugs 28, (see Fig. IV,) by means whereof the piston-sections may be secured to the piston-heads through the aid of screws or bolts 29. The lugs 28, however, may be omitted, if preferred, and bolts, extending from one piston-head to the other, may serve to draw the piston-heads snugly and securely against the ends of the piston-sections, which means, constituting an obvious mechanical expedient, do not appear to require special illustration.

The piston-sections are provided, respectively, with plane walls 30, which, as is clearly shown in Fig. IV, are in the complete piston parallel to each other and separated by offsets 31, so as to define an oblong parallel-sided space 32 within the piston. The space 32 may be of suitable and preferred extent and shape and is designed to accommodate an intermediate packing member 33, which is, as shown in Fig. II, longitudinally coextensive with the piston; but which is transversely considerably narrower than the space 32, as shown in Fig. IV.

The object of the employment of the walls 30 and the offsets 31 to define the space 32 is to eliminate, in a measure, the source of friction between the piston-blades 34 and the ways provided for them in the piston. In my previous patent above referred to the blades are shown as working between the two portions of a piston and in contact with the continuous walls thereof. By my present invention a portion of the frictional contact is dispensed with through the interposition of the space 32.

The packing member is provided with well-known L-shaped packing-strips 35 and is also upon opposite sides provided with packing-boxes 36, within which the ends of the blades 34 may be embedded. Springs 37 within the packing-boxes 36 are preferably employed to yieldingly urge the blades in opposite directions. By the employment of the packing-boxes 36 the passage of the actuating fluid from one side of the blades 34 to the other is prevented, while at the same time it is unnecessary to make a close joint between the piston-blades and the opposing walls of the piston-sections between which the blades move. By the employment of the springs 37 in connection with the intermediate packing member 33 the blades 34 are reversible in practice, so that when their outer edges become worn the inner edges may be set to make contact with the interior wall 38 of the cylinder. It should be noted in this connection that the interior wall 38 of the cylinder is not strictly cylindrical, but is slightly elliptical in cross-section, as was previously explained in my patent above referred to.

Referring particularly to Fig. IV, 40 and 41 indicate inlet and outlet passages formed, preferably, in the wall of the cylinder-section 2, which communicate, respectively, with the interior of a valve-chamber 42, within which is contained a suitable valve 43. The chamber 42 is provided with an actuating-fluid-supply-pipe connection 44.

A more detailed description of the operation of my machine than that already given is deemed unnecessary in view of the familiarity of the art to which it relates, as exemplified in my previous patent above referred to.

What I claim is—

1. In a rotary engine, the combination with a cylinder and rotatory piston fitting within the same, the piston being longer than the cylinder, of cylinder-heads secured to the cylinder, and provided with annular cylinder extensions within which the piston works, substantially as set forth.

2. In a rotary engine, the combination with a cylinder having externally-screw-threaded ends, and a rotatory piston of greater length than the cylinder, fitting within the same, of cylinder-heads provided with cylinder extensions within which the piston works, and internally-screw-threaded rims, respectively, adapted to screw upon the ends of the cylinder, substantially as set forth.

3. In a rotary engine, the combination with a two-part cylinder, of longitudinally-disposed flanges and bolts for uniting the two parts of the cylinder-sections, the flanges being of less extent than the cylinder, of a rotatory piston fitting within the cylinder, and cylinder-heads provided with rims, screw-threads for uniting the cylinder and the rims of the cylinder-heads, and a cylinder extension within the respective heads for the reception of the piston, substantially as set forth.

4. In a rotary engine, the combination with its cylinder, of the two-part piston containing movable piston-blades, piston-heads provided with inward-projecting annular rims which fit over the ends of the two parts of the piston and properly assemble them, and means for uniting the two piston-heads, substantially as set forth.

5. In a rotary engine, the combination with the cylinder and the piston carrying the movable blades, of the piston-heads provided with inward-extending rims which are adapted to fit over the ends of the piston, the oblique walls projecting from the said rims, and annular bearing-flanges which are carried by the said oblique walls, and are adapted to fit within cylindrical extensions of the cylinder, substantially as set forth.

6. In a rotary engine, the combination with its cylinder, piston and piston-heads provided with inward-extending rims, of oblique walls extending outward from the said rims, and annular bearing-flanges carried upon the walls, fitting within the cylinder and extending outwardly beyond the heads, substantially as set forth.

7. In a rotary engine, the combination with

a cylinder, piston, and walls within the piston defining an open space therein, of a packing member working between the walls of the space, packing-boxes in the opposite sides of the packing member, and piston-blades working through suitable apertures in the piston, supported at their inner edges by the packing-boxes, and making contact at their outer edges with the bore of the cylinder, substantially as set forth.

In testimony of all which I have hereunto subscribed my name.

FRANK H. CATHCART.

Witnesses:

J. DU PRATT WHITE,

JOHN M. HITE.