No. 850,049. PATENTED APR. 9, 1907.

P. O. POULSON.

ROTARY ENGINE.

APPLICATION FILED JAN. 4, 1907.

4 SHEETS—SHEET 1.

Fig. 1.

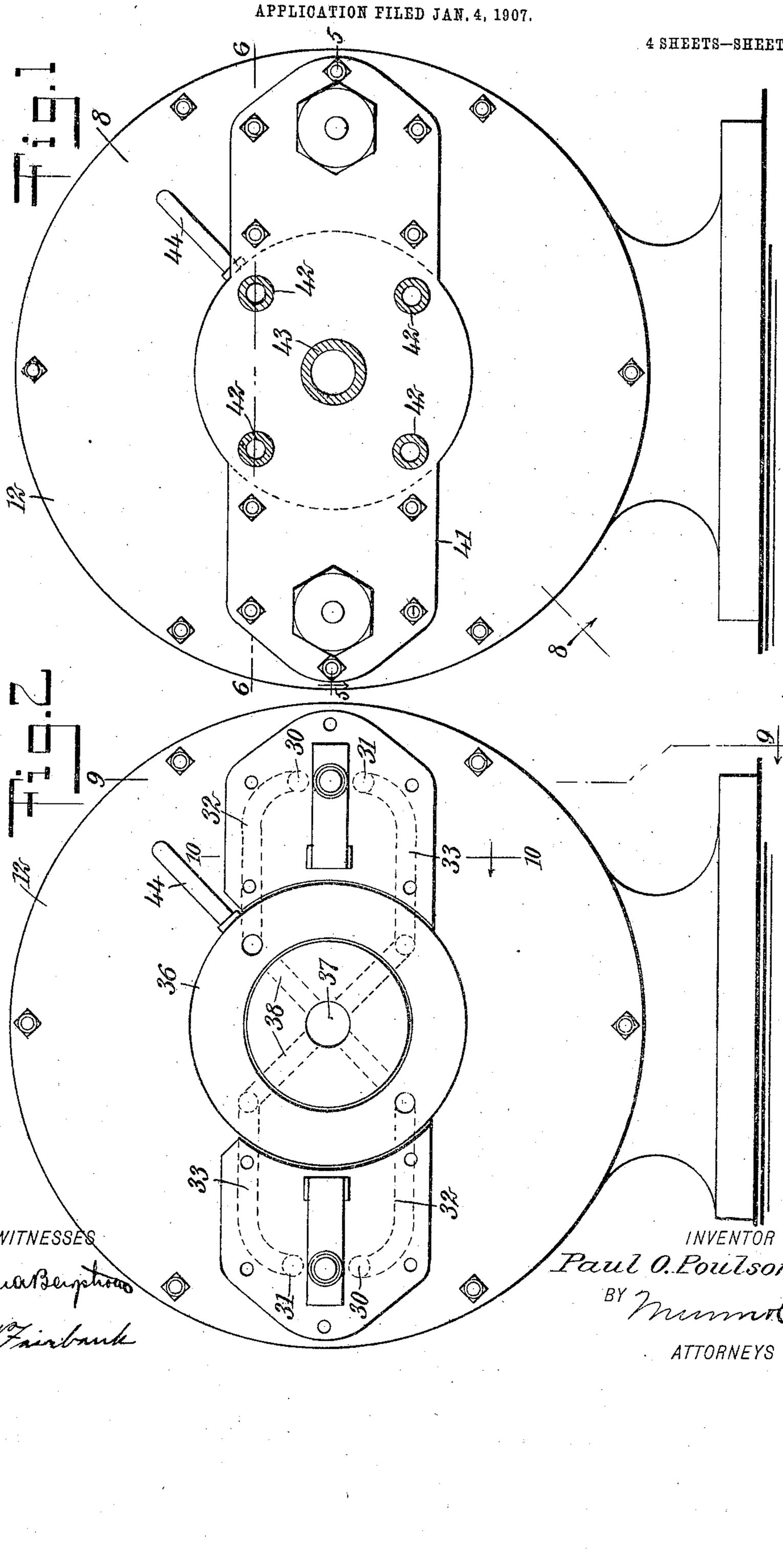

Fig. 2.

WITNESSES

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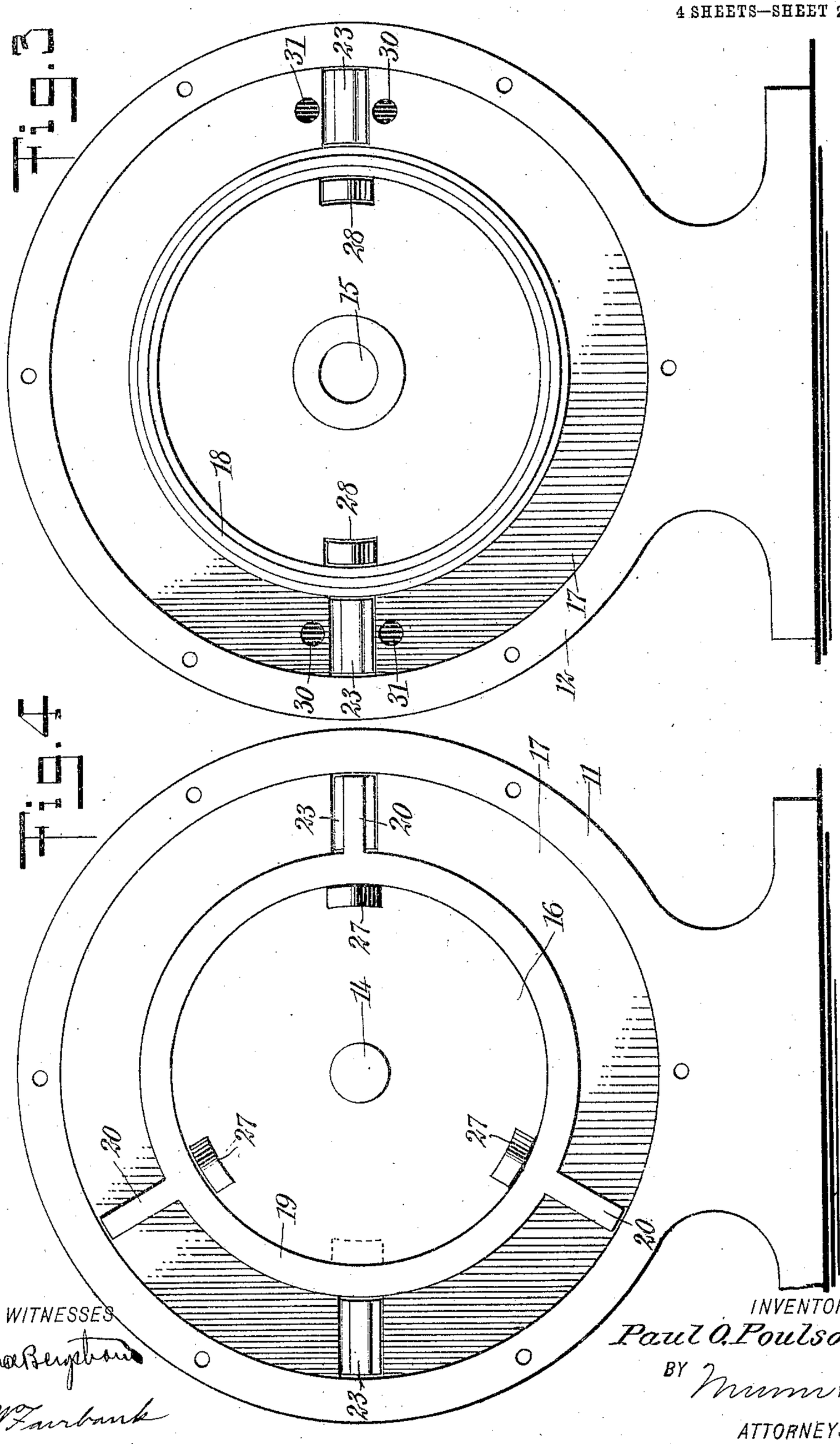
4 SHEETS—SHEET 2.

Fig. 5.



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4 SHEETS—SHEET 3.

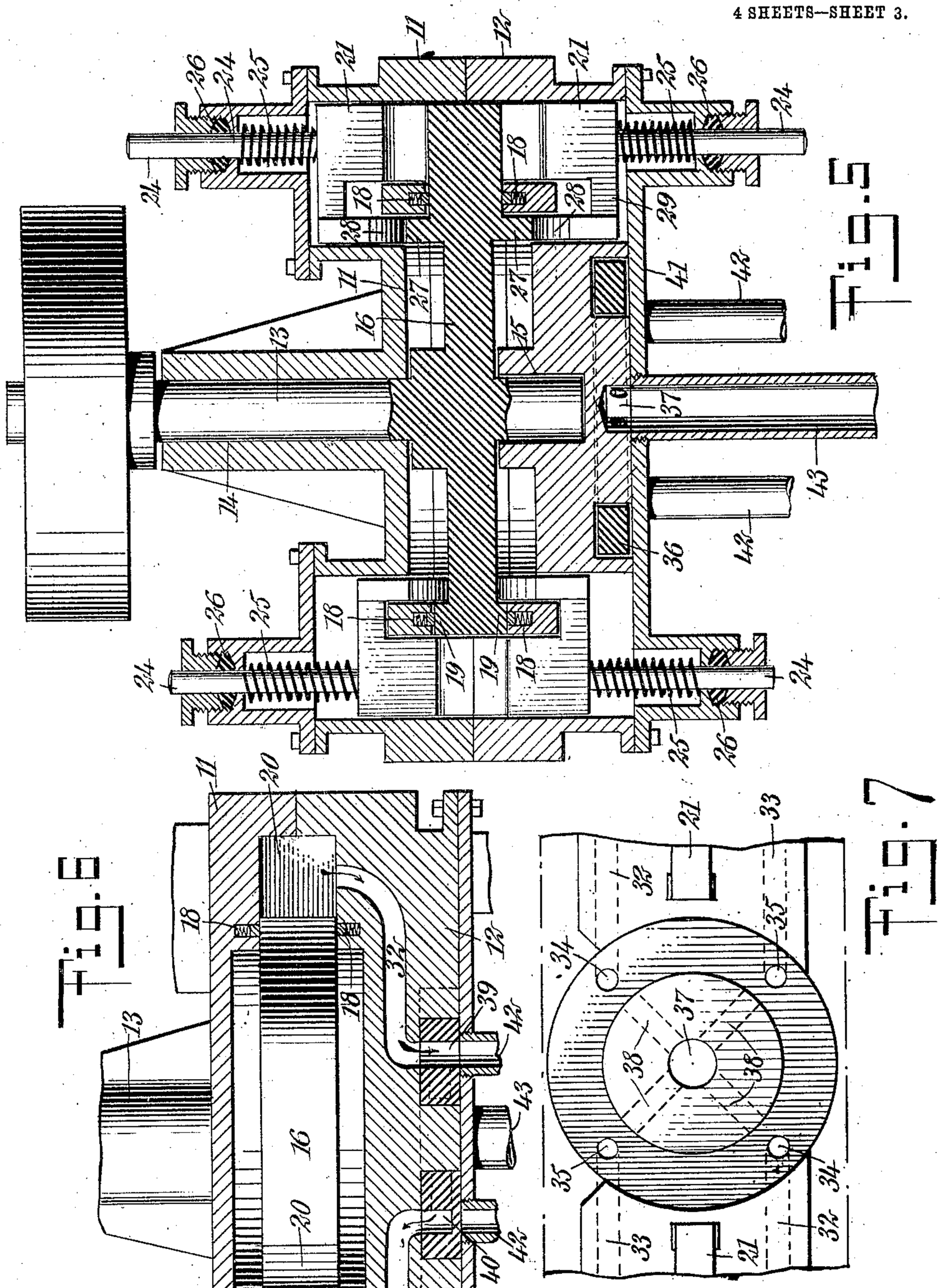

Fig. 5.

Fig. 6.

Fig. 7.

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4 SHEETS—SHEET 4.

Fig. 8

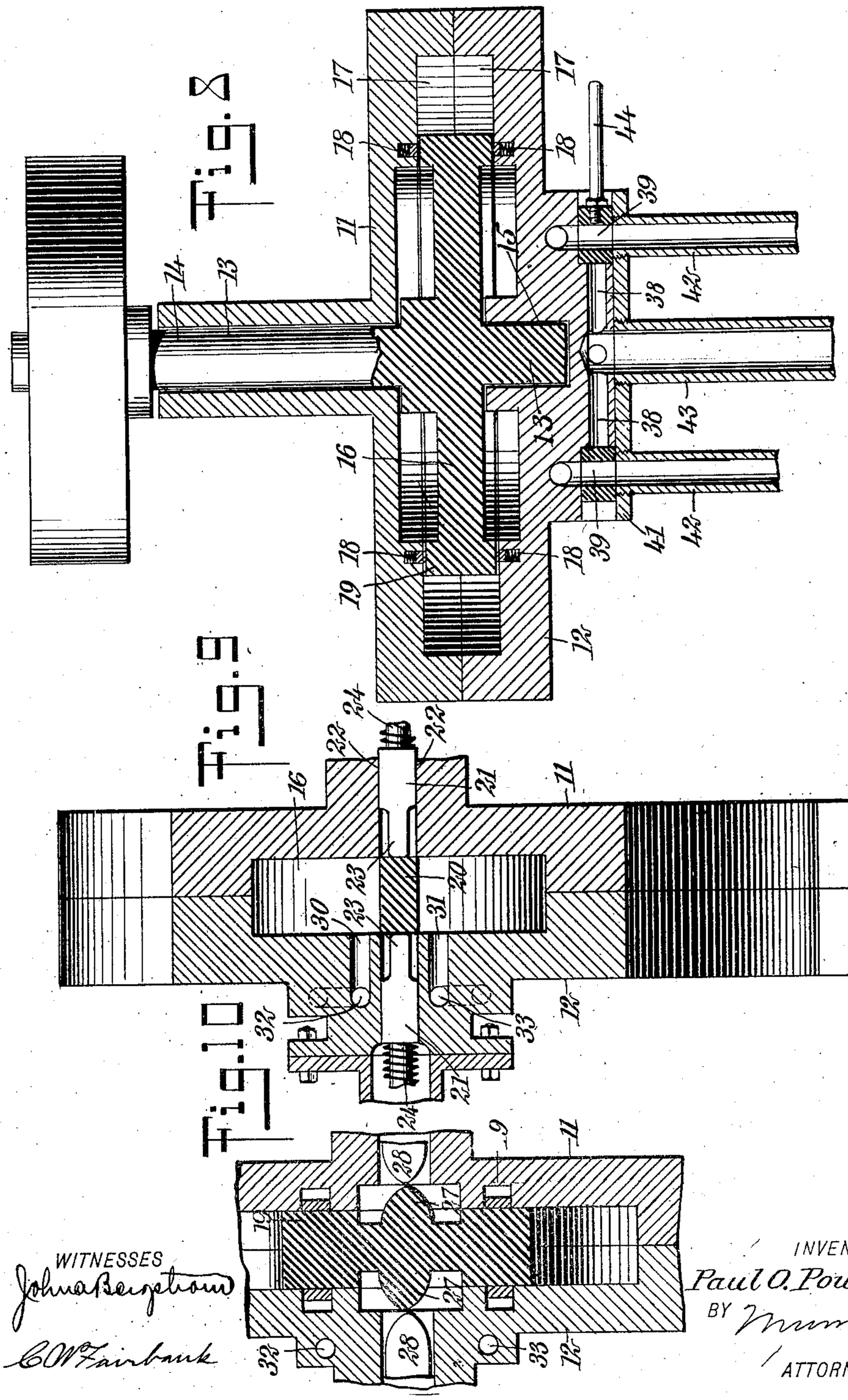

Fig. 9

Fig. 10

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UNITED STATES PATENT OFFICE.

PAUL OLUFF POULSON, OF BRIGHAM, UTAH.

ROTARY ENGINE.

No 850,049. Specification of Letters Patent. Patented April 9, 1907.

Application filed January 4, 1907. Serial No. 350,708.

To all whom it may concern:

Be it known that I, PAUL OLUFF POULSON, a citizen of the United States, and a resident of Brigham, in the county of Boxelder and State of Utah, have invented a new and Improved Rotary Engine, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in rotary engines adapted for use in connection with any suitable motive fluid—as, for instance, steam, compressed air, water, and the like; and the object of the invention is to provide certain new and improved means for moving the abutments from the chamber as the piston passes and also certain improvements in means for supplying the motive fluid adjacent said abutments for operating the device.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, in which—

Figure 1 is an end elevation of my improved engine, the supply and exhaust pipes being shown in section. Fig. 2 is a view similar to Fig. 1, the plate carrying the supply and exhaust pipes being removed. Fig. 3 is an end elevation of the interior of one portion of the casing. Fig. 4 is an end elevation of the interior of the other portion of the casing, showing the pistons and piston-bearing member. Fig. 5 is a transverse section on the line 5 5 of Fig. 1. Fig. 6 is a transverse section on the line 6 6 of Fig. 1. Fig. 7 is an end elevation of a portion of the engine similar to Fig. 2, but with the reversing-valve ring removed. Fig. 8 is a transverse section on the line 8 8 of Fig. 1. Fig. 9 is a vertical section on the line 9 9 of Fig. 2, and Fig. 10 is a vertical section on the line 10 10 of Fig. 2.

In my improved engine I employ a casing made up of opposite sections 11 and 12, each of which is spaced apart to provide an interior chamber and each having a bearing for supporting the shaft 13 of the rotary casing member 11. The bearing of the casing member 11 comprises a suitable journal 14, while the bearing within the section 12 of the casing comprises merely a recess 15, into which the remaining end of the shaft 13 extends. The shaft 13 carries a rotary member 16, rigidly secured thereto, and upon the outer circumference of this rotary member is located the pistons against which the motive fluid acts to rotate said member. The sections 11 and 12 are rigidly secured together around their circumferences, and each is provided with an annular recess 17, which with the recess of the opposite section of the casing forms the annular chamber or cylinder. Adjacent the inner edge of this annular chamber there is provided any suitable form of packing-ring 18, contacting with the corresponding annular flange 19 of the rotary member 16. The annular chamber forming the cylinder is thus effectively sealed against the admission or escape of the motive fluid save through the inlet and exhaust valves hereinafter referred to. The rotary member 16 carries upon its outer circumference a plurality, preferably three, baffles or pistons 20, which closely contact with the inner walls of the annular chamber and effectively close it against the passage of the motive fluid.

At a plurality of points around the annular chamber I provide suitable abutments adapted to move into and out of the annular chamber and serve as partitions against which the motive fluid may act to propel the rotary member. There may be as many of these abutments as desired; but preferably there is a less number of the abutments than there are of the pistons 20 whereby it will be impossible for the engine to stop on a dead-center. Each abutment preferably comprises two oppositely-disposed members 21 21, movable into and out of the annular chamber and supported within recesses in the casing. Each member comprises a plate of uniform thickness moving within guides 22 in the wall of the casing and also comprises the plates 23, which are of a width equal to substantially one-half the width of the annular chamber, and each one in engagement with the oppositely-disposed plate effectively closes said chamber. Each member of the abutment is provided with means for normally forcing it out into the annular chamber, and this means preferably comprises a rod 24, carried by each plate 21 and having a coil-spring 25 in engageme it with said plate and in engagement with the interior of the recess within which the abutment operates. To prevent the escape of the motive fluid, this rod may either terminate within the recess or may, as shown in the drawings, extend out through suitable packings 26 to the exterior thereof.

For operating the abutments to move

them out of the chamber and permit the passage of the piston at the proper time I provide cam-lugs 27 upon each side of the rotary member and inside of the annular ring 19. These cam-lugs are located in the same radial lines as each of the pistons 20 and cooperate with cam-lugs 28, carried by each member of each of the abutments. The plate 21 of each abutment is provided with an extension 29, leading through a recess to the interior of the ring 19, and rigidly secured to this projection is a cam-lug 28. Each cam-lug is of a width somewhat greater than the thickness of the operative part 23 of the abutment, and the inclination of the surface of each of the lugs is such that as the rotary member carrying the pistons is moved two of the cams 27 of said rotary member will engage with the cams 28 of one of the abutments just before the piston reaches said abutment, and as the rotary member is moved still farther the cams 27 force the cams 28 back into their recesses, and the said cams 28 carry their respective members of the abutment therewith, and at the time the piston reaches said abutment it has been moved entirely out of the path of the piston, and the latter is permitted to pass. As soon as the piston has passed the abutment the cams become disengaged, and the members of the abutment are again forced into the annular chamber by means of the springs 25. As the opposite sides of each cam are exactly alike, it is entirely immaterial in which direction the rotary member is moved, as the cams will engage to move the abutment out of the path of the piston whenever the said piston approaches the abutment.

One wall of the casing is provided with the inlet and exhaust ports and the means whereby the flow of the motive fluid may be readily controlled. Separate portions 30 and 31 are provided on opposite sides of each abutment, and suitable passages 32 and 33 lead to ports 34 and 35 in the extreme surface of the casing. These ports open outward and are disposed at equal distances apart and at equal distances from the center of the shaft 14.

Supported upon the outer surface of the member 12 of the casing, or rather within an annular recess in the surface of said member, is provided a reversing-valve ring 36. The portion of the casing within this ring is provided with a central aperture 37, to which the supply-pipe for the motive fluid delivers, and from this central recess lead radial passages 38, extending in the direction of the ports 34 and 35. The ring 36 is provided with two passages or ports 39, adapted to be placed in communication with either the ports 34 or the ports 35, and it is also provided with ports or passages 40, each adapted to be placed in communication with a port 34 or a port 35 and at the same time in communication with one of the passages 38. Secured to the outer surface of the member 12 of the casing is a plate 41, having outlet-passages or exhaust-pipes 42 in alinement with each of the ports 34 and 35 of the casing and also having a supply-pipe 43 leading to the recess 37 of the casing. This plate may also serve to close the outer sides of the recesses in which the abutments are contained and also support the packings for the rods of said abutments, if desired.

In the operation of the engine a motive fluid under pressure is supplied through the pipe 43 to the recess 37, from which it is distributed through the radial passages 38. With the ring 36 in the position shown in the drawings the motive fluid cannot escape through all of these passages, but only through each alternate one. The fluid passes through the ports or passages 40 of the annular member and through the passages 33 of the casing and is delivered into the annular chamber through the ports 31. Meanwhile the ports 30, leading from the annular chamber, communicate, by means of the passages 32, with the passages or ports 39 of the ring 36, and from said ports or passages it may freely escape through the exhaust-pipes 42. Thus the space at one side of each abutment is open to the atmosphere, while the space upon the opposite side of each abutment is in direct communication with the source of motive fluid. As the motive fluid enters the chamber it forces each piston away from the abutment behind it and toward the next abutment. As soon as a piston approaches the next succeeding abutment a second piston has suddenly moved the first-mentioned abutment out of the road and passed the same. The motive fluid then acts upon a new abutment, and the rotation is maintained. As the number of pistons is preferably greater than the number of abutments, it is impossible for any of the supply-ports to be in direct communication with an exhaust-port, there being a piston intermediate the same at all times. It is furthermore impossible for the engine to stop on a dead-center, as there will always be a piston a short distance in advance of some one of the abutments and against which the motive fluid may act.

In order to reverse the engine, it is merely necessary to move the ring 36 by means of the handle 44 until the passages 39, which are shown as being in communication with the passages 32, are brought into communication with the passages 33. At this time the passages 40 of the ring will be brought into communication with the passages 33 of the casing, and the motive fluid will be delivered to the ports 30 instead of to the ports 31, and the ports 31 will be placed in communication with the exhaust. The ring 36 may be employed, if desired, for stopping and starting the engine, as by moving it to an

intermediate position the motive fluid will not be supplied to the annular chamber through any of the ports.

Various changes may be made in the structure of my improved engine within the scope of the appended claims, but without departing from the spirit of the invention.

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

1. In combination, a casing having an annular chamber, an abutment carried by the casing and extending into said chamber, said casing being provided with an inlet and an exhaust port on opposite sides of the abutment, a rotary member within said casing, a piston carried thereby and movable in the annular chamber, and means carried by said rotary member adjacent said piston for moving the abutment out of the path of said piston.

2. In combination, a casing having an annular chamber, an abutment within said casing and extending into the annular chamber, said abutment comprising two members movable into said annular chamber from opposite sides thereof, a rotary member within the casing, a piston carried thereby and movable in the annular chamber, and means carried by said rotary member adjacent said piston for moving the members of the abutment out of the path of the piston.

3. In combination, a casing having an annular chamber, an abutment carried by the casing and extending into the annular chamber, said abutment comprising two members slidably mounted within recesses in said casing, cams carried by said members, a rotary member within said casing, a piston carried thereby and movable in the annular chamber, and means carried by said rotary member adjacent said piston for contacting with said cams to move the members of the abutment out of the path of the piston.

4. In combination, a casing having an annular chamber, an abutment carried by the casing and extending into the annular chamber, said abutment comprising two plates slidably mounted in recesses in said casing and entering said annular chamber from opposite sides thereof, means for normally forcing said members into the annular chamber and into engagement with each other, a rotary member, a piston carried thereby, and means carried by said rotary member adjacent said piston for moving the members of the abutment out of the path of the piston.

5. In combination, a casing having an annular chamber, an abutment carried by the casing and extending into the annular chamber, said abutment comprising two members slidably mounted in recesses in said casing, cams carried by each of said members, means for normally pressing said members into said chamber and into engagement with each other, and a rotary member having a portion thereof extending into said annular chamber and cams carried by said rotary member for contacting with the first-mentioned cams to move the members of the abutment out of the annular chamber.

6. In combination, a casing having an annular chamber, a rotary member within said casing, a plurality of pistons carried by said rotary member, a plurality of abutments carried by said casing and movable into the annular chamber, the number of said abutments being less than the number of said pistons, means carried by said rotary member adjacent each of said pistons for moving the abutments out of the path of said pistons, and means for directing a motive fluid to said annular chamber at either side of each abutment and permitting the exhaust from the opposite side.

7. In combination, a casing having an annular chamber, a rotary member located therein, a piston carried by said rotary member and movable in said annular chamber, an abutment within said casing and movable into said annular chamber, means carried by the rotary member for moving the abutment out of the path of the piston, said casing being provided with an inlet and an exhaust port upon opposite sides of said abutment, a supply-conduit, an exhaust-conduit, and means for connecting either of said conduits with either of said ports.

8. In combination, a casing having an annular chamber, a rotary member located therein, a piston carried by said rotary member and movable in said annular chamber, a plurality of abutments within said casing and movable into said annular chamber, means carried by the rotary member for moving the abutments out of the path of the piston, said casing being provided with a port adjacent each side of each of said abutments, a supply-conduit, an exhaust-conduit, and rotary means for connecting said supply-conduit to the ports upon one side of each abutment or with the ports upon the opposite sides of each abutment.

9. In combination, a casing having an annular chamber, a rotary member located therein, pistons carried by said rotary member and movable in said annular chamber, a plurality of abutments carried by said casing and movable into said annular chamber, said casing being provided with passages and ports leading into said chamber adjacent each side of each of the abutments; a supply-conduit, a plurality of discharge-conduits, and a movable ring intermediate said conduits and said casing, whereby the supply-conduit may be placed in communication with the passages leading to either side of said abutments and the exhaust-conduits placed in communication with the remaining passages.

10. In combination, a casing having an annular chamber, a rotary member within said casing, a piston carried by said rotary member and movable in said annular chamber, a plurality of abutments within said casing and movable into, said annular chamber, means carried by said rotary member for moving said abutments out of the path of said pistons, said casing being provided with a passage leading to each side of each of the abutments and having their opposite ends terminating equal distances apart and at equal distances from the center of the rotary member, a plate secured to said casing, supply and exhaust conduits connected to said plate, and a movable ring intermediate said plate and said casing for placing the supply-conduit in communication with the passages leading to either side of the abutments and placing the exhaust-conduits in communication with the passages leading to the opposite side of each abutment.

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

PAUL OLUFF POULSON.

Witnesses:
CHRIS FREEZE,
SETH FRANKLIN CHRISTENSEN.