

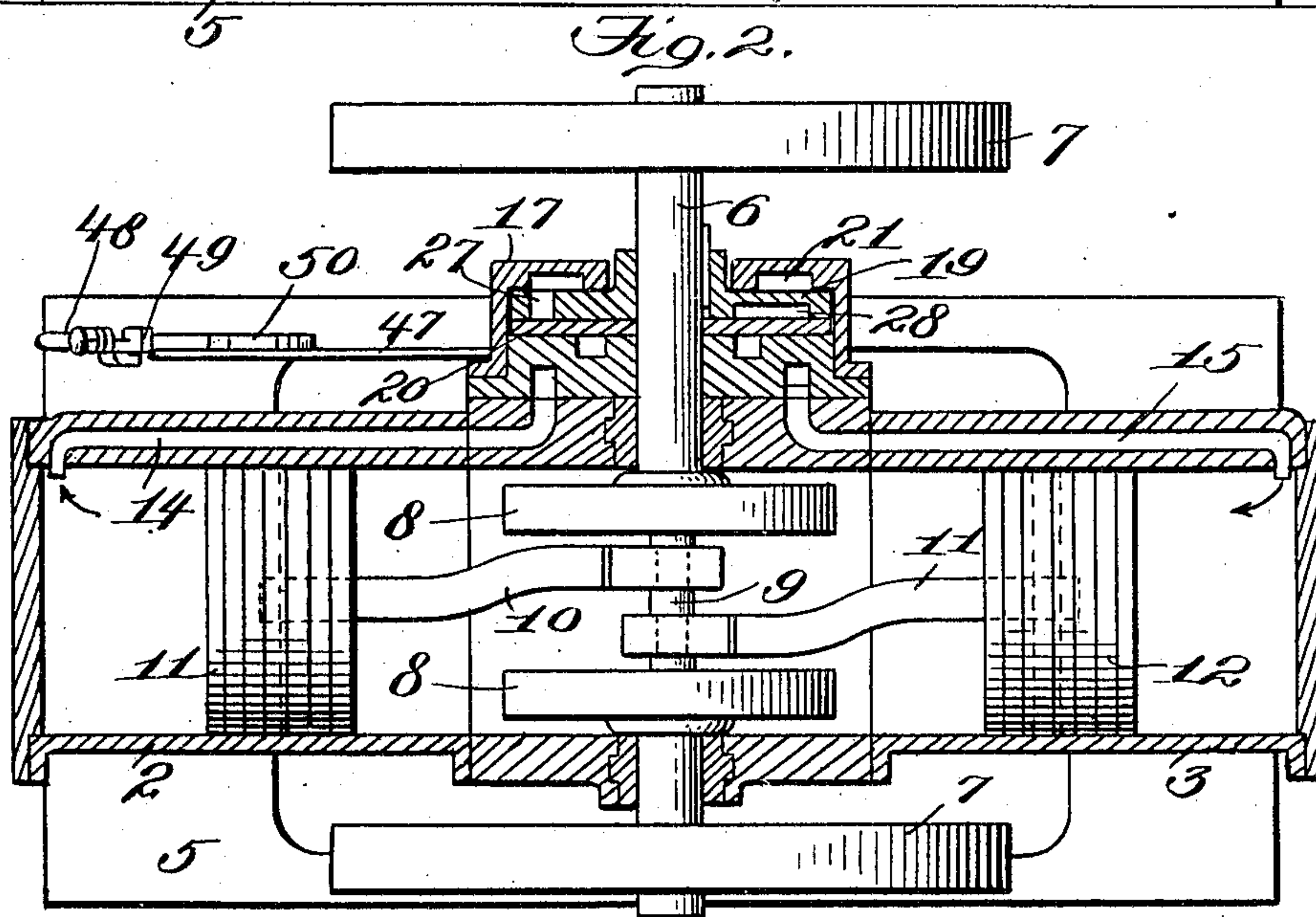
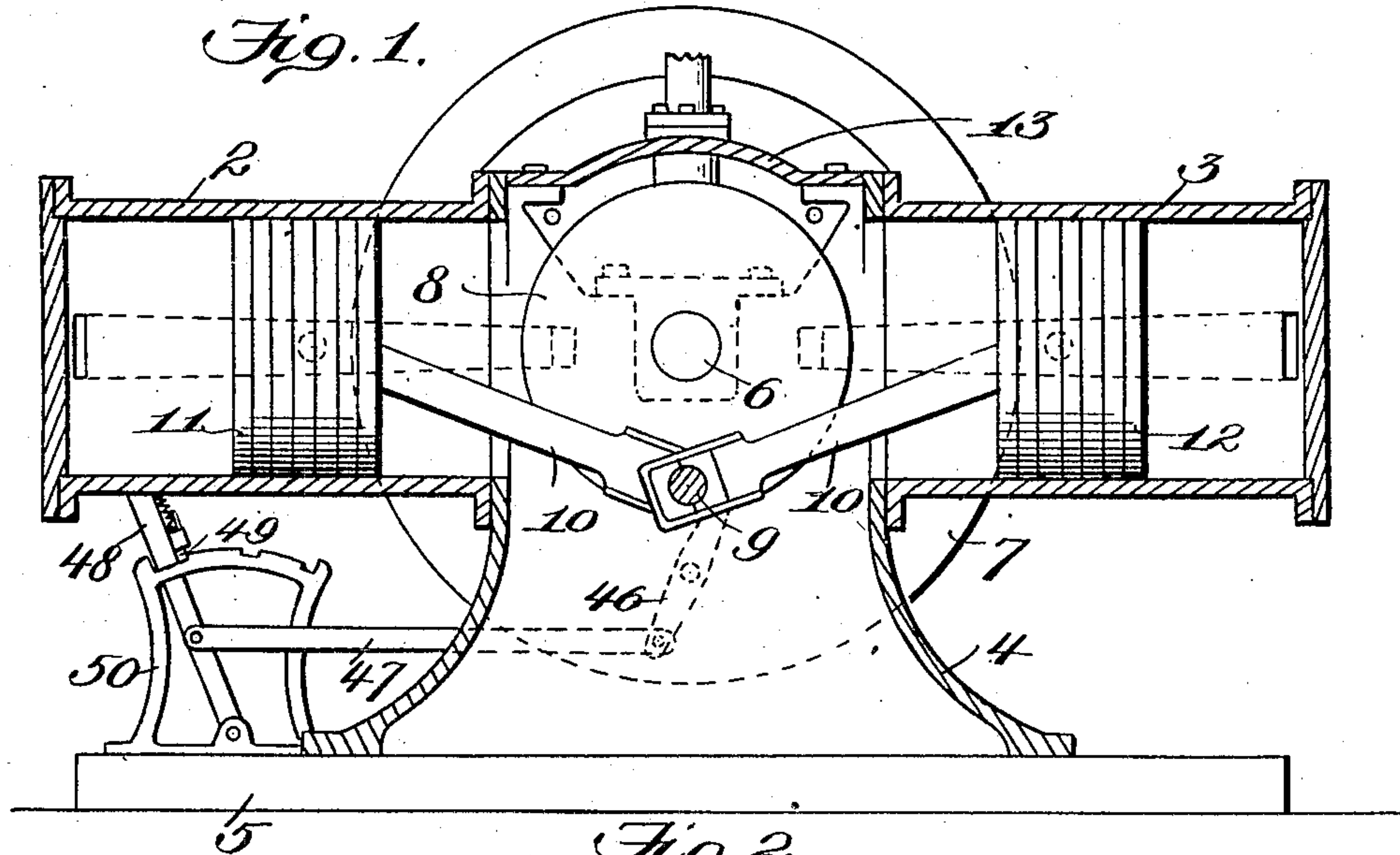
No. 871,660.

PATENTED NOV. 19, 1907.

C. M. ANDREWS.
ROTARY VALVE.

APPLICATION FILED MAY 17, 1907.

2 SHEETS—SHEET 1.



Witnesses;

C. D. Hesler

[Handwritten signature]

Inventor

Charles M. Andrews

By

James L. Norris

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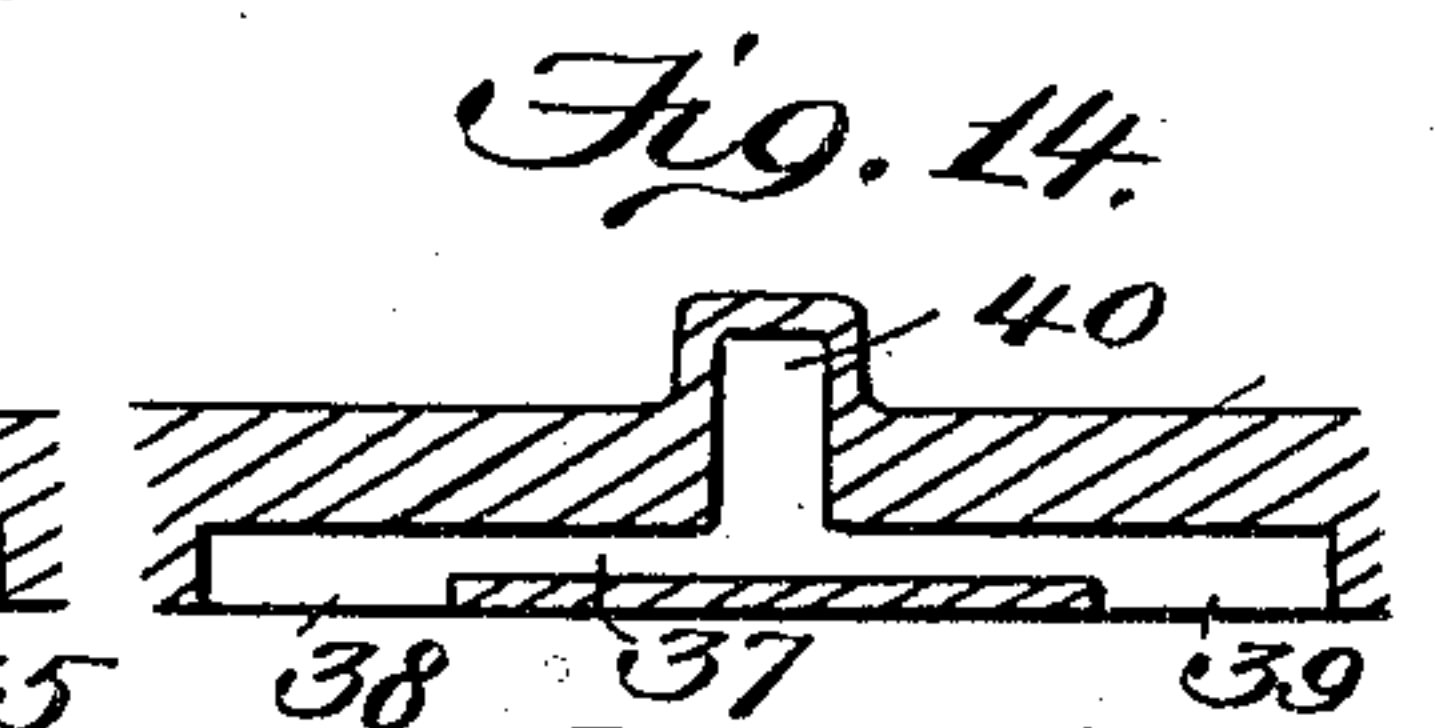
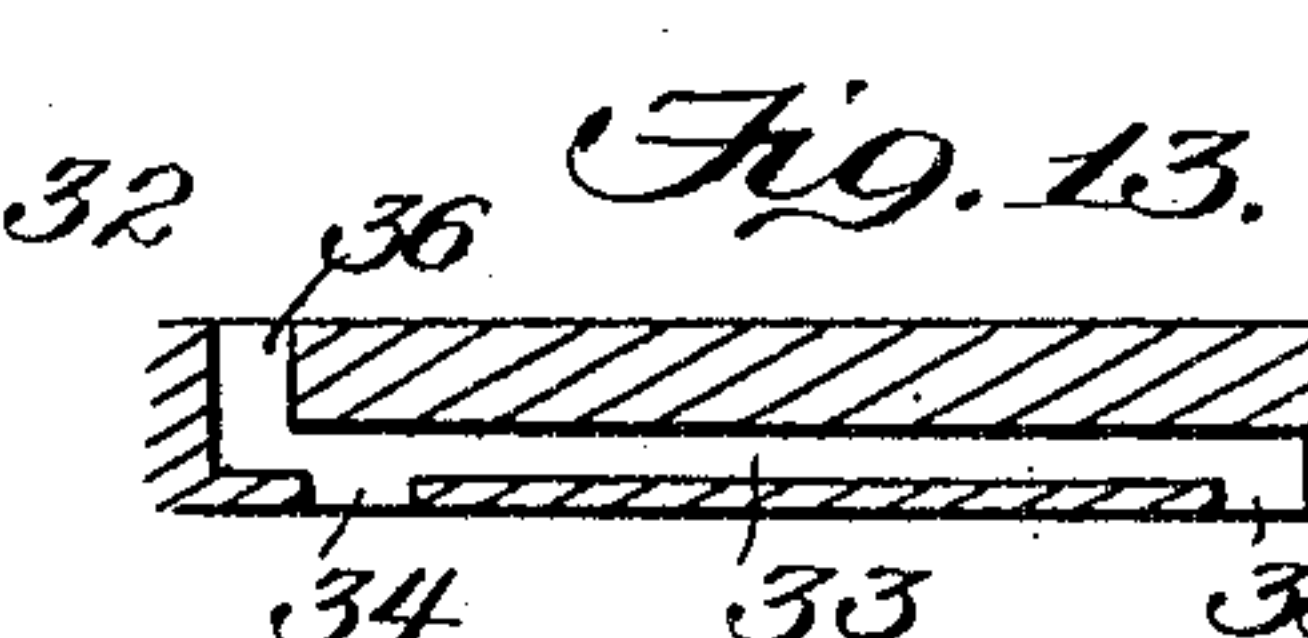
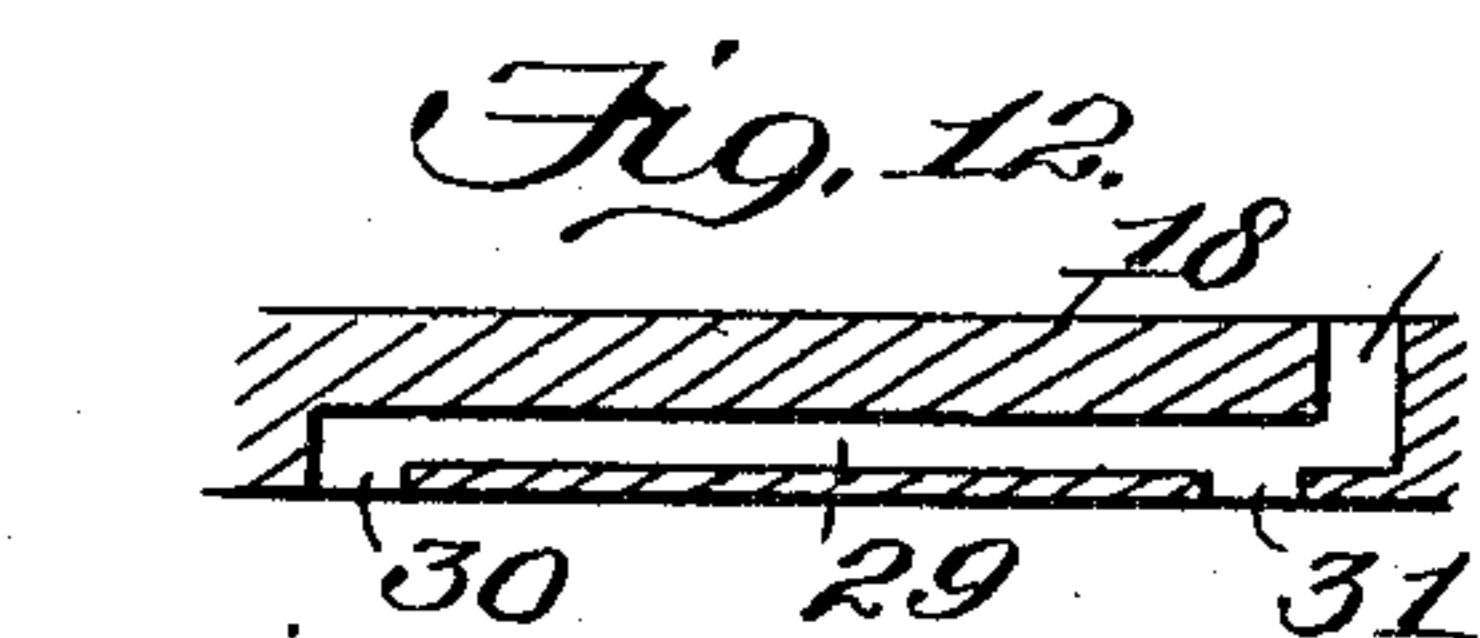
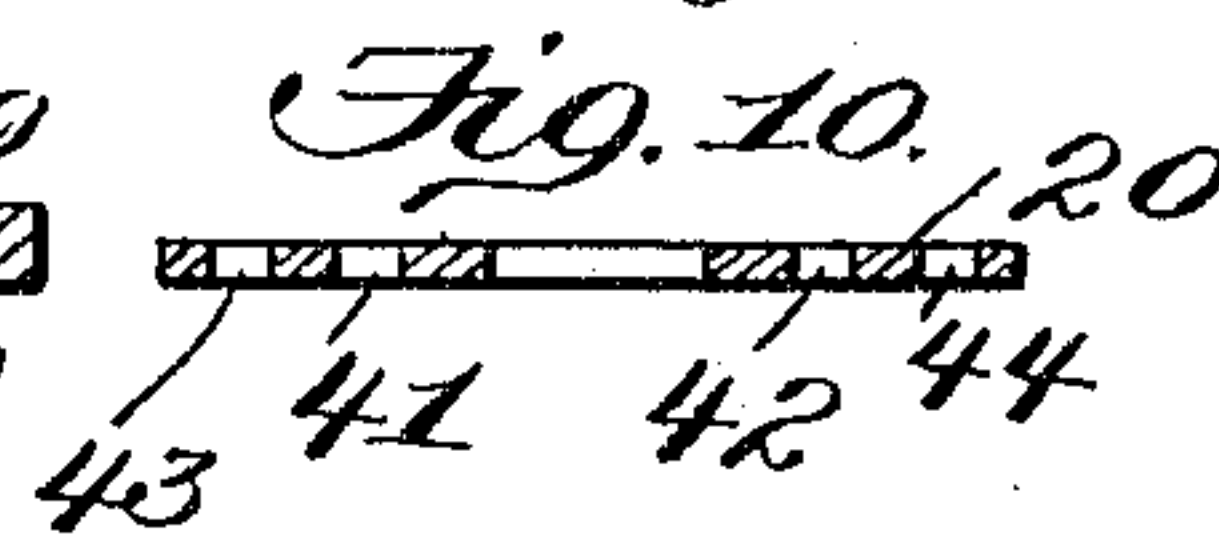
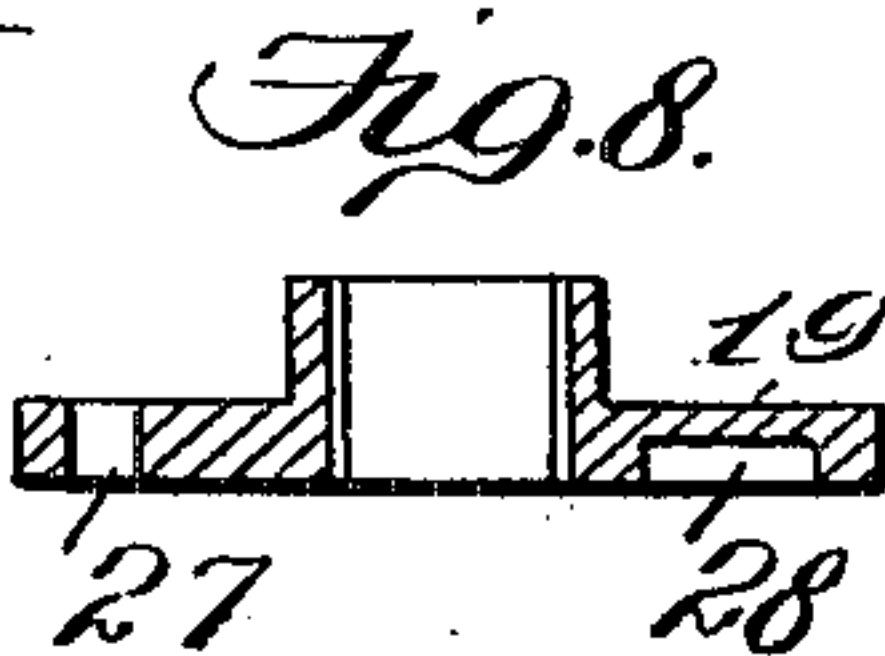
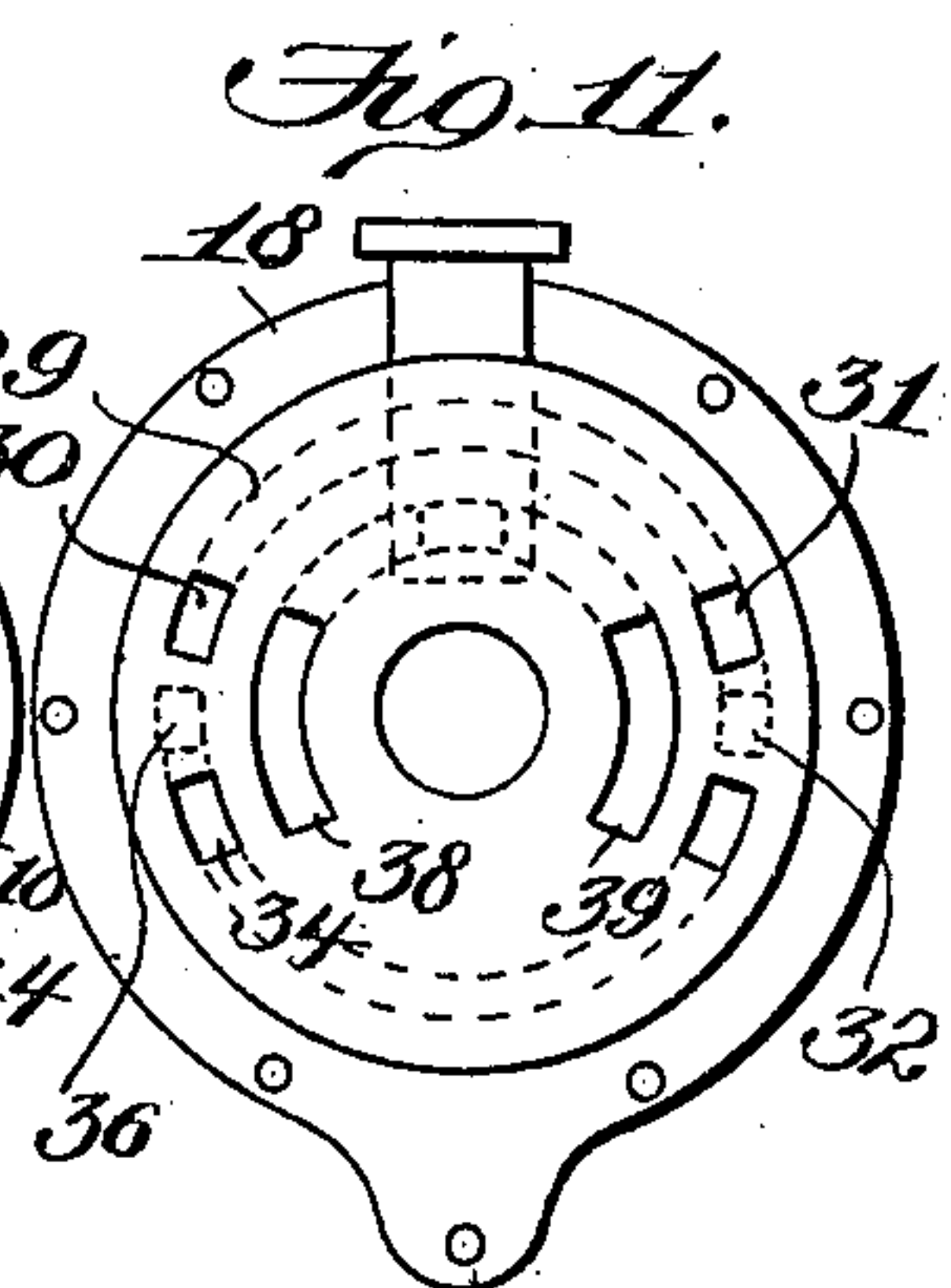
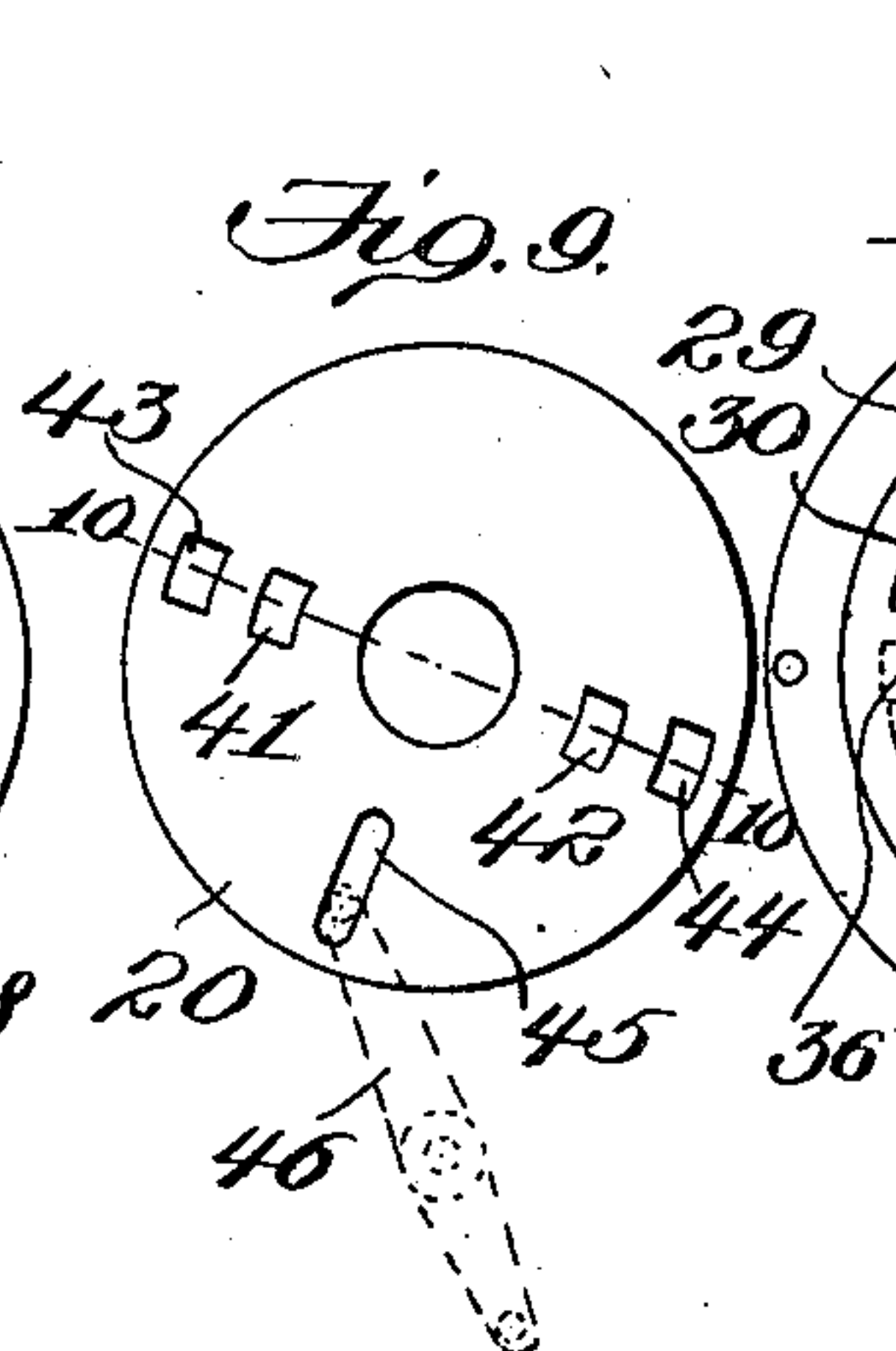
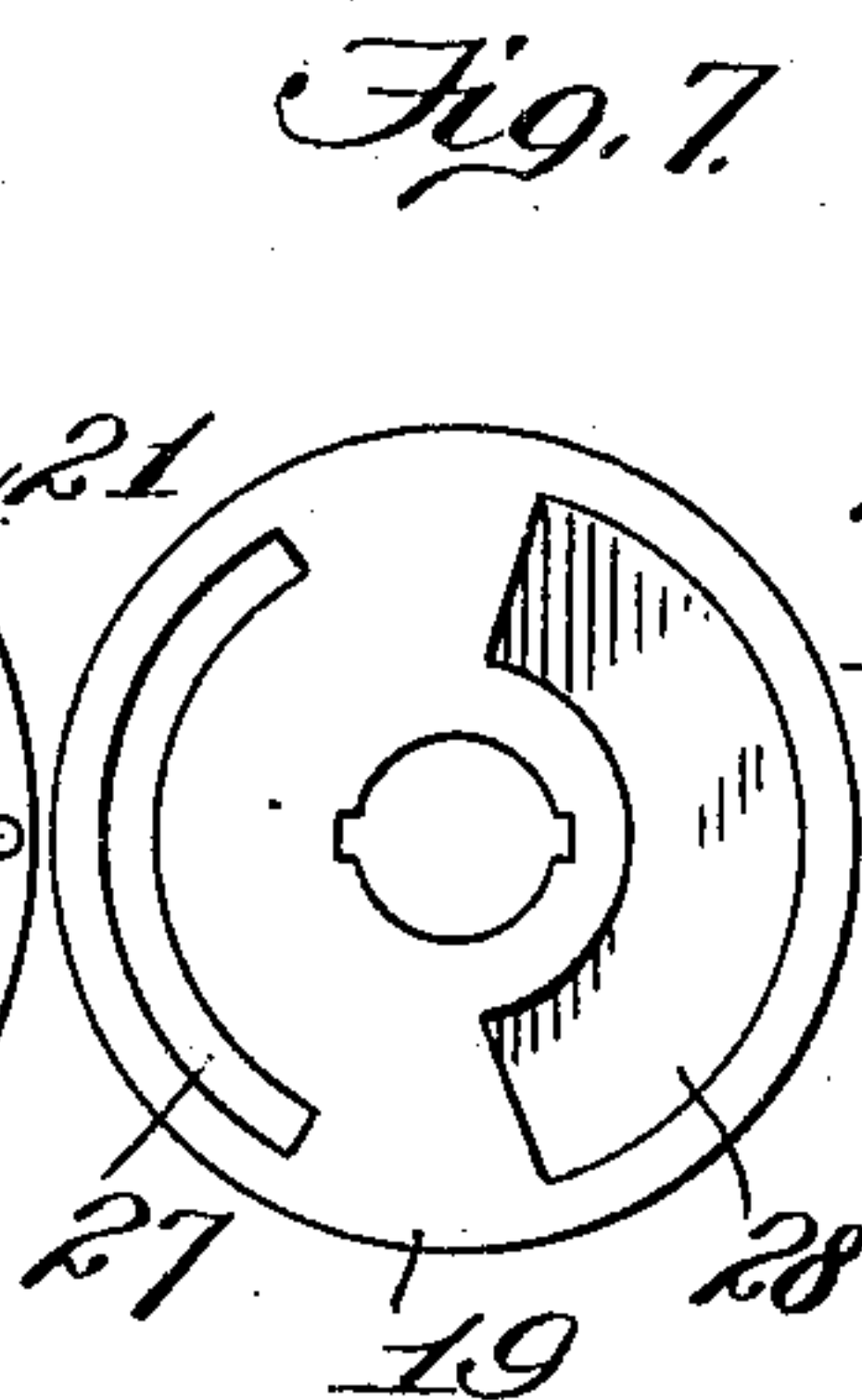
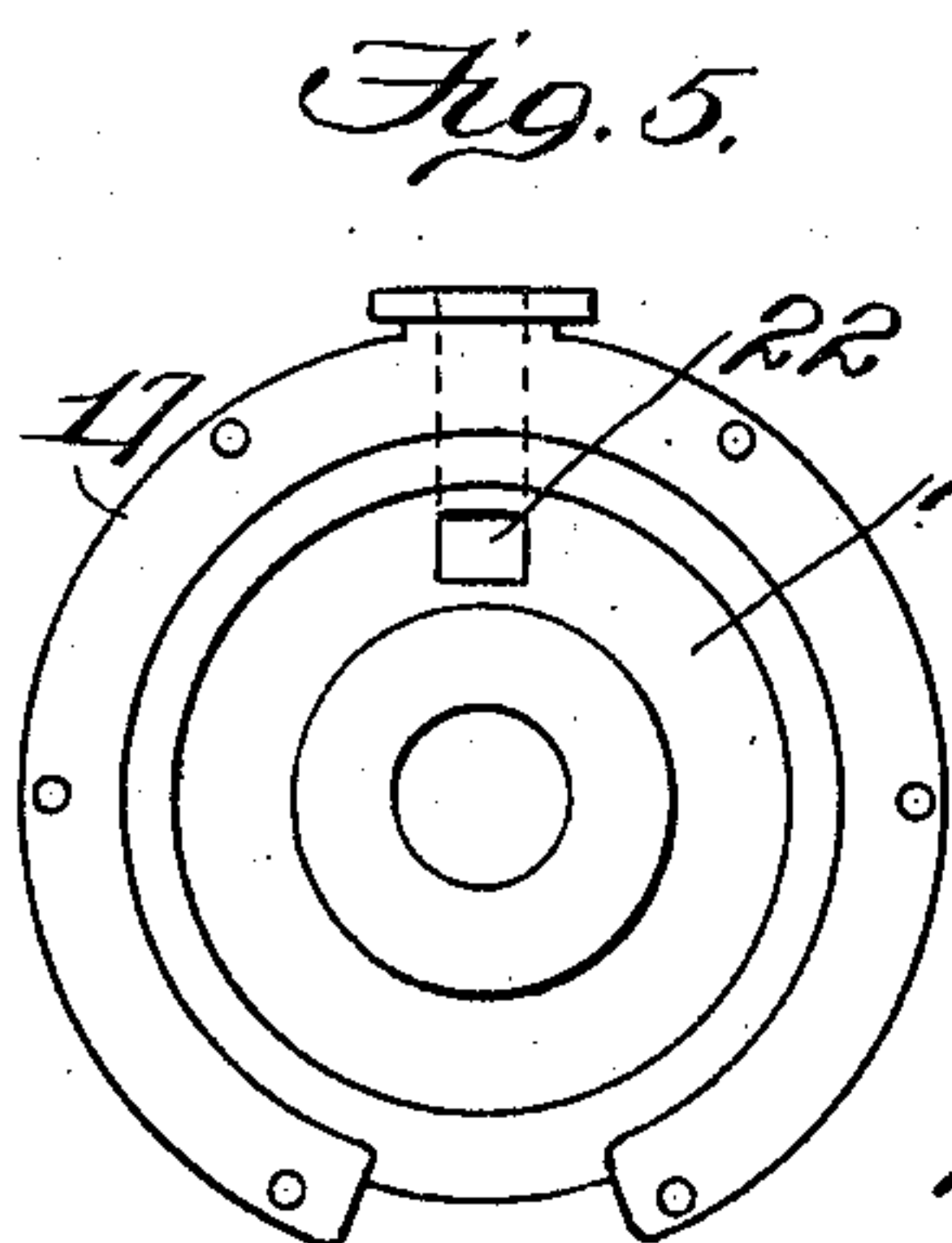
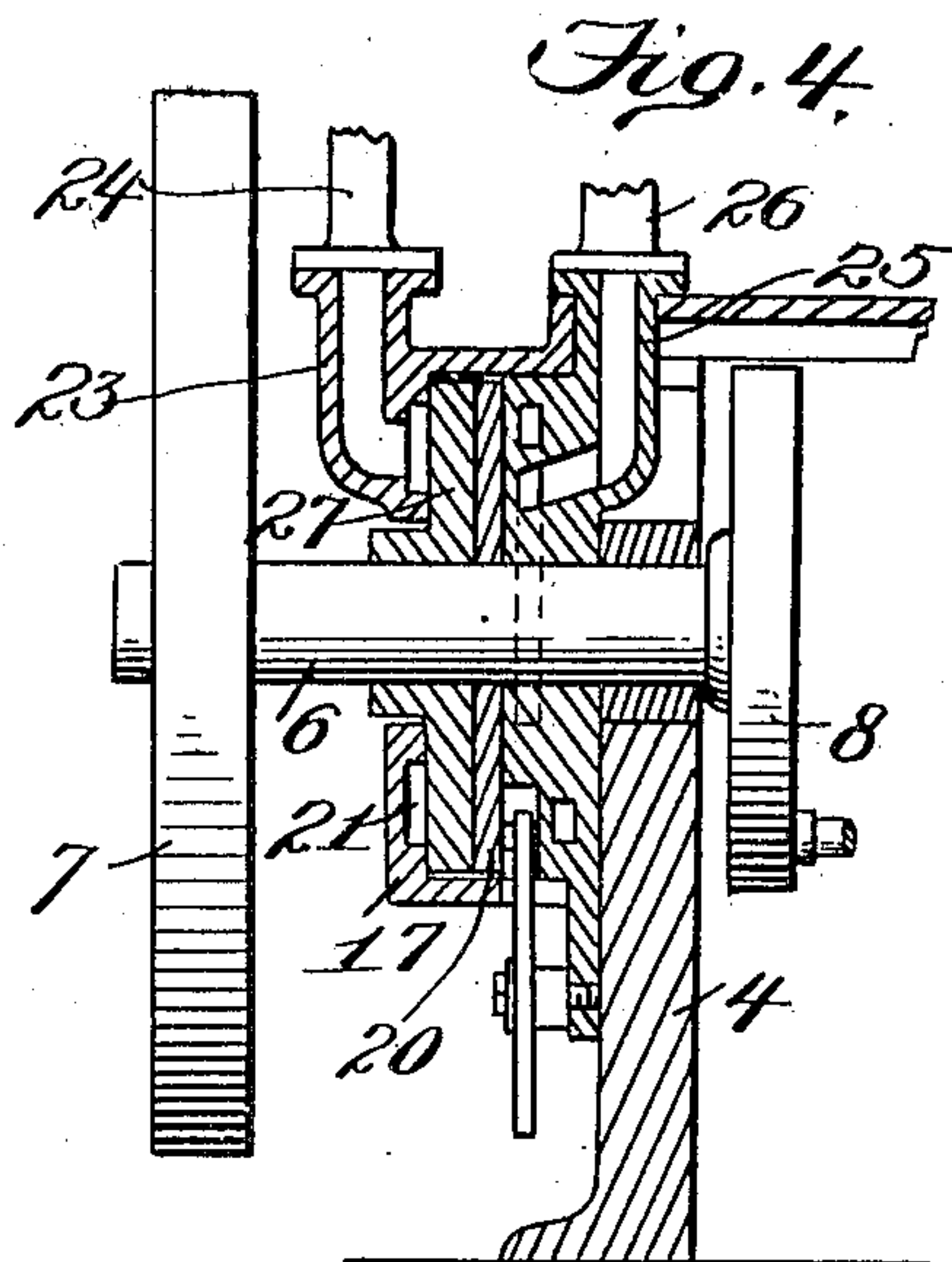
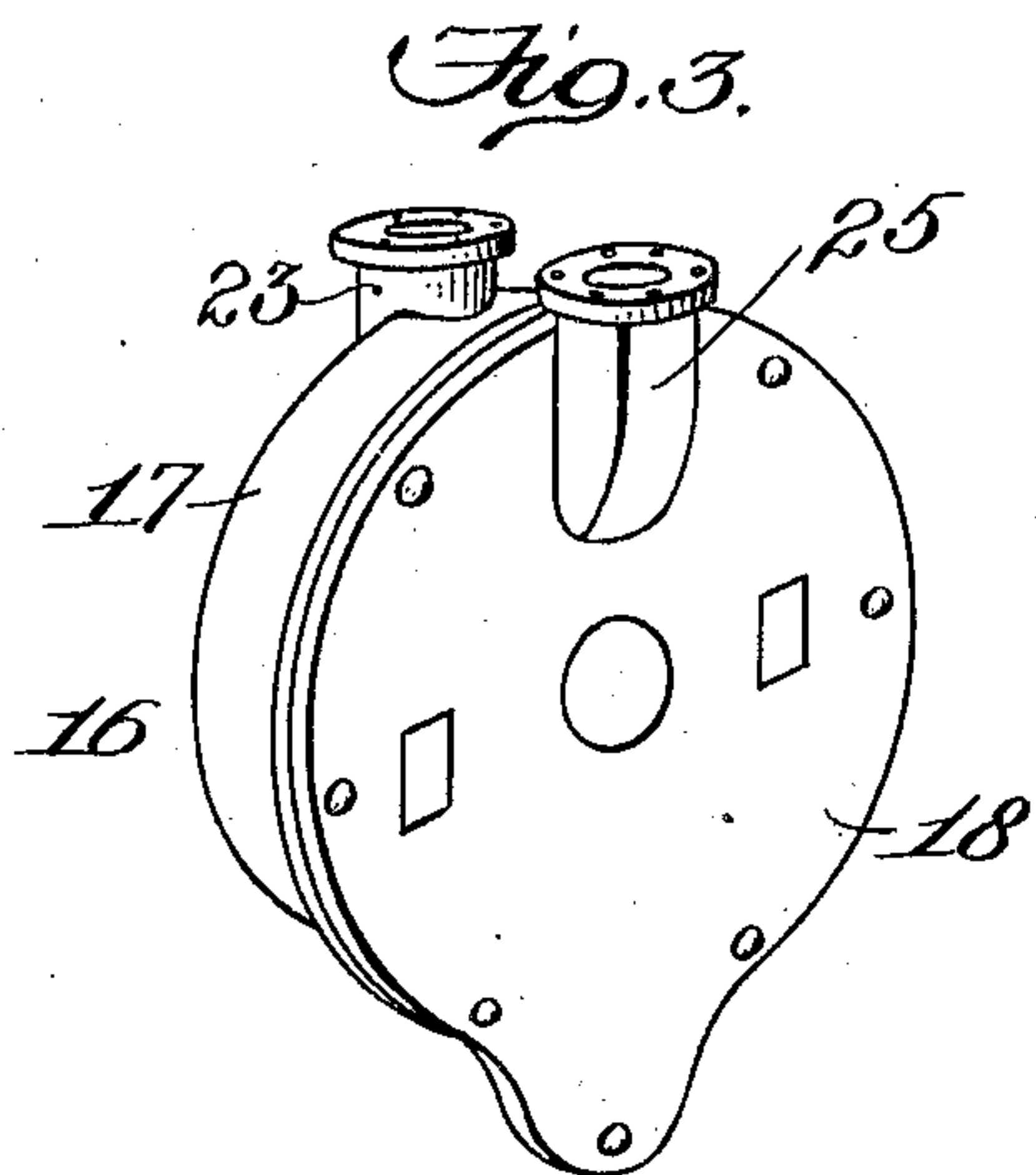
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2 SHEETS—SHEET 2.



Witnesses:
Ed. Kessler
W.B. Kessler

Inventor
Charles M. Andrews
James L. Norris
Atty

UNITED STATES PATENT OFFICE.

CHARLES M. ANDREWS, OF CARYVILLE, TENNESSEE, ASSIGNOR OF ONE-HALF TO
CHARLES M. MOORE, OF CARYVILLE, TENNESSEE.

ROTARY VALVE.

No. 871,660.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed May 17, 1907. Serial No. 374,161.

To all whom it may concern:

Be it known that I, CHARLES M. ANDREWS, a citizen of the United States, residing at Caryville, in the county of Campbell and State of Tennessee, have invented new and useful Improvements in Rotary Valves, of which the following is a specification.

This invention relates to rotary valves. I may use my rotary valve with advantage in various connections, although it is of prime utility when employed in connection with a steam engine, as will hereinafter more particularly appear.

In the drawings accompanying and forming a part of this specification I show in detail one form of embodiment of the invention which, to enable those skilled in the art to practice the same, will be set forth at length in the following description, while the novelty of the invention will be included in the claims succeeding said description.

In said drawings I have shown valve mechanism embodying my invention as associated with or forming part of a double-acting engine, simply for the purpose of representing the mode of operation and advantages of the device.

The valve mechanism involving my invention is simple in construction, effective and rapid in action, and it has provision for reversing the stroke of the engine.

Referring to said drawings: Figure 1 is a sectional side elevation of a double-acting engine equipped with valve mechanism embodying my invention. Fig. 2 is a horizontal sectional plan of the same. Fig. 3 is a perspective view of the valve box. Fig. 4 is a transverse sectional elevation of one side of the engine equipped with said valve mechanism, the latter being in section. Fig. 5 is an inside face view of one of the sections of the boxing. Fig. 6 is a horizontal sectional view of the same. Fig. 7 is an inside face view of the rotary valve. Fig. 8 is a horizontal sectional view of the same. Fig. 9 is a face view of the reversing valve and also showing a means for oscillating the same. Fig. 10 is a sectional view on the line 10—10, Fig. 9. Fig. 11 is an inside view of a part of the boxing. Figs. 12, 13 and 14 are diagrammatic sections of certain ports and passages shown in the preceding figures and hereinafter more particularly described.

Like characters refer to like parts throughout the several figures.

In Figs. 1, 2, and 4 of the drawings I have shown a double-acting steam engine in connection with which my valve mechanism can be advantageously employed. From what has been stated it will be apparent, however, that the valve mechanism can be employed with other types of steam engines; in fact, it could be used with engines or motors using air, water, gas, or other fluid as the operating medium therefor. I will briefly describe said engine. The latter involves in its make-up two longitudinally aligned cylinders as 2 and 3 set opposite to each other and having their inner open ends in proximity. These cylinders 2 and 3 may be bolted or otherwise secured to the bearing 4 which may consist of a hollow casting and which is mounted on and suitably fastened to the bed or foundation plate 5. This bearing 4 supports for rotation the shaft 6 carrying fly-wheels as 7. Said shaft 6 is provided with two disks as 8 connected by the crank pin 9 jointed to the rods 10 which in turn are connected with the pistons 11 and 12 operative in the cylinders 2 and 3 respectively.

I may arrange above the cylinders 2 and 3 and connect thereto or otherwise suitably mount the hood or cap-plate 13 which prevents scattering of oil or other lubricant by the crank pin 9. The cylinders 2 and 3 have respectively longitudinal passages as 14 and 15 for the supply of steam against the outer faces of the pistons 11 and 12 respectively therein, and I have shown by arrows in Fig. 15 live steam as entering the cylinder 3 by way of the passage 15 and exhaust steam leaving the cylinder 2 by way of the passage 14, the two pistons during this time traveling toward the left in Fig. 2. When live steam is supplied into the cylinder 2 by way of the longitudinal passage 14, the longitudinal passage 15 serves as an exhaust passage and, in such a case, the two pistons 11 and 12 would travel toward the right in said Fig. 2.

The valve mechanism includes in its construction a boxing or casing such as that denoted in a general way by 16 and shown best in Fig. 3. Said boxing or casing consists in the present instance of an outer member as 17 and an inner member as 18, the two parts being bolted, riveted, screwed, or otherwise connected together at their margins, and each is preferably, although not necessarily, made of disk or circular form. The boxing or casing 16 is connected to the frame-work

of the engine in any desirable way, for instance, it can be fastened to one side of the bearing 5, as shown in Fig. 4. The boxing is centrally or substantially centrally perforated for the passage of the crank or engine shaft 6 which, as will be evident, rotates with respect to said boxing or casing. Within the boxing or casing is mounted a valve as 19 and a second valve as 20. The valve 19 is the controlling valve of the engine and is normally operative, while the valve 20 is a reversing valve and is normally stationary, although it has provision for oscillation between two positions on said shaft 6. Said valve 20 may be operated in any desirable way, but I have shown and will hereinafter describe a simple means for this purpose.

The outer section 17 of the valve boxing or casing has on the inner side thereof the annular passage 21 into which a port as 22 for the conduct of live steam opens, said port 22 being situated in the present instance at the inner end or constituting the termination of the pipe section 23, with which pipe section 23 a live steam pipe as 24 may be connected. The inner section 18 is represented as having a pipe as 25 through which the exhaust steam is adapted to pass, as will hereinafter more particularly appear, and which may be connected with an exhaust steam pipe as 26, as shown clearly in Fig. 4.

The regulating or controlling valve or disk 19 is rotative with the engine or crank shaft 6, for which purpose said valve 19 may be keyed or otherwise suitably fastened to said shaft. Said valve has an elongated port as 27 of quadrant form extending entirely therethrough and which at all times is in register with the annular passage, cavity, or steam space 21. In addition to this, said valve 19 has on one face thereof or that opposite the space 21 the quadrant-like cavity 28, the length of which is substantially the same as that of the port 27. The width of the cavity 28, however, is greater than that of the port 27, whereby said cavity 28 can transversely bridge certain ports hereinafter described.

The inner section 18 of the boxing is provided with an annular chamber or passage as 29 in the upper side thereof (see Fig. 11 for example.) In Fig. 12, which is a longitudinal section through this passage 29, the latter is represented for clearness of illustration, as straight. The member 18 has on the inner side thereof the two ports 30 and 31 opening into the opposite ends of said passage or chamber 29, while from one end of the latter there is extended a port as 32 which is in communication with the passage 14. In addition to the circular passage 29 the member 18 has a second and lower passage 33, a duplicate of the passage 29, and into which the ports 34 and 35 extend, while from one end of said passage 33 there leads

the port 36 having communication with the passage 15. The two circular passages 29 and 33 are concentric.

In addition to the passages 29 and 33 the part 18 has a third circular passage as 37 into the opposite ends of which the ports 38 and 39 lead, said ports being situated on the inner side of the part 18. Between the ends of the passage 37 there is a port 40 having direct communication with the exhaust pipe section 25. The several ports 30, 31, 34, and 35 are of segmental form and are located equal distances from the center of the part 18, the ports 30 and 34 being in proximity to each other, while the ports 31 and 35 are also in proximity to each other. In other words, the several series of ports are arranged in pairs. The ports 38 and 39 are nearer the center of said part 18, are also segmental, but are longer than the ports 30, 31, 34, and 35, respectively. It is the function of the reversing valve 20 to cover either the port 30 and port 35 or the port 31 and port 34, said reversing valve having a stroke sufficient to obtain this function. In both adjustments of the reversing valve the ports 38 and 39 are uncovered. Should the two ports 30 and 35 be covered, it will be evident, as will hereinafter appear, that the engine can be reversed by uncovering said ports 30 and 35 and covering the ports 31 and 34, and said reversing valve 20 has two inner ports as 41 and 42 and two outer ports as 43 and 44, to secure the function in question. The ports 41 and 42 register at all times with the ports 38 and 39, while the ports 43 and 44 are adapted to alternately register with the ports 30 and 35 and 31 and 34, respectively.

The reversing valve 20 is shown as having a radial slot as 45 to receive a pin at the upper end of the rocker 46 fulcrumed between its ends on a suitable pin or stud and connected at its lower end with the rod 47 which in turn is jointed to a hand lever as 48 provided with a detent as 49 to fit in any one of the three notches in a sector as 50 fastened suitably to the bed or foundation plate 5. When the detent 49 fits in the two outermost notches of the sector 50 the engine may be operated. When, however, the said detent is in the intermediate notch the solid portion of the valve 20 will cover all the ports 30, 31, 34 and 35, to stop said engine.

It will be assumed that the reversing valve 20 covers the ports 31 and 34 and that the ports 43, 41, 42, and 44 in said valve are in register with the ports 30, 38, 39, and 35. In such a condition as this the operation will be as follows: The shaft 6 will rotate and the valve 19 will move therewith. When said valve turns sufficiently to cause the port 27 therein to register with the port 35 live steam will pass through the ports 44, 27, and 35 into the chamber 33 and through the port 36

into the passage 15, to impart a working stroke to the engine 12, said piston, on said working stroke, moving toward the left in Fig. 2. As the piston 12 is given its working stroke the piston 11 is retracted, forcing exhaust steam from the cylinder 2 into the passage 14 and from the latter into the passage 29, by way of the port 32, such steam passing from the passage 29 through the port 30. When the port 27 is in register with the port 35 the cavity 28 is bridging the ports 30 and 38 so that exhaust steam will pass from the port 30 into the cavity 28 and from thence through the port 38 into the chamber 37, the exhaust passing into the pipe section 25 by way of the port 40. On the continued movement of the valve 19 the port 27 will be caused to register with the port 30, while the cavity 28 will bridge the ports 35 and 39, whereby the opposite stroke of the two pistons can be obtained, that is, they will move from the left toward the right in said Fig. 2. To reverse the engine at any time it is only necessary to carry the ports 43 and 44 into register with the ports 34 and 31, respectively.

What I claim is:

1. In combination with a double-acting engine having passages leading to the cylinders of the engine, of a boxing having an inner and outer section secured to each other, said outer section having an annular chamber, a supply pipe in communication with said chamber, said inner section having an upper and lower semi-circular passage terminating at opposite ends in openings, said section further provided with a semi-circular passage-way terminating in openings inter-

mediate the said semi-circular passages, a rotatable disk mounted between the sections and having a quadrant form opening, said disk further provided with a quadrant form cavity directly opposite the said quadrant form opening, a rotary valve member mounted between said disk and the inner section and having circumferentially arranged pairs of openings adapted to register with the quadrant form opening and cavity in the disk and with the openings in the inner section, and a pipe forming communication with the inner quadrant form passage-way in the inner section.

2. In valve mechanism, the combination of a boxing having two oppositely extending passages, ports leading into the respective passages, a passage intermediate the two oppositely extending passages, a supply means in communication with the innermost passage, a rotatable valve member having a quadrant form port and cavity therein adapted to register with either of the ports formed by the passages, said boxing further provided with an annular passage-way forming communication with the quadrant form opening in the valve member, and exhaust means in communication with said annular passage-way.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES M. ANDREWS.

Witnesses:

LON PEBLEY,
GEO. INGLES.