

No. 652,551.

Patented June 26, 1900.

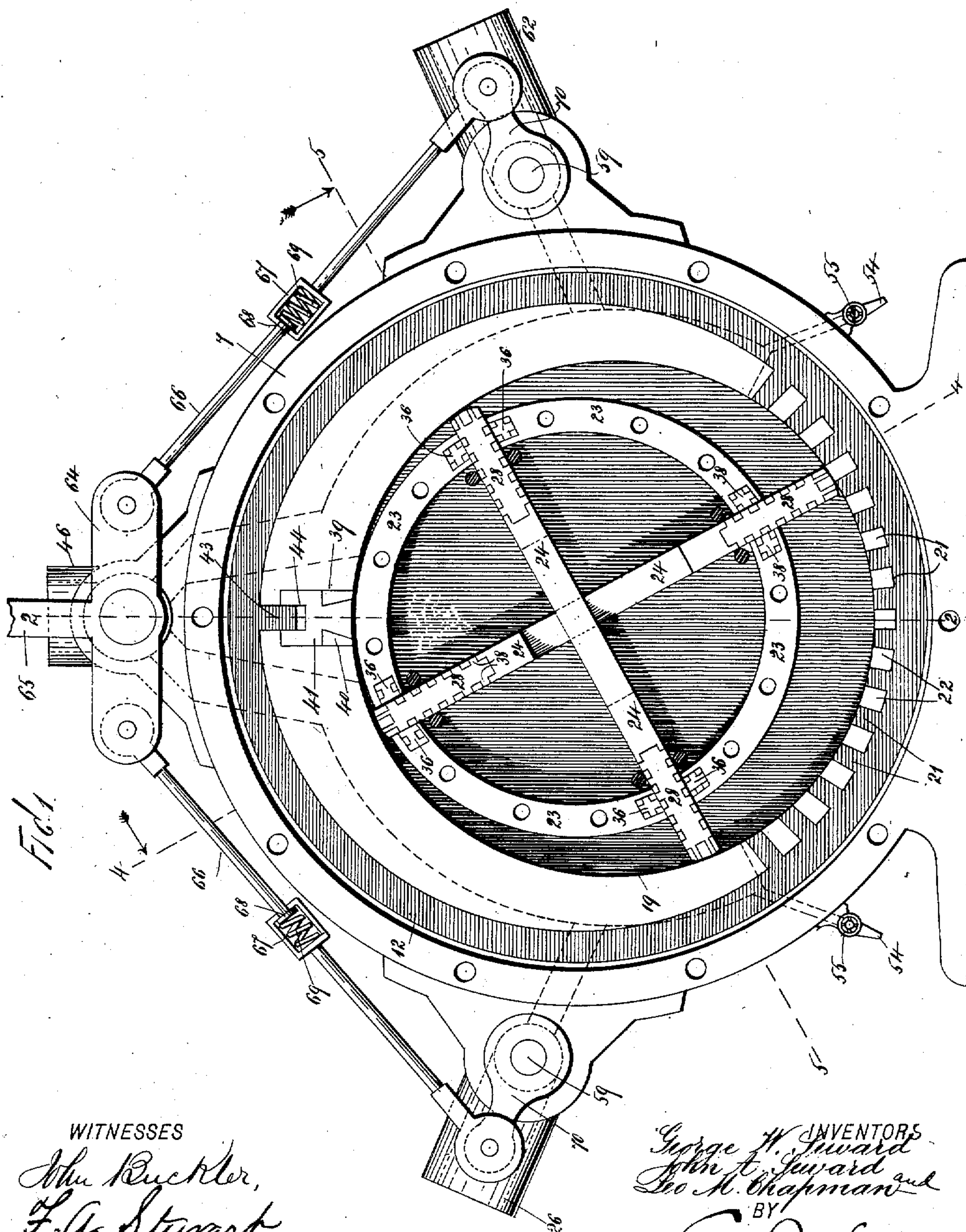
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ROTARY ENGINE.

(Application filed Sept. 6, 1899.)

(No Model.)

5 Sheets—Sheet 1.



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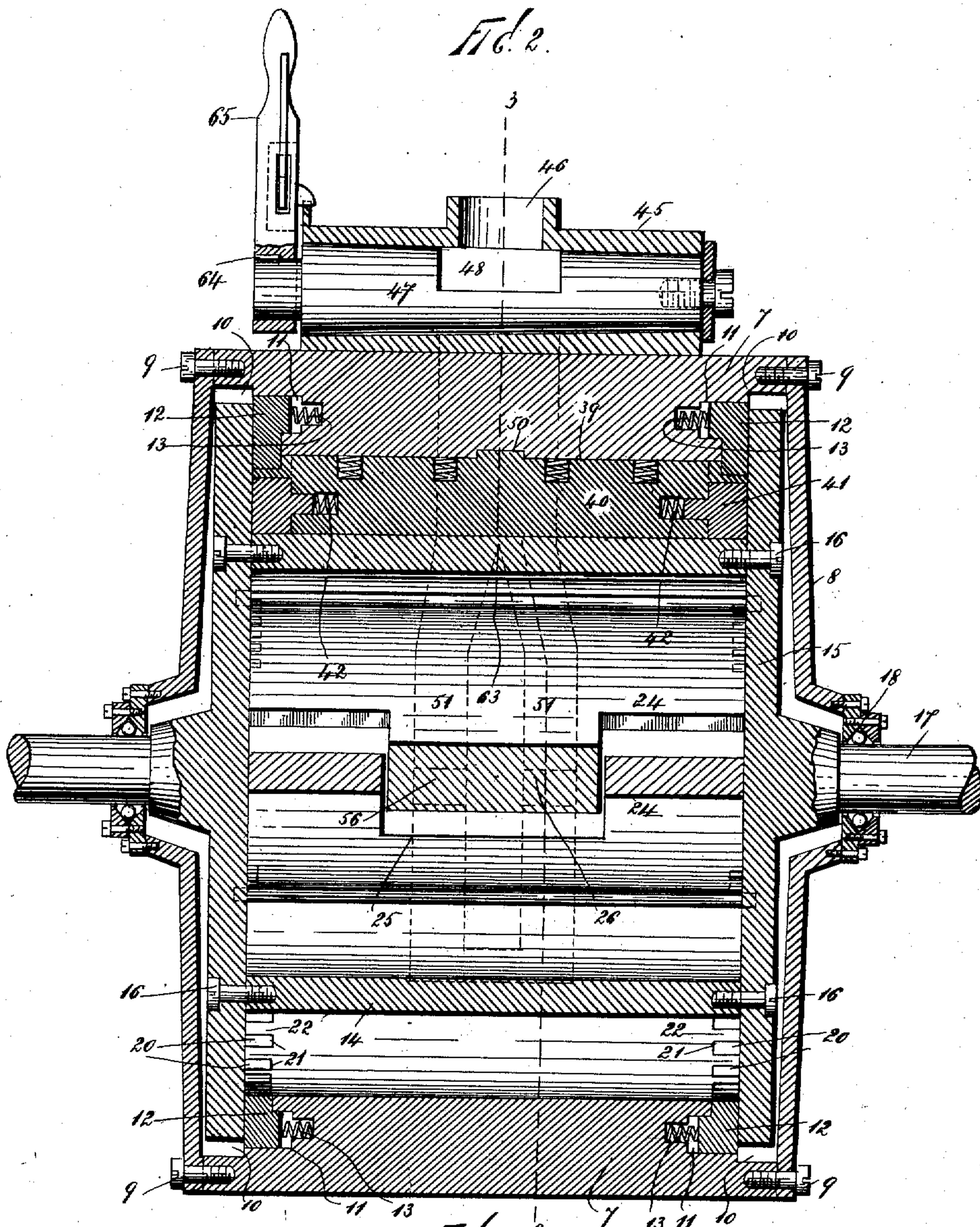
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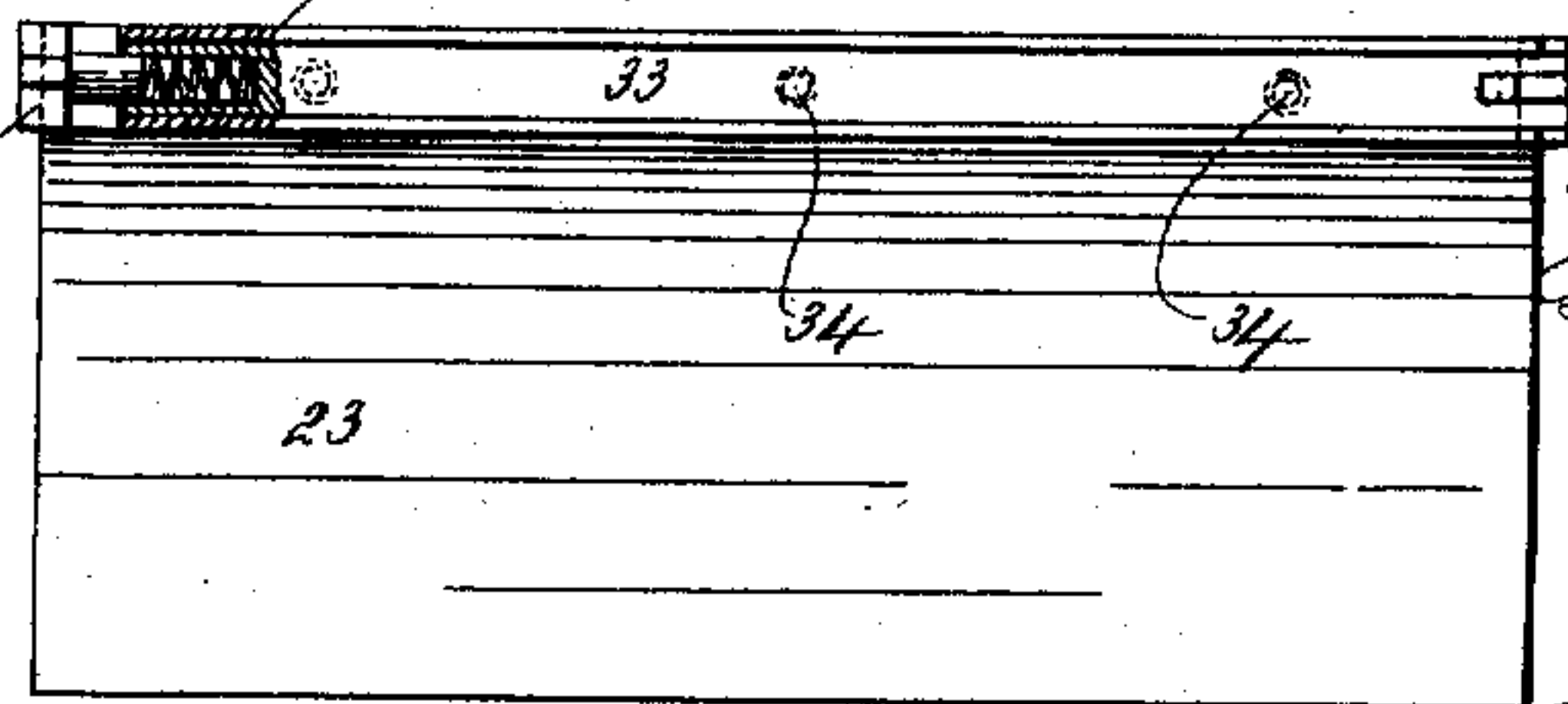
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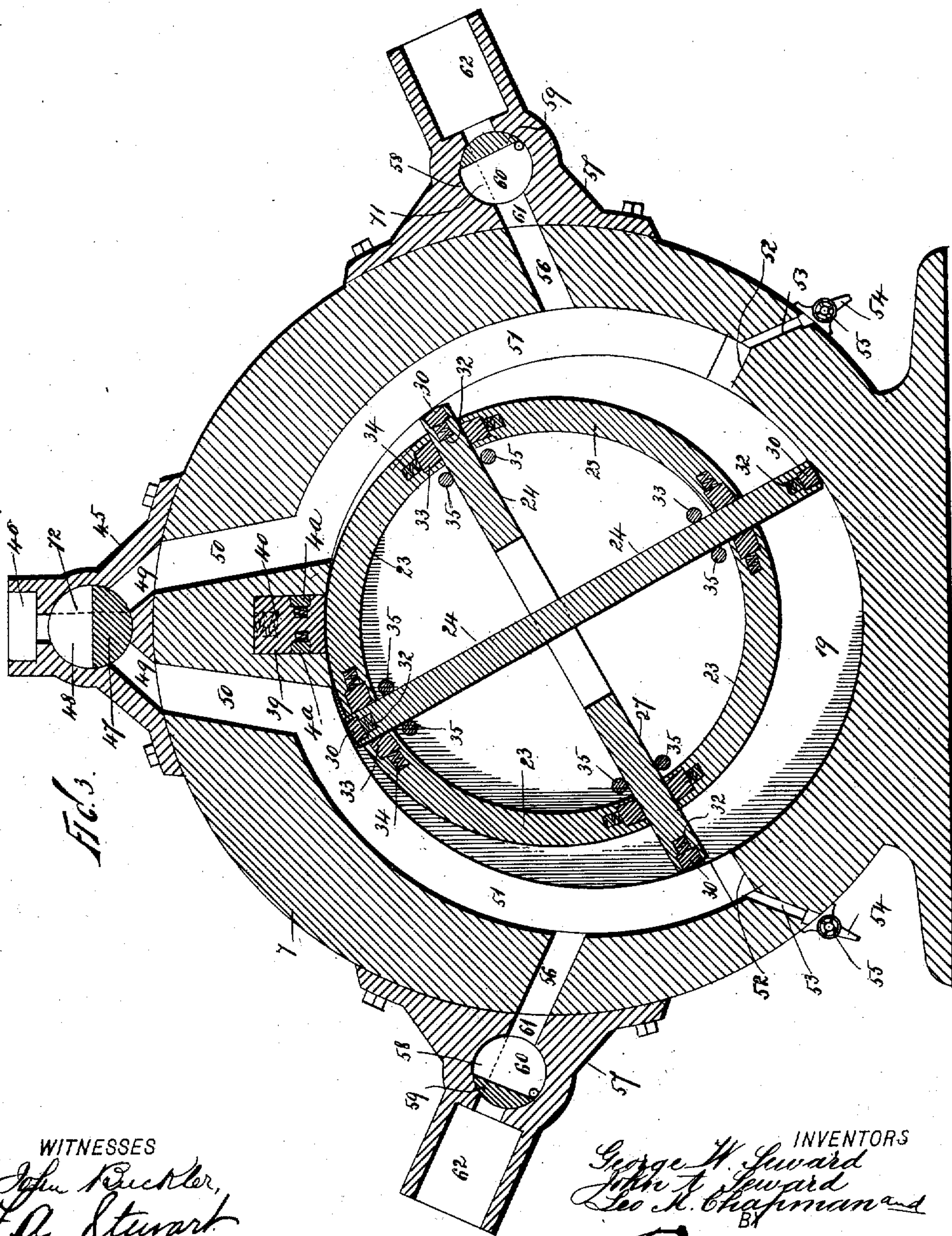
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ROTARY ENGINE.

(Application filed Sept. 8, 1899.)

(No Model.)

5 Sheets—Sheet 3.



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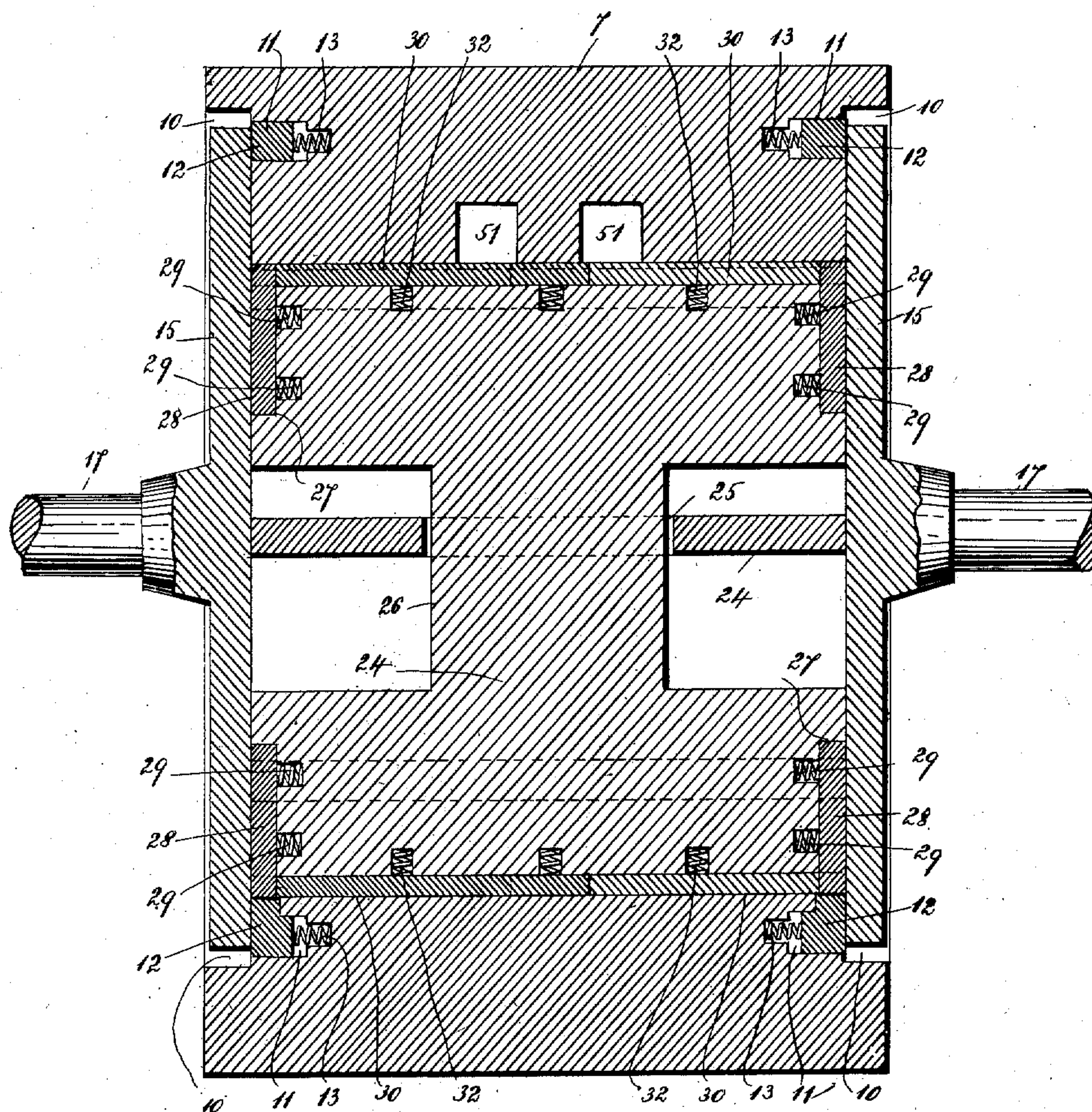
ROTARY ENGINE.

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Fig. 4.



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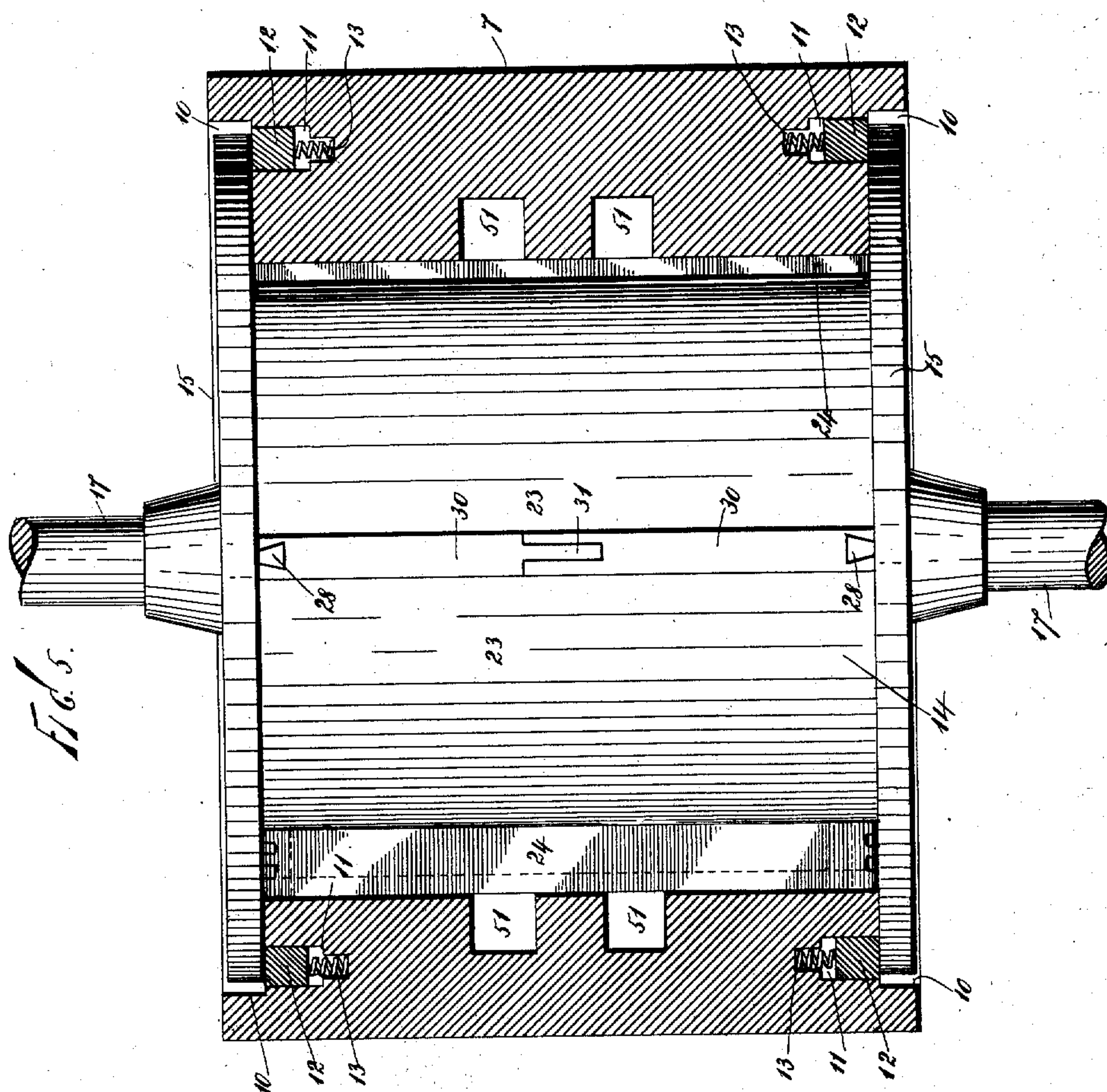
Patented June 26, 1900.

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5 Sheets—Sheet 5.

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GEORGE WASHINGTON SEWARD AND JOHN ALVIN SEWARD, OF BENTONSPORT, IOWA, AND LEO MILLER CHAPMAN, OF LOUISVILLE, KENTUCKY, ASSIGNORS OF ONE-FOURTH TO JAMES M. GELATT, OF LOUISVILLE, KENTUCKY.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 652,551, dated June 26, 1900.

Application filed September 6, 1899. Serial No. 729,596. (No model.)

To all whom it may concern:

Be it known that we, GEORGE WASHINGTON SEWARD and JOHN ALVIN SEWARD, residing at Bentonsport, in the county of Van Buren and State of Iowa, and LEO MILLER CHAPMAN, residing at Louisville, in the county of Jefferson and State of Kentucky, all citizens of the United States, have invented certain new and useful Improvements in Rotary Engines, of which the following is a full and complete specification, such as will enable those skilled in the art to which it appertains to make and use the same.

This invention relates to rotary engines; and the object thereof is to provide an improved device of this class which will economize steam, be practically noiseless in action, reduce friction to a minimum, economize room-space, will fully utilize the expansive power of the steam without compounding the same, and which will be free from back action or back pressure, except the pressure produced by the atmosphere; and with this and other objects in view the invention consists in a rotary engine constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawings form a part, in which the separate parts of our improvement are designated by the same numerals of reference in each of the views, and in which—

Figure 1 is a side view of our improved rotary engine with one side of the casing removed, together with one head of the drum, which forms the central revoluble portion of the engine; Fig. 2, a vertical section on the line 2 2 of Fig. 1; Fig. 3, a section on the line 3 3 of Fig. 2; Fig. 4, a section on the line 4 4 of Fig. 1 with the ends of the main outer casing removed; Fig. 5, a section on the line 5 5 of Fig. 1 with the ends of the main outer casing removed, and Fig. 6 a side view of a section of the body portion of the central drum.

In the practice of our invention we provide a main casing comprising a cylindrical portion 7 and detachable ends 8, which are secured thereto by bolts or screws 9, and the casing 7 is provided at its opposite ends with

deep annular rabbet-grooves 10 and supplemental annular rabbet-grooves 11, which communicate with the grooves 10 and also open inwardly and in which are placed packing-rings 12, which are automatically forced outwardly by springs 13.

Mounted in the casing 7 is a hollow drum consisting of a central cylindrical portion 14, having detachable heads 15 bolted or otherwise secured thereto, as shown at 16, and the heads 15 are provided centrally with shafts 17, which pass through suitable central bearings 18, connected with the ends 8 of the main casing, and said bearings are what are known as "ball-bearings" and may be of any desired construction, and the shafts 17 of the central drum are free to turn in said bearings, which constitute the supports for said shaft and of the central drum.

The main outer casing is adapted to be secured to or on any suitable base or support and is of course stationary, and the central space therein in which the body portion of the central drum is placed is also circular in form and is arranged eccentrically therein, said space being in the lower portion of said casing, as indicated at 19 in Fig. 1.

The body portion 14 of the central drum is supported in the upper portion of the space 19 within the main outer casing, and consequently eccentrically in said space, and the shafts 17 of the heads 15 of said drum pass centrally through the ends 8 of the main outer cylindrical casing 7.

The heads 15 of the central drum fit in grooves 10 in the ends of the main outer casing 7, and the packing-rings 12 make a close joint between the ends of said casing and the heads of said drum.

The packing-rings 12 are angular in cross-section, the outer portion thereof being provided with inwardly-directed extensions which fit in the rabbet-grooves 11, and the inner portions of said rings are provided on the lower side with inwardly-directed rectangular lugs or projections 20, which fit in corresponding recesses 21 in the ends of the main outer casing 7, and between said recesses 21 the ends of the said main outer casing, at the

bottom thereof, are provided with rectangular lugs or projections 22, which are the same in shape and length as the lugs or projections 20 on the packing-rings 12, and which project outwardly over the packing-rings 12, as clearly shown in Figs. 1 and 2, and this construction forms a perfectly-tight connection between the heads 15 of the central drum and the packing-ring 12 and the main outer casing 7, at the bottom portion thereof.

The central drum or the body portion thereof is hollow, as hereinbefore described, and consists simply of a casing composed of four separate equal sections 23, and mounted radially therein and at right angles to each other are piston-blades 24, two of which are employed. The piston-blades 24 are of the form shown in Fig. 4, and one of said blades is provided with a central opening 25 and the other with a reduced central portion 26, which passes through said opening, and said blades are free to move radially of the drum, and the outer ends of said blades are of the full length of the body portion of the drum and abut against the heads 15 thereof, and each is provided at each end with a radial groove 27, in which packing-blocks 28 are placed. The packing-blocks 28 are forced outwardly by springs 29, and in the outer edges of said piston-blades are placed corresponding longitudinal packing-blocks 30, which meet at the center and overlap or are provided one with a cavity or recess and the other with a tongue which fits therein, as shown at 31 in Fig. 5, and the outer ends of the packing-blocks 30 are connected with the packing-blocks 28 by a tongue-and-grooved joint, as shown in Fig. 5, whereby the packing-blocks 30 are adapted to move outwardly and radially of the drum and the packing-blocks 28 outwardly against the heads 15 thereof, and said packing-blocks 30 are forced outwardly by springs 32.

These separate sections 23 of the central drum, as shown in Figs. 3 and 6, are provided in their edges with longitudinal packing-blocks 33, which are forced outwardly by springs 34 and which abut against the sides of the piston-blades 24, and said piston-blades 24 move between antifriction-rollers 35, fixed in the heads of the drum, as shown in Fig. 3, and the packing-blocks 33 in the edges of the separate sections 23 of the drum are provided at their edges with longitudinally-movable packing-blocks 36, which are forced outwardly by springs 37, as shown in Fig. 6, and which abut against the inner faces of the heads 15 of the drum. The packing-blocks 28 in the ends of the piston-blades and the packing-blocks 36 in the ends of the packing-blocks 33 are also provided with side projections 38, which move in corresponding slots or recesses in the parts in which they are placed and form guides for said blocks, as clearly shown in Fig. 1.

In the upper inner surface or wall of the

circular space 19, in which the central drum turns, is a transverse opening or space 39, in which is mounted a packing-block 40, which is forced downwardly by springs against the drum, an end view of these parts being given in Fig. 1, a transverse section in Fig. 3, and a longitudinal section in Fig. 2, and the packing-block 40 is provided in each end with a packing-block 41, which is set thereinto, as shown in Figs. 1 and 2, and these packing-blocks 41 are forced outwardly by springs 42, and the packing-rings 12, at each end of the main casing 7, are provided at the top thereof with a downwardly-directed rectangular lug or projection 43, and said lugs or projections 43 pass through corresponding recesses in the end walls of said casing and enter corresponding recesses 44 in the end blocks 41, mounted in the ends of the packing-block 40, this construction being best shown in Fig. 1.

Secured to the top of the main outer casing 7 and transversely thereof is a valve-casing 45, provided in the top thereof with a steam-inlet port or passage 46, with which a steam-supply pipe may be connected, and mounted in said valve-casing is a valve 47, provided centrally with a transverse opening 48, and in the bottom of the valve-casing 45 are two steam ports or passages 49, which open downwardly at an inclination, and each of said steam ports or passages 49 communicates with a corresponding port or passage 50 in the main outer casing 7, and the port or passage 50 forms a communication between the interior of said main outer casing 7 and the valve-casing 45. One of the steam ports or passages 50 is shown in dotted lines in Fig. 2, and each of these steam ports or passages 50 communicates with two supplemental steam-passages 51, formed in the inner walls of the main outer casing 7, at each side thereof, and these steam-passages 51 are shown in dotted lines in Fig. 2, and one at each side, as shown in full lines in Fig. 3, and both of said passages at one side are shown in full lines in Fig. 4, while both of said passages on both sides are shown in full lines and in transverse section in Fig. 5.

The steam-passages 51 extend downwardly and around the inner walls of the main outer casing to a point below the transverse center of said casing, as shown at 52 in Fig. 3, where they communicate, and drip ports or passages 53 communicate therewith and are provided with nozzles 54, in which are placed valves 55, as shown in Fig. 3. The steam-passages 51 at each side also communicate, above the lower ends thereof, by means of a port or passage 56, (shown in full lines in Fig. 3 and in dotted lines in Fig. 2,) with exhaust-valve casings 57, secured to the opposite sides of the main outer casing, and said exhaust-valve casings are provided with transverse valve-openings 58, in which are mounted valves 59, each of which is cut out centrally or provided with a central transverse open-

ing 60, and the valves 59 are similar in form to the valve 47, a longitudinal view of which is given in Fig. 2.

The exhaust-valve casings 57 are provided with ports or passages 61, with which the ports or passages 56 communicate, and which pass through said valve-casings, and exhaust-pipes are adapted to be connected with said exhaust-valve casings at 62. The steam-passages 51 in the inner walls of the main outer casing communicate at their upper ends, as indicated in dotted lines at 63 in Fig. 2.

The valve 47, which controls the inlet for the steam, is provided at one end with a cross-head 64, which is keyed thereto and provided with an upwardly-directed handle-lever 65, and pivotally connected with the opposite ends of the cross-head 64 are crank-rods 66, composed of two sections connected by means of a rigid open frame 67, secured to one of said sections at one end and into which the end of the other section projects and is provided with a head 68, and a spring 69 is mounted in each of said frames and bears on said head. The lower end of the lower sections of the crank-rod 66 are each preferably connected with a crank 70, secured to one end of the corresponding valve 59, and by means of this construction the operation of the handle-lever 65, which controls the valve 47, which controls the steam-ingress port or passage 46, will also operate the rods 66 and will laterally open and close the valves 59, which control the exhaust ports or passages. It will therefore be seen that when the valve 47 is turned in one direction, so as to admit the steam to one side of the interior space in the main outer casing, the corresponding exhaust port or passage on said side will be closed and the exhaust port or passage on the opposite side will be opened, and a reverse movement on the handle-lever 65 to admit steam to the opposite side of the main outer casing will close the exhaust-valve on said side and open the exhaust-valve on the other side.

The operation will be readily understood from the foregoing description when taken in connection with the accompanying drawings and the following statement thereof.

It will be understood that when the engine is not in operation the steam-ingress port or passage and the exhaust ports or passages are closed, this being the position of the parts shown in Figs. 1, 2, and 3. If now the handle-lever 65 be moved to the left, the left-hand port or passage 50 will be opened and at the same time the right-hand exhaust port or passage 56, as shown in Figs. 1 and 3, will be opened by the rod 66 on said side, the position of the exhaust-valve 59 at this time on the right-hand side of the engine, as shown in Fig. 3, being indicated by the dotted lines 71 in Fig. 3, and the position of the valve 47 being indicated by a dotted line 72. In this position of the parts the exhaust-valve 59 at the left-hand side of the engine is closed and steam enters the casing through the left-hand

port or passage 50 and passes down through the passages 51 and around through the bottom portion of the space 19 (shown in Fig. 3) and exhausts out through the right-hand exhaust ports or passages 56. In this operation the central drum is revolved by the steam which strikes the outer ends of the piston-blades 24, and the ends of said blades are always in contact with the walls of the central space 19, in which the drum is placed, and in the revolution of said drum the piston-blades 24 move freely therein, as will be readily understood, the opposite ends of said blades always pressing on the walls of the central space 19 in the main casing. In order to operate the engine in the opposite direction or turn the central drum in the opposite direction, all that is necessary is to reverse the movement of the handle-lever 65 or turn it to the right. This operation will close the left-hand port or passage 50, as shown in Fig. 3, and open the right-hand port or passage, and the steam will pass around to the right and exhaust through the left-hand exhaust-passage, while the right-hand passage will be closed and the central drum will be turned to the right, as will be readily understood.

By means of this construction we are enabled to utilize the expansive force of the steam from the point where it enters the main outer casing, on the upper side thereof, until it passes around more than two-thirds of the interior space, and the expansive power of the steam is thus almost entirely utilized. It will also be seen that the transversely-movable piston-blades 24 being securely packed at their ends and at their sides and the separate sections 23 being securely packed where said blades pass there-through and the drum itself being securely packed by the packing-rings 12 the steam cannot pass into the drum nor can it pass from the central space around the heads of the drum, while the spring-depressed block 40 prevents steam from passing over the drum. It will also be seen that the outer edges of the radial piston-blades 23 are wider in cross-section than the cavities or recesses in the bottom lower walls of the outer casing 7, in which the lugs or projections 21 on the packing-ring 12 move, and this construction prevents the steam from passing through said recesses in the operation of said packing-rings and steam cannot escape around the drum-heads 15 at the bottom of the casing 7.

By means of the construction herein described our improved engine may be operated in either direction by simply reversing the movement of the valve 47, and said engine is also almost noiseless in operation, and the friction is reduced to a minimum. The expansive power of the steam is also utilized to the fullest possible extent without compounding the same, and the entire construction is simple in form and strong and durable, and by means of this fact the engine cannot in the

operation thereof easily get out of order and will not frequently need repair.

Having fully described our invention, we claim as new and desire to secure by Letters Patent—

1. A rotary engine, comprising a main outer cylindrical casing, a central hollow drum mounted eccentrically therein, and in the upper portion thereof and provided at each end with heads having shafts which pass through the ends of the main outer casing, said main outer casing being provided at the top thereof with a steam-ingress-valve casing which communicates with right and left hand ports or passages in said main outer casing which communicate with side steam-passages in the interior walls of the main outer casing, exhaust ports or passages at the opposite sides of the main outer casing which communicate with said steam-passages, and which are provided with valves, the valve in the steam-ingress-valve casing and in the exhaust ports or passages being in operative connection, said drum being also provided with two radially-movable piston-blades, one of which is provided with a central opening and the other with a reduced central portion which passes through said opening, which pass therethrough, and the lengths of which are equal to the interior diameter of the main outer casing, substantially as shown and described.

2. A rotary engine, comprising a cylindrical main outer casing having rabbet-grooves in the ends thereof and provided with detachable end pieces, a drum mounted eccentrically in said main outer casing, comprising a hollow casing having detachable heads, said heads being provided with shafts which pass through the end pieces of the main outer casing, and being of greater diameter than the body portion of said drum, and being adapted to fit in and turn in the rabbet-grooves in the main outer casing, packing-blocks placed in the ends of the main outer casing which bear on the heads of the drum and which are provided at the bottom thereof with angular lugs or projections which fit in corresponding notches or recesses formed in the bottom walls of the main outer casing, said main outer casing being also provided with a steam-ingress-valve casing at the top thereof which communicates with right and left hand steam ports or passages in the top of said main outer casing which communicate with steam-passages in the interior side walls of the main outer casing, exhaust ports or passages in the opposite sides of the main outer casing which communicate with said steam-passages, exhaust-valve casings secured to the main casing and communicating with said exhaust ports or passages, a valve in the steam-ingress-valve casing, and similar valves in the exhaust-valve casings, said valves being in operative connection, and said drum being provided with radially-movable piston-blades which pass therethrough and the lengths of which are equal to the interior diameter of the cen-

tral space in which said drum is mounted, substantially as shown and described.

3. In a rotary engine, a main outer casing provided with a central drum which is mounted eccentrically therein and which is provided with radially-movable piston-blades which pass therethrough, said drum being hollow and provided where the piston-blades pass therethrough with spring-operated packing-blocks which press on said blades and with antifriction-rollers between which said blades pass, and said piston-blades being provided at their outer side edges with spring-operated packing-blocks and at their ends with supplemental spring-operated packing-blocks, said blocks being loosely connected by tongue-and-grooved joints, and the blocks in the outer edges of the piston-blades being composed of overlapping sections, substantially as shown and described.

4. In a rotary engine, a main outer cylindrical casing, a drum mounted eccentrically in said casing, and in the upper portion thereof, said casing being provided at its ends with rabbet-grooves, and packing-rings mounted therein, the bottom portion of said rings being provided with inwardly-directed radial lugs or projections, and the ends of the main outer casing with corresponding cavities or recesses in which said lugs or projections fit, said main outer casing being also provided in the top thereof with right and left steam-ingress ports or passages, and in the inner sides thereof with passages which communicate therewith, and exhaust ports or passages at the opposite sides of the main outer casing which communicate with said last-named steam-passages, a valve to control the steam-ingress ports or passages, and valves in the exhaust ports or passages, said valves being all in operative connection, and said drum being provided with radially-movable piston-blades which pass therethrough, and the lengths of which are substantially equal to the diameter of the central space in which said drum is mounted, substantially as shown and described.

5. In a rotary steam-engine, a main outer casing, a hollow drum mounted eccentrically therein and provided with radially-movable piston-blades which pass therethrough, said piston-blades being provided at their opposite ends with spring-operated packing-blocks composed of separate sections, the adjacent ends of which overlap, and other spring-operated packing-blocks in the sides of said piston-blades which are connected with the packing-blocks in the ends of said blades by tongue-and-grooved joints, whereby the said packing-blocks in the ends of said blades are adapted to move radially of the drum, and those in the ends of said blades outwardly in the direction of the ends of the drum, substantially as shown and described.

6. In a rotary engine, a main outer casing provided with detachable ends, said casing being provided at its opposite sides with rab-

bet-grooves, and supplemental grooves which communicate therewith in which are placed spring-operated packing-rings, said main outer casing being also provided with an inner circular space arranged eccentrically therein, a hollow drum mounted eccentrically in said inner circular space, and in the top portion thereof, said drum being provided with detachable heads which are greater in diameter than said drum and which fit in the rabbet-grooves in the main outer casing, and against which said packing-rings bear, said drum being also provided with radially-mounted and radially-movable piston-blades, the length of which is equal to the diameter of the space in which the drum is mounted, said piston-blades being provided at their ends and sides with spring-operated packings and said main outer casing being provided in the top thereof with right and left hand steam-supply ports or passages which communicate with interior steam-passages in the side walls of the main outer casing, and also with exhaust ports or passages at the opposite sides which communicate with said last-named steam-passages, valve-casings which control the steam-ingress ports or passages, and the exhaust ports or passages, valves mounted in said casings and connected by rods composed of separate sections having movable spring-operated couplings, substantially as shown and described.

7. In a rotary engine, a revolubly-mounted cylindrical drum and two radially-movable piston-blades mounted therein and passing therethrough, one of said piston-blades being provided with a central opening, and the other with a reduced central portion which passes through said opening, said drum being hollow and provided where the piston-blades pass therethrough with spring-operated packing-blocks which press on said blades, and said piston-blades being provided at their outer side edges with spring-operated packing-blocks, and at their ends with supplemental spring-operated packing-blocks, substantially as shown and described.

8. In a rotary engine, a cylindrical main outer casing having rabbet-grooves in the ends thereof, and provided with detachable end pieces, a drum mounted in said main outer casing and comprising a hollow casing

having detachable heads, said heads being provided with shafts which pass through the end pieces of the main outer casing, and being of greater diameter than the body portion of said drum, and fitting revolubly in said rabbet-grooves, and packing-blocks placed in the ends of the main outer casing and which bear on the heads of the drum and are provided at the bottom thereof with angular lugs or projections which fit in corresponding notches or recesses formed in the bottom walls of the main outer casing, substantially as shown and described.

9. In a rotary engine, a main outer casing provided with a central drum which is mounted eccentrically therein and which is provided with radially-movable piston-blades which pass therethrough, said drum being hollow and provided where the piston-blades pass therethrough with spring-operated packing-blocks which press on said blades, and said piston-blades being provided at their outer side edges with spring-operated packing-blocks, and at their ends with supplemental spring-operated packing-blocks, said blocks being loosely connected by tongue-and-grooved joints, substantially as shown and described.

10. In a rotary engine, a main casing, a drum mounted therein comprising a hollow casing having detachable heads, and packing-blocks placed in the ends of the main casing and which bear on the heads of the drum and are provided at the bottom thereof with angular lugs or projections which fit in corresponding notches or recesses formed in the bottom walls of the main outer casing, substantially as shown and described.

In testimony that we claim the foregoing as our invention we have signed our names in presence of the subscribing witnesses.

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