

No. 615,981.

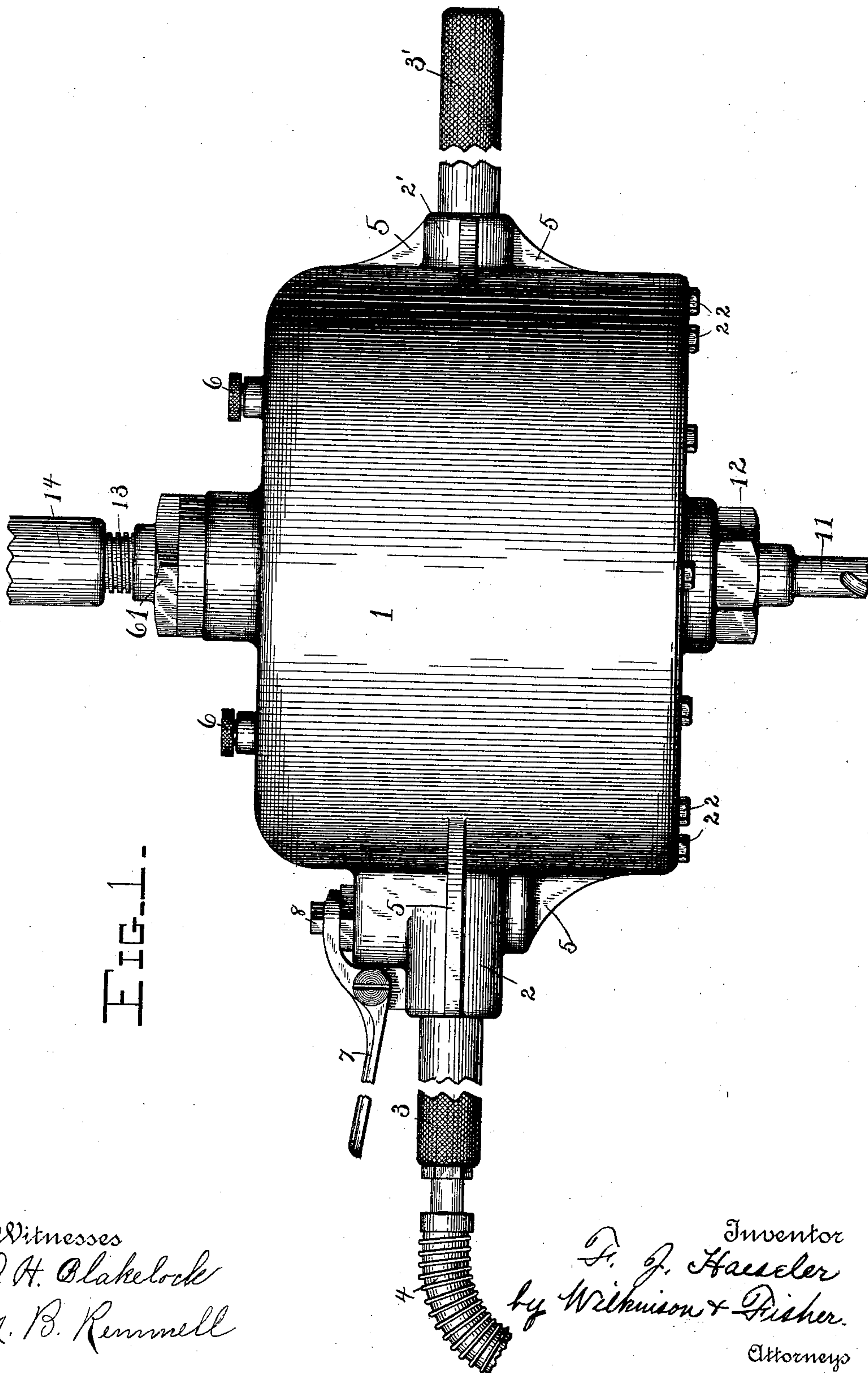
Patented Dec. 13, 1898.

F. J. HAESELER.  
ROTARY ENGINE.

(Application filed May 2, 1898.)

(No Model.)

4 Sheets—Sheet 1.



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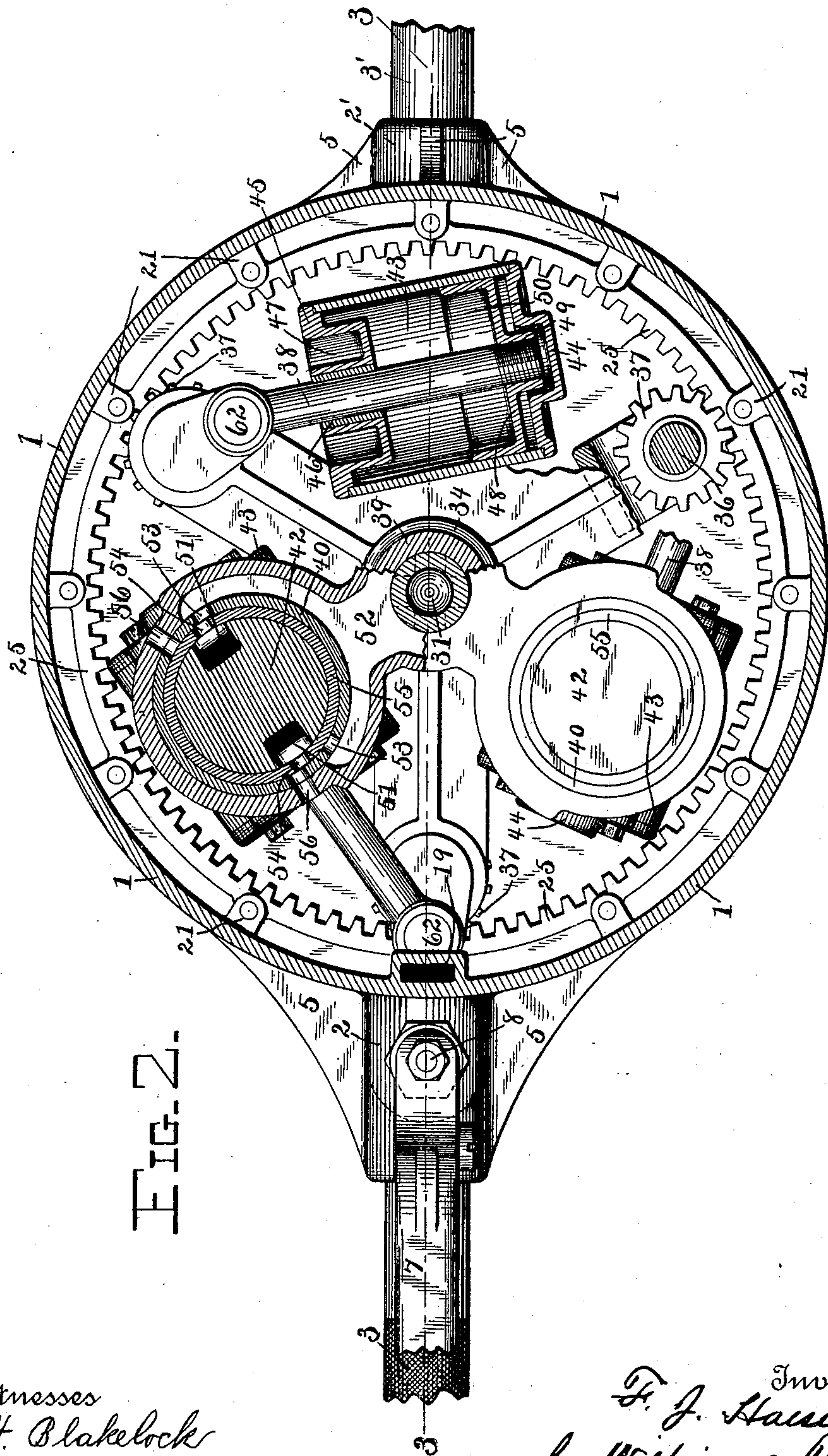


FIG. 2.

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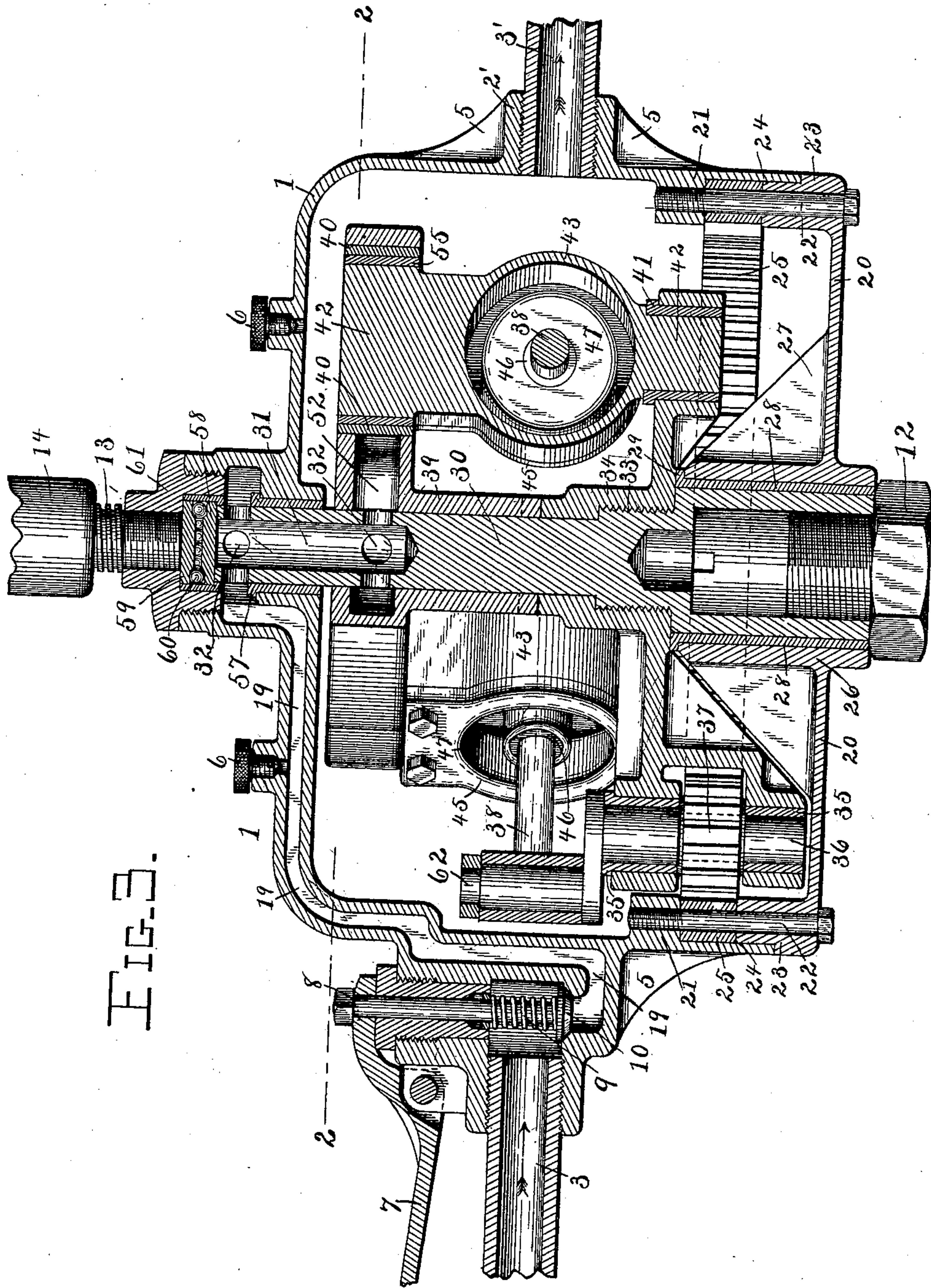


FIG. 3.

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FIG. 4.

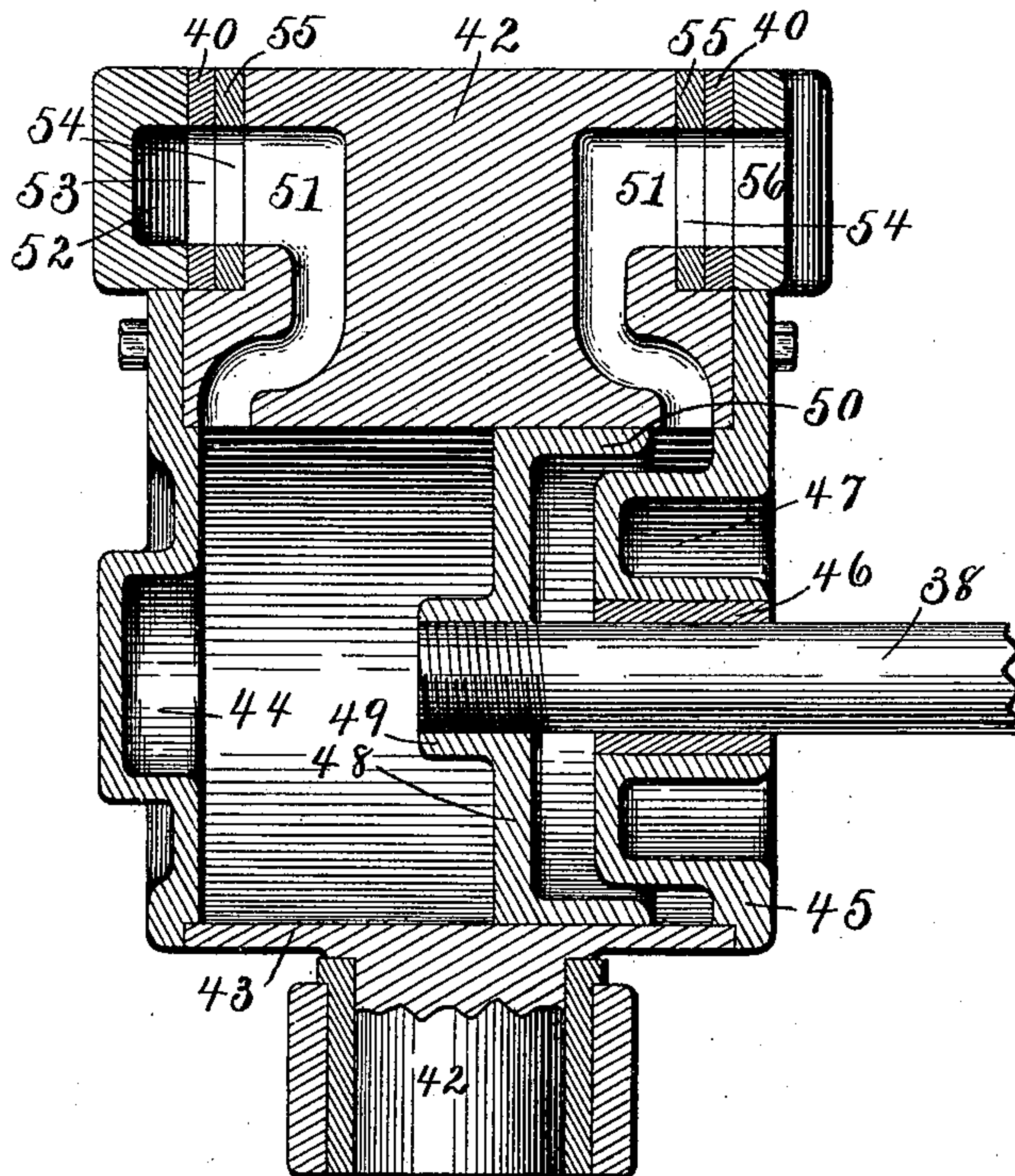
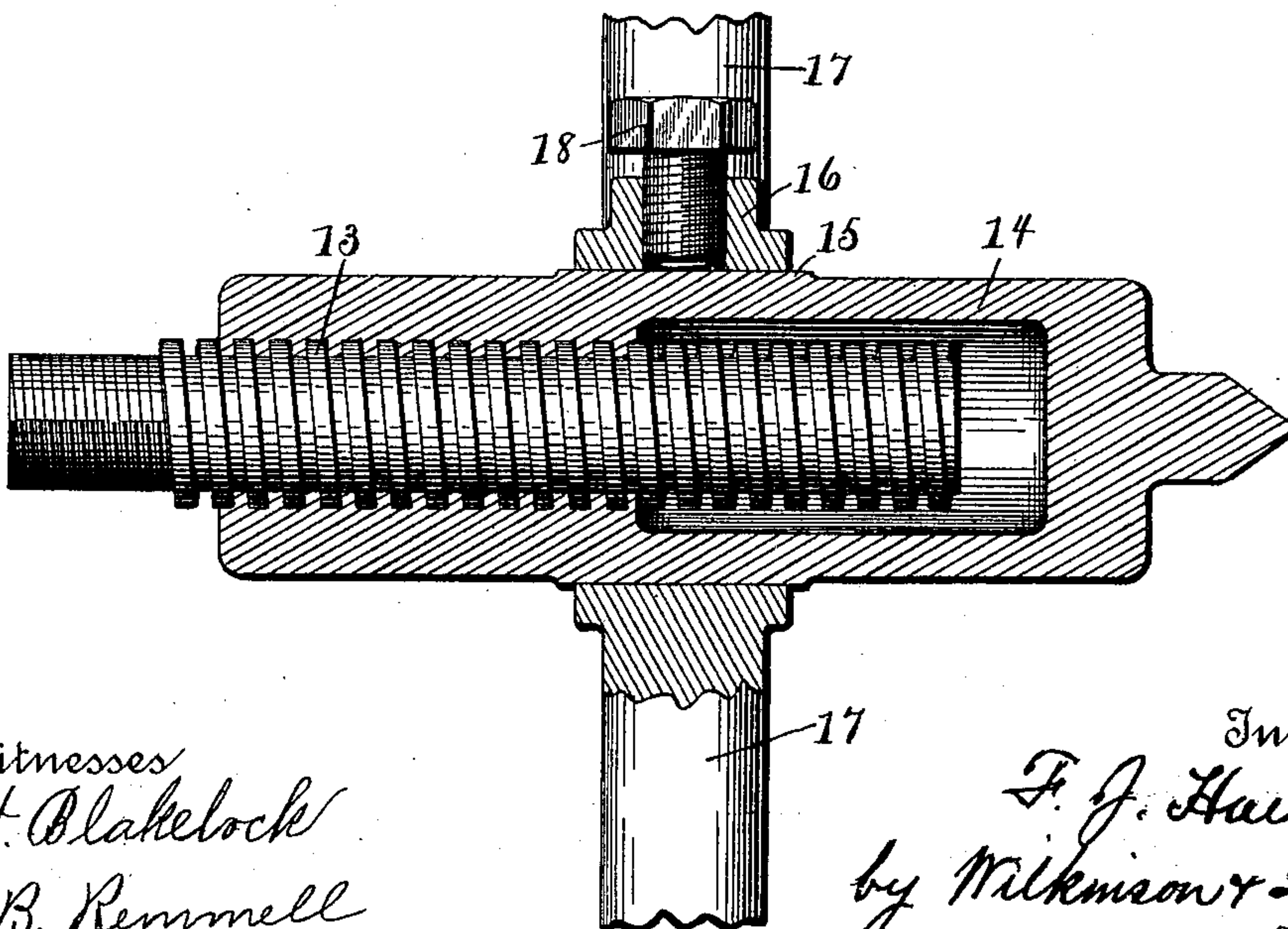


FIG. 5.



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# UNITED STATES PATENT OFFICE.

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ONE-HALF TO THE C. H. HAESELER COMPANY, OF PHILADELPHIA,  
PENNSYLVANIA.

## ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 615,981, dated December 13, 1898.

Application filed May 2, 1898. Serial No. 679,525. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS J. HAESELER, lieutenant in the United States Navy, serving on board the United States battle-ship Texas, at Hampton Roads, Virginia, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in portable drills or reamers, and has for its object to provide a simple and effective machine of this character which will be inexpensive and at the same time strong and serviceable.

In the drawings, Figure 1 represents a side elevation of my improved machine, parts being broken away. Fig. 2 represents a horizontal cross-section of the casing, taken on the line 2 2 of Fig. 3, but showing one of the upper yokes and trunnions in cross-section and one in plan view, and showing one of the engine-cylinders in cross-section. Fig. 3 is a longitudinal vertical section taken on the line 3 3 of Fig. 2. Fig. 4 is a longitudinal vertical section of one of the engine-cylinders, and Fig. 5 is a cross-section of the adjusting means.

In the drawings, 1 represents a casing substantially cylindrical in shape, with projections 2 and 2' for the reception of the hollow handles 3 and 3', to one of which is attached the flexible hose 4, which conveys the air or steam to the device. Strengthening-ribs 5 connect the projections 2 and 2' with the main casing. Said casing is also provided with oil-plugs 6. Pivoted at the outer part of the projection 2 is a lever 7, which actuates a valve-stem 8, on which is mounted a spring 9 and a valve 10, which closes the passage from the hollow handle 3.

At one end of the casing and centrally thereof is mounted a drill 11 in the tool-holder 12. In the center of the opposite end is secured a screw-plug 13, provided with a cylindrical nut 14, which terminates at its outer end in a point which is adapted to be

mounted in any suitable support or brace. The nut 14 has a polygonal periphery at 15 for a portion of its length, on which is mounted a similarly-shaped nut 16, provided with handles 17, usually three in number, for feeding the device toward the work. The parts 14 and 16 are still further secured together by the bolt 18, which is tapped into the part 16.

The cylinder 1 is provided with a passage 19, which connects with the hollow handle 3 and conducts the steam or air to the engines, as will be hereinafter described.

The sides and one end of the cylindrical casing 1 are preferably made in one piece, and the other end is closed by the circular part 20, which rests upon a shoulder in the main casing and is secured thereto by bolts 22. This end 20 is provided with shoulders 23 and 24, as shown clearly in Fig. 3. Mounted between the shoulders 24 and 21 is an annular gear 25, provided with teeth upon its interior and provided also with openings at intervals, through which the bolts 22 pass, securing the gear and the end 20 to the main cylindrical casing.

The end 20 is provided with an enlarged central portion 26, which is hollowed out to form a bearing for the passage of the drill or reamer. Strengthening-ribs 27, triangular in form, connect the bearing 26 with the end 20.

A bushing 28, provided with a shoulder 29, rests upon the bearing 26, and in this bushing the main shaft 30 revolves, which extends completely through the main portion of the casing. This shaft 30 is hollowed out at 31 and is provided with ports 32 for the admission of air to the oscillating reciprocating engines. This shaft 30 is provided with a screw-thread 33, to which is secured the lower cylinder-yoke 34. This yoke extends nearly to the periphery of the cylinder and is bifurcated and perforated and provided with bushings 35, in which are mounted shafts 36, which by means of crank-pins 62 are connected to the piston-rods 38 of the driving-engines.

Each shaft 36 is provided with a small gear-wheel 37, which meshes with the stationary annular gear 25.

Resting upon the cylinder-yoke 34 is an-



other cylinder-yoke 39. These cylinder-yokes are perforated and provided with stationary bushings 40 and 41, in which are mounted trunnions 42 of the driving-engines. These driving-engines are preferably three in number and are shown in detail in Fig. 4. Each one is composed of a cylinder 43, provided with ends 44 and 45, the end 44 being provided with a central projection to receive an enlargement on the piston and the end 45 being provided with a bushing 46 and a depressed portion 47. The piston 48 is provided with a central enlargement 49 and a cylindrical enlargement 50.

The upper trunnion of each of the engines is provided with supply and exhaust passages 51. The upper cylinder-yoke is provided with passages 52, which connect with the passage 31 in the main shaft, and by means of ports 53 in the stationary bushing and ports 54 in the movable bushing 55 a passage is furnished for the air or steam into the driving-engines. By the time the piston is driven one stroke the passages 54 are brought around so that they are opposite to the discharge-opening 56, and the driving fluid is then exhausted into the main cylinder and out through the hollow handle 31. It is obvious that an air-passage might be provided at any point of the cylinder instead of through the handle.

The shaft 30, near the other end of the cylinder, passes through the bushing 57 and rests against the plate 58, which, together with the plate 59, is hollowed out for the reception of a ring of antifriction-balls 60. These plates are kept in place by a nut 61, in which the screw-plug 13 is fastened.

The operation is as follows: After the machine has been placed in position the handle 7 is pressed down, which opens the supply-valve, allowing the air or steam to enter. This air or steam then passes through passages 19, 31, and 52 into one of the driving-engines, causing the piston 48 to make one stroke, and in making this stroke the gear-wheel 37 is turned and all the internal parts of the machine are rotated with the shaft 30, which rotates the drill. By the time the stroke is finished this engine is oscillated, so as to bring the opening 54 in line with the opening 56, and the air or steam is exhausted from one side of the piston and admitted to the other. Thus a continuous rotation is effected as long as the air or steam is admitted.

An important feature of my invention is the shaft 30, which runs the entire length of the cylinder and is so mounted that practically the entire thrust of the drill or reamer is received by the antifriction-balls 60. This renders the machine very steady and effective, and there is but very little wear of the parts, almost all of the wear being upon the antifriction-balls 60 and the plates 58 and 59, which can be easily removed and at a small expense.

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

1. In a portable drill or reamer, the combination of a casing substantially cylindrical in form and provided with inlet and exhaust openings and with an annular gear secured therein, of a shaft passing through said casing and mounted therein, yokes on said shaft for supporting the engines, a plurality of engines mounted in said yokes, and one of the said yokes being provided with gear-wheels driven by said engines and meshing with the annular gear in the cylinder, substantially as described.

2. In a portable drill or reamer, the combination of a casing provided on its interior with an annular gear-ring, a tool-carrying shaft passing through said casing and mounted in bearings therein, yokes mounted on said shaft carrying a plurality of oscillating reciprocating engines, one of said yokes being provided with bearings, gear-wheels mounted in said bearings and meshing with the annular gear, and means for driving said gear-wheels, substantially as described.

3. In a portable drill or reamer, the combination of a casing substantially cylindrical in form and provided on its interior with an annular gear, a shaft passing through said casing and mounted in bearings therein, yokes secured to said shaft, a plurality of oscillating reciprocating engines mounted on trunnions supported in said yokes, one of said yokes being provided with bearings, gear-wheels mounted in said bearings and meshing with the annular gear in the cylinder, crank-pins on the shaft of said gear-wheels and connected to the pistons of the reciprocating engines, substantially as described.

4. In a rotary drill or reamer, the combination of a casing provided with an annular gear on its interior, a tool-carrying shaft passing through said casing, yokes on said shaft, oscillating reciprocating engines mounted in said yokes, one of said yokes being provided with bearings, gear-wheels mounted in said bearings and meshing with said annular gear, driving connections between the shafts of said gear-wheels and the pistons of the engines, and means located at the end of the shaft opposite the tool for receiving the thrust of said shaft, consisting of plates hollowed out, and antifriction-balls between said plates, substantially as described.

5. In a portable drill or reamer, the combination of a casing provided with a passage and an internal annular gear, of a tool-carrying shaft mounted in said casing and passing entirely through it, said shaft being provided with a passage communicating with the passage in the cylinder, yokes mounted on said shaft, engines provided with trunnions mounted in said yokes, gear-wheels carried by one of said yokes meshing with the annular gear and driven by said engines, one of said yokes



being provided with passages communicating with the passage in the shaft, and one of the trunnions of each engine being provided with ports communicating with the passages in the yokes, substantially as described.

6. In a portable drill or reamer, the combination of a casing provided with an internal annular gear, a shaft mounted in said casing and passing completely through it, yokes in said casing carrying oscillating engines, and gear-wheels meshing with the annular gear, substantially as described.

7. In a portable drill or reamer, the combination of a casing provided with a passage and an internal annular gear, hollow handles connected to said casing, a valve in one of said handles, a spring to keep said valve normally closed, a lever to operate said valve, a shaft mounted in said casing and provided with air-passages, yokes mounted on said shaft, oscillating engines mounted in said yokes, said shaft and one of said yokes being provided with passages communicating with the ports of the oscillating engines, and one of said yokes being provided with gear-wheels meshing with the annular gear and driven by said engines, substantially as described.

8. In a portable drill or reamer, the combi-

nation of a cylinder provided with a passage and hollow handles, an internal annular gear secured between shoulders in said cylinder, a tool-carrying shaft mounted on said cylinder and passing through the same, antifriction devices at one end of said shaft, yokes mounted on said shaft and provided with a plurality of bearings, oscillating engines mounted in said yokes, said shaft being provided with a passage communicating with the passage in the casing, and one of said yokes being provided with passages communicating with the passage in the shaft, one of the trunnions of each engine being provided with ports adapted at certain times to communicate with the passages in the yokes, and one of said yokes being provided with bearings, shafts carrying gear-wheels mounted in said bearings, said gear-wheels meshing with the annular gear, said shafts being also provided with crank-pins fastened to the piston-rods of the several engines, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANCIS J. HAESELER.

Witnesses:

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A. P. S. HAESELER.