No. 644,175. Patented Feb. 27, 1900.

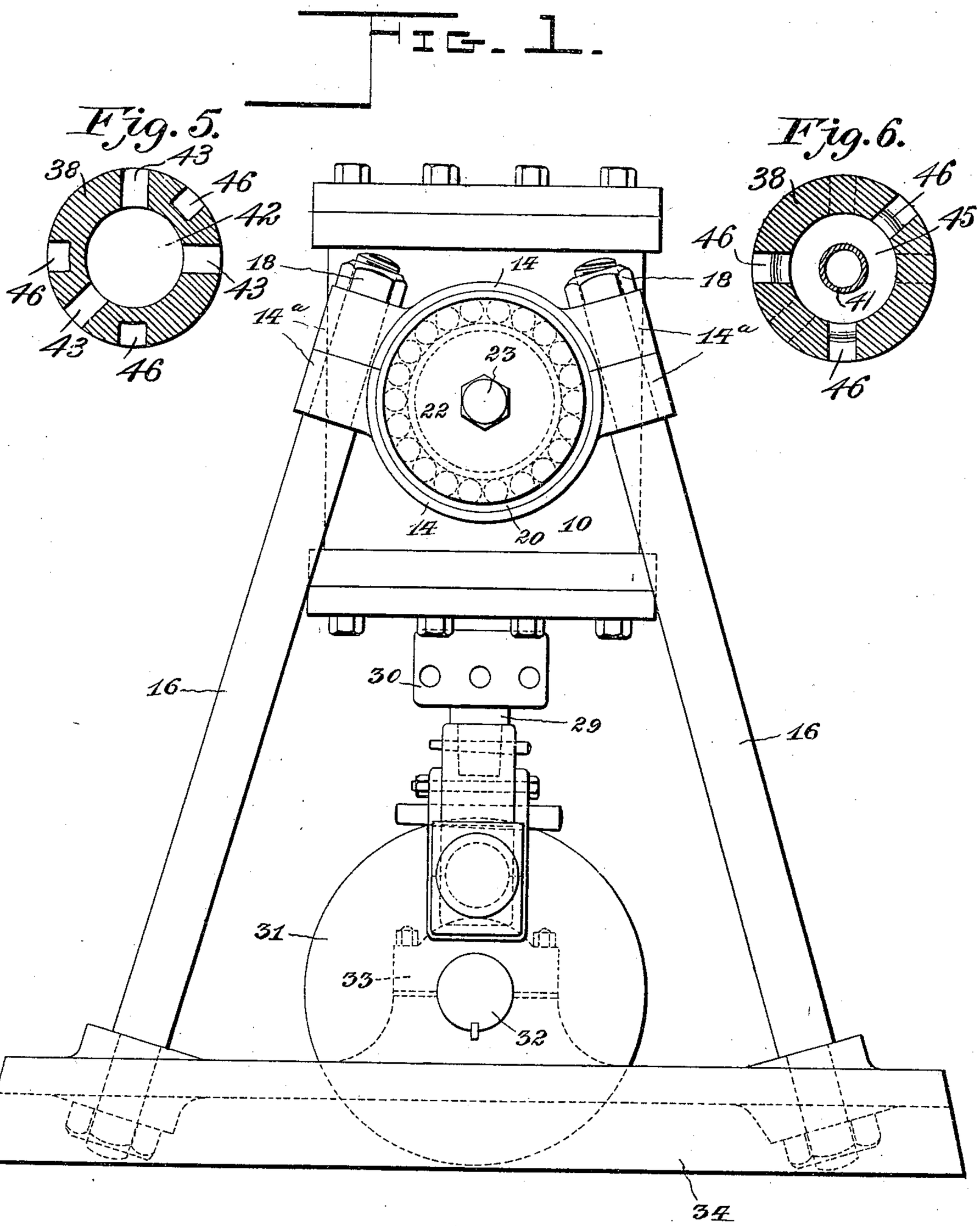
# W. F. HUTCHISON.

## OSCILLATORY ENGINE.

(Application filed Mar. 29, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.




Witnesses
John F. Dewhirst
[illegible]

Wilson F. Hutchison, Inventor
By his Attorneys.
Church & Co.

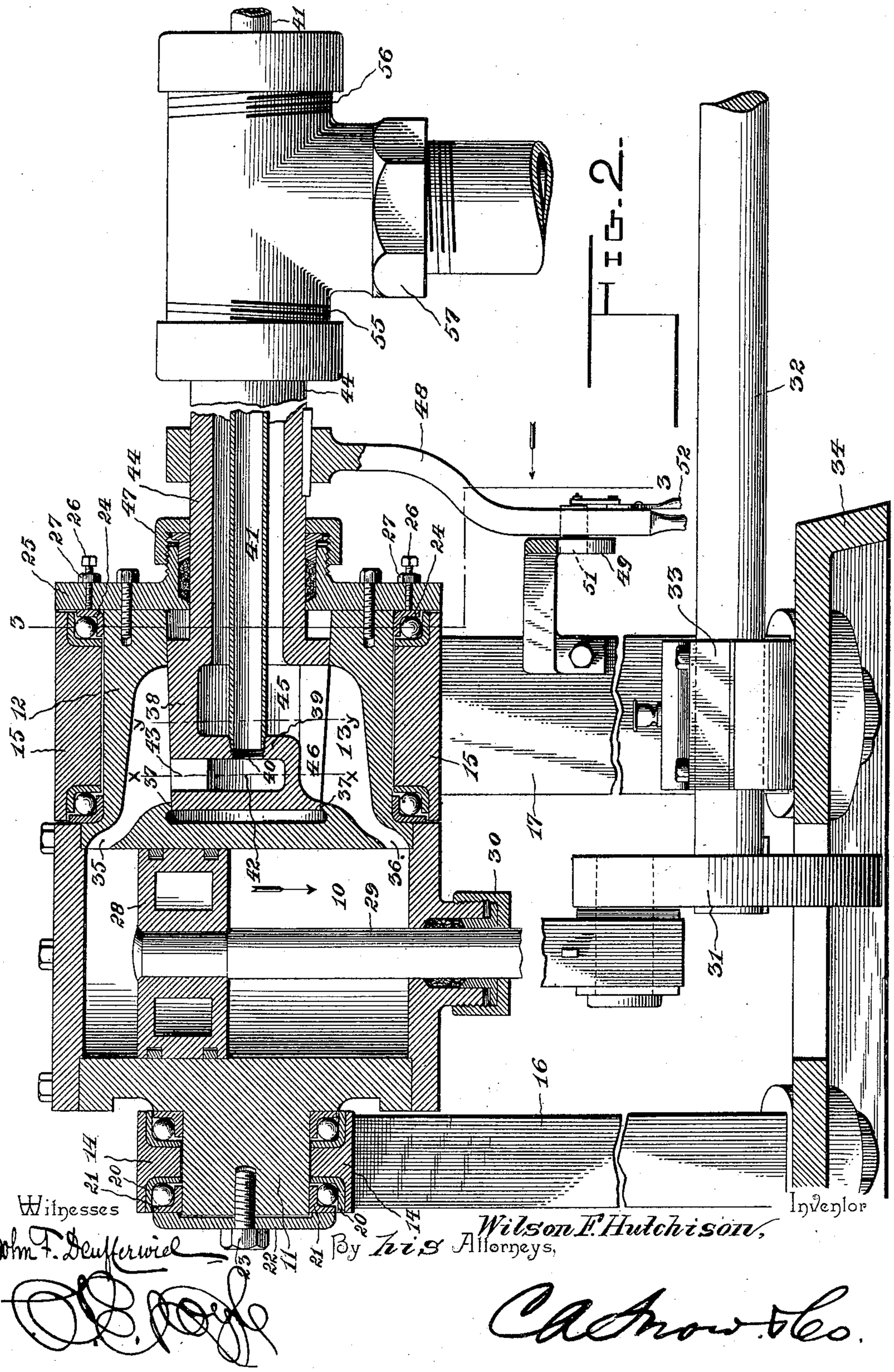
No. 644,175. Patented Feb. 27, 1900.

# W. F. HUTCHISON.

## OSCILLATORY ENGINE.

(Application filed Mar. 29, 1899.)

(No Model.) 3 Sheets—Sheet 2.



No. 644,175. Patented Feb. 27, 1900.

# W. F. HUTCHISON.

## OSCILLATORY ENGINE.

(Application filed Mar. 29, 1899.)

(No Model.) 3 Sheets—Sheet 3.

FIG. 3.

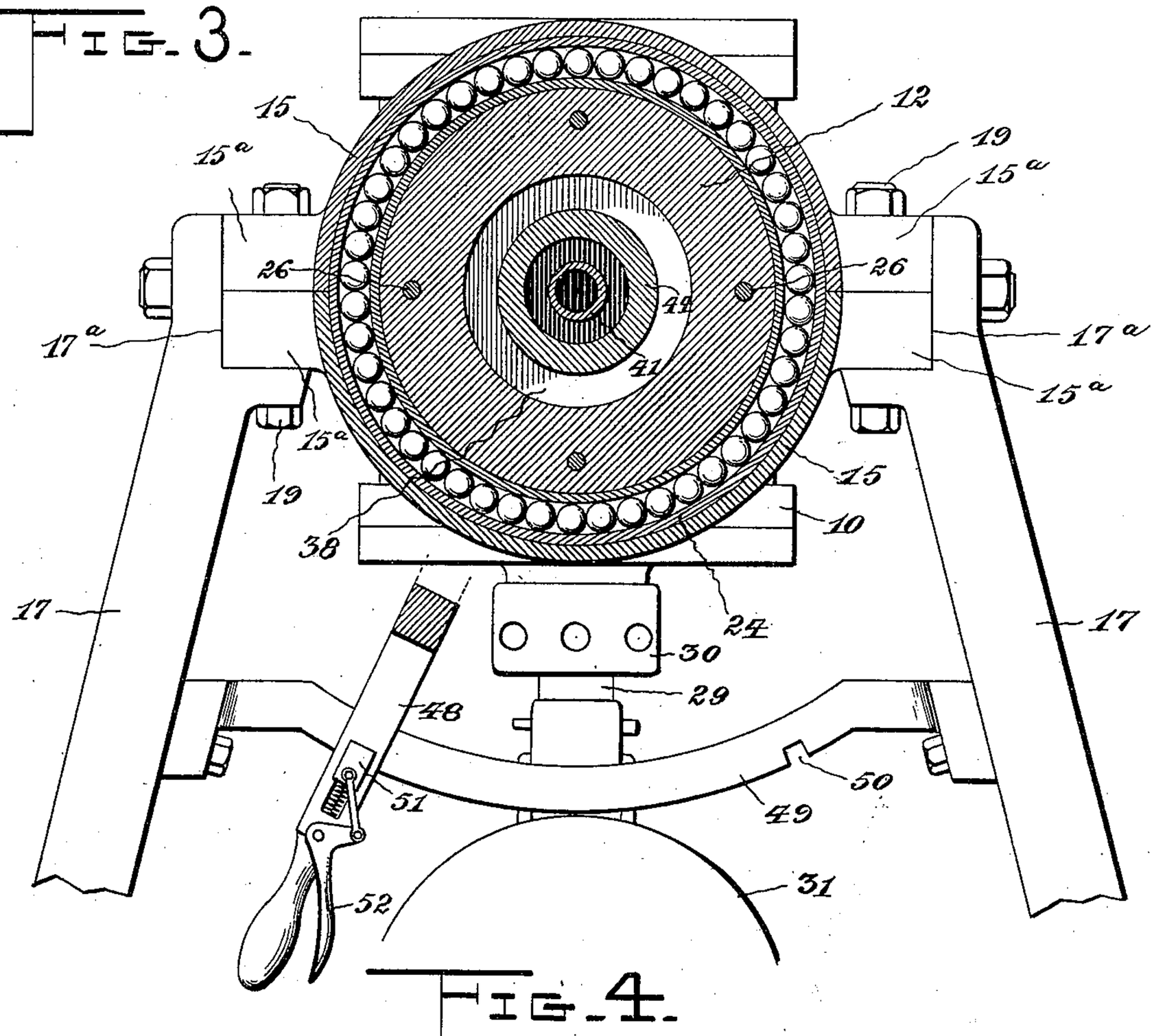
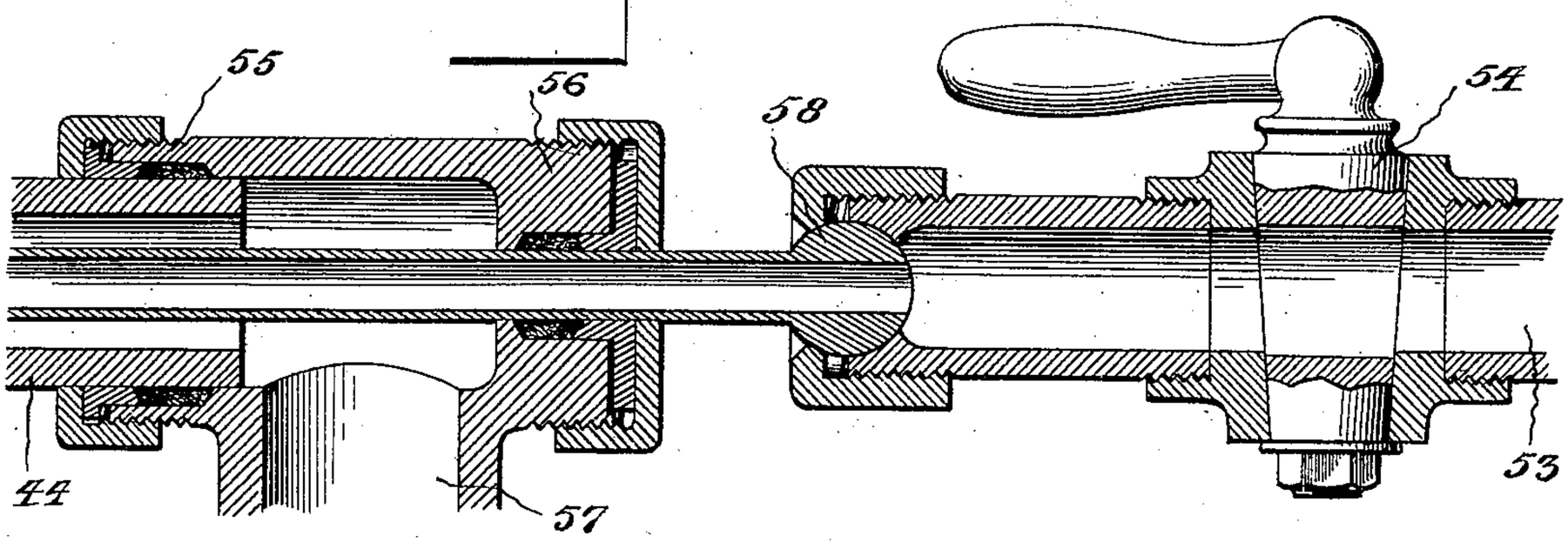



FIG. 4.




Witnesses
John F. Deufler
O. E. Doyle

Wilson F. Hutchison, Inventor
By his Attorneys.
C. A. Snow & Co.

# UNITED STATES PATENT OFFICE.

WILSON FRANK HUTCHISON, OF ORANGE, TEXAS.

## OSCILLATORY ENGINE.

SPECIFICATION forming part of Letters Patent No. 644,175, dated February 27, 1900.

Application filed March 29, 1899. Serial No. 711,009. (No model.)

*To all whom it may concern:*

Be it known that I, WILSON FRANK HUTCHISON, a citizen of the United States, residing at Orange, in the county of Orange and State of Texas, have invented a new and useful Oscillatory Engine, of which the following is a specification.

My invention relates to an oscillatory engine, and one of its objects is to provide an improved construction and arrangement of parts whereby the engine-cylinder is mounted for oscillatory movement, the bearing elements being disposed exteriorly to avoid interference with the working parts of the engine and also to secure extended bearing-surfaces.

A further object of the invention is to provide an improved construction of valve mechanism particularly adapted for engines of the type mentioned.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a front view of an engine constructed in accordance with my invention. Fig. 2 is a longitudinal section of the same. Fig. 3 is a detail transverse section on the plane indicated by the line 3 3 of Fig. 2. Fig. 4 is a detail sectional view of the means whereby the feed-pipe of the engine is connected with the steam-supply pipe. Fig. 5 is a detail cross-sectional view of the valve-plug on the line $x$ $x$ of Fig. 2, showing the relation of the several steam-feed ports. Fig. 6 is a similar view on the line $y$ $y$ of Fig. 2, showing the relation of the several exhaust-ports of the valve-plug.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

The cylinder 10 of the engine embodying my invention is provided at opposite sides with axially-alined extensions forming trunnions 11 and 12, of which the latter is hollow to constitute a valve-chamber 13, and these trunnions are encircled by bearing-sleeves 14 and 15, supported by a suitable framework consisting in the construction illustrated of upwardly-convergent front and rear standards 16 and 17, to the upper ends of which are bolted the separable upper and lower sections of the bearing-sleeves. The upper ends of the front standards 16 are reduced to engage registering eyes $14^a$, formed on the extremities of the sections of the sleeve 14 and held in place by nuts 18, and the upper ends of the rear standards 17 are provided with seats $17^a$, in which the extremities of the sleeve-sections $15^a$ are secured by means of bolts 19.

Each of the bearing-sleeves is provided with spaced ball-races 20, registering with corresponding races carried by the coöperating trunnion, and in practice these races are preferably provided with linings of antifriction-bearing metal, such as Babbitt or the equivalent thereof, the cap 21, by which the outer side of the outer ball-race on the trunnion 11 is formed, being held in place by a cap-plate 22, secured by a suitable bolt or screw 23. In the same way the outer bearing-cap 24 of the trunnion 12 is held in place by the head 25, which closes the outer end of the valve-chamber 13, an adjusting-screw 26 being threaded in the head to bear against the cap 24, whereby the desired adjustment of the parts to take up lost motion may be accomplished, and said adjusting-screw being fitted with a jam-nut 27. Lost motion in the bearings of the trunnion 11 is taken up by the adjustment of the cap-plate 22.

Operating in the cylinder 10 is the piston 28, having its rod 29 extended through a suitable stuffing-box 30 in the lower head of the cylinder, and said piston-rod is connected, as in the ordinary practice, with the crank-disk 31 on the driven shaft 32, which may be mounted, as shown, in bearings 33, supported by the base 34, to which the lower extremities of the standards 16 and 17 are anchored.

Connecting the extremities of the cylinder 10 with the valve-chamber 13 are upper and lower ports 35 and 36, and between said ports is arranged a seat 37 for the inner end of a valve-plug 38. This valve-plug is provided with a transverse partition 39, having a central opening 40, into which is threaded the extremity of a steam-inlet or feed pipe 41, which extends axially into the valve-plug, said feed-pipe thus communicating with the steam-inlet chamber 42 of the valve-plug,

which is provided with a plurality of lateral ports 43, the number of ports illustrated in the drawings being three and the arrangement thereof with relation to the cylinder-ports 35 and 36 being such that only one feed-port can be in communication at one time with the cylinder.

The valve-plug is provided with a hollow stem 44, which communicates with the exhaust-chamber 45 of the plug, said chamber being annular in that it surrounds the feed-pipe 41, and in the wall of this exhaust-chamber is formed a series of three exhaust-ports 46, either of which may be arranged in communication with a cylinder-port; but as the cylinder-ports 35 and 36 are arranged in diametrically-opposite positions and as each feed-port 43 is diametrically opposite an exhaust-port 46 it is obvious that when a feed-port is in communication with the cylinder-port 35 the opposite exhaust-port 46 will be in communication with the cylinder-port 36, whereby, with the piston moving in the direction indicated by the arrow in Fig. 2, the steam or other motive agent will enter through the port 35, while the exhaust-steam will escape through the ports 36 and 46 into the exhaust-conveyer formed by the stem 44 of the plug. This valve-plug stem extends through a suitable stuffing-box 47 in the head 25 of the valve-chamber, and preferably the valve-plug is tapered or of conical shape to fit in a correspondingly-constructed seat in the valve-chamber, whereby adjustment of the plug may be attained to insure the snug fitting thereof.

Attached to the valve-plug stem is a reversing-lever 48, operating in connection with a segment 49, supported by the adjacent standards 17 and having notches 50 for engagement by a spring-actuated detent or pawl 51, connected with a trip-lever 52.

Obviously as the piston reciprocates in the cylinder 10, and thereby communicates rotary motion to the crank of the engine-shaft, the cylinder will rock in the bearing-sleeves 14 and 15 and by this rocking movement will arrange each of the cylinder-ports 35 and 36 in communication alternately with a feed-port and an exhaust-port of the valve-plug, which remains stationary, said valve-plug being locked in a fixed position with relation to the supporting-frame by means of the reversing-lever 48. The bearing-balls which are used in connection with the bearings in which the cylinder-trunnions are mounted obviously reduce the friction to the minimum, and the effect thereof is particularly apparent by reason of the extended areas of the bearing-surfaces, the bearings being arranged exteriorly with that which may be considered the main bearing surrounding the valve-chamber.

Obviously a flexible connection must be established between the feed-pipe 41 and the supply-pipe 53 for steam or other motive agent, said supply-pipe being fitted with a suitable throttle-valve 54. Hence in practice I provide the exhaust-pipe, which is formed by the valve-plug stem 44, with a terminal T-coupling having alined arms 55 and 56, in the former of which is arranged a stuffing-box through which the stem 44 extends, while the lateral arm 57 of said coupling forms the exhaust-port. The other arm 56 of the T-coupling is fitted with a stuffing-box through which the inlet-pipe 41 extends, and connection is established between this inlet-pipe and the supply-pipe 53 by means of a ball-and-socket coupling 58. It is obvious that other means of connection with a supply-pipe may be employed in connection with an engine of the type to which my invention appertains and that various other changes in the form, proportion, size, and the minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having described my invention, what I claim is—

1. In an oscillating engine, the combination with the oscillatory piston-cylinder having at one side a valve-chamber, of a valve-plug seated in and coaxial with the valve-chamber and provided with separate steam inlet and exhaust chambers, feed and exhaust conveyers movable with the valve-plug and in communication respectively with the feed and exhaust chambers thereof, substantially as set forth.

2. In an oscillating engine, the combination with an oscillatory piston-cylinder, having at one side a valve-chamber, of a valve-plug seated in and coaxial with the valve-chamber and provided with separate interior steam inlet and exhaust chambers, feed and exhaust ports communicating respectively with said separate chambers, concentric feed and exhaust conveyers movable with the valve-plug and in communication respectively with the feed and exhaust chambers thereof, and means for securing the said plug in fixed position, substantially as set forth.

3. In an oscillating engine, the combination with an oscillatory piston-cylinder, and an attached valve-chamber at one side thereof, of a valve-plug seated in and coaxial with said valve-chamber and having separate interior steam inlet and exhaust chambers, said separate chambers being provided with ports in communication with the cylinder-ports, a tubular valve-stem rigid with the plug and forming an exhaust-conveyer in communication with the exhaust-chamber, and a feed-pipe extending through the exhaust-conveyer and communicating with the steam-inlet chamber of the valve-plug, substantially as set forth.

4. In an oscillating engine, the combination with an oscillatory piston-cylinder, having at one side a valve-chamber, of a valve-plug seated in said valve-chamber and having separate interior steam inlet and exhaust chambers partitioned from each other, a plurality

of feed and exhaust ports communicating respectively with said separate chambers, each feed-port being diametrically opposite an exhaust-port, a tubular valve-stem rigid with the plug to form an exhaust-conveyer in communication with said exhaust-chamber, a feed-pipe extending through the exhaust-conveyer and fitted in the partition between the two chambers of the valve-plug, and a reversing device connected with the valve-plug and adapted to secure it fixed in an adjusted position, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WILSON FRANK HUTCHISON.

Witnesses:
J. W. LINK,
H. S. FILSON.