

No. 717,001.

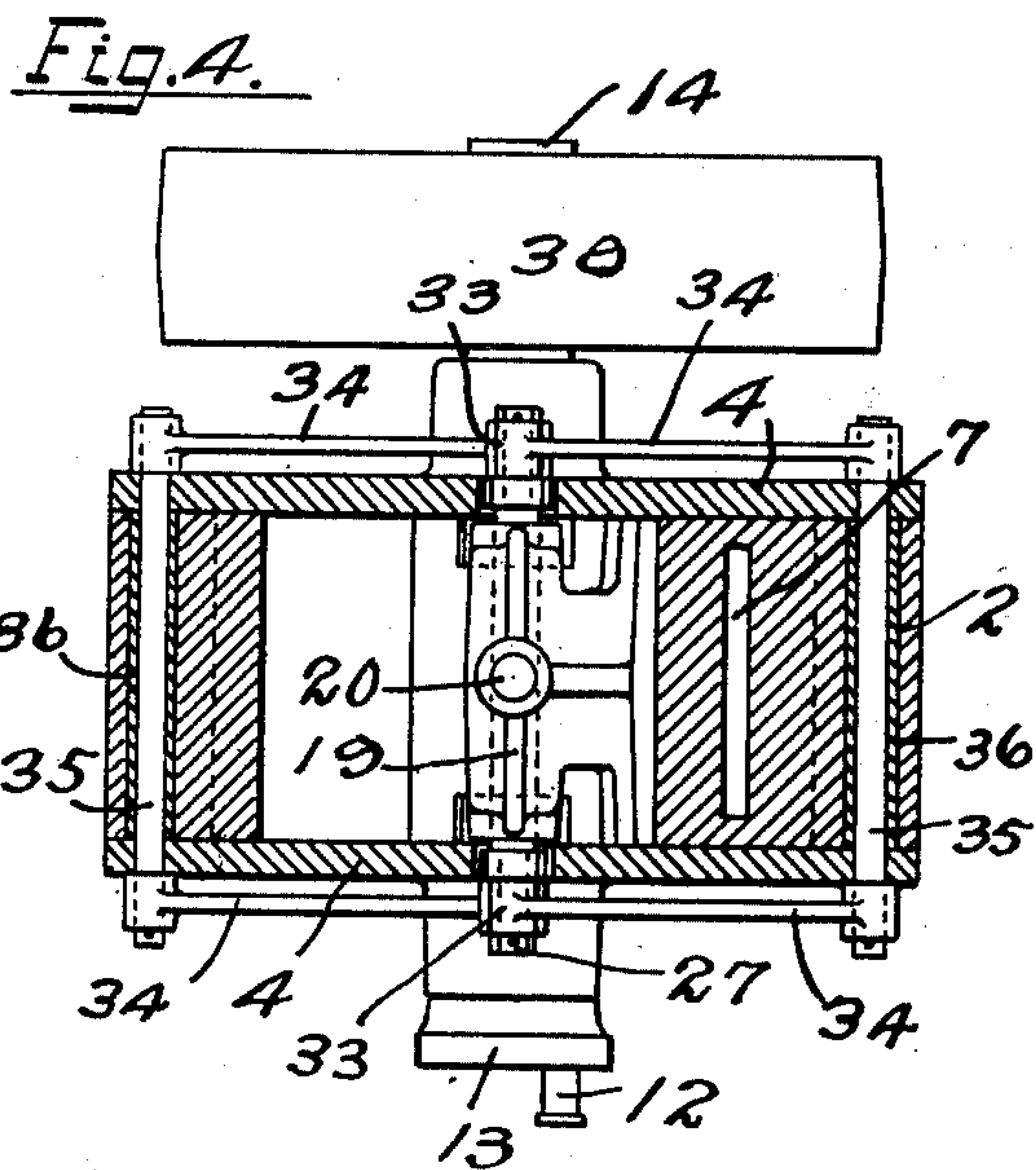
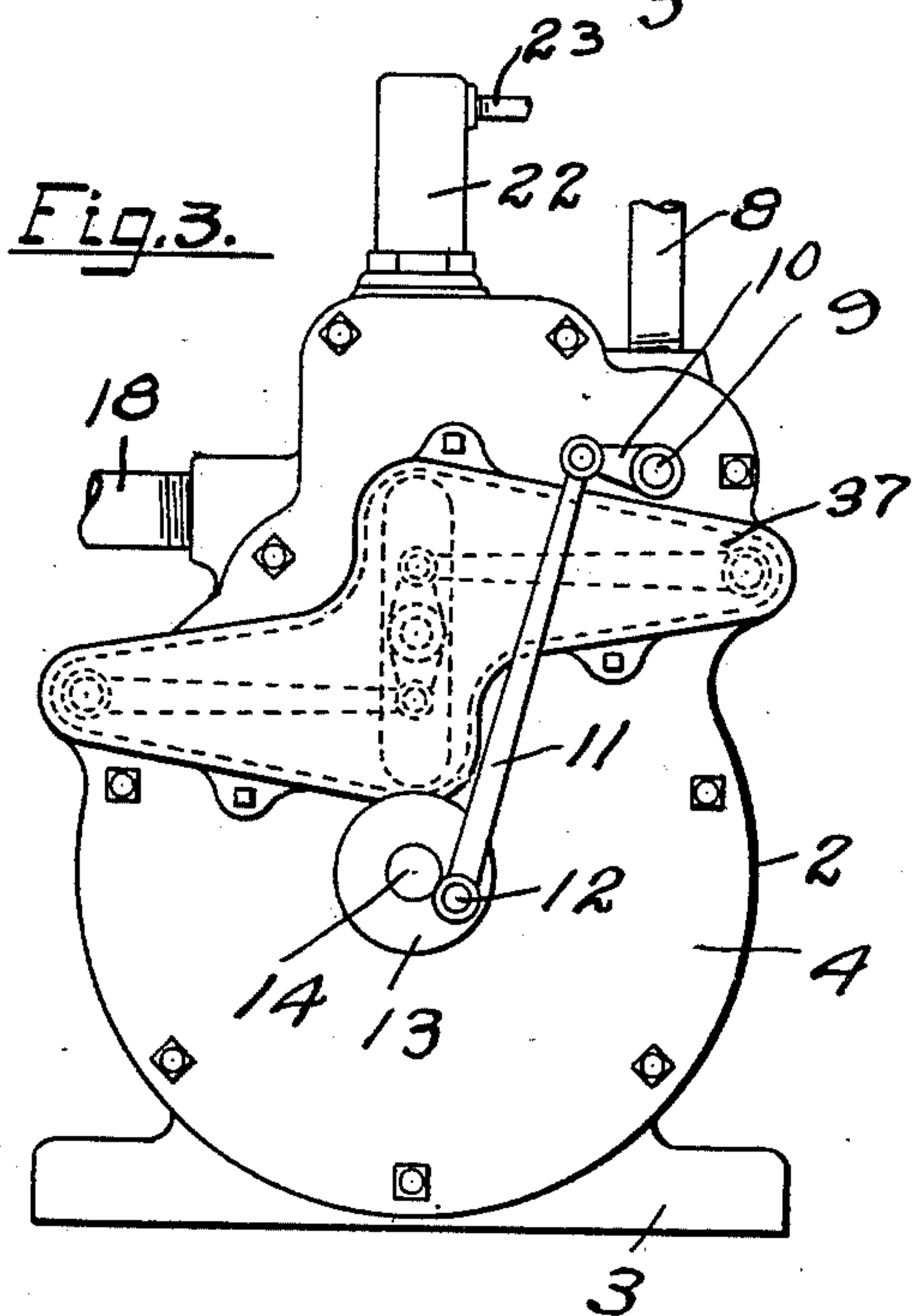
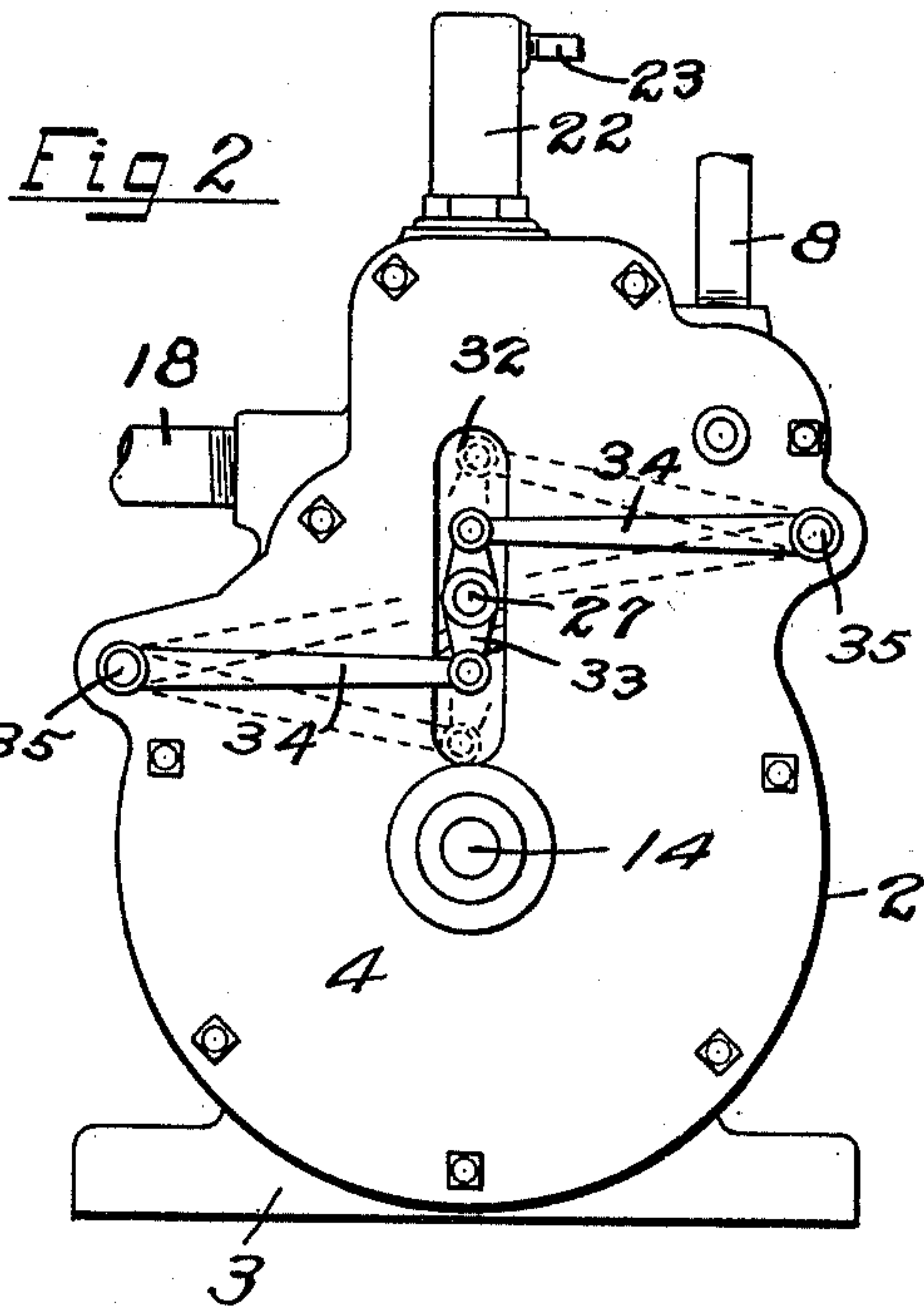
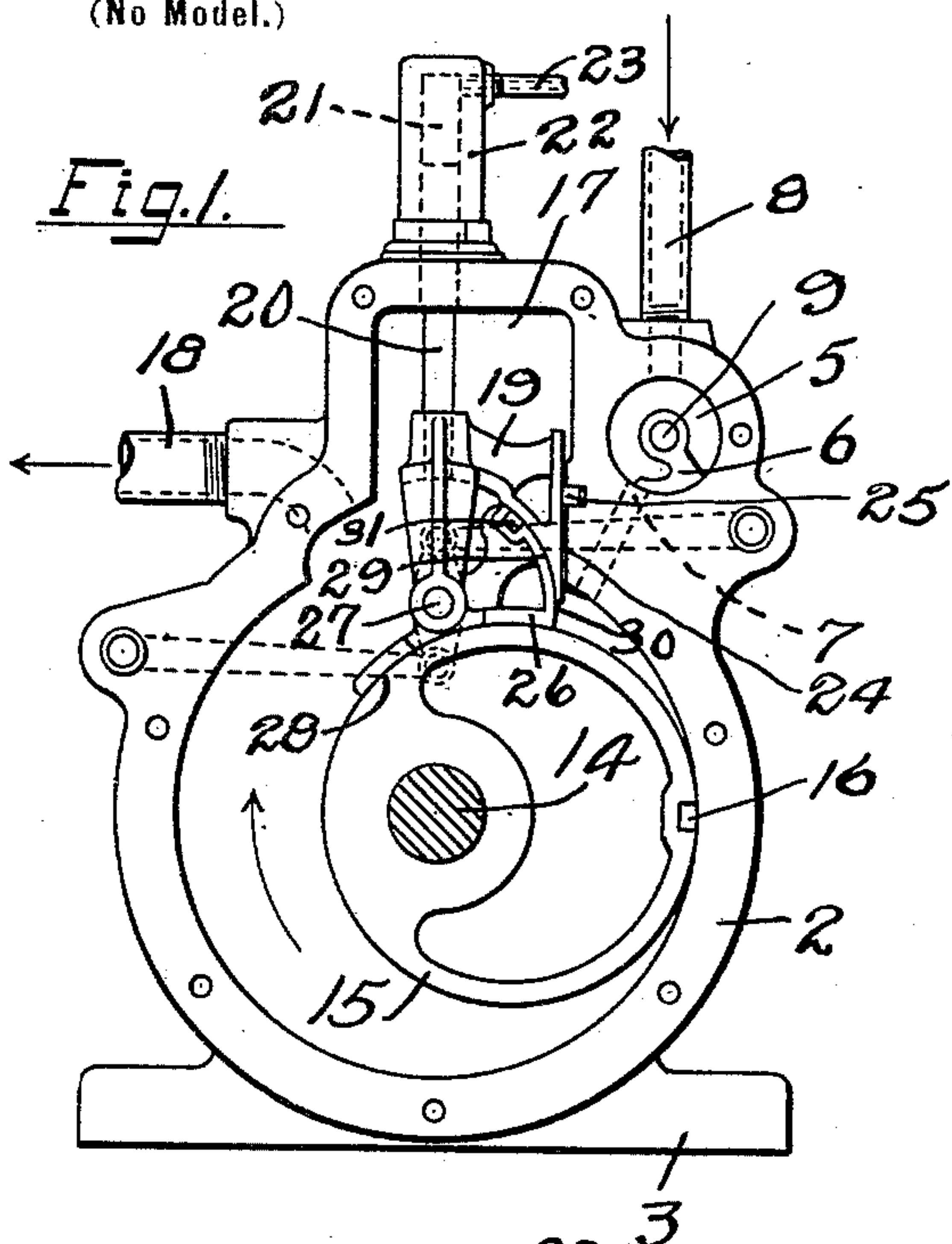
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C. H. HILL.

ATTACHMENT FOR ROTARY ENGINES.

(Application filed May 24, 1902.)

(No Model.)



Witnesses

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ATTACHMENT FOR ROTARY ENGINES.

SPECIFICATION forming part of Letters Patent No. 717,001, dated December 30, 1902.

Application filed May 24, 1902. Serial No. 108,765. (No model.)

To all whom it may concern:

Be it known that I, CHAUNCY H. HILL, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Attachments for Rotary Engines, of which the following is a specification.

My invention relates to rotary engines, and particularly to the piston shoe or abutment therefor.

The object of the invention is to provide means for taking up the lateral thrust exerted on the shoe or abutment and follower by the pressure of the steam, and thereby avoiding contact and friction between the wall of the cylinder and the moving parts and the consequent reduction in the power and efficiency of the engine.

Other objects of the invention will appear from the following detailed description.

The invention consists generally in providing cross-heads on each side of the shoe or abutment pivot or spindle and pivotally connecting said cross-heads by links or rods with the cylinder.

Further, the invention consists in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of a rotary engine embodying my invention, one of the heads being removed to show the interior of the cylinder. Fig. 2 is a similar view with the head in place. Fig. 3 is also a side elevation showing the cylinder-head in place and a casing or cover over the working parts. Fig. 4 is a transverse horizontal section showing the manner of pivoting the links or rods on the cylinder.

In the drawings, 2 represents a cylinder having a suitable base 3 and heads 4. A valve-chamber 5 is provided in said cylinder, wherein a valve 6 is located, that is adapted to admit or cut off the passage of steam to the cylinder through the port 7. A steam-supply pipe 8 communicates with the chamber 5. The spindle 9, whereon the valve 6 is mounted, projects through the cylinder-head and is provided with a crank 10, connected by a link 11 with a wrist-pin 12 on a disk 13, that is secured on the shaft or rod 14 of an

eccentric piston 15, which is adapted to roll over the inner surface of the cylinder and is provided with a packing-strip 16, that forms a substantially steam-tight joint with the surface over which it passes. The disk 13 and the link 11 are so adjusted that the cut-off valve will be moved to close the passage of steam to the cylinder when the piston has moved a certain distance, so that the expansive power of the steam will be employed to move the piston the remaining part of its revolution. In the upper part of the cylinder I provide a chamber 17, communicating with an exhaust-pipe 18, that is opposite, substantially, the steam-inlet pipe. Within the chamber 17 I provide a follower 19, having a guide-rod 20, that is vertically slidable within a socket 21, provided in a stud 22, said socket communicating with a steam-pipe 23, which allows a sufficient quantity of steam to enter the space between the end of the guide and the closed end of the socket to balance the pressure of the steam on the exposed surface of the follower near the intake-passage 7. The follower is adapted to slide over without bearing on the surface 24 near the cut-off valve, and a packing block or strip 25 is provided in said surface to form a close joint with said follower. The opposite side of the follower is out of contact with the wall of the cylinder in an engine that runs only one way, and exposed only to the exhaust and guided by the rod 20 will have a free vertical movement without bearing on the cylinder-wall and causing friction that will reduce the power and efficiency of the engine. Upon the follower 19 I provide a shoe or abutment 26, supported on a pivot 27 and having a concave face 28 to bear upon the surface of the piston 15 and form a close substantially steam-tight joint therewith. The shoe also has a curved face 29, that is adapted to slide over a corresponding face 30 on the follower, between which faces I provide a packing-strip 31. A spindle 27 projects through vertical slots 32, provided in the cylinder-heads, and upon each end of the spindle I arrange cross-heads 33, that are pivotally connected by links 34 with rods 35, that extend through the cylinder from side to side.

In building the engine I provide holes in the cylinder to receive the rods 35, and before se-

curing them therein I attach the links thereto and allow the rods to adjust themselves the proper distance from the spindle to permit free movement of the links and eliminate all unnecessary friction. After the rods have adjusted themselves I fill in around them with Babbitt metal 36, which will hold them firmly and prevent any possibility of their slipping out of place and binding the links. The pivots of the links on the cross-heads will travel in arcs of circles whose centers are concentric with the rods 35, and the arcs of the pivots on the cross-head will be oppositely curved and will, as it were, neutralize each other, so that the spindle between them for the short distance that it moves will travel in a straight line in the slots 32 and permit reciprocation of the follower without bearing or binding on the wall of the cylinder. To adapt the engine to run both ways or "reverse," it is only necessary to duplicate the right-hand construction of the follower and shoe on the left hand and provide a cut-off valve and port on that side also and provide a suitable packing for making a substantially steam-tight joint between the follower and the wall, with which the follower may be entirely out of contact, if preferred.

Over the slots 32 and the links 34 on each cylinder-head I provide casings 37, that form substantially steam-tight joints with the cylinder-heads and prevent the escape of the exhaust-steam which passes into the casings through the slots 32, with which the chamber 17 communicates. The end of the shaft 14 on the side opposite the disk 13 is provided with a driving-pulley 38.

In operation steam being admitted through the port 29 will come in contact with the piston and a portion of the follower-surface and the pivoted shoe or abutment. That portion of the follower-surface that is exposed to the steam is substantially equal in area to the end of the guide-rod 20 that is also exposed, and consequently the follower will remain substantially in balance and free to move up or down as the piston moves. The pressure on the shoe or abutment, which in rotary engines as heretofore constructed is transmitted to the follower to force it against the opposite wall of the cylinder and greatly increasing friction of the parts, is in my improved engine conveyed through the cranks and the links 34 to their pivots on the engine-heads. These links and pivots will support the oscillating shoe or abutment and the follower in the same manner as the latter would support the abutment if it bore directly upon the wall of the cylinder as it does in rotary engines as usually constructed; but the friction of the links on their pivots will be very slight compared with that of the follower when it presses directly against the cylinder-wall, and consequently the movement of the parts will be much easier and freer and the power of the engine and its efficiency will not be materially reduced. The abutment-spin-

dle will move up and down in the vertical slots as the abutment follows the piston in its stroke.

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I claim as my invention—

1. In a rotary engine, the combination, with a cylinder having a piston and a steam-inlet port provided with a suitable cut-off valve, of a shoe or abutment adapted to fit the surface of said piston, a sliding follower having a close joint with the wall of said cylinder on the side adjacent to said cut-off valve and out of contact with the wall on the opposite side, a spindle or pivot mounted in bearings in said follower and pivotally supporting said shoe, the ends of said spindle projecting through slots in the cylinder-heads and movable therein, cross-heads provided on the ends of said spindle, and links pivotally connecting said cross-heads with the cylinder upon each side of said spindle.

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2. In a rotary engine, the combination, with a cylinder having a piston and a steam-inlet port provided with a cut-off valve, of an oscillating shoe or abutment fitting the surface of said piston, a vertically-movable spindle whereon said shoe is mounted, the ends of said spindle projecting through openings in the cylinder-heads, cross-heads provided on said spindle and links pivotally connecting said cross-heads with the cylinder.

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3. In a rotary engine, the combination, with a cylinder having an inlet-port and valve and a piston, of an oscillating shoe or abutment adapted to bear upon the surface of said piston, a sliding follower, a guide therefor, a spindle mounted in said follower and whereon said shoe is supported, the ends of said spindle projecting through slots in the cylinder-heads, cross-heads provided on the ends of said spindle, links pivotally connecting said cranks with the cylinder, and suitable casings inclosing said cranks and links.

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4. In a rotary engine, the combination, with a cylinder having a steam-inlet port and valve and an exhaust-chamber 17 and provided with a suitable piston, of a follower adapted to bear on the wall of said cylinder near said port and out of contact with the opposite wall, a guide-rod on said follower, a socket on said cylinder to receive said guide-rod and communicating with the steam-supply, the area of the end of said rod exposed to the steam-pressure being substantially the same area as the surface of the follower that is normally exposed to the pressure near said port, a shoe or abutment adapted to bear on the surface of said piston and pivotally mounted in said follower, and pivotal connections provided between the pivot of said shoe and said cylinder to take up the pressure exerted by the steam on said shoe and follower.

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5. In a rotary engine, the combination, with a cylinder having a piston and a steam-inlet port provided with a cut-off valve, of a sliding follower, an oscillating shoe or abutment fitting the surface of said piston, a spindle

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mounted in said follower and whereon said abutment is supported, the ends of said spindle projecting through slots in the cylinder, cross-heads provided on the ends of said spindle, and links pivotally connecting the ends of said cross-heads with said cylinder, the links at the same end of the spindles swinging on oppositely-curved arcs whereby said spindle will move in a substantially straight line and binding or clamping of the follower will be prevented.

6. In a rotary engine, the combination, with a cylinder having a piston and a steam-inlet port provided with a cut-off valve, of a follower, a shoe fitting the surface of said pis-

ton, a spindle mounted in said follower and supporting said shoe and having its ends projecting through slots in the wall of said cylinder and movable therein, cross-heads provided on the ends of said spindle, rods provided in holes in said cylinder, links pivotally connecting said rods with said cross-heads and a Babbitt-metal filling around said rods, substantially as described.

In witness whereof I have hereunto set my hand this 13th day of May, 1902.

CHAUNCY H. HILL.

In presence of—

RICHARD PAUL,
M. C. NOONAN.