

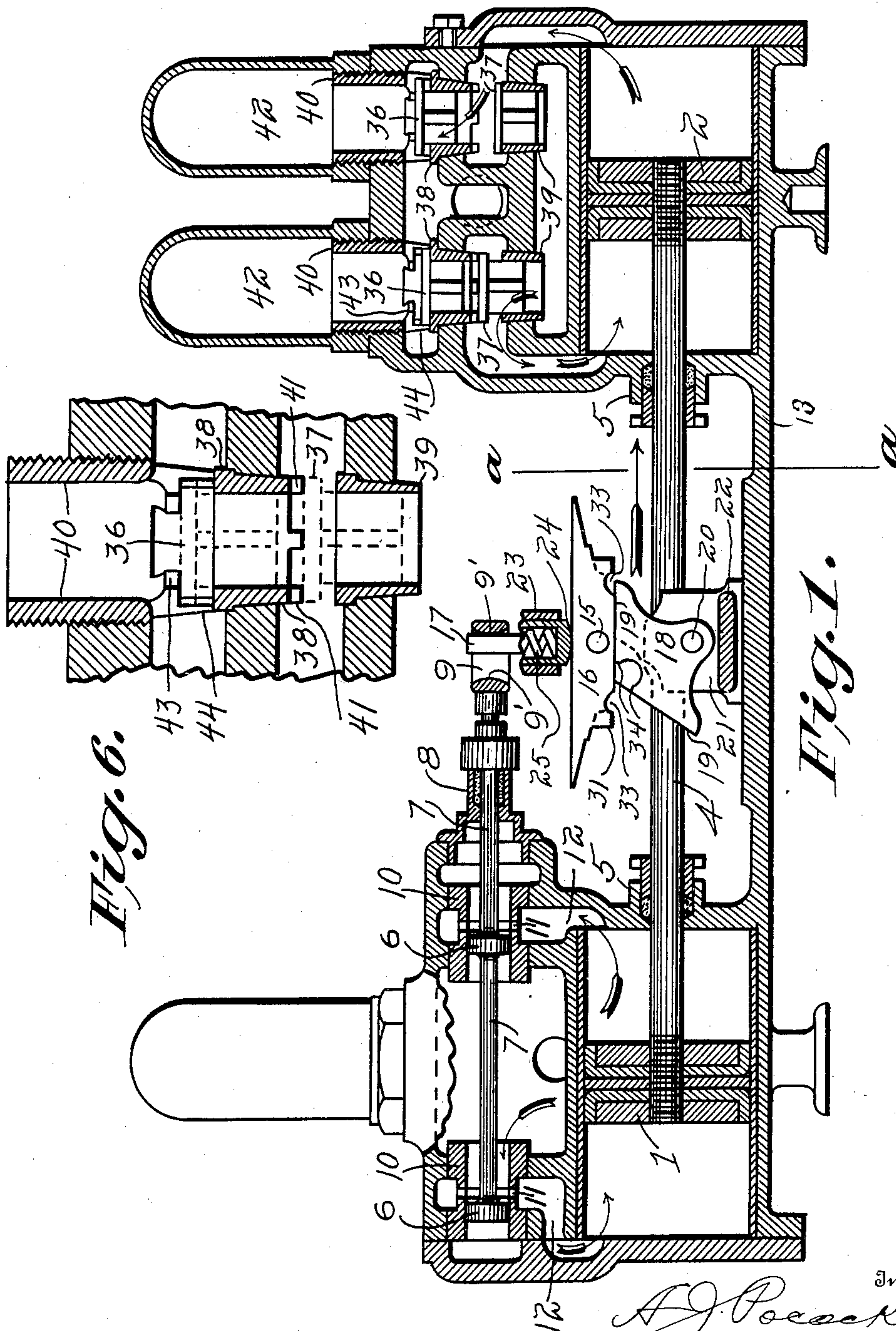
No. 897,654.

PATENTED SEPT. 1, 1908.

A. J. POCOCK.
VALVE GEAR.

APPLICATION FILED MAY 18, 1908.

2 SHEETS—SHEET 1.



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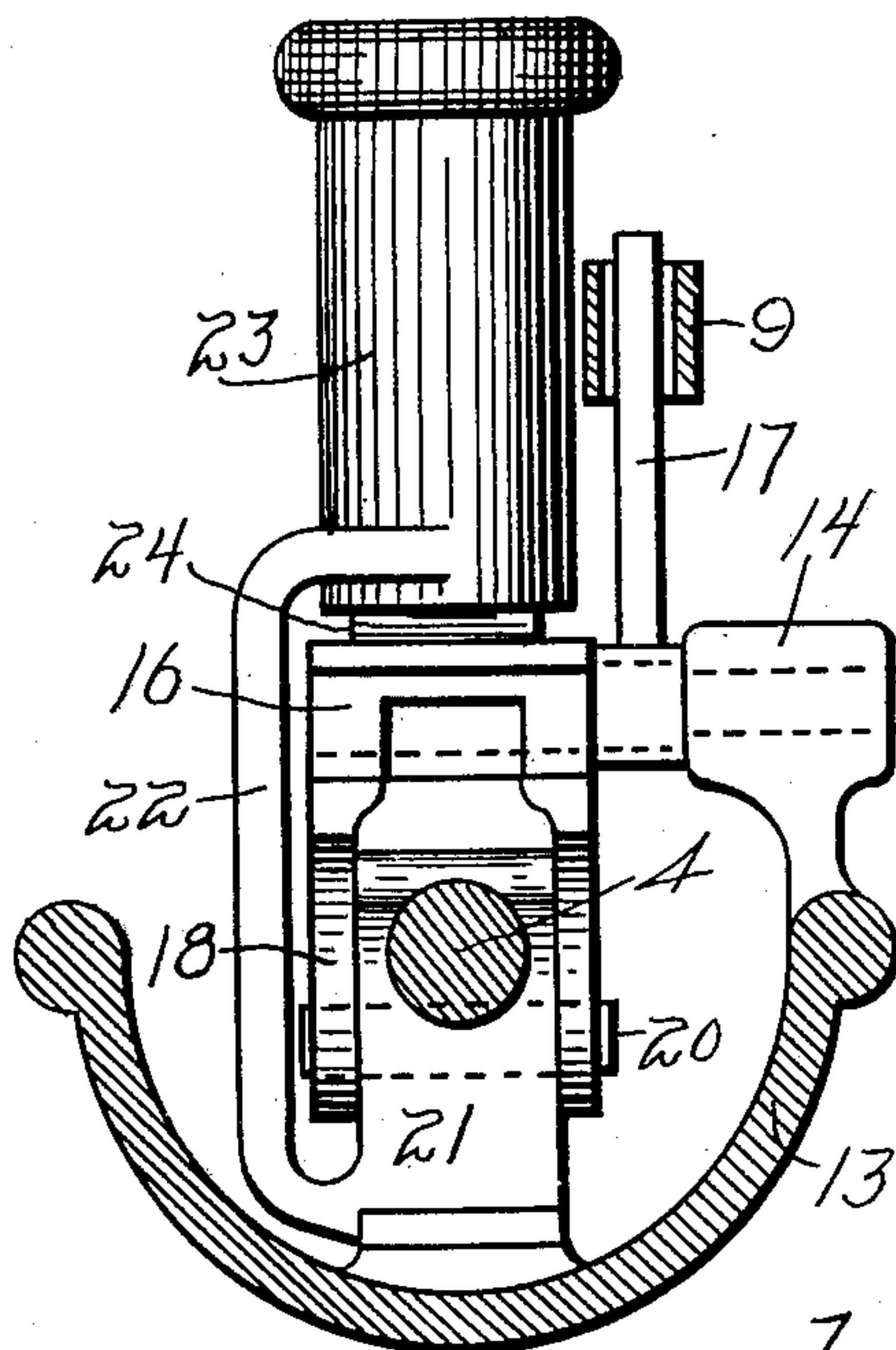


Fig. 2.

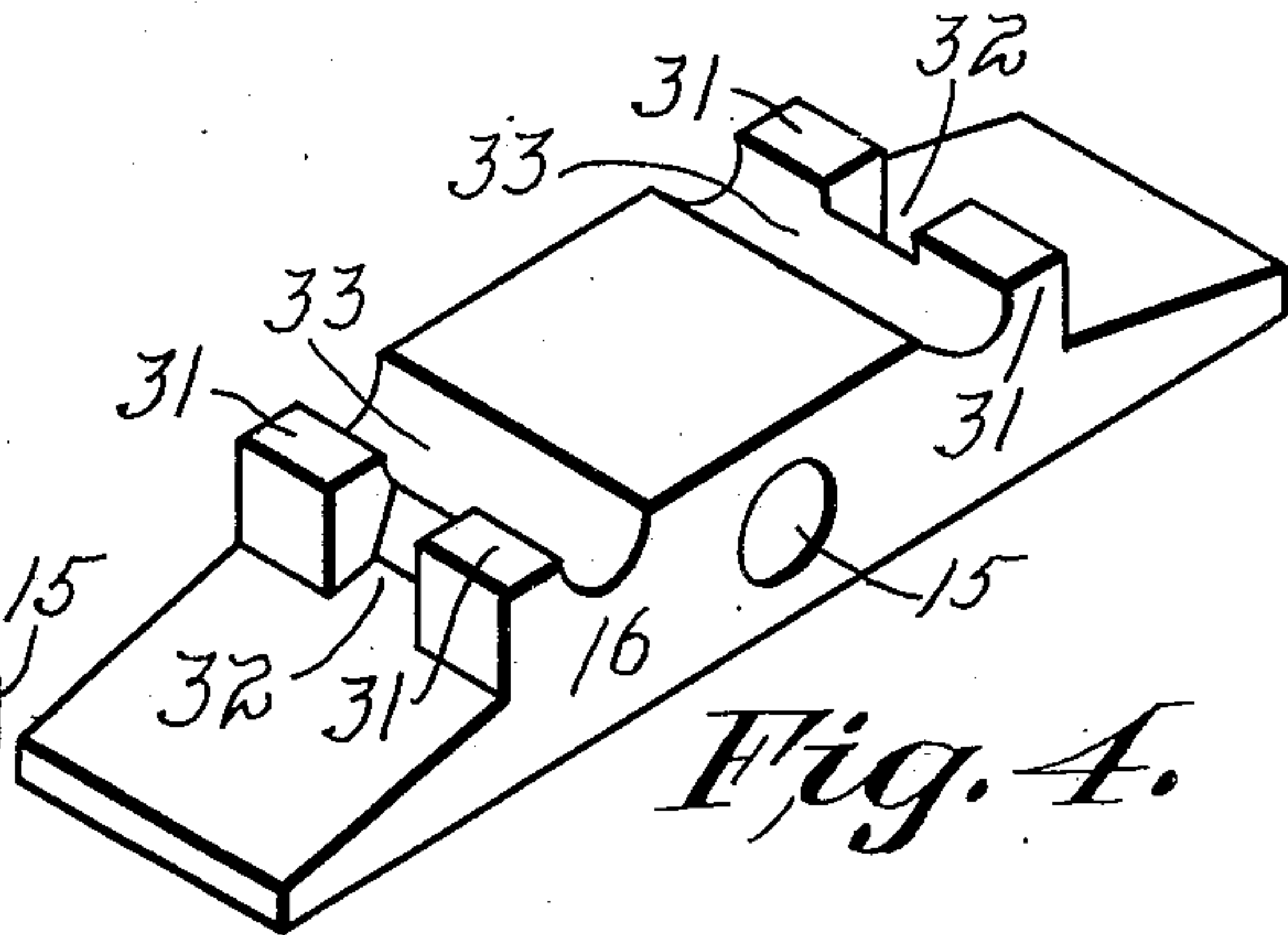


Fig. 4.

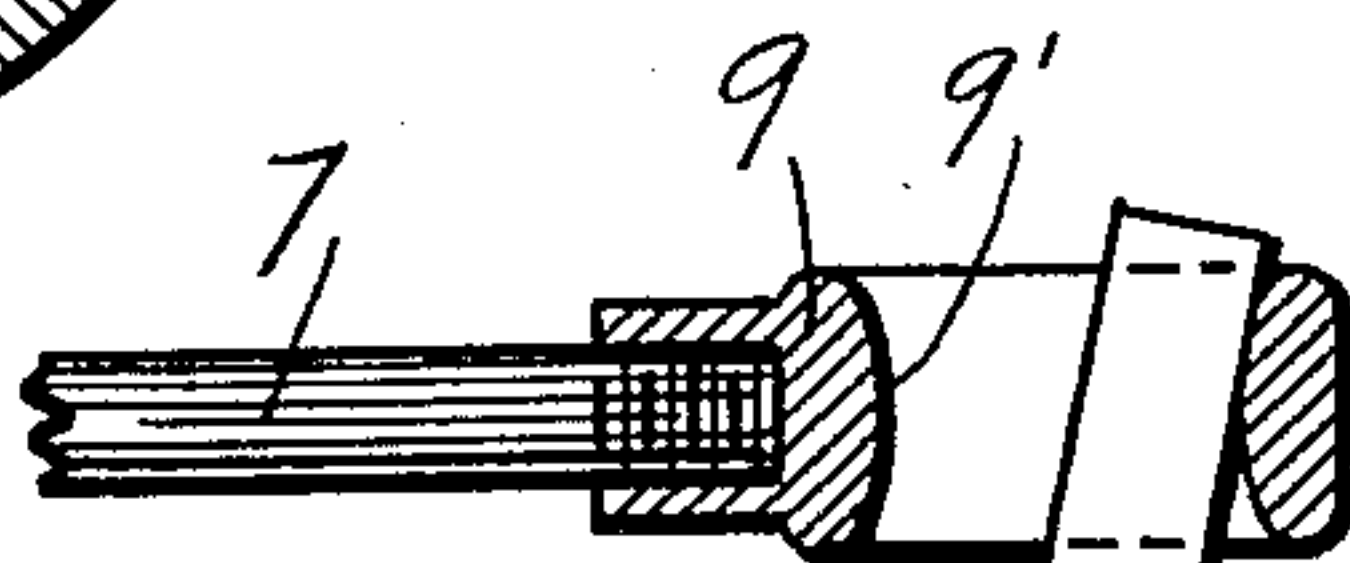


Fig. 5.

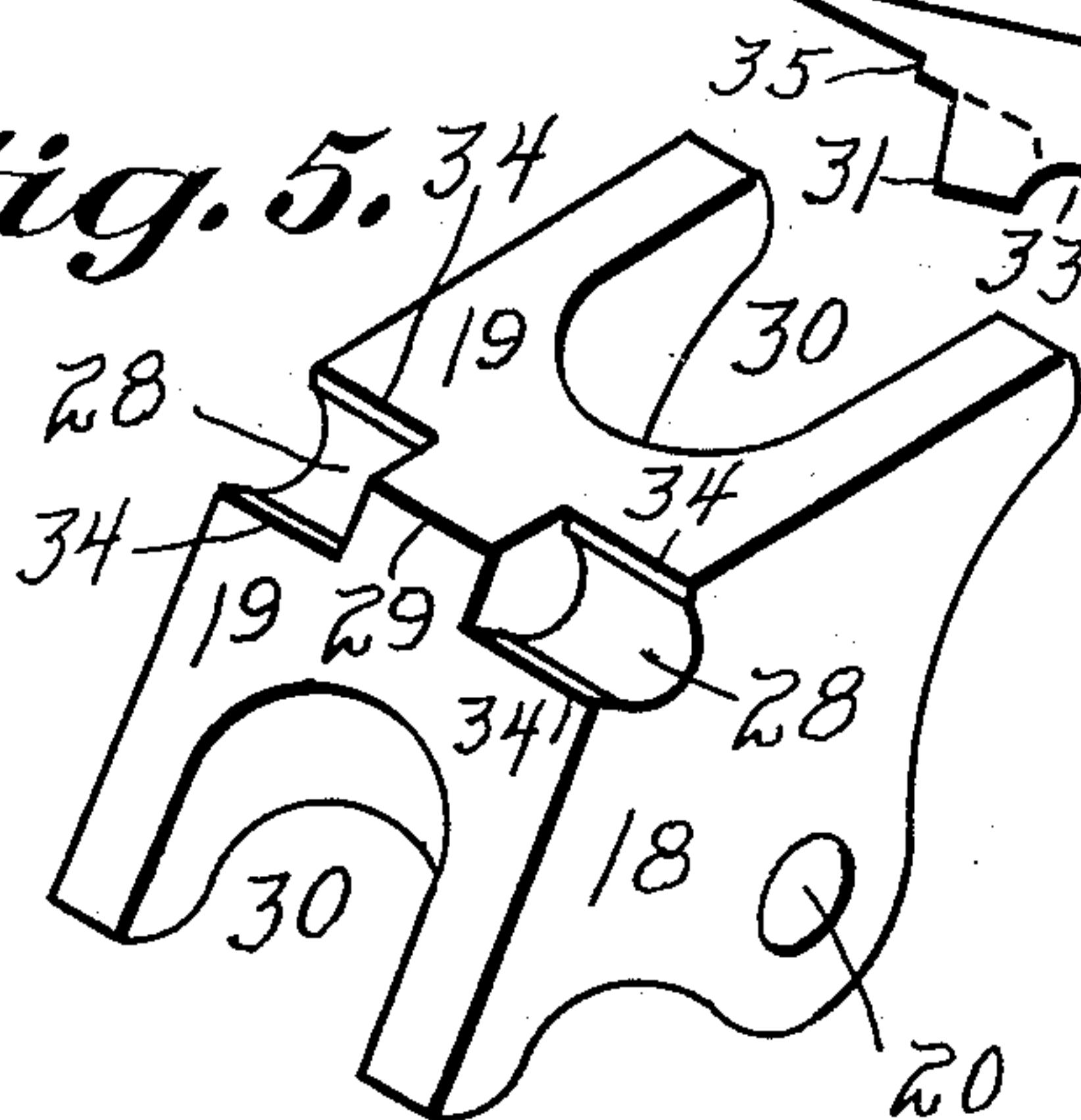


Fig. 3.

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UNITED STATES PATENT OFFICE.

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VALVE-GEAR.

No. 897,654.

Specification of Letters Patent.

Patented Sept. 1, 1908.

Application filed May 18, 1908. Serial No. 433,405.

To all whom it may concern:

Be it known that I, AUGUSTINE J. POCOCK, citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Valve-Gear; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in valve gear for engines or pumps.

The object of the invention is to provide means which enable the dispensing with the use of an auxiliary or pilot valve and auxiliary piston by means of which a main valve is usually moved and a driving piston is reversed in its movement. The desirability of dispensing with the auxiliary or pilot valve and auxiliary piston is well known to those conversant with the construction and operation of direct acting single engines and liquid motors as usually applied to pumps.

Preceding a detailed description of the invention, reference is made to the accompanying drawings, of which—

Figure 1, is a longitudinal sectional elevation of an engine or pump to which my improvements are applied. Fig. 2, is an enlarged view on the line *a a* of Fig. 1. Fig. 3, is an enlarged sectional elevation of the valve-gear mechanism. Fig. 4, is a detached view in perspective of the tilting lever a feature of the valve-gear mechanism. Fig. 5, is a detail view in perspective of the oscillating trip-piece, a feature of the valve-gear mechanism. Fig. 6, is a detail sectional elevation of the arrangement of the valves in the pumping end of the pump.

In a detail description of the invention, similar reference characters indicate corresponding parts.

1 designates a driving piston, and 2 a pumping piston acting in cylinders and mounted upon the ends of a piston rod 4 which passes through stuffing boxes 5 in the heads of the cylinders. Above the piston 1 is a valve casing containing a valve 6 through which the inlet to opposite sides of the piston is controlled. This valve may be of any of

the well-known types of piston or slide valve. The drawings show a type of piston valve with the stem 7 extending out of the casing through a stuffing box 8 and terminating in an apertured head 9; this head in the present instance, is a separate piece screwed on the end of the valve stem or rod. The valve 6 reciprocates in casings 10 having ports 11 which control the passages 12 which convey the energizing fluid, gas or steam, to opposite sides of the piston 1 as indicated by the arrows. Heretofore, it has been the practice to control this inlet valve by means of an auxiliary piston controlled by a pilot valve. Such auxiliary piston and pilot valve are dispensed with in the use of my improved valve gear which mechanically controls the reversing of the inlet valve 6. The central portion of the pump frame 13 is provided with an extended apertured lug which provides a bearing 14 for the pivot 15 of a tilting lever 16; this tilting lever has an arm 17 which projects into the aperture in the head 9 on the valve stem or rod 7, and said aperture has suitable rounded surfaces 9' to permit the arm 17 to have suitable contact with the opposite sides of the head 9 in moving the valve 6.

Coöperating with the tilting lever 16 is an oscillating trip-piece 18 having two straight sides 19 which are adapted to alternately come in contact with the lower side of the tilting lever 16 to move the same to a horizontal position. The trip piece 18 is pivoted to a cross-head 21 by a pin 20, said cross-head having an arm 22 which joins the cylinder 23 of an accumulator. This accumulator stores up energy during the stroke of the piston to be expended at the end of said stroke to throw the valve, and comprises the cylinder 23, the plunger 24 therein which is controlled by a helical spring 25 seated within said plunger and inclosed between the lower portion of the plunger and a plug 26 which is inserted within the mouth of the cylinder 23. The plug 26 and the plunger 24 have apertures 27 for the passage of oil for lubricating the parts. The plunger 24 engages the tilting lever 16 and exerts a suitable pressure thereon. It is obvious that the accumulator may be provided with suitable pressure other than a spring. The cross-head 21 is rigidly secured to the piston rod 4 at a suitable point, and therefore, moves with the piston rod, and carries the trip-piece 18 with it.

The apex of the angle formed by the two

straight sides 19 of the trip-piece is provided with two recesses 28, between which is a lug or shoulder 29 formed by continuing the straight sides 19 to a point of convergence.

5 The opposite sides of the trip-piece are open to provide recesses 30 that enable the trip-piece to clear the piston rod 4 in the oscillating movement of said trip-piece. The lower side of the tilting lever 16 is provided

10 with lugs or shoulders 31 having two straight sides lying at right angles and separated by recesses 32. At the end of each stroke of the piston rod 4, the lugs or shoulders 31 on the tilting lever enter the recesses 28 in the trip

15 piece, and the lug 29 on the trip-piece enters the recess 32 on the tilting lever, and there is thus a connection made between the two members which is substantially the same as a gear connection, and results in a uniform co-

20 operative action between the trip-piece and the tilting lever. On the inside of the lugs or shoulders 31 on the tilting lever, there are recesses 33 which permit the corners 34 on the trip piece to enter said recesses when said

25 trip piece is reversing its position at each end of the stroke of the piston rod 4. The shoulders or corners 34, it will be seen, are formed by terminations of the straight sides 19 of the trip-piece.

30 As the valve-gear mechanism is shown in Fig. 3, the piston rod 4 has moved to its limit in one direction, and the valve 6 would be in a position the reverse of that shown in Fig. 1. In the return movement of the pis-

35 ton rod 4 from its position in Fig. 3, the trip-piece 18 is moved upon its pivot 20, by reason of its contact with the tilting lever 16; this causes the tilting lever to approach the horizontal position, and while approaching

40 such position, the plunger 24 of the accumulator is moved up and compresses the spring 25. In this movement of the trip-piece the side 19 which is in the lower position in Fig. 3, comes in contact with the lower side of the

45 tilting lever, and the tilting lever thus assumes the horizontal position. In this movement of the trip-piece 18 the corners 34 enter the recesses 33 as before stated, and thus said trip-piece is permitted to have the de-

50 sired movement to engage the tilting lever. When the tilting lever is thus moved to the horizontal position, the arm 17 moves in contact with the apertured head 9 at one or the other side of the aperture. The aperture

55 in said head allows the arm 17 some lost motion, so that the first movement of the arm 17 due to the tilting lever being moved to the horizontal position, brings said arm to a position to impart movement to the valve rod

60 when said lever receives its tilting movement.

It has been stated that the plunger 24 of the accumulator is inclosed within a cylinder 23 which is supported upon the moving

65 cross head 21, said cross-head moving with

the piston rod 4 as before stated. It will therefore be seen that the plunger 24 moves in contact with the tilting lever 16 from one end thereof to the other, and likewise the trip-piece moves against the lower side of

70 said tilting lever until the recesses 28 in the trip-piece come in position to receive the lugs 31 on said tilting lever under the action of the plunger 24, and thus said lever is tilted to impart the necessary movement to the

75 valve 6 through the valve stem or rod and to thus reverse said valve. The extent of lost motion which the arm 17 of the tilting lever has before imparting such movement, is shown in Fig. 3. The working surface on the

80 lower side of the tilting lever 16 is adjacent to the vertical sides of the shoulders 31, or rather the point of engagement between the sides 19 of the trip-piece, and the lower side of the tilting lever 16 is indicated at 35,

85 which shows an off-set on the tilting lever as it appears in Fig. 3. This off-set is not shown on the tilting lever in Fig. 4; it may or may not be employed.

As before stated, I do not desire to limit

90 myself to the exact construction of the parts shown herein and described, as it is obvious that the principles involved and which enable a pilot valve and an auxiliary piston as a means for reversing a valve, to be dispensed

95 with, may be employed in other forms of engines or motors without departing from the invention which has for its object the development of power to move a main valve of

100 an engine by means of an oscillating trip-piece acting in conjunction with a tilting lever. The storing of this power or energy in an accumulator which travels with the movement of a piston rod as does also the

105 trip-piece, and the delivery of this energy to a valve stem at the end of the stroke, whereby the valve is moved in its opposite position and thus causes a piston to reverse its move-

110 In the pumping end of the pump, an arrangement of valves is shown, which in addition to being of great utility, provides means for utilizing a bushing to form a stop for one of the valves, and means for holding in position the seat of said valve, said seat also pro-

115 viding a stop for a lower valve so that the entire arrangement of valves and seats is compact and of a character to reduce to a minimum the liability of the valves requiring at-

120 tention.

39 is a bushing providing a seat for an admission valve 37 of well-known construction. Above this admission valve 37 is a bushing 38 forming a seat for a discharge valve 36.

125 The lower end of the bushing 38 is provided with stops 41 for the admission valve 37, and the upper end of said bushing 38 provides a seat for the discharge valve 36.

40 is a bushing above the valve 36 and communicating with the air chamber 42.

130

This bushing 40 has a stop 43 for the discharge valve 36, and lugs 44 for holding the lower bushing or valve seat 38 in position.

As the valves are shown in Fig. 1, the admission valve on the right side is closed, and that on the left is open, while the discharge valve on the right is open and that on the left is closed. The piston 2 is moving in the direction of the arrow.

10 Having described my invention, I claim:

1. In a pump, the combination with a piston rod having a driving piston, and an inlet valve, of valve gear for reversing said valve comprising a tilting lever coöperatively connected with the stem or rod of said valve, a trip piece movable with and pivoted on the piston rod and adapted to impart movement to the tilting lever, and an accumulator pressing the tilting lever and reversing its position at the end of each movement of the trip-piece.

2. In a pump, the combination with a piston rod with a driving piston thereon, and a valve rod with a valve thereon, of a trip-piece pivoted on the piston rod, an accumulator, said trip-piece and accumulator being movable with the piston rod, and a tilting lever interposed between the accumulator and the trip-piece and controlled thereby in the movements of the piston rod to reverse the valve.

3. In a pump or engine, the combination with a piston and piston rod, and a valve and valve rod, of a tilting lever engaging the valve rod to impart reciprocating movement to the valve, an oscillating trip-piece movable with the piston rod and in contact with the tilting lever, said trip piece being adapted to move the tilting lever to a horizontal position, and means engaging the tilting lever and adapted to reverse its position and to thus impart reciprocating movement to the valve.

4. In an engine or pump, the combination with a piston and piston rod, and a valve and valve rod, of a valve gear for reversing said valve and comprising a tilting lever with an extended arm adapted to impart movement to the valve when the tilting lever assumes either of its tilting positions, an oscillating trip-piece movable with the piston rod and having two working surfaces which alternately engage the tilting lever, and means for preserving a suitable contact between the tilting lever and the trip-piece.

5. In an engine or pump, the combination with a piston and piston rod, and a valve and valve rod, of a valve gear comprising a tilting lever with an extended arm engaging the valve rod, said tilting lever having abutments and recesses on one side thereof, an oscillating trip-piece having working surfaces disposed at suitable angles to each other with intervening recesses and shoulders adapted to coöperate with the abutments and

recesses on the tilting lever and whereby the tilting lever is movable from a horizontal to inclined positions at the end of each travel of the trip-piece, and an accumulator engaging the tilting lever and controlling the inclined positions thereof until the trip-piece lifts said lever to its horizontal position.

6. In a pump or engine, the combination with a piston and its rod, and a valve and valve rod, of a valve controlling the admission of the energizing medium to the piston, a tilting lever controlling the movement of the valve, an accumulator, a tilting trip-piece, said accumulator and trip-piece controlling the movements of the tilting lever, and the piston rod controlling the movements of the accumulator and the tilting trip-piece.

7. In a pump or engine, the combination with a cylinder, a piston and piston rod therein, a valve controlling the admission of the energizing medium to the piston, of a valve gear comprising a tilting lever adapted to impart movement to the valve, said tilting lever having shoulders thereon forming abutments with recesses adjacent to said abutments, an oscillating trip-piece having its upper side provided with two straight surfaces which coöperate with the tilting lever in obtaining the desired movement of said lever, the said trip-piece having abutments and recesses at the apex of the angle formed by the two straight surfaces thereof, said abutments and recesses coöperating with the abutments and recesses on the tilting lever to enable said tilting lever to reverse its position and to thus impart movement to the valve, and an accumulator controlling the reversing movements of the tilting lever.

8. In a single cylinder engine, the combination with a cylinder, a piston therein, a piston rod, an inlet valve controlling the admission of the motive fluid to said piston, of a valve gear comprising a tilting lever controlling the movements of the valve, an accumulator, an oscillating trip-piece, said accumulator and oscillating trip-piece engaging opposite sides of the tilting lever, and a cross-head supported upon and movable with the piston rod, and upon which the accumulator and the oscillating trip-piece are mounted.

9. In a single cylinder pump, a cylinder, a piston, a piston rod, and a valve controlling the admission of the energizing medium to the piston, of a tilting lever controlling the movement of the valve, a cross-head supported on and movable with the piston rod, a trip-piece having two oppositely-disposed working sides which coöperate with the tilting lever, an accumulator coöperating with the tilting lever and exerting a pressure thereon oppositely-disposed to that exerted by the trip-piece, the trip-piece and the accumulator being supported upon the cross-head, and both the tilting lever and the trip-piece having means which enable said lever to assume

its tilting position when wholly under the influence of the accumulator.

10. In an engine, means for the development of power to move a main valve, comprising an oscillating trip-piece and a tilting lever acting in conjunction, the tilting lever being adapted to impart movement to the valve, and the trip-piece being movable with a piston rod, a piston to which said rod is connected, and an accumulator which travels with the movement of the piston rod and is

adapted to deliver its energy at each end of the tilting lever to tilt the same at the termination of each movement of the piston rod.

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

AUGUSTINE J. POCOCK.

Witnesses:

C. M. THEOBALD,
MATTHEW SIEBLER.