

No. 637,759.

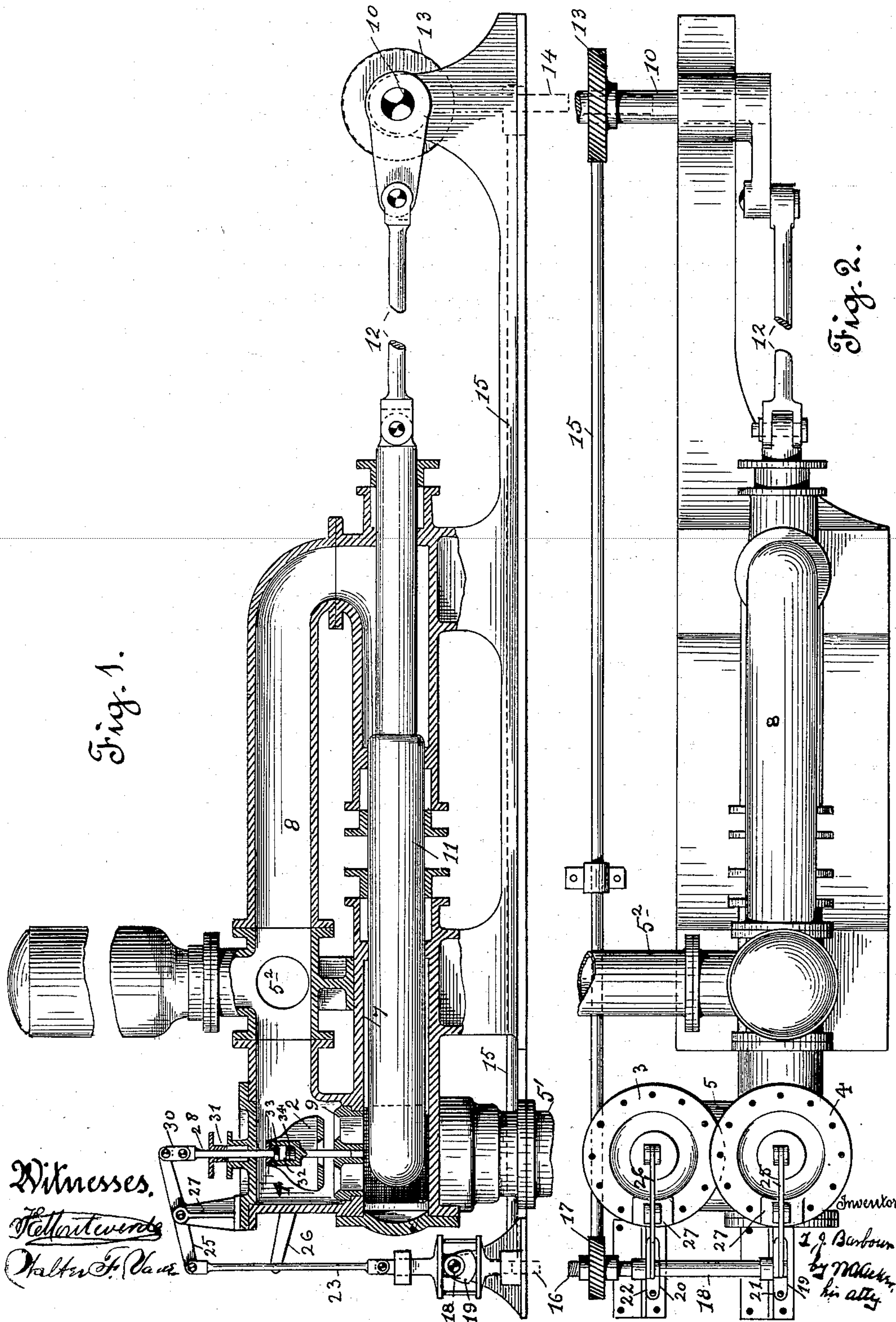
Patented Nov. 28, 1899.

T. J. BARBOUR.
PUMP VALVE MECHANISM.

(Application filed Feb. 3, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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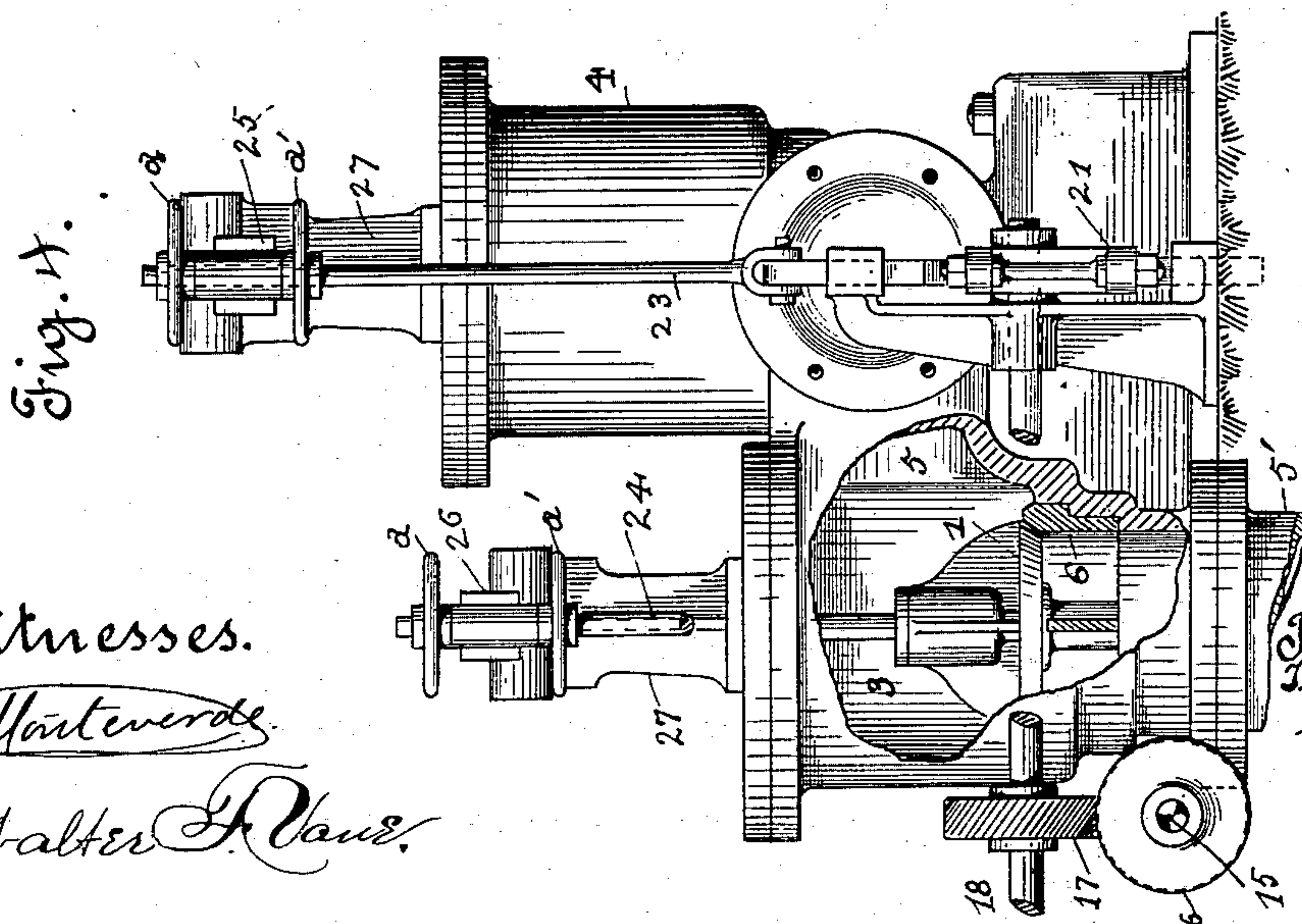
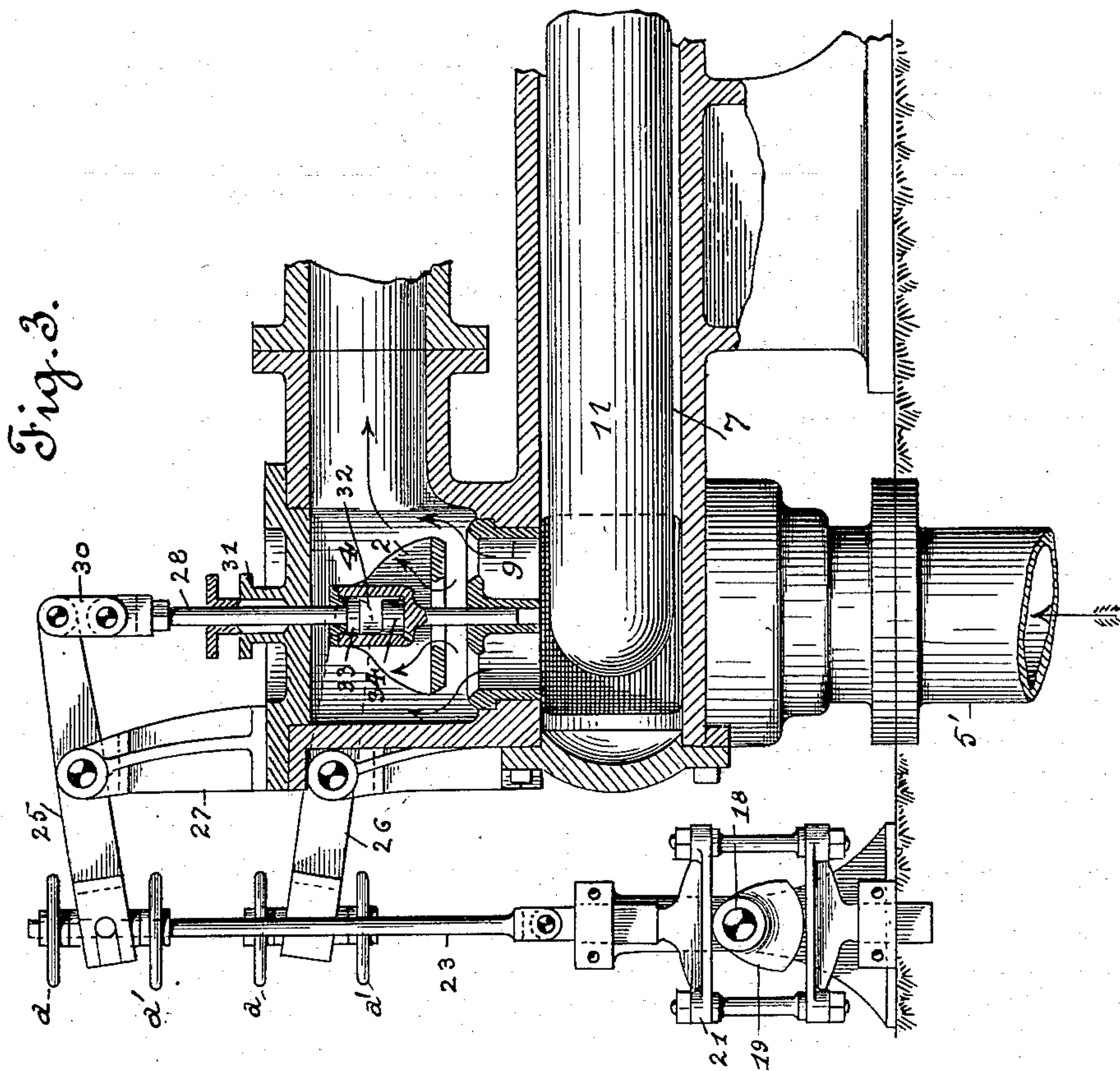
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2 Sheets—Sheet 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

THOMAS J. BARBOUR, OF SAN FRANCISCO, CALIFORNIA.

PUMP VALVE MECHANISM.

SPECIFICATION forming part of Letters Patent No. 637,759, dated November 28, 1899.

Application filed February 3, 1899. Serial No. 704,424. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. BARBOUR, a citizen of the United States, residing in the city and county of San Francisco, in the State of California, have invented certain new and useful Improvements in Pump Valve Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof.

The present invention relates to certain new and useful valve-operating mechanism for use in connection with piston or plunger pumps, differential or otherwise, which consists in the arrangement of parts and details of construction, as will be hereinafter fully set forth in the drawings and described and pointed out in the specification.

The invention is more particularly adapted to pumps working under a heavy load; and its object is to provide suitable valve-actuating mechanism by means of which the closing of the valves is positive at the end of the stroke of the pump, thereby preventing loss through the valves and at the same time shock from the closing of the valves, and in so arranging that a limited movement may be permitted the valve, so as to compensate for dirt or foreign matter which may locate between the valve and its seat, and in providing means by which the stroke of the valves may be increased or decreased, as may be required for the working of the pump.

For a comprehensive understanding of the invention reference must be had to the accompanying sheet of drawings, forming a part of this application, wherein—

Figure 1 is a longitudinal sectional view, in side elevation, of the pump, partly broken away. Fig. 2 is a top plan view thereof. Fig. 3 is an enlarged detail view, partly broken away, of the parts illustrated in Fig. 1; and Fig. 4 is a rear end view in elevation of the pump, the chamber for the outlet-valve being partly broken away.

Any suitable style of pump may be employed; but in the present instance I have illustrated my invention as being applied to what is commonly known as a "direct-acting differential plunger crank and fly-wheel pump" as a convenient type, and in the drawings the numeral 1 is used to designate the suction-valve and 2 the discharge-valve, which

are located and work in the valve-chambers 3 4, respectively, which chambers are connected by the waterway 5. The valve 1 controls the inlet of water from the suction-pipe 5' into the valve-chamber 3 through the ported valve-seat 6, while the valve 2 controls the outflow of water from the plunger or pump barrel 7 into the water-chamber 8 through the ported valve-seat 9. These valves or the movement thereof are controlled through the medium of suitable mechanism driven direct from the crank or power shaft 10, which operates the plunger 11 through its connection thereto by means of the connecting-rod 12.

To one end of the crank or power shaft 10 is secured the worm 13, which meshes with worm-wheel 14, attached to the forward end of the shaft 15, arranged parallel to the pump proper and at right angles to the crank or power shaft 10, Fig. 2 of the drawings. In this manner motion of the crank or power shaft is transmitted to the valve-operating rod or shaft 15, which shaft or rod at its rear end carries a worm 16, which in turn meshes with worm-wheel 17, mounted upon one end of a cross-shaft 18, extending at right angles to the axis of pump-cylinders. On this shaft are fastened two segment-cams 19 20, set diametrically opposite each other, which are used for the purpose of regulating or controlling the movement of the suction and discharge valves and at the same time to transmit motion from the cross-shaft 18 through suitable connections to the stems or rods of said valves. These segment-cams, although cam levers or eccentrics may be used in lieu thereof, work in adjustable slot cross-heads 21 22, which are connected to lower end of connecting-rods 23 24, which in turn are adjustably attached to rock-levers 25 26, fulcrumed to brackets 27, conveniently bolted to the valve-chambers 3 4, Figs. 1, 2, and 3. The inner end of each fulcrumed rock-lever is attached to the upper end of a valve-rod 28 by link connection 30. These valve-rods 28 work through stuffing-boxes 31 in the cover of each valve chest or chamber 3 4, and the lower end of each terminates within a cushion chamber or socket 32, carried by each valve 1 2, and the head 33 thereof rests upon or works against an elastic cushion 34, fitted therein. This head or collar 33 presses upon the elastic

cushion upon the downstroke of the valve-rod and forces the valve gradually to its seat and upon the upstroke of the valve-rod engages the cover of the cushion chamber or socket and raises the valve mechanically and positively from its seat.

The form of the cams 19 20, working in the slot cross-heads 21 22, is such as to permit of the inlet and outlet valves being opened and closed quickly and to remain open or closed during the greater part of the plunger or piston's stroke, the action of the cams upon the valves being as follows: As the plunger or piston approaches the end of its stroke when discharging, the valve 2, due to the action of the cam 19 upon the upper portion of the cross-head 21 and the movement of the rod 23 and fulcrumed lever 25, is being gradually forced toward its seat 9 by the inward movement of the valve-rod 28 until just as the plunger reaches, say, one-quarter of an inch from the end of its stroke, its velocity being greatly diminished and the valve area being correspondingly less, the operating mechanism is so adjusted that at this point the pressure of the head of the valve-rod upon the rubber cushion of the valve exercises a gradually-increasing elastic pressure on the valve until just as the plunger reaches the end of the stroke, the valve meantime being almost closed by the pressure of the closing mechanism, when the upward pressure upon the valve ceasing (due to the plunger having reached the end of its stroke) the valve 2 is seated upon its valve-seat without jar or shock and held firmly against its seat, so as to prevent slip or loss through the valve. By reason of the elastic connection or cushion interposed between the valve and valve-rod it is apparent that the valve may give or adjust itself to any irregularities in the valve-seat due to dirt or foreign matter resting thereon or unevenness in the seat itself. It will be understood that during the working of the discharge-valve the suction-valve remains closed and is kept closed by reason of the adjustment of its operating mechanism until the discharge-valve is seated and the plunger commences to recede or move in a reverse direction, when the suction-valve, operating in the same manner as the discharge-valve, begins to open or unseat itself and continues until

the plunger has made its full inward stroke, the discharge-valve remaining closed or seated during such movement. The water forced from the plunger or pump-barrel 7 into the water-chamber 8 is discharged through the outlet-pipe 5², while the water drawn into valve-chamber 3 through suction-pipe 5' is conveyed or drawn into the valve-chamber 4 through the waterway connection 5.

By means of the adjusting screws or nuts *a a'* the connecting-rods 23 24 may be raised or lowered, so as to increase or decrease the movement of the fulcrumed levers 25 26 and throw off the valve-rods 28 in order to increase or decrease the lift or movement of the suction or discharge valves, so as to compensate for any lost motion in the valve mechanism.

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

1. In a pump of the described character, the combination with an inlet and a discharge valve, of valve-rods each having a lost-motion connection with one of said valves comprising a socket, a head working freely therein, and an elastic cushion in said socket between the same and said head, a fulcrumed rock-lever connected to each valve-rod, a rotating shaft carrying cams, connections between each cam and one of said rock-levers, and mechanism operated from the power-shaft of the pump for imparting motion to said rotating shaft, substantially as described.

2. In a pump of the character described, the combination with an inlet and a discharge valve, of valve-rods each having a lost-motion connection with one of said valves comprising a socket, a head working freely therein, and an elastic cushion in said socket between the same and said head, a fulcrumed rock-lever connected to each valve-rod, and mechanism operated from the power-shaft of the pump for positively rocking said rock-levers, substantially as described.

In testimony whereof I hereunto affix my signature, in presence of two witnesses, this 26th day of January, 1899.

THOMAS J. BARBOUR.

Witnesses:

F. M. LELAND,
N. A. ACKER.