No. 640,767. Patented Jan. 9, 1900.

# F. HOFFMAN.

## PUMP GOVERNOR.

(Application filed June 15, 1899.)

(No Model.)

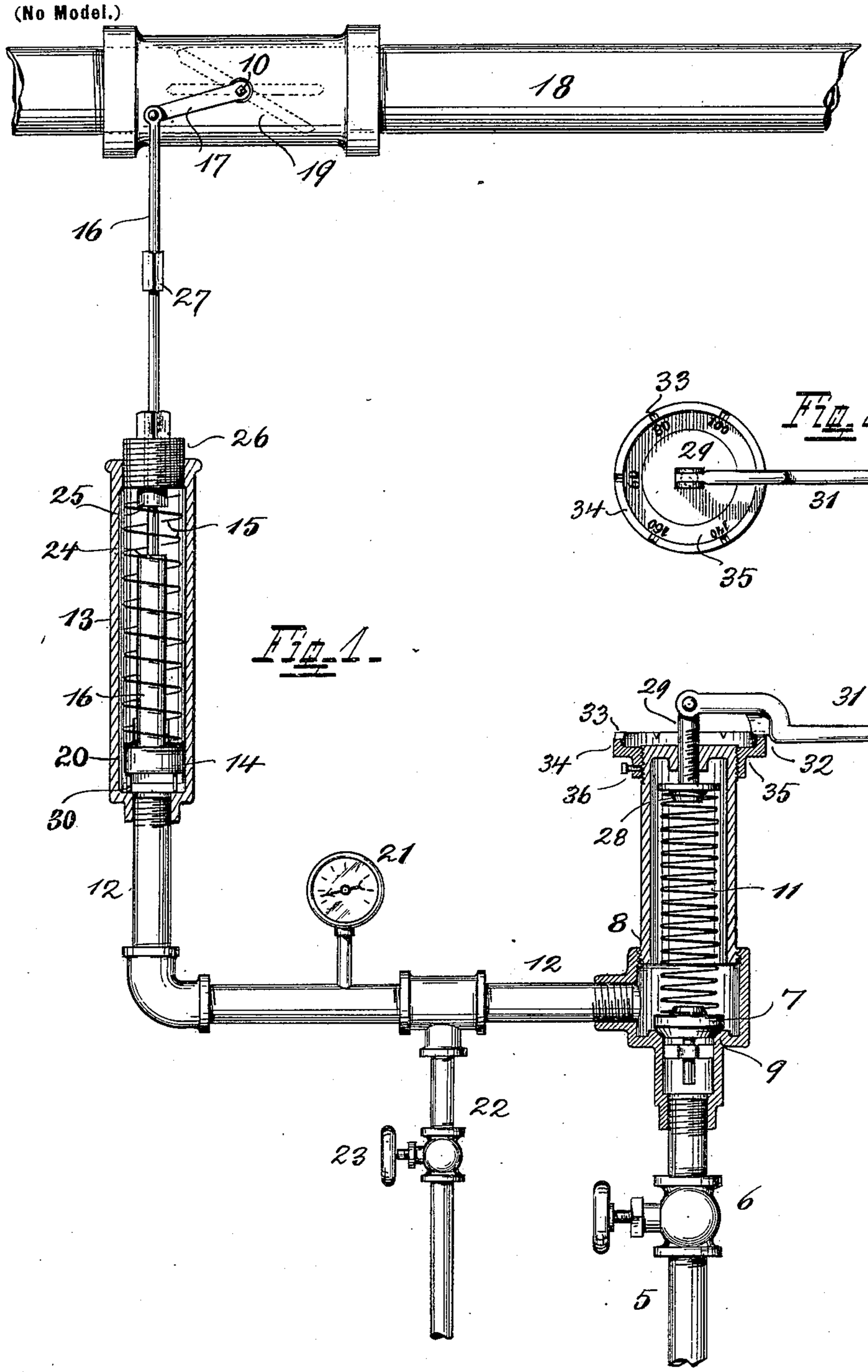


Fig. 1.




Fig. 2.

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J. B. Bawdith
John C. Rogers

Inventor
Frank Hoffman
by C. Spengel atty.

# UNITED STATES PATENT OFFICE.

FRANK HOFFMAN, OF CINCINNATI, OHIO.

## PUMP-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 640,767, dated January 9, 1900.

Application filed June 15, 1899. Serial No. 720,625. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK HOFFMAN, a citizen of the United States, and a resident of Cincinnati, Hamilton county, State of Ohio, have invented certain new and useful Improvements in Pump-Governors; and I do declare that the following is a clear, full, 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, attention being called to the accompanying drawings, with the reference-numerals marked thereon, which form a part of this specification.

This invention relates to means for controlling and governing the operation of pumps where they are actuated by a suitable motor—as, for instance, by a steam-engine—and which acts in such manner that the latter supplies power in proportion to requirements of the former and eventually ceases to furnish such power altogether in case no further demands are made on the pump. The action of the means provided by me for so controlling the operation of the steam-engine or motor is altogether automatic and subject to the condition and pressure of the water passing through the delivery-conduits of the pump.

My invention is of particular value when applied, for instance, to steam fire-engines, combining a pump operated by a steam-engine, in which case it enables the pipeman handling the nozzle to control the operation of the distant fire-engine according to his immediate requirements.

The difficulty of communication at fires between the man handling the nozzle and the engineer tending the fire-engine is a recognized fact and caused by the distance between the two, they being frequently out of sight of each other and the delay in transmitting orders causes often unnecessary damage. This damage may be caused by failure of reducing promptly a stream too heavy or to cut it off instantly altogether when not required any more, or by delay in furnishing water quickly when needed again. My invention enables the man at the nozzle, who is the best judge for requirements by reason of being at the point of action, to control the supply accordingly. This is obtained by controlling the pressure in the delivery pipe or hose and is automatic in its effect upon the operation of the steam-engine or motor.

My invention consists of the provision of certain devices and their construction, all as shown and described, and whereby the desired objects are attained.

In the following specification, and particularly pointed out in the claims at the end thereof, is found a full description of my invention, together with its operation, parts, and construction, which latter is also illustrated in the accompanying drawings, in which—

Figure 1 shows the different parts of my invention arranged in diagrammatic order, certain parts being shown in section. Fig. 2 is a top view of the valve permitting escape of water at a certain pressure.

5 is a pipe controlled by a valve 6 and communicating when this latter is open with the water-delivery in a manner to be capable of receiving a part of the water being pumped and at the same pressure as such latter. In a steam fire-engine a convenient place for such attachment may be found at the so-called "gooseneck" leading to the air-chamber of the pump and in which the water-pressure is the same as in the hose. Pipe 5 is ordinarily held closed by a valve 7 contained within a valve-chamber 8 and held to its seat 9 by a spring 11. A pipe 12 leads from valve-housing 8 to a cylinder 13, which contains a piston 14, held normally near one end of the latter by a spring 15. From the inner side of the piston there leads a stem 16 outwardly and connects to a lever 17, which is mounted in a certain manner so as to be capable when oscillated in a certain direction to control the operation of the engine which actuates the pump. For such purpose it connects to a valve-controlling passage through the steam-pipe 18, which supplies steam from the boiler to the steam-cylinder. This passage is controlled by a valve 19, which is preferably of the butterfly type, swiveling on trunnions, to one of which (indicated by 10) lever 17 connects. This valve is normally open and is provided in addition to the ordinary throttle-valve, (not shown,) by which passage through the steam-pipe is positively controlled.

The operation, in short, now is as follows:

Spring 11 is regulated in its action to yield only when a certain water-pressure is exceeded, which pressure has been determined upon beforehand as a working pressure to suit certain conditions. If now the water-pressure in the water-delivery conduits or hose rises above this determined pressure, then valve 7 will be lifted and admit water to housing 8 and from there through pipe 12 to cylinder 13. Here it acts against piston 14, which by means of stem 16 acts upon lever 17, which controls the operation of the motor. In the case described the effect of the action upon lever 17 is to cause this latter to either partly or wholly close the normally open butterfly-valve 19. Passage through the steam-pipe will thus be impaired or cut off, limiting accordingly or terminating the operation of the steam-engine. This rise in pressure of the pumped water necessary to obtain all these effects may be due to accidental causes or brought about intentionally. Of the accidental causes may be sudden impediments obstructing free passage of water through the hose and are frequently caused by bends or kinks in the latter. In such case my device acts as a safety appliance and prevents bursting of the hose. For stopping the engine intentionally such rise of pressure of the pumped water is created by an artificial impediment in shape of any of the customary cut-offs provided in discharge-nozzles and which is partly or wholly closed. Any such impediment leading to a rise in pressure of the pumped water inaugurates at once the series of actions described above, with the effect of stopping the motor and depriving the pump of its power. Restoring the free flow of water by removal of this impediment causes the motor to immediately operate the pump again. It is to be understood that the stoppages which it is intended for my device to accomplish are only such which are of limited duration. If the interruption is to last any length of time, then the steam-supply pipe is closed by means of the regular throttle-valve the same as at the end of operations.

The excess above normal water-pressure at which the device acts to operate lever 17 should be as little as possible to render the device sufficiently sensitive to enable it to respond instantly. Therefore the water-pressure in pipe 12 required to move piston 14 should be not more than from six to twelve ounces. Excess of this pressure would indicate that certain parts of the mechanism—as, for instance, the trunnions of the butterfly-valve—do not work sufficiently free and require looking after. To be able to have this pressure under constant control, I provide a gage 21.

At times when the pressure in pipe 5 approaches the limit or reaches the same for moments valve 7 commences to vibrate, permitting a limited escape of water. This is permitted to pass off through a waste-pipe 22, controlled by a valve 23. By means of this latter passage through pipe 22 is so limited as not to interfere with the intended operation of the device when valve 7 opens fully on a decided excess of pressure in pipe 5. The discharge from this waste-pipe may be directed under the fire-box of the engine to portect the street-pavement against the heat.

Piston 14 is packed with a leather bushing 20 and provided with legs 30, which prevent it from coming fully to a seat against the open end of cylinder 13. This permits the water when entering to act at once against the full face of the piston and against the leather bushing, with the effect of spreading the same against the inside of the cylinder and preventing leakage.

To prevent piston 14 from moving on after lever 17 has been swung sufficiently to do its work—that is, in this case after it has seated valve 19 and at which time an excess of movement would do damage, possibly by bending stem 16—such movement is limited by a shoulder 24 on this latter when it comes in contact with another shoulder 25 within cylinder 13. The position of one shoulder at least is made adjustable to permit accurate regulation as to time of these incidents—that is, termination of movement of piston 14 at the end of the stroke of lever 17. In this case shoulder 25 is made adjustable, which is done by connecting it with a plug 26, attached to cylinder 13 by a screw connection. Stem 16 passes freely through a perforation in this plug large enough to obviate all friction. The length of stem 16 may be regulated by a coupling 27.

By changing the pressure with which spring 11 bear against valve 7 the device may be set to operate at various water-pressures. This is attained by adjusting the length of spring 11, which is done by moving shoulder 28, against which spring 11 is seated, to or from valve 7. For such purpose shoulder 28 is connected to form a part of a stem 29, mounted by means of a coarse screw-thread in the end of valve-housing 8. This stem has an operating-handle 31, pivotally connected and provided with a knife-edged projection 32, which after turning of stem 29 is dropped in any one of the notches 33 provided in the upturned edge 34 of a flanged ring 35, attached to the valve-housing. Figures opposite these notches denote the pressure which spring 11 exerts when handle 31 has been turned to a particular notch. At the beginning of operations the desired notch is selected, according to the size and force required for the stream to be ejected.

Ring 35 is adjustably connected by means of a screw-thread, so that the position of the notches with reference to stem 29 may be closely adjusted and also readjusted to suit the condition of spring 11 in case it loses its adjustment by changes of its strength. It is securely held in its adjusted position by means of a set-screw 36.

The whole device may be cut out of action by closing valve 6 in case its operation be-

comes impaired by accidental injury, which especially in fire-engines is liable to occur.

Having described my invention, I claim as new—

1. In a device controlling operation of a pump by controlling the operation of the motor which actuates the same, the combination of a cylinder, a piston adapted to reciprocate therein, and operatively connected to the means which control operation of the motor, a pipe connecting this cylinder with the delivery of the pump a valve in this pipe adapted to be adjusted to open at certain pressures, a spring 11, to hold it against its seat, a shoulder 28, against which this spring is seated, a stem 29 carrying this shoulder 28, and mounted with a screw connection, an operating-handle 31 pivotally connected thereto and a notched ring 34, operating in conjunction therewith.

2. In a device controlling operation of a pump by controlling the motor which actuates the same, the combination of a lever 17 which controls the motor, a cylinder 13 open at one end, a piston 14 contained therein, a stem connecting it with lever 17, a spring 15 to hold it in a position against the open end of the cylinder, a valve-housing 8, a pipe 5 connecting it with a pump-delivery, a pipe 12 leading from housing 8 to the open end of cylinder 13, a waste-pipe 22 connected with pipe 12 a valve to control the quantity of waste-water passing through it, a valve 7 contained in housing 8, and a spring to hold it closed against a certain pressure in the pump-delivery which when exceeded causes said valve to open admitting water to cylinder 13 and moving the piston therein for the purpose described.

3. In a device to control a motor which operates a pump, the combination of a piston 14, a cylinder 13 in which it is contained, a stem extending outside and beyond the latter and connecting it with the means controlling operation of the motor, a shoulder 24 on this stem, a stop 25 within the cylinder to limit motion of the piston, when engaging shoulder 24, a spring to keep the piston seated in one end of its cylinder which end is open and a pipe connecting this open end with the delivery of the pump.

4. In a device to control a motor which operates a pump, the combination of a piston 14, a cylinder 13 in which it is contained, a stem 16 connecting it with the means controlling operation of the motor, a shoulder 24 on this stem, a screw-plug 26 mounted in one end of cylinder 13, and forming with its inner end a stop 25, which in conjunction with shoulder 24 operates to limit the motion of the piston, a perforation in this plug to permit stem 16 to pass, a spring to keep the piston seated in one end of cylinder 13 which end is open and a pipe to connect this end with the delivery of the pump.

In testimony whereof I hereunto set my hand in presence of two witnesses.

FRANK HOFFMAN.

Witnesses:
C. SPENGEL,
JOHN C. ROGERS.