F. HOFFMAN.

GOVERNOR FOR FIRE ENGINES.

APPLICATION FILED OCT. 25, 1913.

1,093,585. Patented Apr. 14, 1914.

Fig. 1

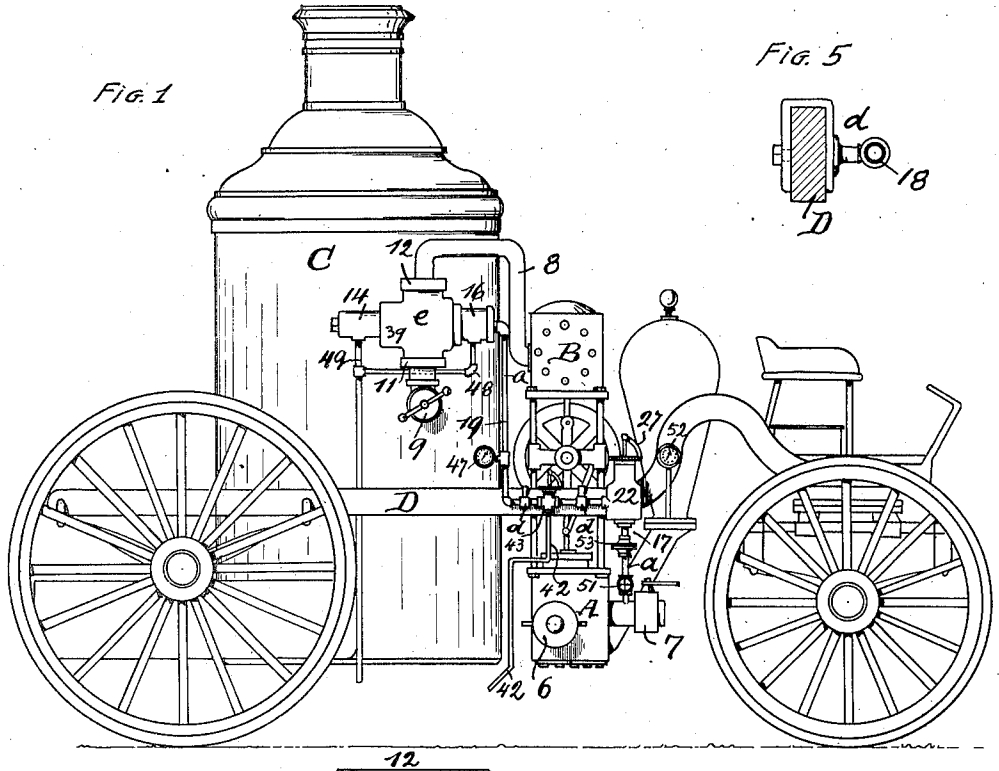


Fig. 5

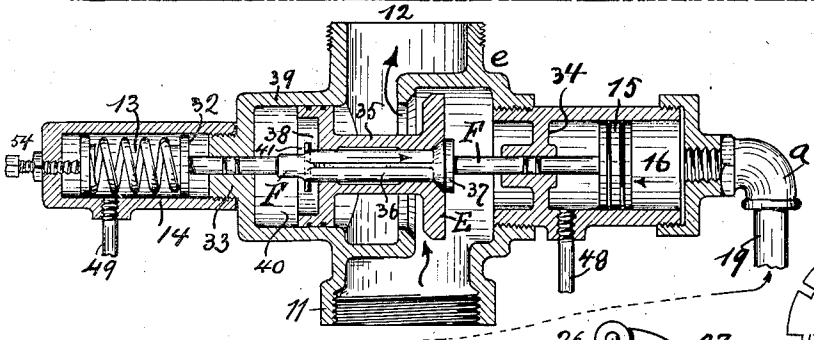


Fig. 3

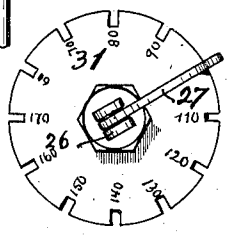


Fig. 2.

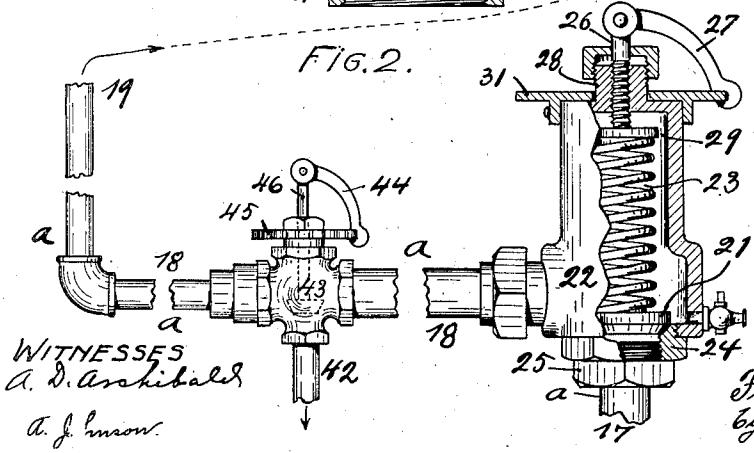
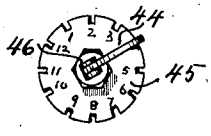


Fig. 4



WITNESSES
A. D. Archibald
A. J. Imson

INVENTOR.
Frank Hoffman
by C. Spengel atty

UNITED STATES PATENT OFFICE.

FRANK HOFFMAN, OF CINCINNATI, OHIO, ASSIGNOR TO MICHAEL F. HOFFMAN, OF CINCINNATI, OHIO.

GOVERNOR FOR FIRE-ENGINES.

1,093,585. Specification of Letters Patent. Patented Apr. 14, 1914.

Application filed October 25, 1913. Serial No. 797,339.

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 a certain new and useful Governor for Fire-Engines; and I do declare the following to be a clear, full, and exact description of the invention, attention being called to the drawing which accompanies this application and forms a part thereof.

This invention concerns fire-engines in which the pump is operated by a steam-engine and the object of the invention is to provide certain means which permit operation of the pump in a manner that water may be discharged therefrom at a certain pressure and maintained at such pressure.

The invention consists of these means and of their construction whereby this object is attained all as hereinafter described and claimed and as illustrated in the accompanying drawing, in which:

Figure 1, shows in side-elevation a fire-engine of customary type and equipped with the devices provided by my invention. Fig. 2, shows a diagrammatic view of these devices, enlarged and partly in section. Figs. 3 and 4, show top-views of certain parts of these devices. Fig. 5, in a sectional view shows a certain detail of construction.

In the drawing letter A, indicates the pump, 6 is the nipple provided for connection of a suction hose and 7 is one of the nipples permitting attachment of a hose-line.

B indicates the engine whereby the pump is operated and 8 designates the pipe whereby steam is supplied to it from boiler C.

9 shows the throttle-valve, whereby the steam supply to the engine is controlled.

D indicates one of the longitudinal members of the frame whereby these parts are supported.

It is the usual practice, after arriving at a fire, to operate the pump at a certain speed adapted to produce the pressure necessary to throw a stream the distance required at the particular time and occasion. It is also desirable that this pressure may be maintained as long as circumstances demand it. In order to obtain these conditions in a reliable manner without the requirement of constant attention, I have provided means whereby this is accomplished automatically so that, after the engine has been started to operate the pump at a pressure required to throw a stream a certain distance, this particular pressure is automatically maintained until the operation of the pump is changed to suit different conditions. These means consist substantially of an automatically operating valve E, contained in a housing *e*, having attaching nipples 11 and 12 as shown in Fig. 2, to permit connection to steam-pipe 8, in a manner locating said valve between throttle-valve 9, and engine B, as shown in Fig. 1. This valve is normally open, being held so by a spring 13 (Fig. 2), and by intermediate means to be presently described, so that it does not interfere with the control of the steam by the throttle-valve as far as this latter is used to admit or to cut off the steam with reference to the steam engine. Spring 13 is contained in a spring-housing 14, which forms a connected extension of housing *e*.

15 indicates a piston fitted to move within a cylinder 16, which forms a water-chamber and likewise is a connected extension of housing *e*, on which it is located on the opposite side of the spring-housing and so as to be axially alined therewith. Connection is made to cylinder 16, in a manner rendering entrance of pumped water to it possible. This water may be taken from any point suitable for the purpose on the delivery side of the pump and is shown here as being taken from discharge-nipple 7 by means of a pipe-conduit *a*, made up of a number of pipe-sections 17, 18 and 19. Passage of water through this conduit is controlled by a valve 21, contained in a valve-housing 22, inserted in the pipe conduit and connected so as to be between pipe-sections 17 and 18 (see Fig. 2). A spring 23 is contained in said housing and serves to hold this valve normally to its seat. This latter is formed by a member 24, which is detachable, to render access to the housing and to the valve-seat possible and serves also as a means to permit connection of a pipe-

coupling 25, whereby pipe-section 17, and valve-housing 22, are joined. Spring 23 may be adjusted so as to bear with more or less pressure upon valve 21, so that after adjusted to a certain pressure, said valve will open only when water forced into pipe-section 17, by the pump, has attained a corresponding pressure which is sufficient to overcome the resistance of the spring. This latter is adjusted for this purpose by means of a screw-threaded stem 26, manipulated by a hingedly connected handle 27, and seated in a threaded neck 28. Stem 26 acts upon the spring by means of an interposed disk 29. A dialplate 31 is provided in conjunction with handle 27 and has spaced notches in its edge, as shown in Fig. 3, adapted to receive the free end of the handle. For manipulation, the handle is lifted and after turned to a certain notch to adjust the spring to the pressure indicated by the number opposite such notch, it is dropped into the same to be held thereby. If the pressure is to be changed the handle is moved to a different notch which corresponds to this different pressure.

Between piston 15 and a disk 32, against which spring 13 bears, there is a stem F which, as far as its function and operation is concerned, may be considered as being of one piece and continuous although, to facilitate its manufacture and assembling, it may be made up of two or more sections. Near its ends it is supported and guided in structural parts 33 and 34, which close housing 14 and cylinder 16 respectively, against valve housing *e*. Valve E is provided with a sleeve 35, which extends laterally from one side thereof and by means of which it is mounted upon the middle-portion 36, of stem F. On its other side, valve E is provided with a valve seat, and an auxiliary valve 37, connected to stem-portion 36 is fitted thereto. On the other end of sleeve 35, a follower 38 is provided and fitted into a lateral extension 39, of valve-housing *e*, which extension forms a chamber 40. Beyond the follower a shoulder 41 is provided on stem F, which may be formed by a collar or pin, whereby the action of spring 13 is transmitted to valve F to hold this latter normally open, as before described. Valve E is mounted upon stem-portion 36 in a manner to have a limited axial movement between this shoulder 41 and auxiliary valve 37, the two being spaced accordingly. The formation of the outside of stem-portion 36 and of the opposite surface in the hollow part of sleeve 35 is such as to provide clearance as shown in the drawing and permits communication between valve-housing *e*, and chamber 40, except as far as it is controlled by auxiliary valve 37. As before stated, valve E is normally open, held so by spring 13, and does not interfere with the free admission of steam to the engine and the control of the same by throttle-valve 9. Steam, as soon as admitted, lies therefore against both sides of valve E, so that the same occupies a balanced position. If the water pumped exceeds the intended pressure, the resistance of spring 23, adjusted accordingly by handle 27, is overcome, valve 21 will be raised and water will force its way past it and through pipe conduit *a*, into cylinder 16. Observe dotted line between arrows in Fig. 2. There, the water acts against piston 15 and stem F, moving first the auxiliary valve against valve E which contact finally causes this latter valve to move toward its seat. The clear passage space between valve E and its seat is thereby reduced and the steam supply to the engine is cut down accordingly. Thus the opposing actions of spring 13 against one end of stem F, and of the water-pressure against the piston at the other end of the stem, tend to hold valve E, in a variable, but balanced and open position so that a water-pressure is maintained which is constant and normal with respect to the pressure it is intended to carry at the time and as determined and controlled by valve 21.

Should valve E, close entirely, the operative speed of engine and pump will decline rapidly, causing the water-pressure to drop correspondingly. The action of the factors which balance stem F, being thus disturbed, spring 13 will presently overcome the reduced water-pressure and shift said stem, causing thereby movement of auxiliary valve 37 independent of valve E. Steam is thereby permitted to enter between stem-portion 36, and sleeve 35, into chamber 40, where, by acting against follower 38, valve E becomes again balanced so as to permit spring 13 to move it readily into open position, thus restoring free passage of steam. To render these fluctuations possible, provision must of course be made for escape of the water confined between valve 21 and piston 15 in pipe sections 18 and 19, to permit piston 15, to yield to the action of spring 13. For such purpose a waste-pipe 42 is provided through which the water may escape. This pipe is constantly open and a valve, contained in housing 43 is provided to adjust this wastage, to maintain it within proper limits so as not to impair the intended action with respect to piston 15, of the water admitted by valve 21 into pipe sections 18 and 19. A handle 44, in connection with a notched dialplate 45, and attached to stem 46, of this valve, is provided for the purpose of facilitating this adjustment.

A gage 47 permits observation of pressure conditions in the part of pipe conduit *a*, between valve 21 and piston 15. It may be mentioned here, that this pressure is less

than the pressure in pipe-section 17, where the pressure of the pumped water prevails. Nevertheless, this lower pressure rises and falls however proportionately to the variations in the pressure of the pumped water and its effect upon piston 15, for the purpose of acting upon valve E, is proportionately the same as if this action were obtained by the pressure of the pumped water directly.

48 and 49 are waste-pipes to drain cylinder 16 and housing 14 respectively.

The device is constructed in a manner to permit its convenient connection to existing engines, clamping brackets *d* fitted for attachment to frame D, as shown in Fig. 5, being provided for the purpose.

The use of the device may be dispensed with, if necessary for any purpose and without interfering with the operation of the engine, by cutting off the flow of water through it, a valve 51 being provided for this purpose in pipe section 17. In that case the usual pressure-gage 52, present in engines, to show the water pressure, is used to observe and manage the operation of the pump. A strainer 53 is provided in pipe-section 17 to prevent matter like sand from entering the device.

54 is an adjusting screw serving to maintain spring 13, in proper pressure condition.

Having described my invention, I claim as new:

1. In means for controlling the pressure of water pumped by a steam-operated pump, the combination of a valve-housing, a spring-housing provided on one side thereof and a cylinder which forms a water-chamber provided in axial alinement therewith on its other side, and both closed against the valve-housing, a stem which traverses the valve-housing and extends therefrom respectively into the spring-housing and into the water-chamber mentioned, a valve supported on the stem-portion which traverses the valve-housing, a spring contained in the spring-housing and adapted to act against that portion of the stem which extends into it, a piston in the water-chamber adapted to act against that portion of the stem which extends into it and means to admit water from the pump into the water-chamber.

2. In means for controlling water-pressure, the combination of a pump, a steam-engine to operate it, a steam-pipe to supply this latter, a throttle-valve in this steam-pipe to control the passage of steam therethrough, an automatic valve adapted to control the passage of steam between the throttle-valve and the steam-engine, an auxiliary valve seated upon the automatic valve, a stem on which both valves are supported in a manner that one may move independently of the other the auxiliary valve being rigidly connected, a spring adapted to act against one end of this stem, a piston at the other end of it and means to admit pumped water to the piston so as to cause it to act upon the stem in opposition to the spring mentioned and to move the auxiliary valve against the automatic valve.

3. In means for controlling water pressure, the combination of a pump, a steam-engine to operate it, a steam-pipe to supply this latter, a throttle-valve in this steam-pipe to control the passage of steam therethrough, a valve-housing between the throttle-valve and the steam-engine, an extension on one side of this housing forming a steam-chamber, a cylinder forming a water-chamber on the other side of this housing and a spring-housing beyond the steam-chamber all three being axially alined, a valve contained in the valve-housing and adapted to control passage of steam through the steam-pipe, a follower fitted to the steam-chamber and forming a connected part of the valve, an auxiliary valve adapted to admit steam to the steam-chamber so as to act against the follower contained therein; a stem whereby the valves mentioned are supported in a manner that one may move independently of the other and which stem extends from the spring-housing, through the steam-chamber and valve-housing and into the water-chamber, a spring contained in the spring-housing and acting against the stem in a manner that passage for steam through the valve-housing is normally open, a piston contained in the water-chamber and means to admit pumped water to this chamber so as to cause the piston contained therein to act against the stem in opposition to the spring mentioned.

4. In means for controlling the pressure of the water moved by the pump of a steam-operated fire-engine, the combination of the pump, steam-engine and boiler, a frame whereby these parts are supported, a steam-pipe to supply the engine from the boiler, a throttle-valve provided in this steam-pipe to control the steam-supply to the engine, a spring-actuated valve which controls passage through the steam-pipe between the throttle-valve and the engine and tends to keep this passage normally open, a housing in which this valve is contained and which forms a part of the steam-conduit between the boiler and the engine, an operatively connected piston adapted to operate in a manner tending to close this valve, a cylinder which forms a connected extension of the housing mentioned and constitutes a water-chamber closed against said housing and to which the piston is fitted, a pipe-conduit whereby this water-chamber is connected with the pump-delivery, means to connect this pipe-conduit in position to the longi-

tudinal members of the frame mentioned, a spring-actuated valve which controls passage of water to the water-chamber and makes such passage dependent on pressure-conditions of the pumped water, adjusting means to regulate the action of this valve, a housing in which it is contained and a normally open waste-outlet in the pipe conduit between this housing and the water-chamber.

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

FRANK HOFFMAN.

Witnesses:
C. SPENGEL,
A. JOHNSON.