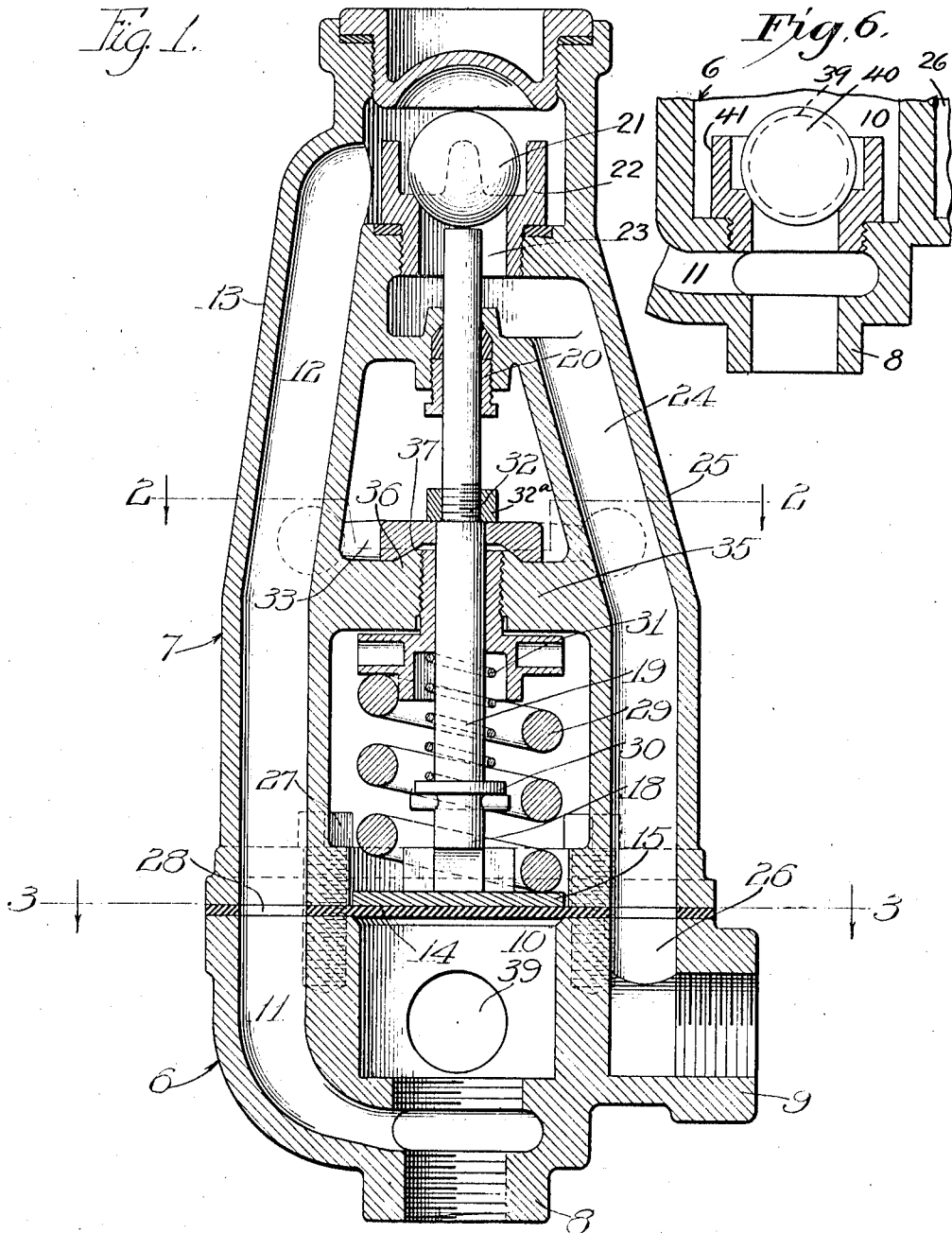


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APPLICATION FILED NOV. 20, 1917.

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Patented Sept. 2, 1919.
2 SHEETS—SHEET 1.



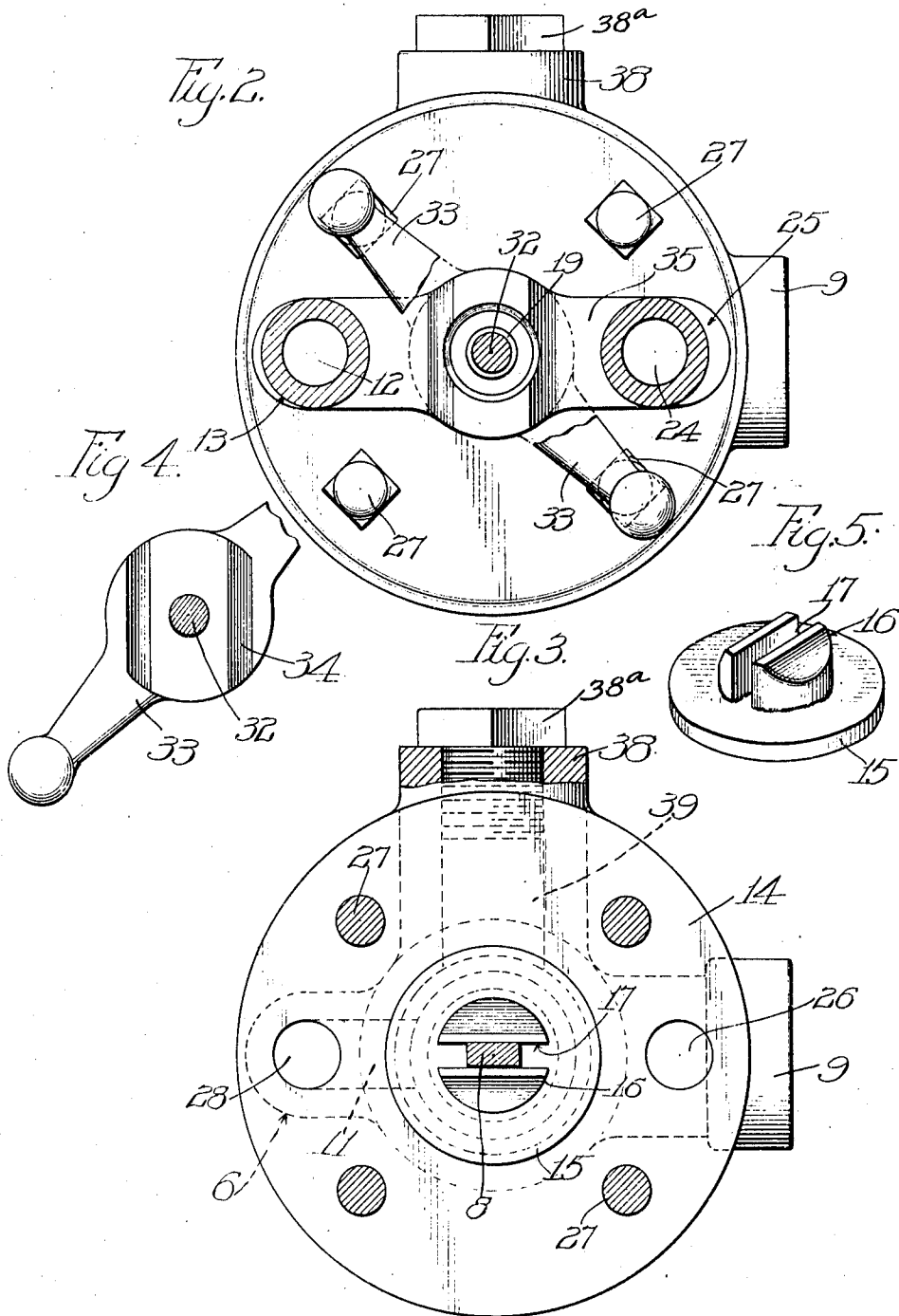
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Wm. L. Hayes

Inventor:
Ralph W. E. Hayes.
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UNITED STATES PATENT OFFICE.

RALPH W. E. HAYES, OF GALVA, ILLINOIS, ASSIGNOR OF ONE-HALF TO HAYES PUMP & PLANTER COMPANY, OF GALVA, ILLINOIS, A CORPORATION OF ILLINOIS.

PUMP-REGULATOR OR RELIEF-VALVE.

1,314,746.

Specification of Letters Patent.

Patented Sept. 2, 1919.

Application filed November 20, 1917. Serial No. 202,919.

To all whom it may concern:

Be it known that I, RALPH W. E. HAYES, a citizen of the United States, residing at Galva, in the county of Henry and State of Illinois, have invented certain new and useful Improvements in Pump-Regulators or Relief-Valves, of which the following is a specification.

The present invention relates to an attachment used in conjunction with force pumps and is particularly applicable to power spraying machines used for the purpose of spraying fruit trees, etc.

One object of the invention is to arrange the parts of a device of the character specified so that they can be readily taken apart for the purpose of repairs, cleansing, etc., without breaking the pipe connection to the tank or to the pump.

A further object of the invention is to provide a form of casing which will be capable of ready and quick conversion to enable it to be used either as a relief valve or as an automatic pump governor.

A further object of the invention is to arrange means which will enable an instantaneous relief to be effected without waiting for the usual inflation of the diaphragm against a spring pressure to bring about such result.

The invention further consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings:

Figure 1 is a vertical section through the entire appliance;

Fig. 2, a section on line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3, a section on line 3—3 of Fig. 1, looking in the direction of the arrows;

Fig. 4, an under face view of the rotative member for effecting the quick release;

Fig. 5, a perspective detail of the member placed upon the top of the diaphragm and which receives the diaphragm rod; and

Fig. 6 is a detail sectional view of the valve used in the diaphragm chamber.

In the art to which the present invention relates, devices are now known whereby if a fluid pressure within a hose or conduit gets beyond a predetermined degree, automatic mechanisms are set in motion which effect a circuit of the fluid so that it is re-discharged back into the tank, thus relieving the pump of the load that would other-

wise be produced by forcing the liquid against an abnormal pressure, which pressure might, unless relieved, cause the hose or other conduit to burst.

These devices sometimes take the form of what is commonly termed a pressure relief valve or the form of what is termed an automatic pump governor.

The present invention deals with a form of device which can be quickly adapted to serve as either one of the above types of mechanism, and also contains various improvements which will be apparent from the following specification.

Referring now to the drawings, the device as shown comprises what may be termed a base portion 6 and a top portion 7. The base portion is formed with a vertical neck 8 and a horizontal neck 9, each of which is interiorly threaded. In the form of construction shown in Fig. 1, the device is arranged to be used as a relief valve, and in such constructions the conduit leading to the pump is connected to the neck 8; and interposed in this conduit is the connection to the line of hose, on the outer end of which is the usual spray nozzle. In ordinary operation, the liquid is forced through the hose and out through the nozzle, but in spraying operations from time to time the passage of liquid through the nozzle is cut off and the spraying operations stopped. When this takes place, the fluid, not being able to pass out from the hose, backs up and enters through the passage in the neck 8 into the chamber 10 within the base and through passage 11, and thence through the passage 12 in a leg 13, forming a portion of the top 7.

When the pressure of the liquid within the chamber 10 reaches a predetermined degree, it will force upward a diaphragm 14 communicating with said chamber. Resting on top of this diaphragm is a plate 15 carrying, as shown in the drawings, companion lugs 16 spaced apart to provide a cavity 17, within which rests the lower end 18 of a stem or rod 19, and in the construction shown this lower end is flattened to a rectangular shape. This rod extends upward through a suitable stuffing box 20 and its upper end rests adjacent a ball check valve 21 seated upon a flanged ring 22.

When the diaphragm is moved upward by pressure of the liquid, it elevates the rod 19,

lifts the ball 21 from its seat, opening a passage for the liquid, so that it flows down through the opening 23 into the conduit 24 formed in a leg 25 in the top portion 7, and thence downward through the conduit 26 formed in the base, and out through the passage in the neck 9 and into a conduit (not shown) which leads to the supply tank. When this is established, there is a circuit from the pump, through the hose, through the passages in the relief valve and back to the tank, so that the liquid is circulated and the pump is not acting against any other than a predetermined pressure.

The base 6 and the top portion 7 are joined together by suitable bolts 27. The diaphragm is extended, as will be seen from Fig. 1, to form a packing at the point of connection of the base and top portion, and suitable openings 28 are cut in the diaphragm to allow the passage of the liquid through the various conduits in the base and top portion. It will be observed that the pipe connections are all made to the base section. By removing the bolts 27, the base and top sections can be separated easily and quickly for the purpose of cleansing, repairs, etc., and at the same time the connections between the base and pump and tank conduits remain unbroken. This is a very important point since it is highly desirable that no leakage occurs at the point of connection of these conduits, and by making the appliance in the manner described, tight fitting joints can be employed at such points of connection without creating difficulties in the way of disconnecting or disassembling the appliance.

In the ordinary operation of the relief valve, the upper check valve 21 will be lifted by the movements of the rod 19 produced by the actuation of the diaphragm 14. This diaphragm works against the tension of a strong coil spring 29 and it is frequently necessary to get a quick relief before sufficient fluid pressure has been created to force the diaphragm and rod 19 upward against the pressure of this strong spring 29. To accomplish this, I provide a means for obtaining a quick relief, whereby the rod 19 may be operated to lift the check valve 21 without the presence of sufficient fluid pressure to actuate the diaphragm.

To carry out the above, I affix a washer 30 adjacent to the lower end of the rod 19. Surrounding this rod and resting against the washer is a coil spring 31. Threaded on to the rod, as at 32, is a nut 32^a, and located below this nut, but having a turning fit on the rod 19, is a hand grip 33 (see Figs. 2 and 4) formed with a cam surface 34 on its under face. A bridge or cross wall 35 is formed between the legs 25 and 13, and on top of this cross wall is a ring-like surface 36 formed with a cam or wedge-shaped sur-

face 37, which surface 37 is alined with the cam surface 34 on the under face of the hand grip 33. When this member 33 is turned by the operator, the engagement of the wedge surfaces 34 and 37 will cause the hand grip to rise, and through contact of the hand grip with the nut 32^a, an upward movement will be given to the rod 19.

The reason for making the nut 32^a adjustable is so that the throw of the rod 19 can be regulated somewhat in case the end of the rod should become worn or misadjustment occur, and the reason for flattening the lower end of the rod 19 and mounting it between the lugs 16 is to prevent the rod from turning when adjustment is made of its nut 32^a. The upward movement of the rod 19 unseats the check valve 21, allowing the liquid to pass through the conduits 24 and 26 back to the tank. Such movement of the rod 19 is against the pressure of the light spring 31 only, since, owing to the fact that there is no positive engagement between the end 18 of said rod and plate 15, the rod can move back and forth without moving the diaphragm 14, and can move without being subjected to the retarding pressure of the heavy spring 29. Hence this emergency or quick relief can be brought about very easily and quickly.

The light spring 31 is only provided to insure the quick return of the rod 19. It would fall by gravity, but the movement might be rather sluggish, owing to the friction exerted by the packing 20.

When the device is used as an automatic pump governor, a connection is made between an air chamber (not shown) and a neck 38 (see Figs. 2 and 3), which is arranged at right angles to the neck 9; the hose connection to the spray rod is disconnected from the conduit leading from the pump to the neck 8 and connection is made between the air chamber and spray rod; a valve seat 41 is inserted in the chamber 10, as indicated in Fig. 6; and a check valve 40 seats thereupon (also shown in Fig. 6). When the device is thus used, the liquid enters through the passage in the neck 8 from the pump, raises the check valve 40, flows out through the opening in the neck 38 into the air chamber, and thence to the hose leading to the spray rod.

When the nozzle is operated to cut off the passage of liquid therethrough, a back pressure is created in the air chamber which is quickly communicated through the neck 38 to the chamber 10, driving the valve 40 to its seat, and lifting the diaphragm 14. This raises the stem 19, lifts the check valve 21 from its seat, and allows the liquid to flow through passages 11, 12, 23, 24 and 26 and back to the supply tank.

Thus, by a simple change, the device can be readily adapted for use either as a pump

governor or a relief valve. The operation is believed to be obvious from the foregoing description and therefore will not be taken up in detail.

5 By referring to Figs. 2 and 3, it will be understood that the passage through the neck 38 is closed by a removable plug 38^a when the device is used as a relief valve, and in such use connection to the air cham-
10 ber is not made.

I claim:

1. In a device of the class described, the combination of a base portion arranged to receive a pump conduit and a tank conduit,
15 said base portion having a chamber with which the pump conduit connects, a top portion, a circuitous passage through said top portion communicating at one end with the pump conduit and at the other end with the
20 tank conduit, a valve arranged in the top portion and controlling communication through said passage, means influenced by an excess fluid pressure in said pump conduit for actuating said valve and allowing
25 liquid to pass through said passage and back to the tank, and separable means for connecting said top and base portions to allow said top portion to be removed and the passage and valve therein cleaned, said separable means being located above the point of
30 connection between the base portion and pump and tank conduits, whereby the top portion may be disconnected from the base portion without disturbing the connections
35 of the pump and tank conduits to the base portion, substantially as described.

2. In a device of the class described, the combination of a base portion arranged to receive a pump conduit and a tank conduit,
40 said base portion having a chamber with which the pump conduit communicates, a top portion, a circuitous passage through said top portion communicating at one end with the pump conduit and at the other end
45 with the tank conduit, a valve arranged in the top portion controlling communication through said passage, the adjoining faces between the base and top portion being of flat formation, a diaphragm interposed be-
50 tween said faces and extending across said chamber and exposed to the action of the liquid coming through the pump conduit, means actuated by said diaphragm for operating said controlling valve, releasable means
55 for bringing the adjoining faces of said top

and base portion into hard engagement with the diaphragm, said diaphragm being located above the point of connection between the base portion and pump and tank conduits, whereby the base and top portions
60 may be disconnected without disconnecting the pump and tank conduits, and said diaphragm being formed with openings in alinement with the circuitous passage and forming a packing around said passage to
65 prevent leakage at the juncture of said passage and conduits, substantially as described.

3. In a device of the class described, the combination of a body portion having a
70 fluid passage therein, means for establishing communication between one end of the passage and a pump conduit and between the other end of the passage and a tank conduit, a diaphragm subjected to the pressure
75 of liquid from the pump conduit, a spring against the resistance of which the diaphragm moves, a plate resting on the diaphragm, lugs extending from said plate and spaced apart from one another, a rod resting
80 against said plate, whereby the rod may be moved longitudinally independent of the diaphragm, valvular controlling means for said passage actuated by said rod, and means for causing said rod to move and
85 unseat said valve independent of the movement of the diaphragm and free of the resistance of said spring to obtain a quick relief, substantially as described.

4. In a device of the class described, the
90 combination of a body portion having a fluid passage therein, means for establishing communication between one end of the passage and a pump conduit and between the other end of the passage and a tank
95 conduit, valvular means for controlling communication through said passage, a rod for opening said valve, means influenced by an excess pump pressure for actuating said rod, a hand-operated member secured to
100 said rod and having a cam surface on its under face, a corresponding cam face fixedly secured to the body portion of the device, and said cam surfaces cooperating when the hand-operated member is turned to lift said
105 member and move the rod longitudinally independent of the means actuated by the fluid pressure whereby a quick relief is obtained, substantially as described.

RALPH W. E. HAYES.