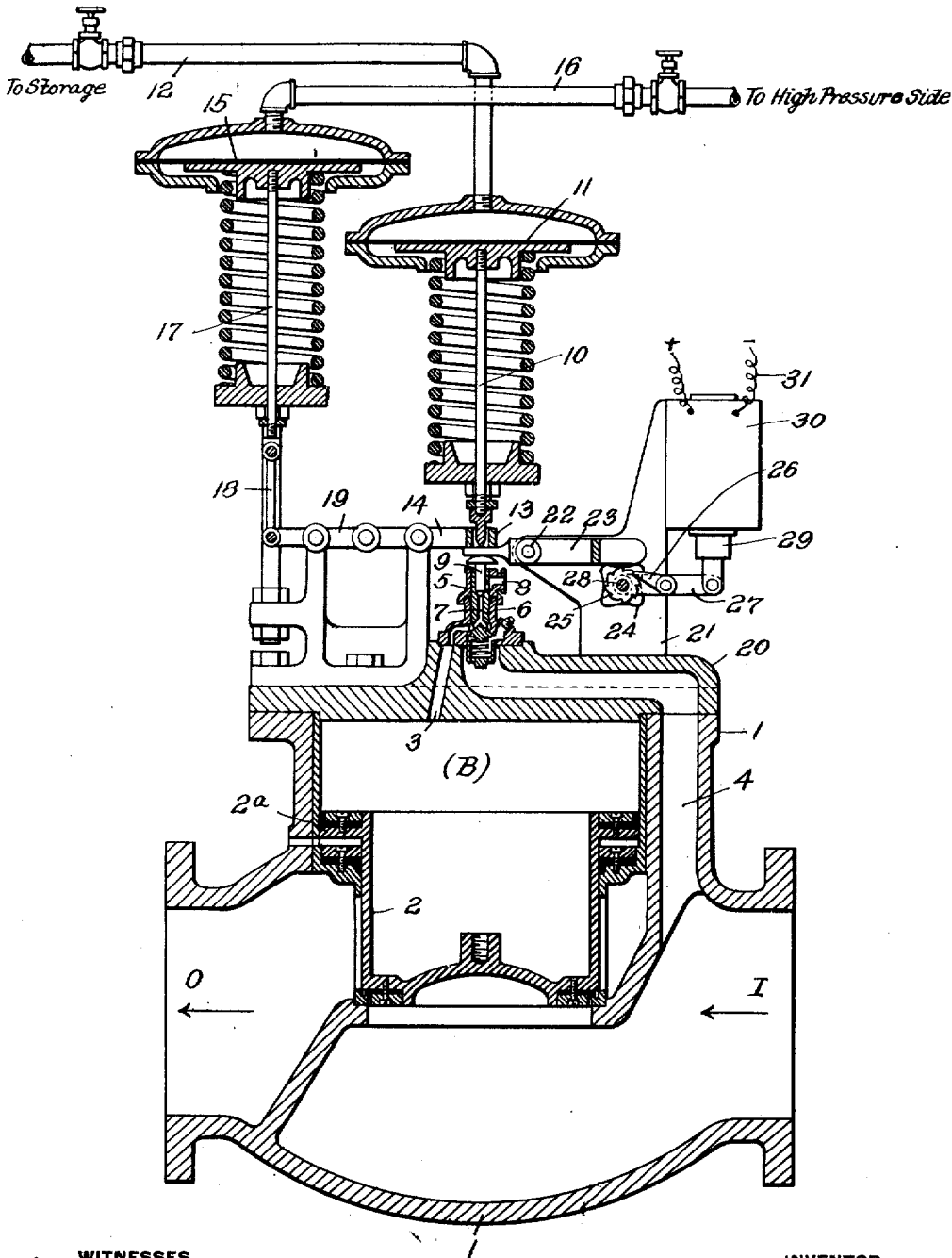


E. V. ANDERSON.
VALVE OPERATING DEVICE.
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1,201,426.

Patented Oct. 17, 1916.



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UNITED STATES PATENT OFFICE.

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VALVE-OPERATING DEVICE.

1,201,426.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWARD V. ANDERSON, a citizen of the United States, residing at Monesson, in the State of Pennsylvania, have invented certain new and useful Improvements in Valve-Operating Devices, of which the following is a specification.

My invention relates to the operation of main valves by the agency of pilot valves and more particularly to means of conveniently manipulating the pilot valves having certain peculiar functions.

The primary objects of the invention are to provide, in conjunction with automatic regulating valves, means for varying or modifying the automatic action, or interrupting it at will; to provide for operating a pilot valve from a distance; and to provide improved electric means for operating a valve, and to generally improve the structure and operation of regulating valves.

I have illustrated the invention as applied to an altitude valve in the accompanying drawing, which is a vertical central section of a main valve, a pilot valve, valve operation regulating devices, and a side elevation of means for operating the regulator.

Supposing the main valve casing 1, having an inlet at I, and an outlet at O, is in the line feeding a storage tank, through the main valve 2, this valve has behind it a closed chamber (B) which intermittently communicates with the inlet side of the line by passages 3 and 4 and pilot valve 5. It is sufficient for my purpose to point out that the pilot valve proper is a vertically movable plunger 6 which has a central passage 7, either communicating with an air outlet 8, or stopped by a reciprocating plug 9, and that, when the plug 9 is depressed, it first closes connection with the outlet 8 and then pushes down the hollow plunger 6, which opens the valve at the bottom of the plunger 6, against the coil spring, and by the lateral passages in the plunger 6 and the small casing surrounding it, opens communication between the passages 3 and 4. The result of this is that high pressure from the inlet I is thus admitted to the chamber (B) above the main valve 2 and by reason of the larger area of the main valve operating piston 2^a, the main valve is closed.

The pilot valve is so arranged in some cases as to have its governing plug 9 depressed by the influence of the rod 10 of the

pressure diaphragm 11 depressed in order to close the main valve as before described, when the pressure on the diaphragm 11, coming through pipe 12 from a storage tank, increases beyond a predetermined value. That is, the main valve remains open until a certain head of water is obtained, for example, and then the increase of pressure operates the pilot valve to close the main valve as above described. Furthermore, there is provision made, by the ring-shaped end 13 of a lever 14, for depressing the pilot valve governing plug 9 independently of the altitude regulator. Thus if a pressure diaphragm 15 is subjected, through the pipe 16, to the high pressure side of the main pipe line, then when such high pressure increases beyond a desired limit, as for instance in case of fire, the diaphragm 15 will depress the rod 17, and by link 18 pivoted thereto, will tilt the lever 19, move connected lever 14, and depress the governing plug 9 of the pilot valve so as to close off the main valve, whether or not the receiving storage tank has the normal desired pressure in it.

Now in addition to the automatic arrangement for normally maintaining a certain altitude in the receiving reservoir, and the automatic device for governing the main valve independently in certain emergencies, it is also desirable to have all the devices under manual control from a central station. This is the more specific object of the present improvement.

I provide on the hood 20 of the main valve casing 1 a support 21 upon which is pivoted at 22, a lever 23 whose end is flattened and interposed between the pilot valve governing plug 9 on the one side, and the ring end of the lever 14 and diaphragm rod 10 on the other side. On the support 21 there is also pivoted a cam 24 arranged to raise and lower the free end of lever 23, and this cam 24 is moved by means of a circular rack 25 thereon, and a dog 26 pivoted on a lever 27 which in turn may be carried on the pin 28 supporting the cam 24. The end of lever 27, farthest from cam 24 is reciprocated by means of a movable plunger 29 of a solenoid 30, whose coil is in circuit with leads 31 passing to any distant convenient electric switch of any ordinary kind.

It will be seen then, that upon making the circuit of solenoid 30 the plunger 29 will rise, raising the lever 27 and by means of

dog 26 turning over the cam 25 an eighth of a turn, so that the cam will raise lever 23 and depress the pilot valve plug 9, the parts remaining in this position when the distant electric switch is again opened, because the plunger 29 may drop, and the dog 26 ride idly over its rack without disturbing the position of the cam 24 and lever 23. But upon again closing the distant switch and the electric circuit 31, the solenoid will again rise and effect the throwing of cam 24 to another position in which the lever 23 is allowed to drop, thus restoring the normal condition of the pilot valve. Thus one opening and closing of the distant switch, will "set" the pilot valve, and the next opening and closing of the switch will restore it to normal condition; so that an operator, situated at any point may, under any condition of the automatic device, effect the closing of the main valve, and it will remain closed until he again throws the switch. The position of the switch therefore becomes immaterial and there is no necessity for holding it down or paying any attention to the manner of operating it. The operator merely touches a button and closes the main valve, or touches the button to restore the normal automatic operation of the main valve.

The advantages of providing a main valve with automatic regulating and emergency devices, while at the same time maintaining complete manual control will readily occur to those familiar with the art.

Having thus described my invention and illustrated its use, what I claim is the following:

1. The combination with a main valve, a connected pressure chamber operating to open and close the valve by control of pressure therein, a pressure operated pilot valve adapted to regulate the pressure in said chamber to open and close the main valve, and an electrically operated trip directly connected to the pilot valve and adapted to positively move it independently of the normal pressure operating means, substantially as described.

2. The combination with a main valve having means to operate it by a pressure chamber and a pilot valve controlling the pressure in said pressure chamber, of a separate and independent emergency device for operating said pressure control, and a third device operating independently of either of said controlling devices, to effect the same controlling movement of the pilot valve, substantially as described.

3. The combination with a main valve and

a pilot valve, of a pressure regulating device for operating the pilot valve to close the main valve, a separate and independent pressure operated device for tripping the pilot valve without regard to the condition of the first pressure regulator, and a third operating device for the pilot valve adapted to work it to effect the closure of the main valve independent of the other two regulating devices, and being electrically operated from a distance, substantially as described.

4. The combination of a main valve having a connected movable wall forming part of a closed chamber and adapted to be opened by release of pressure in said chamber, of a pilot slide valve controlling a passage between said chamber and the atmosphere, a pressure operated device for moving the slide valve of the pilot, a lever also operating on said slide valve independently of the normal pilot valve operating means, an intermittently operating cam for moving said lever, and means operated from a distance to actuate the cam in a step-by-step movement to hold it at rest in either of two positions, substantially as described.

5. A pilot valve for a pressure operated main valve comprising a casing having a passage connecting the atmosphere with the pressure chamber of the main valve, a slide valve therein comprising two relatively movable parts, a pressure operated mechanism to move said slide valve, a supplemental pressure operated device adapted to move said slide valve independently of the first mentioned pressure operated device, and an electrically operated cam and lever device for moving the said slide valve independently of the action of either of the other valve operating devices.

6. In an automatic pilot valve the combination with a main valve, a pilot valve and a pilot valve operating device, of a supplemental control comprising a lever normally in engagement with the valve proper of the pilot valve, a multiple cusp cam adapted to alternately raise and lower said lever by turning in a constant direction, a solenoid and lever connected to said cam by a dog and rack whereby to revolve the cam in one direction by reciprocation of the solenoid plunger, substantially as described.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

EDWARD V. ANDERSON.

Witnesses:

FRED'K STAUB,
W. A. HECKMAN.