E. V. ANDERSON.

VALVE MECHANISM.

APPLICATION FILED JULY 19, 1909.

967,702. Patented Aug. 16, 1910.

Fig. 1.

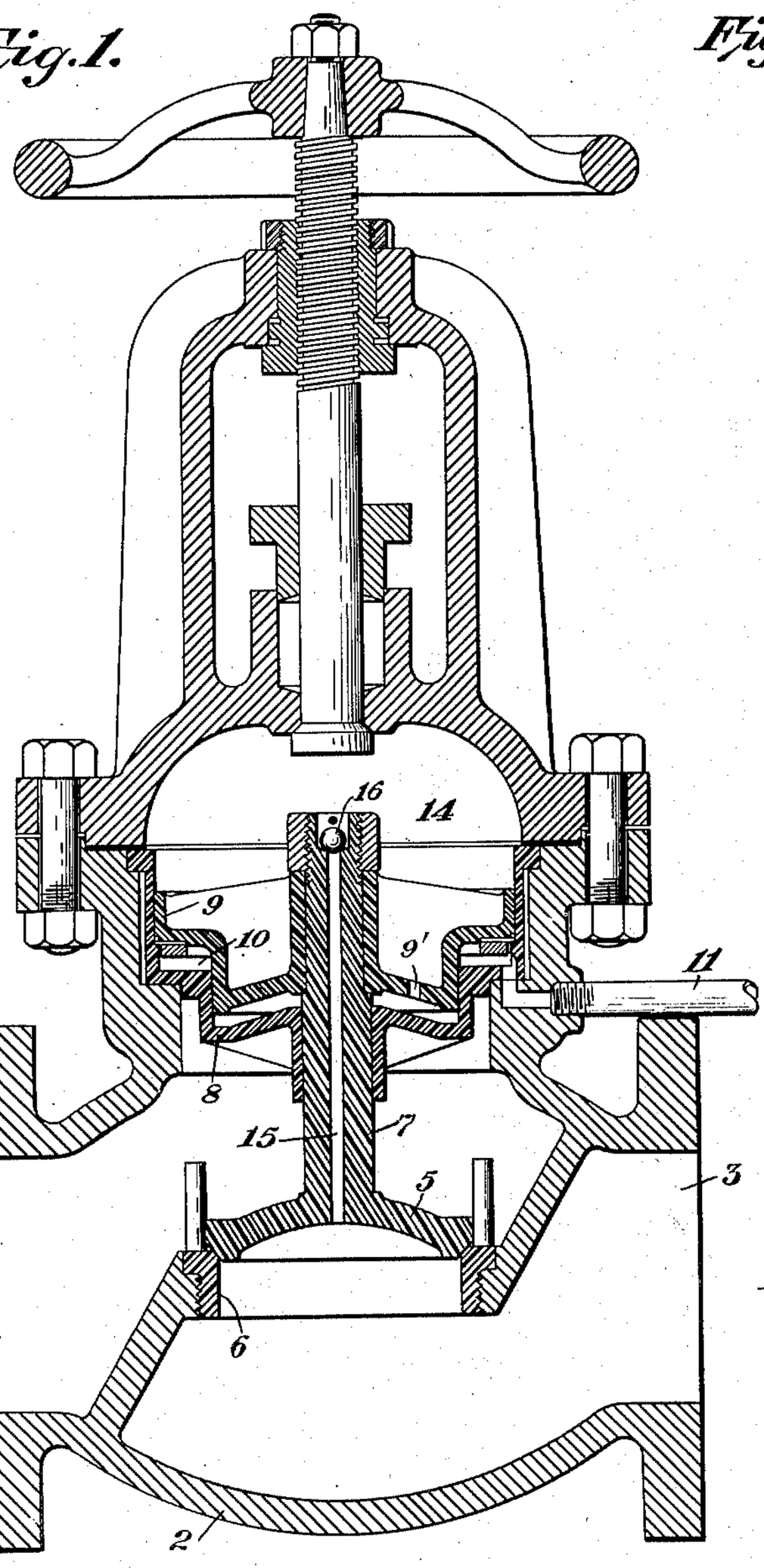
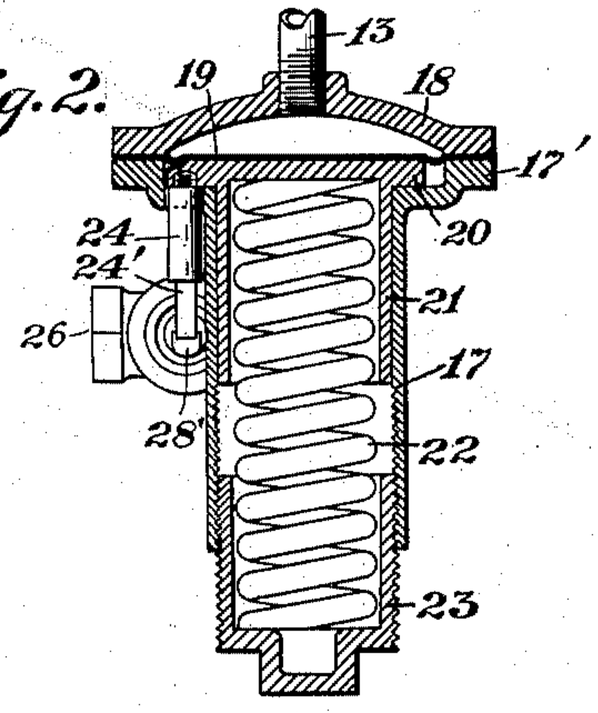


Fig. 2.



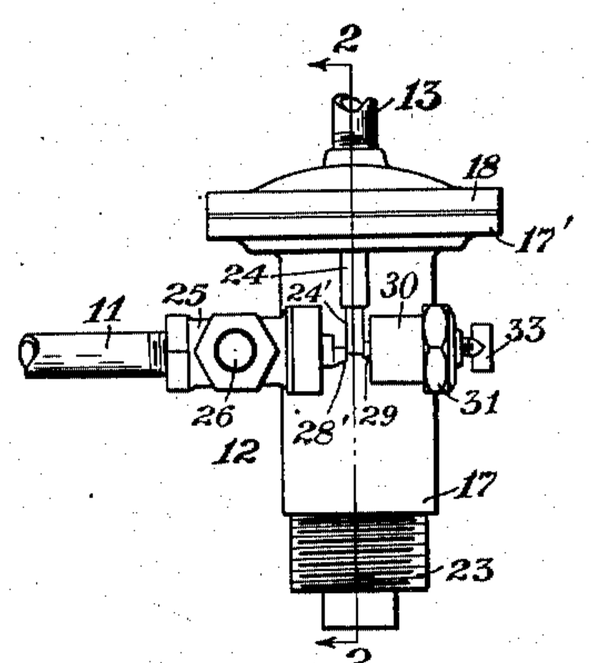
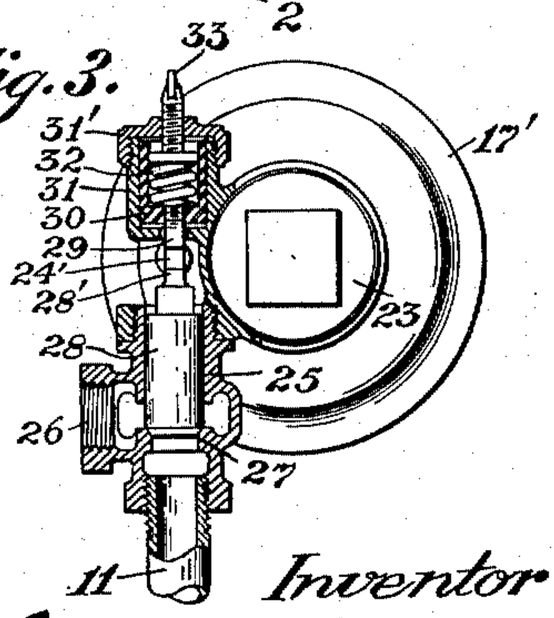


Fig. 3.



Witnesses;
Cyril B. Crick.
H. D. Knapp.

Inventor
Edward V. Anderson,
By Geo. Kent
Att'y.

UNITED STATES PATENT OFFICE.

EDWARD V. ANDERSON, OF MONESSEN, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO CHARLES E. GOLDEN, OF CRAFTON, PENNSYLVANIA.

VALVE MECHANISM.

967,702. Specification of Letters Patent. **Patented Aug. 16, 1910.**

Application filed July 19, 1909. Serial No. 508,309.

To all whom it may concern:

Be it known that I, EDWARD V. ANDERSON, a resident of Monessen, in the county of Westmoreland and State of Pennsylvania, have invented certain new and useful Improvements in Valve Mechanism, of which the following is a specification.

This invention has particular reference to valve mechanism for service in the connection between a boiler and the header, manifold or steam main of a steam generating plant wherein two or more boilers are used. Valve mechanism of this general character is well known in the art, its purpose being to close automatically whenever a rupture occurs in either the boiler or the header, so that steam cannot escape from the header through a disabled boiler, nor can steam escape from the boiler through a break in the header. While designed primarily for controlling the flow of steam, the mechanism may be utilized for water and other fluids when subjected to like manipulation.

The main valve mechanism is of the general type illustrated in Letters Patent No. 901,222, granted to me October 13, 1908, the only substantial change being the addition of a check valve for the bypass port through the valve stem which closes when the valve is seated, as in the event of a break in the boiler, and prevents such steam as may pass from the header around the valve stem and piston into the upper chamber of the valve casing from escaping through the bypass, which if permitted would maintain a constant leak.

The invention herein is directed primarily to the controlling or pilot valve which operates to effect the closing of the main valve in the event of a break in the header. The object is to provide a quick acting pilot, and one in which the operating parts are readily accessible.

In the accompanying drawings, Figure 1 illustrates the main valve mechanism in sectional elevation and the pilot valve in side elevation. Fig. 2 is a vertical section of the pilot valve on line 2—2 of Fig. 1. Fig. 3 is an inverted plan of the spring and diaphragm casing, with the pilot valve proper shown in section.

Referring to the drawings, 2 designates the casing of the main valve, 3 being the branch thereof connected to the boiler, and 4 the branch connected to the header.

5 is the main valve, and 6 the seat therefor in casing 2.

7 is the upwardly extending stem of the valve which works through the cylinder-like part 8 secured in the upper portion of casing 2, and 9 is the piston working in cylinder 8 and secured to valve stem 7. The space between the piston and cylinder (which increases in area as the valve opens) forms a pocket or chamber 10, and the piston and cylinder are offset, preferably in manner reverse to that shown in Fig. 4 of Patent 901,222, to provide a dash-pot for cushioning the valve in its closing movement. Space 10 fills through piston port 9′, and is connected by pipe 11 with the pilot valve 12, the upper end of the latter being in communication through pipe 13 with the header or other steam container connected to branch 4 of the main valve.

The operation of the parts thus far described, and the general function of the pilot valve in causing the main valve to close when a break occurs in the header, are fully set forth in my above mentioned patent, and need not be repeated here. I will therefore proceed at once with a description of the construction and operation of the parts which characterize the present invention.

In the operation of the main valve, a bypass is necessary between the boiler or boiler-connection and chamber 14 above piston 9, and, as in my former patent, this bypass consists of a port 15 through valve stem 7. But obviously, the bypass may be variously arranged, it being only necessary that a steam connection of some kind be provided between the parts indicated. When valve 5 is closed following a rupture in the boiler, pressure from the header forces steam around valve stem 7 and into chamber 10 and upwardly around piston 9 into chamber 14, and with port 15 constantly open, as in my former design, a leak of more or less proportion would be maintained. To obviate this, I provide check valve 16 which is here shown as a ball suitably seated and having requisite movement in the upper end of stem 7, so as to open and permit free upward passage of steam through port 15, but when the boiler pres-

sure is lowered and valve 5 seated, the check valve will seal port 15 and prevent the leaking referred to.

The pilot valve mechanism consists of a barrel-like casing 17 enlarged at its upper end at 17′ and provided with cap 18, with which pipe 13 from the header connects, the cap securing in place a diaphragm 19. Beneath the diaphragm is head 20 which normally seats in the enlargement of casing 17, as shown, with the diaphragm bearing thereon, and with depending hollow extension 21 fitting casing 17 to receive the upper end of the normally contracted spring 22. This spring is adjustably secured by hollow nut 23 fitting the lower end of casing 17. A bolt 24 is secured to head 20 and projects through enlargement 17′ to the outside of the casing and acts to trip or release the pilot valve proper, as will now be described. It will be understood that under working conditions the pressure of spring 22 is overcome by header pressure through pipe 13 exerted on diaphragm 19, thus holding bolt 24 lowered and maintaining the pilot valve inactive. But when the pressure of the spring exceeds the header pressure, as when a break occurs in the header, head 20 of the diaphragm is moved upward by the spring and such movement releases the pilot valve.

The pilot valve proper consists of a casing 25 which may be conveniently secured to the exterior of casing 17 and provided with a branch with which pipe 11 connects, and also an exhaust branch 26. Between these branches is seat 27, and seating thereon in the direction of pressure in pipe 11 is the cylindrical valve 28, so that the constant tendency of the pressure from pipe 11 (such pressure emanating from chamber 10 beneath piston 9 of the main valve) is to open valve 28, and the function of bolt 24 is to hold said valve normally closed. To this end, the extremity 24′ of bolt 24 engages the extremity of stem 28′ of valve 28, as clearly shown in Fig. 2, and holds said valve normally seated.

To relieve bolt 24 of lateral strain or stress, adjustable pressure means is arranged to engage the bolt, preferably in the plane of valve stem 28′. In the adaptation here shown, the extremity of bolt 28 is engaged by stem 29 projecting from head 30. This head is movably mounted in a casing 31 which may be secured to casing 17, with a spring 32 operating to force the head and stem 29 toward valve 28. The pressure of spring 32 is regulated by thumb screw 33 working through cap 31′ of casing 31. By this means, the pressure of the spring may be adjusted to the fluid pressure of valve 28 so that there is practically no lateral stress or strain on bolt 24. By referring to Figs. 1 and 2 it will be seen that extremity 28′ of valve 28 is reduced, being flattened on its upper side, so that extremity 24′ of bolt 24 has a very short hold thereon, and only slight upward movement of the bolt is necessary to release the valve and permit it to open under fluid pressure from pipe 11.

As fully explained in Patent 901,222, when the pressure is reduced beneath piston 9, valve 5 closes under pressure on top of said piston, and this action takes place when the pressure is reduced in the header or other part to which pipe 13 is connected. When such reduction occurs, spring 22 raises diaphragm 19 and head 20 sufficiently to withdraw the extremity of bolt 24 from between valve stem 28′ and pressure stem 29, thereby permitting valve 28 to move from its seat under steam pressure from pipe 11, whereupon said pipe is open through branch 26 to the atmosphere and the steam beneath piston 10 exhausts and valve 5 closes.

The construction herein provides for a quick release of valve 28 and a correspondingly prompt closing of valve 5 whenever the condition of the header is such that communication should be closed between it and the boiler.

While the pilot valve mechanism is here shown and described in connection with a non-return valve for steam-plant service, it may be used wherever such valve mechanism may be employed without departing from the invention.

I claim:—

1. A valve mechanism comprising a casing having a passage through which fluid under pressure flows, a valve for the passage, a piston movable with the valve, a chamber of which the piston forms a movable wall, a bypass establishing communication between the inlet side of the valved casing and said chamber, and a check valve for the bypass closing toward said inlet side of the casing.

2. A valve mechanism comprising a casing having a passage for the flow of fluid, a valve for the passage having a port formed therethrough, and a ball check valve for the port closing in the direction in which the first mentioned valve seats.

3. A valve mechanism comprising a casing having a passage therethrough, a valve for the passage, the valve having an elongated longitudinally ported stem, cushioning means for the valve consisting of a cylinder and piston—one of said parts fixed and the other secured to the valve stem, and a check valve for the stem port opened and closed by the pressures, respectively, which open and close the first mentioned valve.

4. A valve mechanism comprising a casing having a passage therethrough, a valve for said passage having a port formed therethrough, and a check valve for the port closed by fluid pressure and closing in the

direction in which the first mentioned valve seats.

5. A valve mechanism comprising a casing having a passage therethrough, a valve for said passage, a bypass, a check valve for the bypass preventing flow in the direction in which the first mentioned valve seats, a cylinder, a piston therein and connected to the valve, the bypass conducting fluid to the side of the piston where it will close the valve, a port for the escape of fluid to the opposite side of the piston and an outlet on such side of the piston, and a valve normally closed by fluid pressure controlling the outlet.

6. In a valve control, a valve casing, a valve therein normally seated against fluid pressure, controlling means for the valve actuated in one direction by fluid pressure to hold the valve closed, and means acting on the controlling means in opposition to the fluid pressure and when dominating the latter moving the controlling means to effect the opening of the valve.

7. In a valve control, a valve casing, a valve therein normally seated against fluid pressure, a device movable with relation to the valve and in one position holding the same seated, fluid-pressure actuated means maintaining the device in said holding position, and pressure means opposing the fluid pressure means and when dominating the latter moving said device to permit the valve to open under the fluid pressure thereon.

8. In a valve control, a valve casing, a valve therein normally seated against fluid pressure, a device movable with relation to the valve and in one position holding the same seated, a casing and a diaphragm therein to which said device is connected, means admitting fluid under pressure to one face of the diaphragm for maintaining said device in valve-holding position, and a spring opposing such pressure on the diaphragm and operating upon reduction of such pressure to move the diaphragm and release the valve.

9. In a valve control, a diaphragm casing having an inlet for fluid under pressure, a diaphragm, a spring in the casing opposing fluid pressure in the diaphragm, a device connected to the diaphragm and extending outside the casing, a valve casing outside the diaphragm casing, and a valve in the valve casing under fluid pressure and held seated by said device when the fluid pressure on the diaphragm dominates the spring pressure and released when the spring pressure dominates.

10. In a valve control, a valve casing, a valve therein seating against fluid pressure, pressure exerting means for the valve separated therefrom, a trip device connecting the pressure means and valve, and means for withdrawing the trip device.

11. In a valve control, a valve casing, a valve therein seating against fluid pressure and having a projecting stem, a housing, a stem projecting from the housing toward the valve stem with spring means in the housing projecting the stem, and a trip device between and transmitting pressure from one stem to the other with means for withdrawing the trip device.

12. In a valve control, a diaphragm casing having an inlet for fluid under pressure, a diaphragm, a spring in the casing opposing fluid pressure on the diaphragm, a bolt movable with the diaphragm and projecting from the casing, a valve casing at the exterior of the diaphragm, a valve therein held normally seated against fluid pressure by the bolt, and a pressure-exerting device in line with the valve stem and exerting pressure thereon through the bolt, the bolt moved from engagement with the valve stem when the spring pressure on the diaphragm exceeds the fluid pressure thereon.

13. In double acting non-return valve mechanism, a non-return valve casing, a valve therein seating against boiler pressure, a piston connected to the valve and means admitting boiler pressure to both sides of the piston, an outlet for the side opposing closing of the valve and a valve for the outlet seating against the pressure therein, a trip device holding the outlet valve seated, a diaphragm casing, a diaphragm therein with means admitting header pressure to one side thereof, the trip device connected to the diaphragm and held by header pressure in valve holding position, and a spring opposing the header pressure and when dominating thereover moving the trip device to release the said valve.

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

EDWARD V. ANDERSON.

Witnesses:

MINNIE BUMER,

FRANK BUMER.