No. 670,250. Patented Mar. 19, 1901.

R. RYAN.

CUT-OFF.

(Application filed June 28, 1900.)

(No Model.)

FIG. 1.

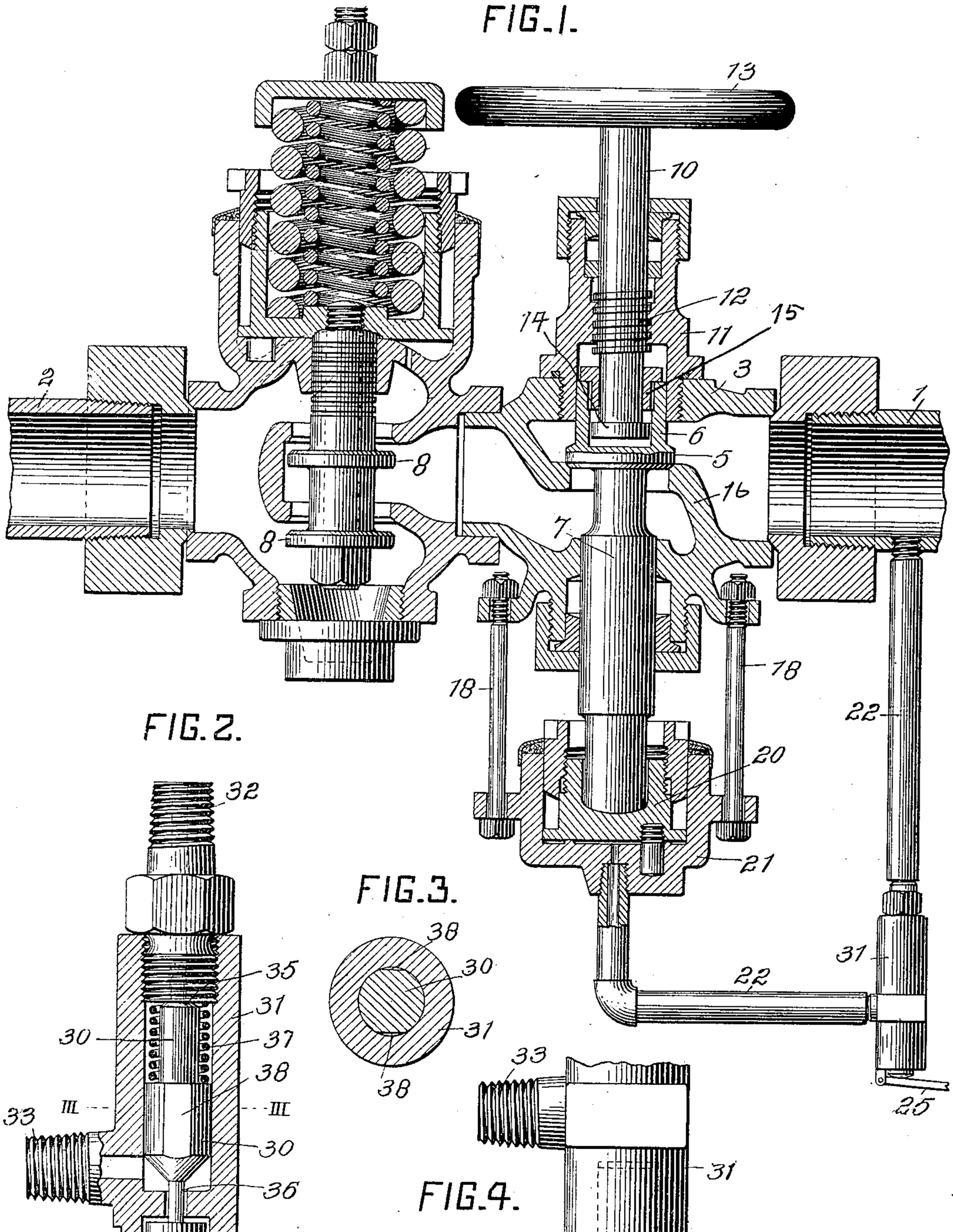

FIG. 2.

FIG. 3.

FIG. 4.

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RAPHAEL RYAN, OF PITTSBURG, PENNSYLVANIA.

CUT-OFF.

SPECIFICATION forming part of Letters Patent No. 670,250, dated March 19, 1901.

Application filed June 28, 1900. Serial No. 21,934. (No model.)

To all whom it may concern:

Be it known that I, RAPHAEL RYAN, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Fluid-Pressure Regulators and Cut-Offs, of which improvements the following is a specification.

My invention relates to cut-off valves employed in conduits for fluid under pressure.

In general terms the invention consists in the construction and combination substantially as hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a vertical section of the entire apparatus, shown in operative juxtaposition to a pressure-regulating valve. Fig. 2 shows, partly in section and partly in elevation and on a larger scale, the auxiliary-valve chamber shown at 31, Fig. 1. Fig. 3 is a cross-sectional view on the line III III, Fig. 2. Fig. 4 shows in elevation the lower portion of the auxiliary-valve chamber 31, the means for operating the auxiliary valve being different from the means shown in Fig. 2.

Like numerals indicate like parts in the several figures.

The apparatus is placed in the line of flow of fluid between two adjacent sections 1 and 2 of the pipe or conduit.

3 is the valve-casing. Across valve-casing 3 extends a web 16, and the port of the valve is formed in this web.

5 is the valve. It closes in the direction of the flow of fluid through the port and opens against the stream.

The stem 7 of the valve 5 extends through the wall of casing 3, a suitable stuffing-box being there provided, and into an abutment-chamber presently to be described. Stem 7 is preferably so formed that the fluid-pressure on the discharge side of valve 5, tending to unseat the valve, is rendered negligible. Immediately beneath the web it is desirable that stem 7 be substantially smaller in diameter than the port, so as to afford a free flow for the fluid through the port when the valve is open. To counteract in part or wholly the effect which the pressure of the gas on the discharge side of valve 5 would otherwise have upon the position of valve 5, the diameter of stem 7 is increased, as shown, before passing through the wall of casing 3.

The abutment-chamber 21 is connected to or otherwise held in fixed position relative to the valve-casing 3, as by bolts 18 18. Within this chamber is placed an abutment 20, capable of being impelled in one direction by fluid-pressure admitted into the chamber behind the abutment and capable of returning to the end of the chamber when pressure from behind is relieved. This may conveniently be accomplished by placing the abutment-chamber beneath the valve-chamber and allowing the abutment to descend by gravity when relieved of pressure from below. Abutment 20 is so arranged that it bears upon the end of the stem 7 of the valve 5, and as abutment 20 moves to and fro valve 5 is raised from and left free to return to its seat. The abutment-chamber 21 is preferably a cylinder and the abutment 20 a piston, as shown in the drawings. When so formed, piston 20 should be packed in any suitable manner known in the art.

Abutment 20 is caused to move in the direction to open valve 5 by the admission of fluid under pressure from the pipe or conduit on the inlet side of valve 5 into chamber 21 behind abutment 20. It is left free to move in the opposite direction by cutting off the connection from the pipe or conduit to the abutment-chamber and opening communication from the abutment-chamber to the open air. To this end I preferably employ an auxiliary valve, such as is shown in the drawings. The abutment-chamber 21 in the rear of abutment 20 is in communication with inlet 1 through a connecting-pipe 22 22. In this branch pipe 22 is placed the auxiliary-valve chamber 31. This portion of the apparatus is shown in detail in Figs. 2, 3, and 4. It consists of a casing 31, which communicates with inlet 1 through a pipe-coupling 32 and with abutment-chamber 21 through a pipe connection 33 and with the open air through an orifice 34. Within chamber 31 is placed a double-seating valve 30, controlling two ports 35 and 36. Port 35 leads to inlet 1. Port 36 leads to the open air. The valve is so arranged in its casing that when relieved of an opposing force

it will close port 36. This is accomplished in any suitable manner, as by a spring 37. When valve 30 is in that position, fluid under pressure from inlet 1 passes through port 35, passages 38, (preferably formed by flattening the sides of the stem connecting the valves, as shown in Figs. 2 and 3,) and pipe connection 33 to abutment-chamber 21. Port 35 is closed and port 36 opened by forcing valve 30 to the other limit of its movement against the tension of spring 37 or other opposing force. This may be accomplished in any suitable manner. In Fig. 2 I have shown a screw-thread formed on the end of valve-casing 31. Upon it is screwed a hand-wheel 23, which abuts against the prolonged stem of the auxiliary valve and when screwed up drives the auxiliary valve to close port 35 and open port 36. A passage 24 through the hand-wheel gives free communication from passage 34 to the open air. In Fig. 4 I have shown another means for accomplishing the same result—namely, a lever, one arm 25 of which bears upon the prolonged stem of valve 30. In case the apparatus is used in connection with a fluid-pressure motor this auxiliary valve 30 may be operatively connected with the throttle-valve, which controls the flow of fluid to the motor, so that the cut-off valve 5 may be opened and closed as the throttle is opened and closed.

10 is a stem adapted to be advanced toward and to be retracted from valve 5, adapted when at one limit of its movement to clamp valve 5 to its seat and when at the other limit of its traverse to hold valve 5 open, and adapted when in intermediate position to allow valve 5 to move independently of it in response to the movements of auxiliary valve 30, already described. To this end I preferably emply the construction shown in Fig. 1 of the drawings. Stem 10 is arranged in a casing 11, formed on or secured to the valve-casing 3 in such manner that the stem 10 is alined with the valve 5 and its stem upon the supply side of the valve 5. Stem 10 is provided at some convenient portion of its length with a screw-thread 12, and the casing 11 is provided with a corresponding screw-thread adapted to engage the thread on stem 10. Stem 10 is screwed back and forth away from or toward the valve 5 by means of any suitable contrivance, such as a hand-wheel 13. On the end of stem 10, adjacent to valve 5, is an enlargement or head 14. Valve 5 is provided with a hollow projection 6, and within this projection the head upon stem 10 projects and is allowed some freedom of movement independent of valve 5. In each direction movement of stem 10 independent of the valve is limited by the head 14, bearing upon the wall of the projection 6, shoulder 15 being rigidly fixed to projection 6. It is obvious that the hollow projection 6 may be mounted on stem 10 and head 14 on valve 5.

8 8 is a regulating-valve ordinarily employed in connection with my improved cut-off valve. It forms no part of the present invention. Its presence is not essential to the proper operation of the cut-off valve.

As shown, the apparatus is at rest, as when fluid is not passing through it. Auxiliary valve 30 is raised, port 36 is open, the chamber beneath abutment 20 is open to the atmosphere, and abutment 20 is withdrawn to the limit of its movement. Valve 5 rests on its seat. Stem 10 is withdrawn from contact with valve 5. To open the valve and allow fluid under pressure to pass through the conduit, valve 30 is shifted, closing port 36 and opening port 35. Fluid-pressure passes at once to abutment-chamber 21, driving abutment 20 forward and opening valve 5. Valve 5 then remains open until valve 30 is again shifted or until fluid-supply fails or until stem 10 is operated to drive valve 5 to its seat, as will presently be explained. When it is desired to cut off the fluid-supply, auxiliary valve 30 is shifted again. Communication between inlet and abutment chamber is interrupted, communication from abutment-chamber to the open air is made, the abutment is withdrawn from valve-stem 7, and valve 5 is seated. When valve 5 is closed, the flow of fluid is substantially stopped; but to prevent leakage, which would otherwise occur under valve 5 so long as the pressure on the supply side exceeded that on the delivery side, stem 10 is screwed forward until head 14, bearing upon valve 5, clamps it firmly to its seat. Stem 10 performs a further function. When withdrawn until head 14 engages shoulder 15, further withdrawal will open valve 5. Thus this stem 10 serves as an emergency device or means of operating valve 5 independent of the other parts already described. At the same time its presence does not interfere with the normal operation of those other parts.

I claim as my invention—

1. In a fluid-supply conduit, the combination of a stop or cut-off valve, an abutment operated by fluid-pressure from the inlet side of the valve to shift the stop or cut-off valve, and an auxiliary valve controlling the flow of fluid-pressure to and from the said abutment, substantially as described.

2. In a fluid-supply conduit, the combination of a cut-off valve; an abutment in a chamber, operated by fluid-pressure from the inlet side of the cut-off valve to shift the cut-off valve to open position, said chamber being provided with inlet and exhaust ports; and an auxiliary valve controlling said ports, substantially as described.

In testimony whereof I have hereunto set my hand.

RAPHAEL RYAN.

Witnesses:
F. E. GAITHER,
E. P. LORD.