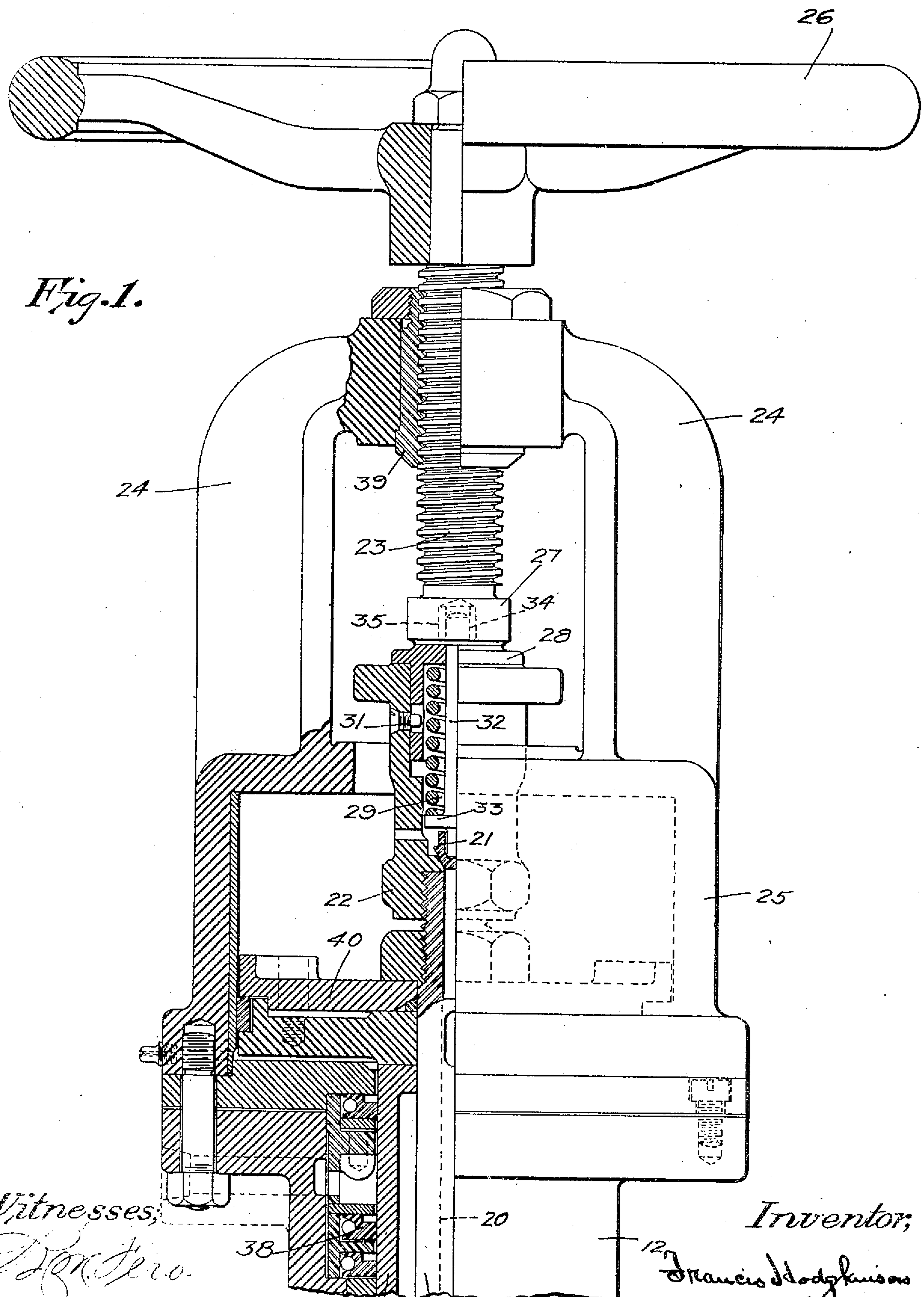
F. HODGKINSON.
AUTOMATIC CUT-OFF VALVE.
APPLICATION FILED OCT. 8, 1909.

978,294.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses;
[signature]
B. J. Funk

Inventor;
Francis Hodgkinson
Jno. D. Owen
Attorney.

F. HODGKINSON.

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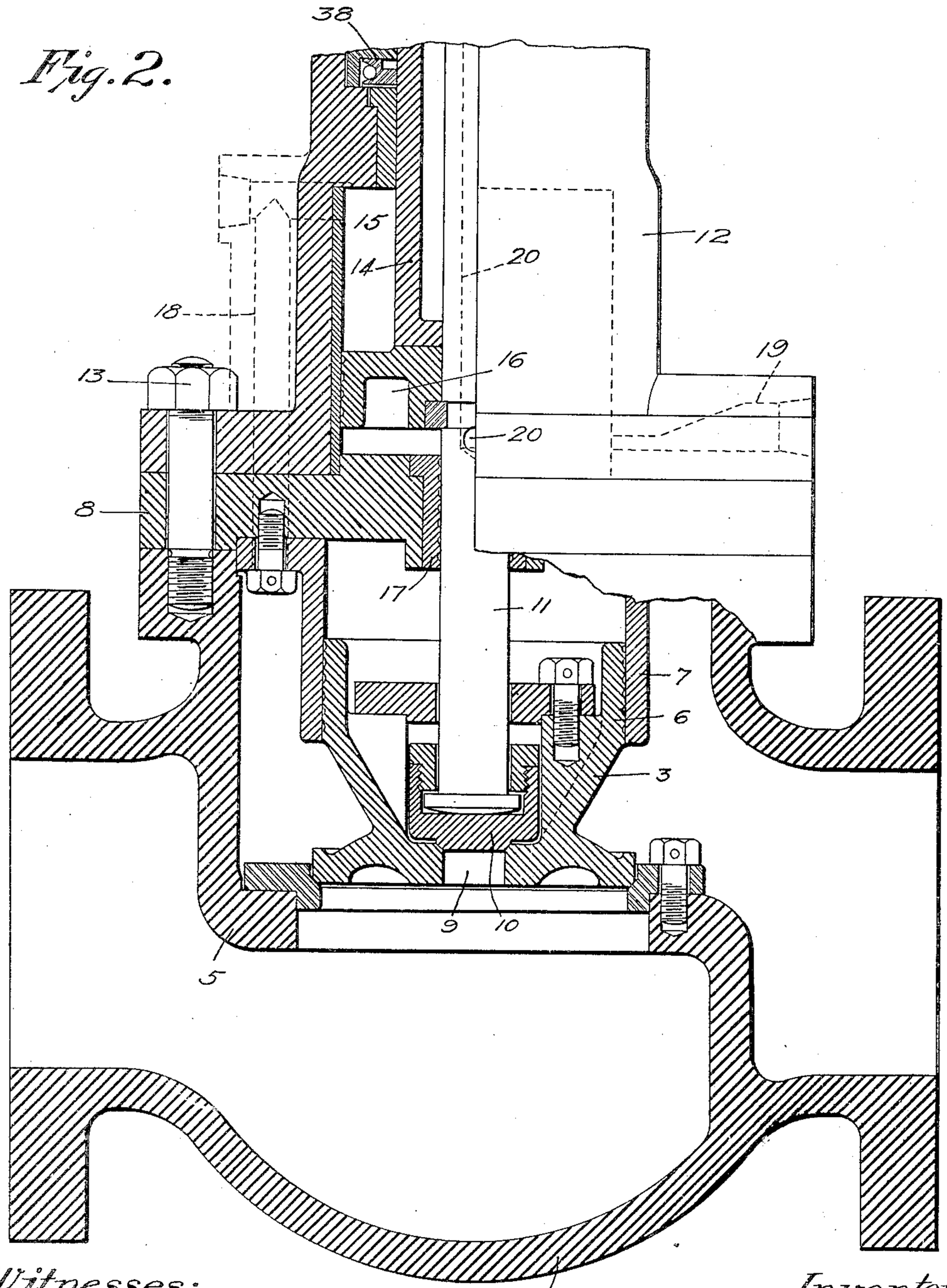
2 SHEETS—SHEET 2.

Fig. 2.



Witnesses;

D. F. McSweeney.

B. F. Funk.

Inventor,

Francis Hodgkinson

by Jno. J. Green

Attorney.

UNITED STATES PATENT OFFICE.

FRANCIS HODGKINSON, OF EDGEWOOD PARK, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE MACHINE COMPANY, A CORPORATION OF PENNSYLVANIA.

AUTOMATIC CUT-OFF VALVE.

978,294. Specification of Letters Patent. Patented Dec. 13, 1910.

Application filed October 8, 1909. Serial No. 521,743.

To all whom it may concern:

Be it known that I, FRANCIS HODGKINSON, a subject of the King of Great Britain and Ireland, and a resident of Edgewood Park, in the county of Allegheny and State of Pennsylvania, have made a new and useful Invention in Automatic Cut-Off Valves, of which the following is a specification.

This invention relates to valves and particularly to automatic cut-off valves.

It is customary to provide engines and other fluid actuated motors with throttle valves, which may be manually operated to control the supply of fluid to the engine or the motor and which will operate automatically to shut off the fluid supply when the engine or motor has exceeded a predetermined speed. The automatically actuated portion of such a valve is usually fluid actuated and is controlled by a relief valve which is operated by a speed responsive relief mechanism on the engine or motor. The objection to such an arrangement is that the operation of readjusting the relief mechanism, opens the valve. This is objectionable for the reason that a careless operator might latch up the release mechanism immediately after it has been automatically released and thus, fully opening the supply valve, immediately delivering a full supply of fluid to the engine. Such a procedure might cause disastrous results to the engine or to the apparatus driven by it.

An object of my invention, is to produce an automatic cut-off valve with which means are employed for rendering the automatic relief mechanism ineffective for opening the valve immediately after the valve has been automatically closed.

A further object is to produce an automatic cut off valve in which manually operated means are employed, in addition to the automatic means, for readjusting and opening the valve after it has been automatically closed.

A further object is to produce a combined manually operated throttle valve and an automatic cut off valve.

These and other objects I attain by means of an apparatus embodying the features herein described and illustrated.

In the drawings accompanying this application and forming a part thereof, I have illustrated a valve embodying my invention, partially in elevation and partially in section.

For convenience of illustration, the illustration is divided into two parts so that Figure 1 represents the upper part, and Fig. 2 the lower part of the valve.

I have illustrated an embodiment of my invention in connection with a cut-off valve but with no idea of in any way limiting it to the details shown or its application to throttle valves.

Referring to the drawings: A throttle valve 3 is mounted within a casing 4 so that it seats on a diaphragm 5 formed within the casing. A cylindrical piston 6 is formed integrally with the valve 3 and operates within a cylindrical extension 7 which may be secured to the top portion 8 of the valve casing 4. A pressure equalizing port 9, formed in the valve disk 3, is controlled by a pilot valve 10 which is secured to the end of the valve stem 11 and is so arranged that the port 9 will be opened prior to the raising of the valve 3 from its seat.

The valve stem 11 projects upwardly through the top portion 8 of the casing 4 and through a cylindrical casing 12 which may be secured to the portion 8 by bolts 13 and which incloses a differential piston 14. The piston 14 is secured to the stem 11 and is so located within the casing 12 as to divide its interior into two chambers 15 and 16.

Fluid presure is admitted from the inlet side of the valve 3 to the chamber 15 through a continuously opened passage 18. Limited amounts of fluid are admitted to the chamber 16 from the casing 4 past the piston 6 and around the valve stem 11, and between it and a packing 17, which is mounted on the portion 8. Leakage steam from the chamber 15, past the differential piston 14, also enters the chamber 16. The differential piston 14 is so located that the face of greater area is exposed to the fluid pressure in the chamber 16 and the face of smaller area is exposed to the fluid pressure in the chamber 15, consequently when the pressures are equal in the two chambers the effort of the fluid pressure in the chamber 16 to raise the piston and open the valves preponderates over the effort of the fluid in the chamber 15 to force the piston down and close the valve.

A passage 19 communicates with, and is adapted to exhaust the chamber 16 when the engine or motor to which the valve supplies fluid has exceeded a determined speed. This may be accomplished by providing a valve (not shown) of suitable construction for controlling the flow of fluid through the passage 19 which is automatically actuated by a cut-off governor on the engine or motor, to open the passage 19. When the chamber 16 is exhausted the fluid pressure in the chamber 15 preponderates and forces the piston 14 downwardly to close the valve. I provide a second passage 20 for exhausting fluid from the chamber 16 so that the valve 3 cannot be opened by merely closing the passage 19. The passage 20 is formed in the valve stem 11 and extends from the upper end of the stem to a point below the piston 14 where it communicates with the chamber 16. The upper end of the passage is closed by a valve 21 which is located in a casing 22 secured to the valve stem and which may be closed by a screw valve stem 23. The screw valve stem 23 is suitably mounted in brackets 24 formed on a housing 25 which is secured to the top of the cylindrical casing 12. A hand wheel 26 is provided on the stem 23 for raising and lowering it. A collar 27 is provided on the lower end of the stem 23 and abuts against a cap 28, which incloses a coil spring 29 and projects downwardly into the casing 22 and is moved longitudinally along the casing within the limits of a lost motion connection 31. The spring 29 surrounds a plunger 32 and is mounted between the cap 28 and the collar 33, formed on the plunger, so as to force the plunger down to close the valve 21 when the cap 28 is forced down by the screw stem 23. A tip 34, on the plunger 32, extends upwardly through the cap 28, so as to guide the longitudinal motion of the plunger, and the stem 23 is recessed at 35 to receive it.

When the passage 19 is opened the valve 3 is moved to the closed position by the pressure of the fluid in the chamber 15 and the cap 28, since it is carried by the valve stem 11, recedes from the collar 27 releasing the spring 29. After the plunger 32 has moved downward and eased the tension of spring 29, the valve 21 is weakened to the extent of being unable to resist pressure from the chamber 15. Thus, the automatic feature of the valve having once operated, it is impossible to open the valve without first lowering the screw stem 23 so that the collar 27 abuts against the cap 28 and, through the agency of the spring 29 and the plunger 32, holds the valve 21 closed and permits pressure to build up in the chamber 16. This pressure of course, will not build up until after the passage 19 is closed. The screw stem 23 may then be raised and the valve 3 will follow it, the upward pressure exerted by the fluid in the chamber 16 being sufficient to hold the valve 21 closed. The screw stem 23 may be employed to control the operation of the valve 3 irrespective of the pressure in the chamber 16. That is the valve 3 may be moved to any intermediate position and may even be closed by the screw stem 23 against the pressure in the chamber 16.

The housing 25 incloses a piston 40 which with the housing performs the function of a dash pot and cushions the downward motion of the valve 3.

A packing 38 is located between the chamber 16 and the dash pot and surrounds the smaller portion of the differential piston 14. This packing is employed to prevent the leakage of fluid from the chamber 15 into the dash pot below the piston 40.

The stem 23 might abut directly against the plunger 32 to close the valve 21, but the spring and cap connection, which intervenes between the stem 23 and the plunger 32, are employed because it is desirable for the valve 3 to seat against a solid support when the valve is opened so that it will not rattle in the steam currents passing through the casing 4. With the spring and cap connection as described, the disk 3 can seat firmly against the upper portion of the valve casing 4 when the collar 27 abuts against stop 39 provided for it and carried by the bracket 24. Without the spring connection, there would be danger of relieving the pressure on the valve 21 after the disk 3 was seated against the cap portion 8 and so exhausting the fluid pressure from the chamber 15.

The pressure of the spring 29 against the valve 21 is, of course, diminished after the valve 3 is seated on the top portion 8, but the arrangement is such that the stem 23 cannot be raised far enough to totally relieve the valve 21 of the spring pressure and to permit it to open.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim is:

1. In combination with a supply valve, a manually operated and fluid actuated means for closing said valve and means for rendering the fluid actuated means incapable of opening said valves until said manually operated means is moved to the closed position.

2. In combination with a supply valve, a fluid actuated means for closing said valve, a fluid actuated means for opening said valve and manually operated means for con-

trolling the operation of said fluid actuated means.

3. In combination with a supply valve, an automatically controlled piston for closing said valve, manually operated means for closing said valve independently of said piston, means for rendering said piston ineffective in opening said valve without the cooperation of said manually operated means.

4. A supply valve, an automatically controlled device for closing said valve, means for closing said valve independently of said device and means for rendering said device ineffective in opening said valve without the coöperation of said independent closing means.

5. A supply valve, an automatically controlled device for controlling said valve, means for manually closing said valve independently of said device and a valve for rendering said device ineffective in opening said valve without the coöperation of said means.

6. A supply valve, an automatically controlled device for controlling said valve, means for manually closing said valve independently of said device and a valve controlled by said means for rendering said device ineffective in opening said valve.

7. A supply valve, an automatically controlled device for controlling said valve and a manually controlled valve for rendering said device effective in opening said valve.

8. A supply valve, a fluid actuated piston for opening and closing said valve, an automatically controlled passage and a manually controlled passage for exhausting the opening fluid pressure from said piston.

9. A supply valve, a fluid actuated piston for opening the valve, an automatically controlled passage and a manually controlled passage for controlling the opening fluid pressure on said valve.

10. A supply valve, a fluid actuated piston for opening said supply valve, an automatically controlled passage for controlling the opening fluid pressure on said piston and an independent valve for controlling the opening fluid pressure on said piston.

11. A supply valve, a fluid actuated piston for opening said valve, an automatically controlled passage for controlling the opening fluid pressure on said piston and a manually operated valve for controlling the opening fluid pressure on said piston.

12. A supply valve, a fluid actuated piston for controlling the operation of said valve, a chamber exposed to fluid pressure for actuating said piston to close said valve, a chamber exposed to fluid pressure for actuating said piston to open said valve, an automatically controlled fluid passage for controlling the fluid pressure in said last mentioned chamber and a valve for controlling the fluid pressure in said chamber.

13. A supply valve, a fluid actuated piston for controlling the operation of said valve, a chamber exposed to fluid pressure for actuating said piston to close said valve, a chamber exposed to fluid pressure for actuating said piston to open said valve, an automatically controlled fluid passage for controlling the fluid pressure in said last mentioned chamber and manually actuated means for closing said valves independently of said piston and for controlling the operation of said piston.

14. A fluid supply valve, a fluid actuated piston for controlling the operation of said valve, a chamber exposed to fluid pressure for actuating said piston to open said valve, an automatically controlled fluid passage for controlling the fluid pressure in said chamber, and a control valve for controlling the fluid pressure in said chamber and manually actuated means for closing said control valves and for closing said supply valve independently of the operation of said piston.

15. A supply valve, a fluid actuated piston for opening and closing said valve, an automatically controlled passage for exhausting the opening pressure from said piston, a second passage for exhausting the opening pressure from said piston and a manually controlled valve controlling the flow of fluid through said second passage and a spring and lost motion connection for controlling the operation of said manually controlled valve.

16. A supply valve, a fluid actuated piston for opening and closing said valve, an automatically controlled passage and a manually controlled passage for exhausting the opening pressure from said piston, a valve controlling the delivery of fluid through said manually controlled passage, means for closing said valve and a lost motion and spring connection between said closing means and said valve.

17. A supply valve, a fluid actuated piston for opening said valve, an automatically controlled passage and a manually controlled passage for controlling the opening pressure on said valve, a manually actuated valve for controlling the flow of fluid through said manually controlled passage, means for closing said valve and a spring between said means and said manually controlled valve.

In testimony whereof, I have hereunto subscribed my name this 5th day of October, 1909.

FRANCIS HODGKINSON.

Witnesses:
C. W. McGhee,
C. W. Ballay.