Nov. 3, 1936. B. L. ROBART ET AL 2,059,808

FLUID PRESSURE REGULATOR

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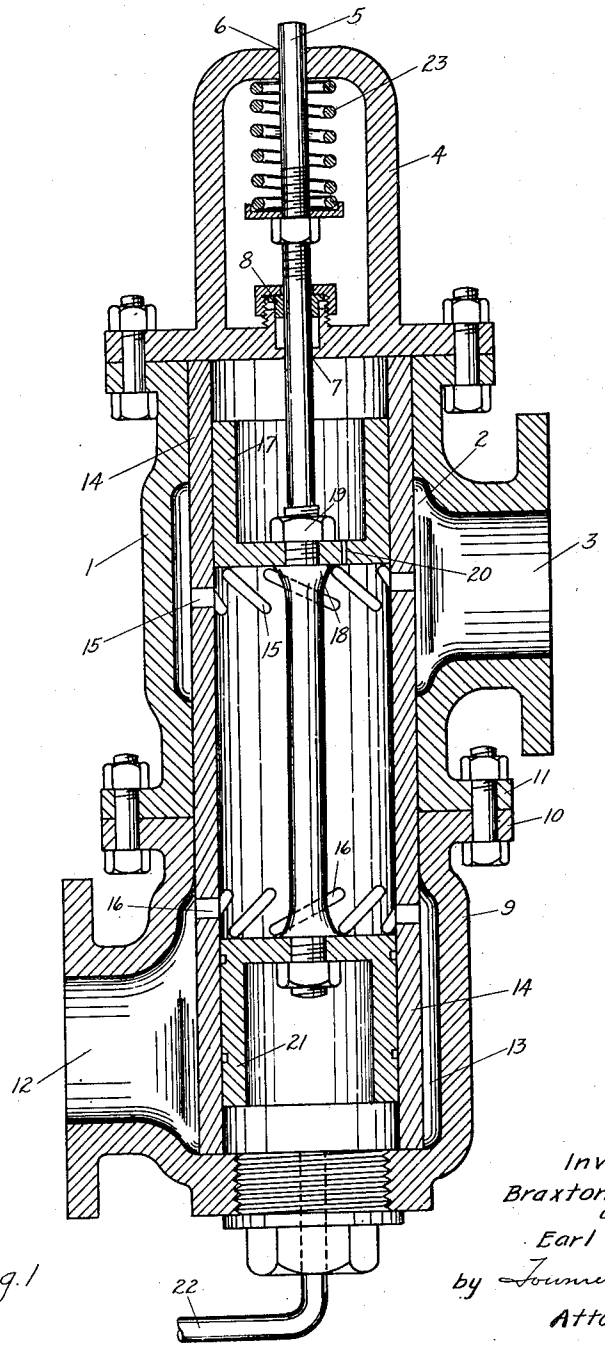


Fig. 1

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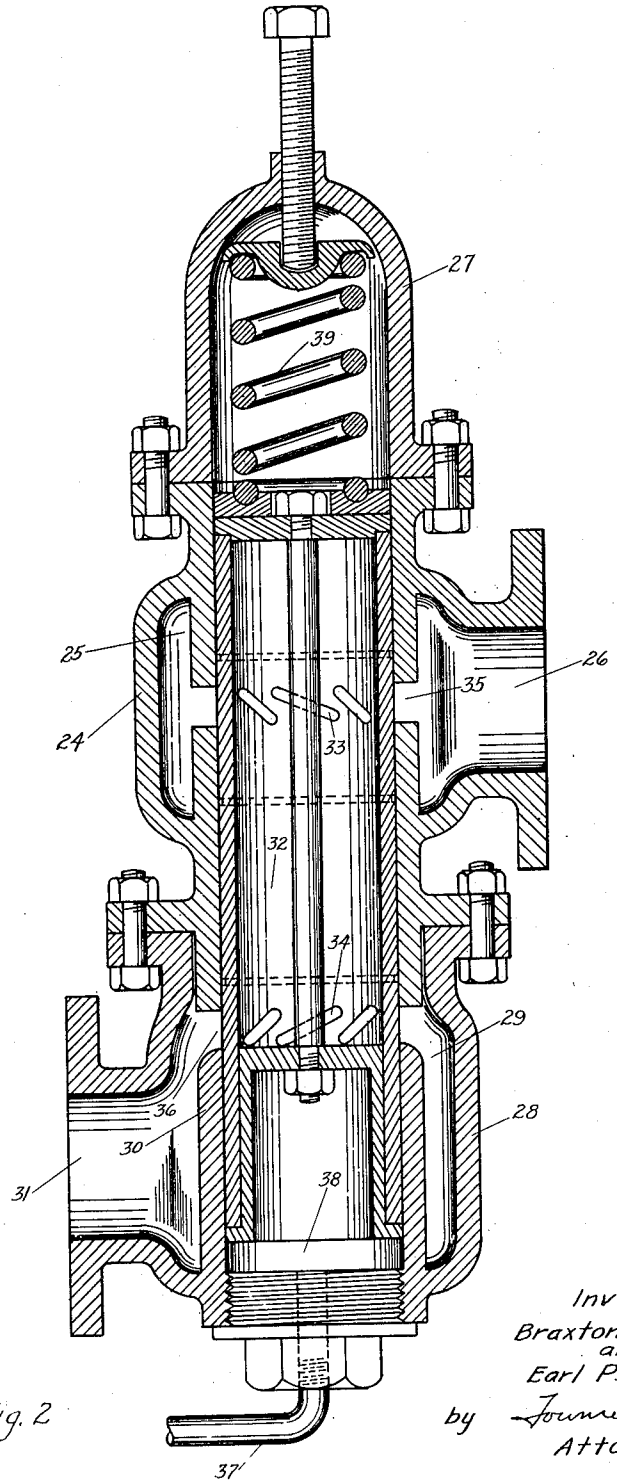


Fig. 2

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FLUID PRESSURE REGULATOR

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5 Claims. (Cl. 137—153)

The present invention relates to improvements in steam pump governors having particular reference to feed water pumps for steam boilers.

One of the primary objects of this invention is to provide a pump governor which is compact in construction, requires a minimum amount of machining and has a minimum number of moving parts.

Another object of this invention is to provide inlets and outlets, associated with the governor, capable of having their angularity in parallel planes adjusted.

A further object is to provide an excess pressure governor having a dash pot controlled action and which will prevent the steam pump from racing in the event the working load is accidentally removed.

A still further object is to provide a piston type of valve which is guided and operated in a novel manner.

These and other objects and advantages will appear as the description proceeds. It is to be distinctly understood, however, that we do not wish to be limited to the exact details herein disclosed and described, but intend to include as part of our invention all such changes and modifications as would occur to those skilled in the art and fall within the scope of the appended claims.

In the accompanying drawings, wherein two convenient forms which our invention may take are shown for the purpose of illustration,

Fig. 1 is a longitudinal cross sectional view of one form of our improved pump governor.

Fig. 2 is a view similar to Fig. 1 of a modification of our improved pump governor.

With reference to Fig. 1, a central housing 1 is provided with a jacket 2 opening into a flanged inlet 3. A flanged yoke is secured to the upper portion of the housing 1 in which the valve rod 5 is guided for vertical movement at 6—7. The usual stuffing box for the rod 5 is shown at 8.

A lower housing 9 having a flanged portion 10 is adjustably secured to a flange portion 11 of the housing 1. This construction permits the angularity of the inlet 3 and outlet 12 opening into the jacket 13 to be adjusted in parallel planes.

A lining sleeve 14 secured in the housing 1—9 is provided with ports 15—16 opening into the jackets 2—13. The valve rod 5 is of reduced diameter at the upper end to permit the insertion of the cupped shape guiding member 17 which abuts an enlarged diameter at 18. A nut 19 is threaded on a portion of the rod 5 to secure the member 17 in position. The guide 17 is ported at 20 to permit the pressure to be balanced above and below the same. An inverted cupped shape valve member 21 is concentrically secured to the lower end of the rod 5. The member 21 functions as a double acting piston being subjected to steam pressure upon the upper end to lower the valve and being subjected to discharge pressure on the lower end, admitted through the conduit 22, to raise the same.

In order to provide feed water pressure in excess of boiler pressure and to overcome the friction of check valves and the like in the line, an excess pressure spring 23 is provided urging the rod 5 downwardly opposing the lifting of the valve by pump discharge pressure admitted through the conduit 22 against the member 21.

The operation of the foregoing described mechanism is as follows: Upon the initial starting of the steam pump or other mechanism to be governed by our improved governor, it is necessary to by-pass the steam around the same in any well known manner. When sufficient pressure has been created on the discharge side of the pump, the discharge pressure admitted through the conduit 22 will raise the valve 21 and rod 5 to the position shown removing the guide 17 from a position closing the ports 15. The valve is now in a regulating position and during normal operation the variation in differential pressure upon opposite sides of the upper end of the valve 21 will result in a smooth reciprocation of the valve 21 in the sleeve to open and close the ports 16 to varying degrees to regulate the flow of steam to the pump. During normal operation the member 17 functions merely as a guide and the ports 15 are always in a full open condition. In the event the working load of the pump is suddenly removed as a result of pipe failure and the like, the rod 5 and its associated members will be lowered to completely close the ports 15 by the member 17 and thus avoid dangers connected with racing of the pump. Another important function of our improved governor resides in the dash pot action effected by chamber above the valve 17. The port 20 is relatively small and a decided dash pot action results upon movement of the valve mechanism in either direction. This is one of the structural features of our improved governor which contributes to its smooth operation with complete elimination of any "hunting" action.

In Fig. 2 is shown a modified type of governor into which certain of the structural details of the governor shown in Fig. 1 have been em-

bodied. As illustrated a central housing 24 is provided with a jacket 25 opening into a flanged inlet 26. The upper and lower ends of the housing are flanged to receive a spring cage 27 and a lower housing 28. The housing 28 has a jacket 29 defined by an integral sleeve 30 and opening into the outlet 31. A hollow piston valve 32 closed at both ends is supported for reciprocating movement in the housing 24 and sleeve 30. Longitudinally spaced ports 33—34 in the piston 32 are adapted to communicate with annular ports 35—36 opening into the jackets 25—29. It will thus appear that the piston 32 is balanced both longitudinally and transversely by the steam flowing between the inlet 26 and outlet 31.

In order to regulate the flow of steam to the pump is accordance with the discharge pressure, a conduit 37 connected to the discharge side of the pump directs the discharge pressure into the chamber 38 defined by the sleeve 30 and closed by the lower end of the piston 32. An adjustable compression spring 39 resists the discharge pressure against the lower end of the piston tending to raise the piston to decrease the flow of steam through the governor. By regulating the tension of the spring 39 a predetermined constant discharge pressure may be effected. Upon sudden decrease in discharge pressure the piston 32 will be lowered to close all the ports thus preventing racing of the pump. As in the type shown in Fig. 1, it is necessary to by-pass the governor upon starting.

Having thus described our invention, what we claim as new and desire to be protected by Letters Patent is:

1. A fluid pressure regulator comprising a central housing having a vertical chamber, a chamber jacketing said vertical chamber opening into a horizontal inlet, a lower housing removably secured to said central housing, a chamber concentric with said vertical chamber defined within said lower housing, a chamber jacketing said concentric chamber and opening into a horizontal outlet the securing means for said housings enabling the angularity of said inlet and outlet to be varied in parallel planes, a spring cage closing the upper end of said vertical chamber, a bottom closure for said concentric chamber ported to direct discharge pressure into the same, ports effecting communication between said jacketing chambers, valve mechanism supported for reciprocating movement in said vertical and concentric chambers to interrupt and/or regulate the communication between said ports, said mechanism being moved in one direction by the discharge pressure.

2. A fluid pressure regulator comprising a chamber having inlet and outlet ports, an unbalanced valve supported for reciprocating movement in said chamber for regulating said ports, said valve being unbalanced by fluid admitted through said ports to move said valve to a position delivering fluid to a pump, means adapted to direct discharge pressure from the pump against said valve to regulate the flow of fluid to the pump, said valve and ports being so arranged that upon sudden reduction of pump discharge pressure being urged to another position to interrupt the flow of fluid to the pump.

3. A fluid pressure regulator for pumps having a safety cut-off in the event of abnormal reduction in discharge pressure comprising a chamber, ports in said chamber, means normally regulating passage of fluid through said ports to the discharge, means to direct pump discharge pressure against said first means, and means for cutting off the flow of fluid through said regulator upon abnormal reduction in pump discharge pressure.

4. A fluid pump governor having a safety cut-off in the event of abnormal reduction in pump discharge pressure comprising a chamber, ports in said chamber, means normally regulating the passage of fluid through said ports to the pump, means to direct discharge pressure against said first means, and means for cutting off the flow of fluid through said regulator upon abnormal reduction in discharge pressure.

5. A fluid pump governor having a safety cut-off in the event of abnormal reduction in pump discharge pressure comprising a chamber, ports in said chamber, an unbalanced valve mechanism adapted to close said ports cutting off the flow of fluid to the pump when the discharge pressure is below a predetermined amount, means adapted to direct discharge pressure against said valve to move the same to a regulating position with reference to said ports, said valve and ports being so arranged that upon abnormal reduction in discharge pressure being moved to a position closing said ports.

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