Aug. 20, 1940. G. W. MORGAN ET AL 2,212,302

VALVE MEANS

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Fig. 1

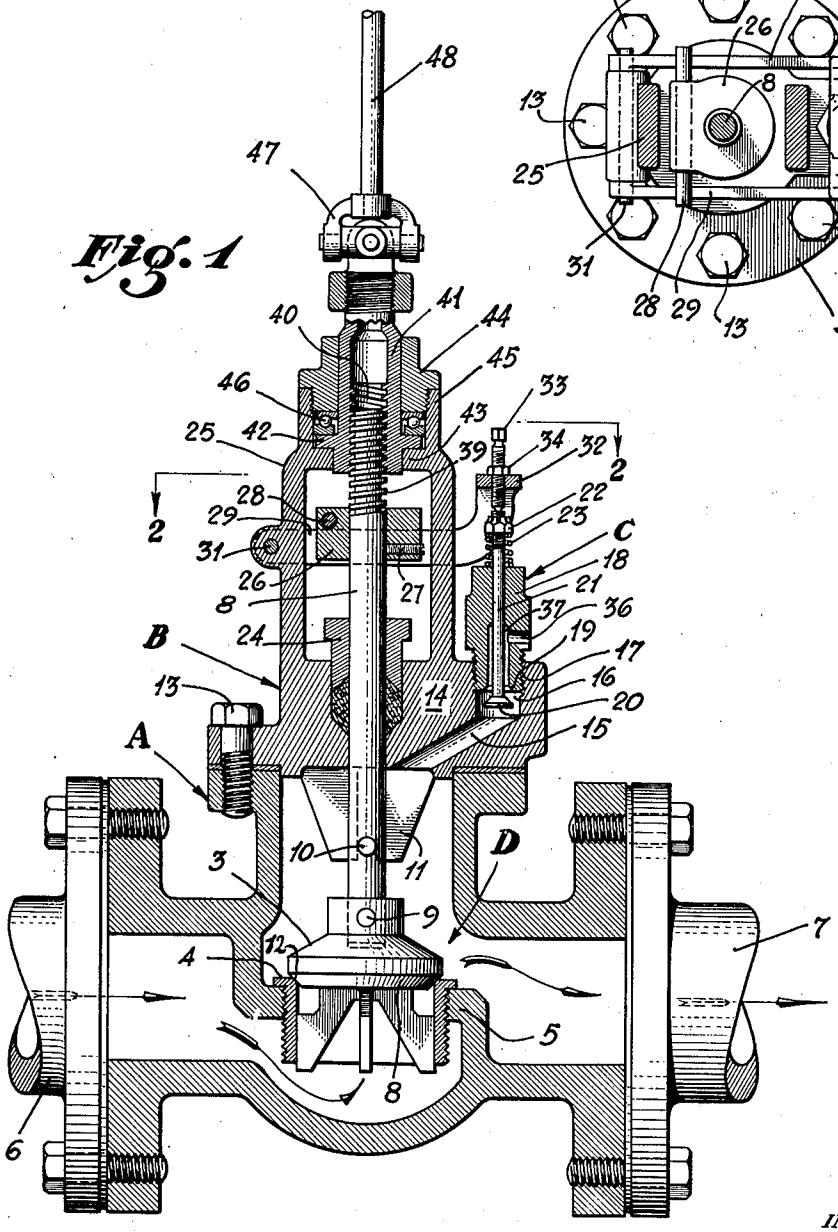


Fig. 2

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VALVE MEANS

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1 Claim. (Cl. 277—14)

This invention relates to valve means, and more particularly to valve means for controlling the supply of actuation or pressure medium to engines, pumps and other power consumers.

In the operation of the latter it has been found in practice that there is frequently a leakage of pressure or power fluid, such as steam or compressed air, past or through the valve means after the latter has been set to discontinue such passage and terminate the operation of a power consumer. This has resulted in unintended and untoward operation of the power consumer by building up of pressure therein or in the steam chest thereof, so that unexpectedly a turning over or partial turning over of such power consumer has resulted, causing unintended operation of driven parts or injury or loss of life to workmen or others attending the machinery.

It is the object of the present invention to provide approved valve means of the character and for the uses referred to, having the above and other objects in view, and which will be generally superior in point of relative inexpensiveness and simplicity taken in conjunction with facility and positiveness of control and actuation, definiteness and dependability in functioning, and, therefore, increased reliability and length of life, and which will be generally superior from the standpoint of efficiency and serviceability; all of which will be hereinafter described, illustrated in one embodiment in the drawing, and finally pointed out in the claim; and the invention consists in the new and useful combination and construction of parts and features so set forth.

In the drawing:

Fig. 1 is a vertical or longitudinal sectional view of valve means constructed and organized in accordance with and illustrating one embodiment of the invention, parts therein being shown in full lines or elevation; and

Fig. 2 is a detail transverse sectional view taken upon line 2—2, Fig. 1, and looking in the direction of the appended arrows.

Corresponding parts in both figures are designated by the same reference characters.

Referring with particularity to the drawing, we have shown therein valve means in one preferred embodiment of our invention, which includes a valve 3 adapted to move with respect to, and to be positioned in a closing relation upon, a valve seat 4 which may be threaded and detachably and replaceably applied to the orificial upper wall of an annular casing 5 to which pressure medium or fluid has access from beneath from a feed pipe 6, and through which annular casing 5 such pressure medium or fluid passes when the valve 3 is unseated, as indicated by the directional arrows in Fig. 1, to a discharge pipe 7 which may be suitably connected with or in communication with a power consumer, not shown, or one of many types or classes thereof, and may extend to the cylinder or steam chest or fluid supply pipe thereof, all to the end that such engine or other power consumer may receive its pressure medium or pressure fluid, such as steam or compressed air, from the discharge pipe 7 of the valve means, to actuate such prime mover or engine or pump or motor or whatever such may be the specific character of such prime mover. The valve 3 may preferably have a conical or truncated conical seating periphery or peripheral portion 12 cooperating with a similarly formed superficial portion of the valve seat 4, to provide a close fit. Rising from the valve 3 is the valve stem 8 which may be pinned to the valve, as at 9, and it carries a transverse projecting pin 10 guided at its projecting ends in opposed and spaced depending guide plates 11, vertically slotted, as indicated in Fig. 1, so that the stem may be permitted longitudinal or vertical movement but constrained from rotation. The valve 3 rises and falls within a valve chamber D which communicates with the inlet pipe 6 and discharge pipe 7, through the annular valve seat casing 5 as to the former, and directly as to the latter. In accordance with the present invention, we provide a housing or fitting B above, and seated upon the housing or fitting A which includes and accommodates the parts and features heretofore described, aside from the valve and its valve stem and attendant parts, and this fitting B is bolted to the fitting A as at 13. In the base portion 14 of this fitting B is provided an upwardly and outwardly inclined fluid passage 15, having a vertical upper end portion 16 within which is threadedly received, as at 17, bleed valve means C, which may include a valve housing 18 having a dished valve seat 19 with which cooperates a truncated conical valve 20 mounted upon a valve stem 21 which is mounted to play vertically in the housing 18, and the upper end of which is provided with a threaded and adjustable nut 22 between which and the top of the housing 18 is confined a coiled compression spring 23.

The valve stem 8 of the valve 3 plays vertically or longitudinally through a suitable opening in the base portion 14 of the fitting or housing B, and a stuffing box 24 mounted therein, and above the base member 14 rises a frame structure

25 within which a block or head 26 is adjustably positioned upon the valve stem 8 by a set screw 27, and carries a laterally projecting pin 28 adapted to bear against lever arms 29 connected and pivotally mounted at one end as at 31 to a member of the frame structure 25, whereby longitudinal movement of the valve stem 8 in closing direction will cause depression of a cross-head 32 at the outer end of the lever arms 29 and which carries a threaded and adjustable vertical contact pin 33 adjustable vertically through an opening in the cross-head 32 and having a lock nut 34 and the lower end of which bears upon the nut 22 at the upper end of the valve stem 21. When the valve stem 8 is depressed, the pin 33 depresses the valve stem 21 against the compression of the spring 23 and unseats the valve 20, so that there is open communication between the valve chamber with its valve 3 and seat 4, and generally designated at D, to the end that any pressure fluid or medium which leaks past the valve 3 is diverted through the bleed passage 15 and outwardly to the open air through a bleed-port 36 opening laterally from an annular chamber 37 in the fitting 18 and surrounding a portion of the valve stem 21.

The upper end of the valve stem 8 is coarsely threaded, as at 39, and its threads are inter-engaged with coarse threads 40 in an annular fitting 41 which has an annular flange 42 confined between an annular member 43 at the top of the frame structure 25 and a large cap nut 44 threaded into an annular bearing case 45 above the flange 43 and within which a ball race and bearing balls 46 may be positioned. It, therefore, results that when annular fitting 41 is rotated, it causes the valve stem 8 either to lower or rise, and in the lowering thereof and the forcing of the valve 3 to its seat 4, in the translation of the rotation of the fitting 41 into movement of the valve stem lengthwise, any upward thrust is taken upon the balls and ball race 46 to reduce friction. The upper end of the fitting 41 is provided with an universal joint 47 from which rises an actuating stem 48 which may be operated by a hand-wheel or otherwise at a point more or less remote from the location of the valve means.

In the operation of the device it will be apparent that rotation of the actuating stem 48 in either direction will cause a corresponding movement, either in a closing or opening direction, of the valve stem 8 and its valve 3, to open or terminate communication between supply pipe 6 and discharge pipe 7. When this is a closing movement, the pin 33 depresses the valve stem 21 of the bleed valve 20 and removes it from its valve seat 19, establishing open communication between valve chamber D and the open air. As long as the valve 3 remains closed, or it is the intention that it remain closed, resultant upon operation of its valve stem 8 in a closing direction, the bleed valve 20 will be maintained in an open position or off from its seat 19, so that any pressure fluid or medium inadvertently admitted past the valve 3 and its seat 4 to the valve chamber will be bled or discharged through such bleed port 36, and inadvertent admission of such pressure fluid or medium to the power consumer, with unfortunate, damaging, fatal or untoward results, will be prevented.

The line in which the pin 28 engages each of the lever arms 29 is twice as close to the fulcrum 31 of the lever arms as it is to the adjustable pin 33 which engages the valve stem 21 to depress it and unseat the bleed valve 20. It, therefore, results that the stem 21 travels at an accelerated rate, due to such leverage action, such mechanical advantage resulting in a quick opening of the bleed valve, due to proper timing of the parts and adjustment of the contact pin, such opening being produced and completed into a wide opening at the moment the main valve 3 closes. This prevents any bleeding of pressure fluid or medium prior to the closing of the main valve and the stopping of the engine or power consumer.

It is obvious that many changes and variations and departures may be made from the foregoing description and the disclosure of the drawing, in adapting the invention to varying conditions of use and service, all within the true spirit of the invention.

Having thus disclosed our invention, we claim and desire to secure by Letters Patent:

A combined control and pressure relief valve construction for use in fluid lines supplying power consumers, said construction adapted to automatically release the pressure in the fluid line on the downstream side of the control valve when the latter is closed, comprising, a valve casing having a valve chamber, a primary seat in the chamber, a main control valve for said seat, a stem carrying said valve and having a portion exposed exteriorly of the casing, means for moving the stem in the casing to cause the valve to engage and disengage said seat, an auxiliary valve seat in the casing communicating with the valve chamber at the downstream side of the valve, an auxiliary valve for said auxiliary seat, a stem for said auxiliary valve extending exteriorly of the casing, spring means engaging the stem of the auxiliary valve to normally urge it to seating position, a substantially U-shaped lever member having its free ends pivoted to the casing and the arms thereof located on opposite sides of the main valve stem while the transverse portion thereof carries an adjustable member for engaging the end of the auxiliary valve stem, and a cross member carried by the main valve stem and engaging the outer sides of the arms of the lever, whereby when the control valve is seated to stop flow through the valve chamber, the auxiliary valve is automatically opened to release the pressure on the downstream side of the main control valve.

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