April 8, 1952 H. H. VANDERZEE 2,592,213

QUICK RELEASE VALVE MECHANISM

Filed Dec. 27, 1945 2 SHEETS—SHEET 1

Fig. 1

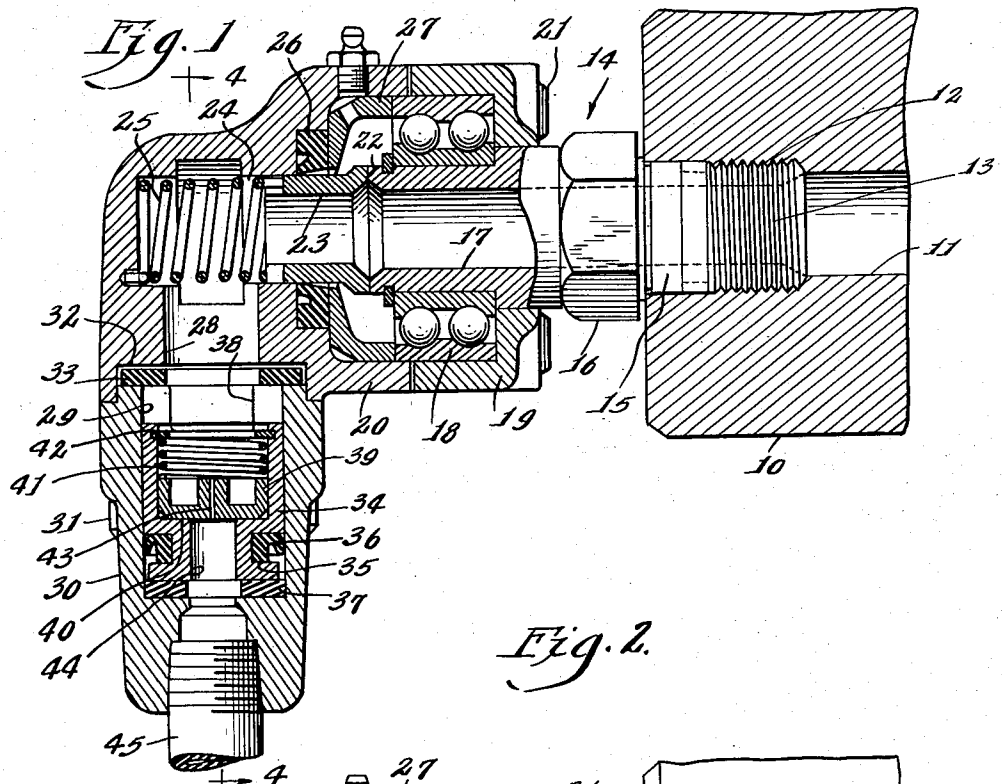
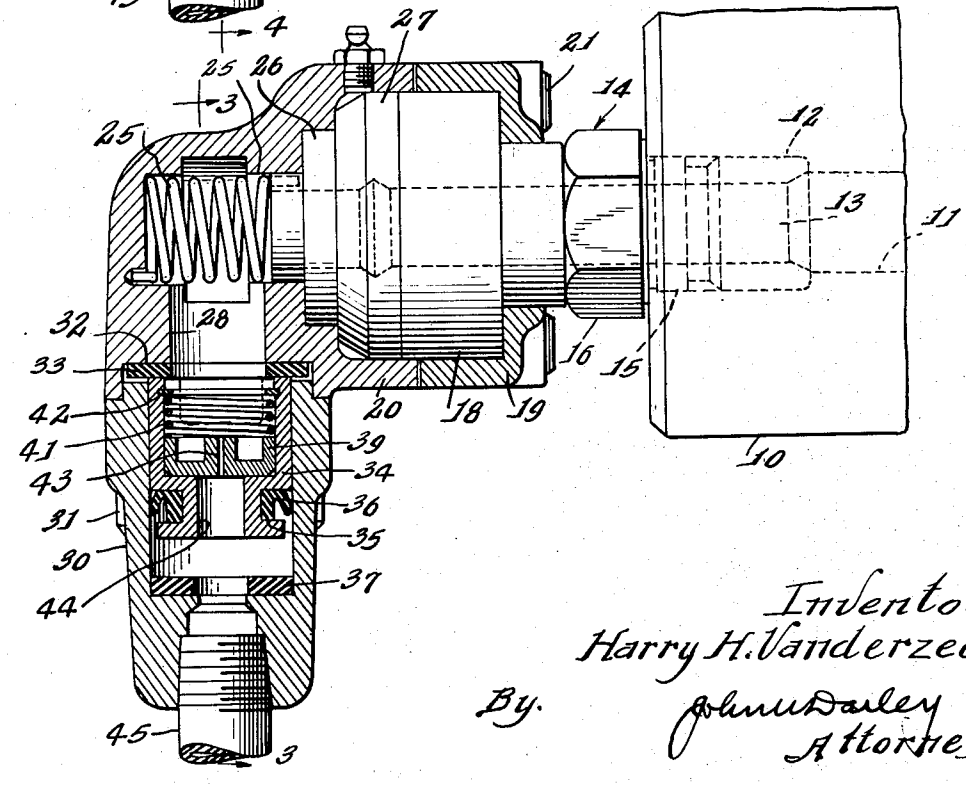


Fig. 2.



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April 8, 1952 H. H. VANDERZEE 2,592,213

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Filed Dec. 27, 1945 2 SHEETS—SHEET 2

Fig. 3

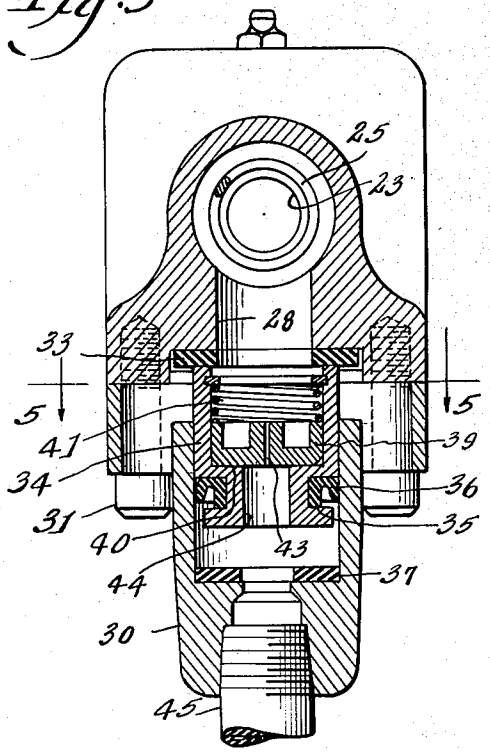


Fig. 4

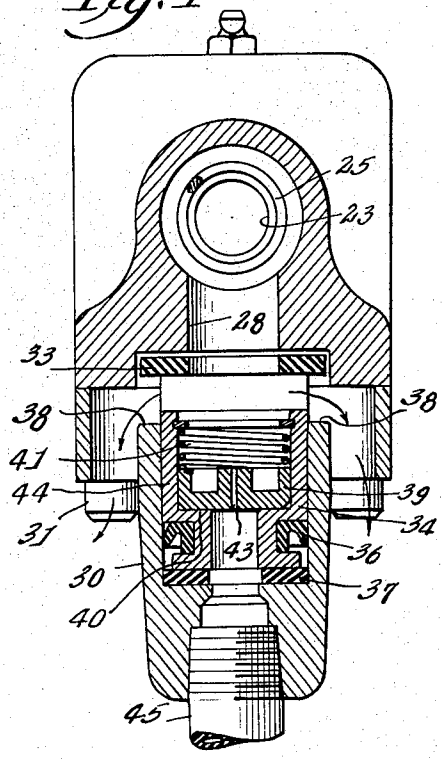


Fig. 5.

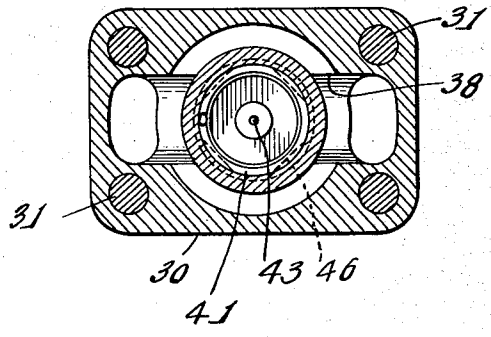


Fig. 6.

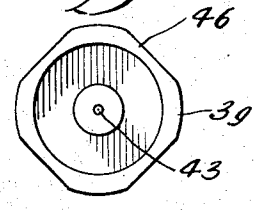
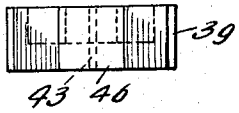


Fig. 7



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QUICK RELEASE VALVE MECHANISM

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Application December 27, 1945, Serial No. 637,443

2 Claims. (Cl. 277—45)

1

My invention relates to quick release valve mechanisms for conducting air under pressure to stationary or rotary members and more particularly to the hollow shaft of an air operated clutch.

While some features of the mechanism are capable of general application, i. e., to devices other than clutches and whether moving or stationary, a characteristic embodiment including all aspects of the invention is one which is arranged for securement to the hollow shaft of an air operated clutch and the invention will be so described.

One object of the invention is to provide a quick release valve mechanism including valve means which is automatically operable to quickly release the pressure in the device being supplied when the air supply in the main feed line to the mechanism is cut off.

A further object is to provide a mechanism of the character indicated in which the valve means is moved by the air pressure to close the quick release port when air begins flowing through the mechanism.

A further object is to provide a mechanism having valve means biased to a closed position and moved to an open position by the source air pressure to connect the source and the device being supplied and which further incorporates a provision whereby communication between the source and device is maintained as the pressures on opposite sides of the valve means approach equalization and the valve means tends to close.

A further object is to devise a mechanism which is arranged for securement to a hollow shaft with provision for insuring an adequate seal on the air flowing to the interior of the shaft.

These and further objects of the invention will be set forth in the following specification, reference being had to the accompanying drawings, and the novel means by which said objects are effectuated will be definitely pointed out in the claims.

In the drawings:

Fig. 1 is a sectional elevation of the mechanism, the valve means being shown in a position corresponding to zero air pressure in the mechanism.

Fig. 2 is a view similar to Fig. 1, but showing the valve means in the position corresponding to full air pressure in the device being supplied.

Figs. 3 and 4 are sections along the lines 3—3 and 4—4 in Figs. 2 and 1, all respectively, showing the quick release ports.

Fig. 5 is a section along the line 5—5 in Fig. 3.

2

Figs. 6 and 7 are plan and side views of one element of the valve means.

Referring to Fig. 1, the numeral 10 designates a shaft constituting, for example, part of an air actuated clutch and having an axial passage 11 for supplying air under pressure to the air chambers (not shown) of the clutch. The passage 11 is threaded at 12 adjacent the outer end shown in the drawing to receive the correspondingly arranged end 13 of a spindle 14 which projects beyond the end of the shaft and may additionally be provided with an annular shoulder 15 which fits within the outer end of the passage and furnishes adequate support for the spindle. Outwardly of the shaft, the spindle is hexagon shaped as at 16 for engaging with a wrench whereby the spindle is set up tight in and rotates with the shaft.

The spindle 14 includes an axial passage 17 that extends the length thereof and is in alignment with the shaft passage 11. A bearing 18 encircles the spindle and provides journal support jointly for a cover 19 and a housing 20 that are secured together by cap screws 21. Accordingly, the housing 20 and all parts attached thereto may be held stationary while the spindle rotates.

The end 22 of the spindle within the housing is finished smooth to provide a sealing surface that is contacted by one end of a rotarily immobile, axially movable, carbon sleeve 23 that fits within a chamber 24, the sleeve being constantly urged into sealing contact by a helical spring 25 that abuts the end wall of the chamber. The sleeve is held against rotation by the spring 25 whose opposite ends are engaged with the housing 20 and the sleeve. A packing ring 26 encircles the sleeve 23 in sealing contact therewith and with the housing 20 and an L-shaped, packing ring 27 also encircles the sleeve in abutting and sealing relation to the ring 26 and the outer race of the bearing 18, and in sealing contact with the housing 20.

The housing 20 also includes a passage 28 that communicates with and extends laterally from the chamber 24 and is in further communication with a chamber 29 provided in an elongated cap 30 that is secured to the housing 20 by screws 31. The face of the housing 20 which is abutted by the cap 30 is counterbored at 32 and received in the counterbore is a sealing washer 33 which is capable of a slight axial movement between the base of the counterbore and the adjacent end of the cap.

A sleeve valve 34 is reciprocable in the cham-

ber 29 and its lower end, as viewed in Fig. 1, is provided with an annular recess 35 for receiving a packing ring 36 which has sealing contact with the wall of the chamber. A sealing washer 37 is positioned in the bottom of the chamber 29 and provides a seal therewith and with the lower end of the valve 34 when the latter occupies the lower or release position shown in Fig. 1. In the release position, the valve uncovers exhaust ports 38—38 (see Figs. 3, 4 and 5) in the cap 30 which communicate with the atmosphere.

Slidably mounted in the sleeve valve 34 is a piston valve 39 which is normally seated on a shoulder 40 provided in the sleeve valve 34 by the lower end of a helical spring 41 whose upper end abuts a washer 42 that is recessed in the wall of the valve 34. The piston valve 39 includes a bleed passage 43 which provides communication between the chamber 29 above the shoulder 40 and a passage 44 in the sleeve valve 34 below the shoulder, the passage 44 being in further communication with one end of an air hose 45 that is secured to the cap 30. As indicated in Fig. 6, the lateral, cylindrical surface of the piston valve 39 is relieved as at 46 in a plurality of locations so that when the valve 39 moves upwardly relative to the sleeve valve 34 as presently described, air, in addition to flowing through the bleed passage 43, also flows around the bottom of the valve 39 and upwardly along the relieved sides 46 to the chamber 29. During periods of zero pressure in the air hose 45, the valves 34 and 39 occupy the lowermost and relative positions shown in Figs. 1 and 4, the valve 34 seating on the washer 37 and uncovering the ports 38, and the valve 39 seating on the shoulder 40. When air pressure is established in the hose 45, the throttling resistance interposed by the passage 43 is such that the air pressure acting on the bottom of the valve 39 first moves the valve 34 through the spring 41 until the upper end of the valve 34 sealingly engages the washer 33 against the base of the counterbore 32 and in this position, the valve 34 masks the exhaust ports 38. Thereafter, the pressure moves the valve 39 upwardly against the spring 41, thus establishing free communication between the hose 45 and the chamber 29, and hence with the shaft passage 11. As the pressure in the passage 11 approaches equalization with that in the hose, the spring 41 tends to reseat the valve 39 on the shoulder 40, but the bleed passage 43 enables the pressure in the passage 11 to be slowly built up to a maximum. After the pressure is fully equalized, the valve parts occupy the positions shown in Fig. 3.

When the pressure in the hose 45 is cut off, the pressure in the passage 11, i. e., the device being supplied with pressure, forces the valve 34 into sealing contact with the washer 37, thus unmasking the ports 38 and providing quick release of the pressure in the passage 11.

I claim:

1. A quick release valve mechanism comprising a housing having an inlet chamber connectible to a source of pressure fluid, an outlet chamber and an exhaust port, a sleeve valve in the housing shiftable between positions masking and unmasking the port when the pressure in the inlet chamber is substantially higher and lower, respectively, than that in the outlet chamber and having an internal valve seat, a

piston valve slidable in and having parts connected to the sleeve valve for biasing the piston valve to normally engage the seat for controlling primary flow through the sleeve valve from the inlet to the outlet chamber and a bleed passage through the piston valve providing constant communication between the chambers, the piston valve, when the inlet chamber pressure is controlling, initially moving the sleeve valve to mask the port and thereafter moving relative to the sleeve valve to connect the chambers through the sleeve valve and moved in the opposite direction when the outlet chamber pressure is controlling to cause the sleeve valve to unmask the port, the piston valve tending to reengage the seat as the pressures in both chambers approach equalization and the bleed passage enabling the maximum pressure to be built up slowly in the outlet chamber in the final stages of equalization.

2. A quick release valve mechanism comprising a housing having an inlet chamber connectible to a source of pressure fluid, an outlet chamber and an exhaust port, a sleeve valve in the housing shiftable between positions masking and unmasking the port when the pressure in the inlet chamber is substantially higher and lower, respectively, than that in the outlet chamber and having an internal valve seat, a piston valve slidable in the sleeve valve and having a bleed passage extending therethrough for providing constant communication between the chambers, and a spring positioned in the sleeve valve for biasing the piston valve to normally engage the seat for controlling primary flow through the sleeve valve from the inlet to the outlet chamber, the piston valve, when the inlet chamber pressure is controlling, initially moving the sleeve valve to mask the port and thereafter moving relative to the sleeve valve to connect the chambers through the sleeve valve and moved in the opposite direction when the outlet chamber pressure is controlling to cause the sleeve valve to unmask the port, the piston valve tending to reengage the seat as the pressures in both chambers approach equalization and the bleed passage enabling the maximum pressure to be built up slowly in the outlet chamber in the final stages of equalization.

HARRY H. VANDERZEE.

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