

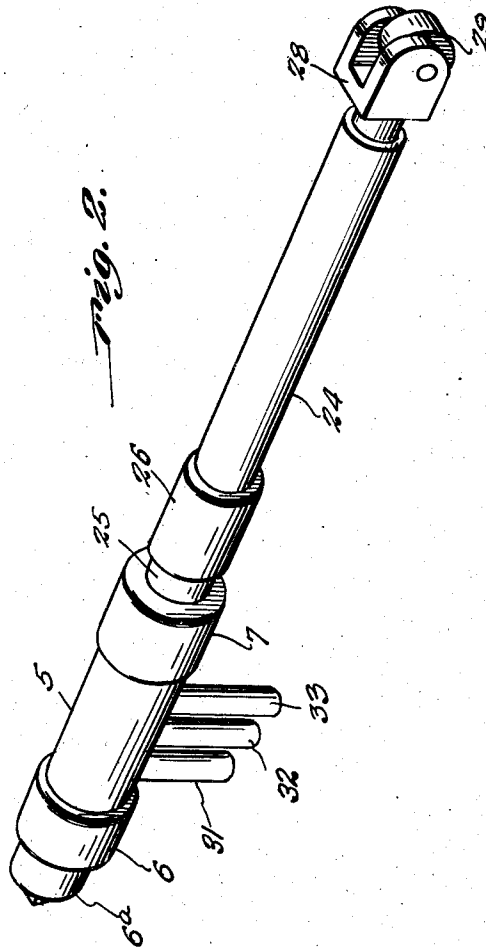
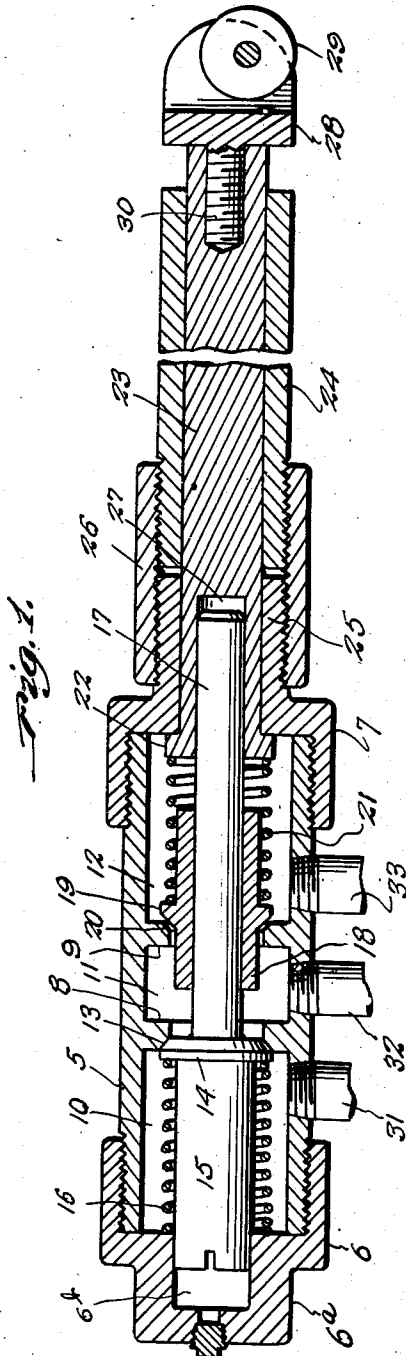
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CONTROL VALVE FOR WORK EJECTORS

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CONTROL VALVE FOR WORK EJECTORS

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3 Claims. (Cl. 277—21)

This invention relates to devices for ejecting work from various types of machines, and has particular reference to an improved control valve for controlling the flow of compressed air to and the exhaust of air from the actuating cylinder of a pressure-operated work ejector.

The primary object of the present invention is to provide a control valve of the above kind which is simple and durable in construction, efficient in operation, and composed of a minimum number of moving parts which move short distances so as to reduce wear to a minimum and ensure a long period of usefulness and efficiency for the valve.

Other objects and specific features of the present invention will become apparent from the following description when considered in connection with the accompanying drawing, and the invention consists in the novel form, combination and arrangement of parts hereinafter more fully described, shown in the accompanying drawing and claimed.

In the drawing:

Figure 1 is an enlarged central longitudinal sectional view, partly broken away, of a control valve constructed in accordance with the present invention; and

Figure 2 is a perspective view of the complete valve shown in Figure 1.

Referring in detail to the drawing, the present control valve includes a cylindrical valve body 5 having closure caps 6 and 7 threaded on the respective ends thereof. The outer closure cap 6 has a central outwardly projecting portion 6a provided with a cylindrical bore 6b, for a purpose which will later be described.

The valve body 5 has a pair of spaced internal partitions 8 and 9 intermediate the ends thereof, which partitions are centrally apertured and define three chambers 10, 11 and 12 within the body. The partition 8 is provided with a tapered valve seat 13 at its outer side in surrounding relation to its central aperture, and a valve head 14 normally engages this seat and has an outwardly projecting cylindrical guide stem 15 slidably projecting into the bore 6b of the cap extension 6a. A helical compression spring 16 surrounds the stem 15 between the cap 6 and the valve head 14 and acts to normally yieldingly engage said head 14 with its seat 13. The valve head 14 also has a further inwardly projecting stem 17 that projects axially through the partition 9 and cap 7, and slidably fitted on this stem 17 is a tubular valve member 18 provided with an intermediate valve head 19. The partition 9 is formed at its inner side in surrounding relation to its central

aperture with a tapered valve seat 20 and normally engaged by the valve head 19 through the medium of a helical compression spring 21 interposed between said valve head 19 and the enlarged inner end portion 22 of a tappet rod 23. The tappet rod 23 is slidably fitted in a tubular guide 24 and a tubular axial extension 25 of cap 7, said guide and the extension 25 being coupled by means of coupling sleeve 26. The inner end of the tappet rod 23 has an axial socket 27 into which slidably projects the inner end portion of the valve stem 17, and the depth of this socket is such that a clearance is left between the inner end wall of the same and the inner end of the stem 17 when the parts are normally positioned with the valve heads 14 and 19 seated. Thus, when the tappet rod 23 is forced toward the valves, it has a slight movement before engaging and actuating the stem 17 to open the valve 14, thereby placing the spring 21 under additional compression for effectively maintaining the valve head 19 closed.

At its outer projecting end, the tappet rod 23 is provided with a bifurcated head 28 in which is journaled a roller 29 adapted to engage the cam surface of an actuating cam, not shown. The head 28 is preferably a member separate from the tappet rod 23 and provided with an axial attaching stem 30 threaded into an axial bore provided in the outer end of the tappet rod 23, as shown in Figure 1.

Communicating with the chamber 10 at the outer side of the partition 8 is a supply pipe 31 leading from a suitable source of supply of air under pressure, and communicating with the intermediate chamber 11 provided between partitions 8 and 9 is a pipe 32 adapted to communicate with the actuating cylinder of the work ejector to be controlled. Still another pipe 33 communicates with the chamber 12 at the inner end of the body 5, and this pipe may extend to a suitable point where it is desired to discharge the spent air into the atmosphere.

In operation, the actuating cam engaging the roller 29 will force the tappet rod 23 inwardly so as to place the spring 21 under additional compression and maintain the valve head 19 tightly seated. As the tappet rod 23 continues its inward movement, the end of the stem 17 engages the inner end wall of the socket 27 and the tappet rod then forces the valve head 14 away from its seat 13 against the action of the spring 15. When the latter takes place, air under pressure is admitted from the pipe 31 into the chamber 10 and is allowed to flow through the aperture of the partition 8 in the chamber

11, and then through the pipe 32 to the actuating cylinder of the work ejector. As soon as the ejecting stroke of the ejector has been completed, the tappet rod 23 is allowed to return to its normal position under the action of the springs 16 and 21, and as soon as the inner end wall of the socket 27 starts to move away from the adjacent end of the valve stem 17, the air in the pipe 32 and the chamber 11 is allowed to force the valve 19 open against the action of the spring 21 so that it will pass through the central aperture of the partition 9 into the chamber 12 and thence through the exhaust pipe 33 to the atmosphere, thereby permitting the work ejector to return to normal position for its next actuation. This cycle of operation is repeated as long as actuation of the ejector is required.

It will be noted that the control valve embodies a minimum number of moving parts which have only relatively slight degrees of movement, thus ensuring minimum wear of the parts and a long life or period of efficient usefulness for the control valve. It will, of course, be understood that minor changes may be made in the details of construction illustrated and described without departing from the spirit and scope of the invention as claimed.

What I claim as new is:

1. A control valve for pressure-operated work ejectors, comprising a cylindrical valve body having a pair of spaced internal and axially apertured partitions defining three air chambers within the body, a pair of spring-seated valves seating toward each other against the respective partitions and normally closing communication between the end and the intermediate one of said chambers, an air pressure supply pipe communicating with one end chamber, an air exhaust pipe communicating with the other end chamber, a combined supply and exhaust pipe communicating with the intermediate chamber and adapted to extend to the actuating cylinder of an ejector, and tappet means for periodically opening one of said valves, and means whereby the seating spring of the other of said valves is placed under increased compression for more tightly seating the same when said first one of said valves is opened.

2. A control valve for pressure-operated work

ejectors, comprising a spring-seated valve for controlling the flow of air under pressure to the actuating cylinder of a work ejector, a second spring-seated valve for controlling the exhaust of air from the said actuating cylinder to the atmosphere, a tappet rod for actuating the first-named valve to open the same, and means affording limited lost motion between the first-named valve and said tappet rod, the seating spring of the second-named valve being operatively engaged with the tappet rod, whereby the same will be placed under increased seating pressure during the period of lost motion between the first-named valve and said tappet rod.

3. A control valve for pressure-operated work ejectors, comprising a valve body having a pair of spaced apertured partitions defining two end chambers and an intermediate chamber within the valve body, an air pressure supply pipe communicating with one end chamber, another pipe communicating with the intermediate chamber and adapted to communicate with the actuating cylinder of the work ejector, and a third pipe communicating with the other end chamber and adapted to exhaust into the atmosphere, a spring-seated valve cooperating with one partition for normally closing communication between the first-mentioned end chamber and said intermediate chamber, a second spring-seated tubular valve member cooperating with the other partition for normally closing communication between the intermediate chamber and the other end chamber, said first-named valve having a stem slidably extending through the second-named valve, a cylindrical guide on one end of the valve body, and a tappet rod slidable in said guide and having an axial socket in the inner end thereof into which the said valve stem slidably projects, said axial socket of the tappet rod being of a length to permit limited lost motion between said tappet rod and said valve stem, and the seating spring of the second-named valve being engaged with the tappet rod, whereby the tension of the last-named spring will be increased for tightly seating the second-named valve during the period of lost motion preceding the opening of the first-named valve.

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