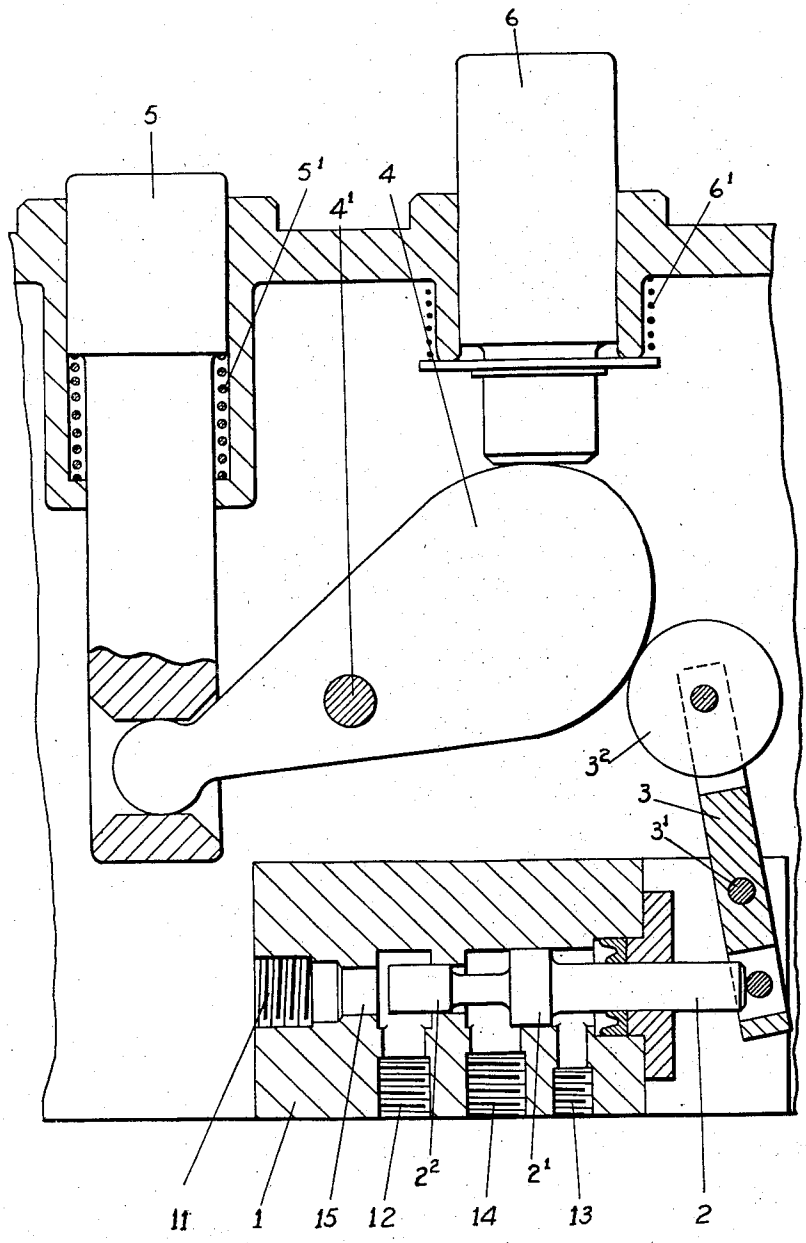
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HYDRAULIC CONTROL VALVES

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INVENTOR
FRANK HATHORN TOWLER
JOHN MAURICE TOWLER

by: Carlson, Pitzner, Hubbard & Wolfe
ATTORNEYS

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HYDRAULIC CONTROL VALVES

Frank Hathorn Towler, Rodley, and John Maurice Towler, Dob Park, near Otley, England; Frank H. Towler, administrator of said John M. Towler, deceased

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This invention relates to hydraulic control valves and, in particular, to control valves for hydraulic presses in which the admission and exhaust of primary pressure liquid to and from the press cylinders is controlled by pilot operated control valves and in which the pumps which supply the primary pressure liquid are provided with pilot-operated unloading valves. The invention is not restricted to hydraulic presses and it may be applied with equal facility to other machines in which force is applied by hydraulic pressure.

One object of this invention is to provide a hydraulic emergency stop mechanism embodying a hydraulic control valve which may be closed by actuating a push-button and provided with additional means to close the valve automatically if the pressure fails or falls below a predetermined figure and, when the valve has been closed by such emergency mechanism, it will remain closed until it has been reset by push-button. A further object of this invention is to provide a hydraulic control valve of improved design embodying emergency mechanism such as described above and arranged so that, when it is closed, it interrupts the flow of pilot pressure to the pilot control circuits.

The present invention consists broadly of a control valve which is operable to control the flow of hydraulic pilot pressure liquid for the actuating of hydraulic apparatus in such manner that the valve member of the control valve is moved to the closed position either automatically when the supply of pilot pressure liquid fails or is interrupted or its pressure falls below a predetermined figure or mechanically by manual actuation of a push-button, and is held in said closed position by automatically operating means, and which is released and reset in the open position by manual actuation of another push-button.

A control valve as above may have in combination a valve plunger against which the pilot pressure liquid can act to apply a force tending to move the plunger to its open position and actuating means comprising two pivoted levers the inner ends of which co-act to provide a cam and its follower, and the outer ends engaging respectively a push-button plunger which is spring loaded and one end of the valve plunger, said spring automatically resisting opening movement of the valve plunger, and a further push-button the inner end of which engages the inner end of one of the levers so that the depressing inwards of the push-button will act through the levers to move the valve plunger to its closed position.

One embodiment of this invention is illustrated in the accompanying diagrammatic drawing by way of example, and comprises a control valve embodying emergency stop mechanism and comprises a valve body 1, valve spindle 2 with associated valve lever 3, actuated by the cam 4 and spring plunger 5, with a further emergency push-button plunger 6. The valve is shown in the open position in the drawing, with pilot pressure entering port 11 and passing out port 12 to the pilot circuit. The pilot pressure operating on the area of the bottom of the

spindle 2^2 tends to hold the valve open in opposition to the spring 5^1 of the spring plunger 5. Overblow pressure from relief valves (not shown) in the primary pressure system enter the valve at port 13, and act on the annular area of the piston 2^1, tending to close the valve in opposition to the pilot pressure acting on the lower end of the spindle 2^2. The intermediate portion of the valve between the piston 2^1 and the spindle end 2^2 is open to exhaust through the connection to the port 14. The valve lever 3 is pivoted intermediate its ends at 3^1, and has a roller 3^2 which makes contact with the cam 4 which is pivoted at 4^1. The emergency push-button 6 is held in contact with the cam by a light spring 6^1. The spring 5^1 and plunger 5 tend to move the cam in a clockwise direction, looking at the drawing, in opposition to the pilot pressure acting on the spindle end 2^2 which holds the lever 3 and roller 3^2 in contact with the cam. The emergency push-button 6 may also serve to move the cam in a clockwise direction and close the valve. Thus the valve may be closed by the emergency push-button 6 in opposition to the pilot pressure; alternatively, if the pilot pressure fails, the spring plunger 5 will close the valve by means of the cam 4 and lever 3; or finally, bow-off pressure acting on the annular area of the piston 2^1 will close the valve in opposition to the pilot pressure and assisted by the spring plunger 5 and spring 5^1, the spindle end 2^2 of the valve spindle being forced down into the associated lapper bore 15 of the valve body, thereby interrupting the flow of pilot pressure from the inlet port 11 to the outlet port 12. When the valve has been closed by clockwise movement of the cam, by push-button 6, or by failure of pilot pressure, or by overblow of primary pressure the valve will be held closed in consequence of the relative positions of the cam and the roller 3^2 until it is reset by the spring plunger 5 when actuated as a push-button and in this closed position of the valve the port 12 will be in communication with the exhaust port 14.

What is claimed is:

1. In a control valve having a pressure fluid inlet port and an outlet port, the combination of a shiftable plunger controlling communication between said ports, said plunger having an area at one end exposed to the pressure prevailing at the inlet port urging the plunger toward open position, a first lever pivoted intermediate its ends and having one end positioned to engage the other end of the valve plunger and shift the same axially, a second lever pivoted intermediate its ends for movement between operated and retracted positions, means operable manually to rock said second lever on its pivot relative to said first lever between operated and retracted positions, and a cam surface on one of the levers co-operating with a follower on the other lever operative to rock said first lever in a direction to shift said plunger against the pressure exerted on said one end to closed position in response to the manual rocking of said second lever from a retracted position to an operated position, said cam surface being shaped to effectively lock the levers against movement by the pressure applied to said one end of the plunger when the latter is in closed position.

2. In a control valve having a pressure fluid inlet port and an outlet port, the combination of a shiftable plunger controlling communication between said ports, said plunger having an area at one end exposed to the pressure prevailing at the inlet port urging the plunger toward open position, a first lever pivoted intermediate its ends and having one end positioned to engage the other end of the valve plunger and shift the same axially, a second lever pivoted intermediate its ends to swing between operated and retracted positions, and a cam surface on one of the levers co-operating with a follower on the