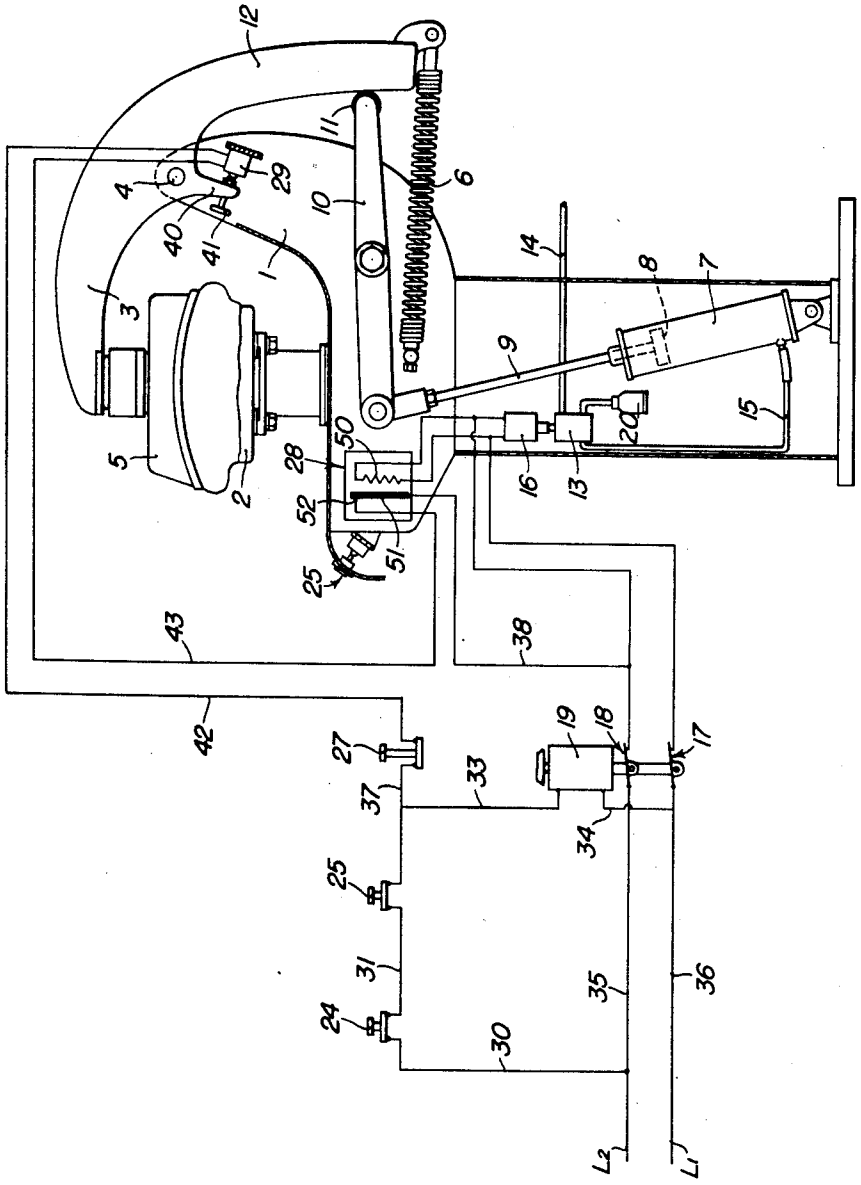
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ELECTRIC CONTROL FOR FLUID OPERATED MACHINES

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INVENTOR.
Tandy A. Bryson

BY
Bruno C. Lechler

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ELECTRIC CONTROL FOR FLUID OPERATED MACHINES

Tandy A. Bryson, Troy, N. Y., assignor to American Machine and Metals, Inc., New York, N. Y., a corporation of Delaware

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This invention relates to an electric control for fluid-operated machines.

The invention relates particularly to machines which involve danger to the operator during their initial stages of operation, such as during the time the material is fed into the machine, but do not involve such danger at a later stage when there is no possibility of the operator being caught by the machine. This might be because the moving parts have moved out of the range of his hands, or because the jaws of the machine will then already have closed. One illustration of such a machine is a garment press where the work has to be laid out between heated jaws, and these are then brought together, and after they have come together so that the operator can no longer insert his hand, the machine is to continue in its cycle of operation, holding the work under pressure and applying heat. During the last-named part of the cycle no protection for the operator is needed. The invention is equally applicable to other types of presses, and machines generally, having an initial portion of the operating cycle of greater danger to the operator than the balance of the cycle.

Safety controls for machines operated by fluid hitherto have employed one or more valves which had to be held closed by the operator while the machine went through the dangerous part of its cycle. Such devices have the disadvantage that, to make the valves easily operable several times a minute by a female operator the passages must be kept small and therefore the supply of fluid to the machine is apt to be insufficient for rapid starting. Safety controls which provide for taking over the operation of the machine when a safe point in the manual cycle is reached, either by closing air circuits or by closing electric circuits have been used as in Patent 2,292,846, granted to E. M. Pritchard, but at times the machine, or press, is accidentally moved to operated position, such as by the breaking of a return spring or in adjusting the machine, and in that event the automatic control takes over and the operator may be caught.

It is an object of the present invention to provide an electric manual control which occupies the operator until the machine is in a position where danger to the operator, should he approach the machine, has passed and therefore means controlled by the moving parts of the machine hold the machine in operative position under fluid pressure.

It is a further object to provide a control requiring minimum exertion of the operator, as by closing a circuit and still retain a large fluid control valve that makes for fast operation.

It is a further important object of the invention to provide an electric control for fluid-operated machines with the electric parts arranged and combined in such a way that the machine will not be maintained in operated position if it has been brought to that position by any other means than the manual control, but will go back to unoperated position. If brought into operative position manually or by accident such as by gravity, though the moving parts of the machine are in the position to actuate the machine locking means, those means will not function.

Other novel features reside in the specific arrangement and combination of the parts as will be seen more clearly in the accompanying specification and drawing, and the features set forth in the claims.

The drawing shows an elevation of a fluid-operated machine partly in section showing the machine in operated position with the parts of the control mechanism and the electric control circuits in a diagrammatic form.

In the illustrative example the invention is applied to an electrically-controlled air-operated garment press having a movable pressing head 5 and a stationary pressing buck 2. The frame 1 supports a stationary buck 2 and a yoke 3 pivoted at 4 which carries at its front end a pressing head 5. The head is brought into and out of engagement with the buck 2 by the oscillation of lever 3. A spring 6, anchored on the frame 1, normally pulls the head into raised position. A cylinder 7 is pivoted at its rear end to the frame 1. A piston 8 therein is fixed to a piston rod 9 which actuates a swinging lever 10. This carries a roller 11 which engages the rear end 12 of the yoke 3 to move the head toward closed position for pressing operation when pressure fluid is supplied to the cylinder 7.

A 3-way air valve 13 of a form well known to those skilled in the art has a normally closed inlet valve and a normally open exhaust valve combined in one casing and joined by a common valve stem. This valve admits pressure fluid from air line 14 through line 15 to cylinder 7, when operated by the electrical means to be described later, and closes the air inlet and connects the cylinder to the exhaust 20 when released.

A solenoid 16, when actuated, moves the air valve 13 just described into the actuated position. Current is supplied to solenoid 16 through the contacts 17 and 18, of a solenoid-operated switch. This switch has a solenoid 19 which,

when energized by a circuit that includes push buttons 24 and 25 each operated by one hand of the operator, closes the contacts 17 and 18. Push button 24 is behind button 25 in the end view of the press, conveniently spaced apart to force the operator to use both hands to operate these two buttons.

When push buttons 24 and 25 are depressed, a circuit is closed from the feed line L2 through line 30, push button 24, line 31, push button 25, line 33, solenoid 19, lines 34, 36, and other feed line L'.

When the solenoid 19 is actuated, a circuit is closed from line L2 through line 35, switch contact 18, solenoid 16, a switch contact 17, line 36, and back to L'.

The yoke 3 carries an extension 40 which supports an adjustable screw 41 in a threaded bore at its end. This screw is adapted to engage the button of switch 29 and to close that switch when the press comes close to or into safe closed position. Screw 41 permits adjusting the point in the movement of the press when the switch 29 takes over. Thus, due to wear for the padding on the buck 2, the travel of the head and the yoke to closed position may have increased and this can be corrected by this adjustment.

When the press is closed and switch 29 closed, a circuit that does not include the two hand buttons is established through line L', line 36, and 34, solenoid 19, line 33, line 37, normally closed release button 27, line 42, switch 29 now closed, line 43, contact 52, of time switch 28, line 38, contact switch 18, line 35, to other feed line L2.

The timer 28 may be of that type well known in the art which is started when the press closes and is adjusted to open the circuit in which it is located after a predetermined time. In the construction shown heating coil 50 is energized in parallel to solenoid 16 which is holding the press closed.

This heating coil heats the bi-metallic contact strip 51 which is adapted to open contact 52 after a predetermined time when heated enough.

It will be seen that after the press has come to a safe-closed position with the magnetic switch 17, 18, closed while the press is closing, a circuit is established from feed line L1 through release button 27, timer 28, and switch 29, bypassing the two push buttons 24 and 25. The buttons now can be released while the described circuit maintains the magnetic switch closed and thereby holds the press closed.

To open the press the timer 28 opens its contact after a preset period of time or the press can be opened by pressing push button 27 which also interrupts the maintaining circuit described above.

It will be noted however, an essential feature of the invention is that the aforementioned maintaining circuit can maintain the press closed only if the magnetic switch has been closed previously—that means that the press has been closed by power, by operation of the buttons 24 and 25, energizing the operating coil 19 and thus closing the magnetic switch 17, 18.

If the press has been closed either manually or accidentally by gravity, for example because spring 6 has broken, no power can be applied to the press without pressing both push buttons 24, and 25 simultaneously, because the magnetic contacts 18 are broken and no current can therefore flow through the maintaining circuit to energize coil 19, and to close the magnetic switch. If the press is closed manually it will not stay closed, as spring 6 will always bring it back to open position.

Operation.—After the operator has arranged the garment to be pressed on the buck, she must use both hands to push buttons 24 and 25, and then continue to push them until the press has come to safe-closed position.

Operation of the two buttons 24 and 25 energizes coil 19 of the magnetic switch and causes it to close, whereby solenoid 16 of air valve 13 is energized and valve 16 opened to admit air to cylinder 7. The press closes. Release of one or both buttons before the press has closed will interrupt this circuit and cause the press to open under action of spring 6.

In the safe-closed position of the press the screw 41 on extension 40 of the yoke 3 closes switch 29 and establishes a maintaining circuit through the coil 19 of the magnetic switch which keeps the press closed.

This circuit which, however, is only complete if the press has been closed previously in the described manner by operation of the two buttons, remains energized, keeping the press closed under power until, by the timer 28 or the release button 27, this circuit is interrupted. This causes the magnetic switch to open, the solenoid 16 becomes de-energized, and valve 13 connects the cylinder to exhaust and spring 6 brings the head back to open position.

I claim:

1. A combined fluid-electric control for a press having, in combination, a press-closing electric circuit requiring the attention of the operator to maintain the circuit, a separate electric maintaining circuit effective only upon the closing of the press if the circuit has been pre-conditioned by the closed first-named circuit, a solenoid-operated switch in both circuits which controls the supply of current to an electrically operated fluid valve that controls the application of power to close the press.

2. A safety electric control for a fluid-operated operated machine having, in combination, a solenoid-operated switch, one terminal of whose solenoid is connected to a power source, two lines connected to the other terminal either of which will complete the circuit through the solenoid, the one line passing through the manually operable push button, the other circuit passing through a holding switch and through a contact of the solenoid-operated switch, the holding switch closed only when the machine has advanced to a safe position in its operating cycle, a solenoid-operated fluid valve actuated whenever the solenoid-operated switch is closed, a fluid motor actuating the machine which is operated by the fluid.

3. In connection with a fluid-power operated machine having a manually operable button in an electric circuit that controls the admission of fluid to the machine, a holding circuit which is initiated only when the push button is held down and the holding switch has been closed by the arrival of the machine at a point in its cycle of operation where danger of injury to the operator has passed.

4. A garment press, having in combination, fluid operating means adapted both to close the press and hold it closed under pressure, electrical means for controlling the supply of fluid, manual means for controlling the electrical means, additional electric control means effective only to hold the press closed under pressure if the manual control means have been actuated up to the time of the completion of the closing of the press.

5. A garment press having, in combination, a frame, a buck supported thereon, a head pivotally supported on the frame, means tending to lift the head away from the buck, fluid operated means to close the press against the means tending to lift the head, a 3-way valve normally connecting the fluid operated means to exhaust, a solenoid adapted to shift the 3-way valve to disconnect the exhaust and connect the operating means to a source of fluid under pressure, an electric circuit which must be held manually closed to actuate the switch that supplies power to the solenoid, a branch circuit around the manual control permitting release of the hand, this circuit including a normally closed release button, a holding switch closed only when the press is closed to a point where the operator cannot insert his hand between head and buck, and the first-named switch in its actuated position.

6. A garment press having in combination, a frame, a buck supported thereon, a head pivotally supported on the frame, means tending to lift the head away from the buck, fluid operated means to close the press against the means tending to lift the head, a 3-way valve normally connecting the fluid-operated means to exhaust, a solenoid adapted to shift the 3-way valve to disconnect the exhaust and connect the operating means to a source of fluid under pressure, an electric circuit which must be held manually closed to actuate the switch that supplies power to the solenoid, a branch circuit around the manual control permitting release of the hand, this circuit including a normally closed release button, a holding switch closed only when the press is closed to a point where the operator cannot insert his hand between head and buck, and the first-named switch in its actuated position, and an automatic time measuring device which is actuated only upon the closing of the branch circuit and which breaks the circuit at the end of a pre-determined interval and, upon breaking the circuit, resets itself.

TANDY A. BRYSON.