SAFETY DEVICE FOR PUNCH PRESSES AND THE LIKE

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5 Claims

Abstract of the Disclosure

A safety device for presses in which the hands of the operator of the press are attached to a withdrawing mechanism for forcibly withdrawing the operator's hands from the work area of the press instantaneously upon the initial operation of the press.

SUMMARY OF THE INVENTION

The invention contemplates associating with a conventional punch press or the like an air control valve with an actuating plunger in close proximity with a cam on the crank shaft of the press for controlling air from a compressor to a pair of pistons mounted one on each side of the table of the press, with the plungers rods thereof connected to harnesses attached to the hands of the operator. Under air pressure the piston rods are projected outwardly of their respective cylinders until the press is initially operated. Upon initial operation of the press the air control valve opens a line to the cylinders to forcibly retract the plunger rods, whereupon, the operator's hands, being connected by harnesses to such rods, will be forcibly withdrawn from the work area of the press into a safety zone.

The invention will be best understood by reference to the accompanying drawings showing a form of construction, in which:

FIG. 1 is a schematic illustration of a conventional press to show particularly the relationship of my invention therewith;

FIG. 2 is an elevation view of the air control valve and piston rod and its respective withdrawing mechanism;

FIG. 3 is a fragmentary sectional view taken substantially on line 3—3 of FIG. 2;

FIG. 4 is a fragmentary sectional view taken substantially on line 4—4 of FIG. 2;

FIG. 5 is a fragmentary sectional view similar to FIG. 4 but showing the parts thereof in different positions;

FIG. 6 is an elevation view of a piston embodied in the invention;

FIG. 7 is a sectional view of a cylinder embodied in the invention.

In FIG. 1, I have schematically illustrated a conventional punch press P which includes a fly wheel 10, a crank shaft 11, and a work table 12, all supported by a conventional stand 13. Mounted on the crank shaft 11 is a cam 14 including a hill 14' which bears upon the plunger 15 of a piston rod 16. The plunger 15 includes a head 17 rotatably supporting a ball bearing 18 to lessen the frictional engagement between the plunger 15 and the cam 14. Disposed between the head 15 and the cam 19 of a cylinder 20 is a spring 21 which yieldably urges the plunger 15 into engagement with the cam 14.

The cylinder 20 includes an air inlet tube 22, a pair of air supply tubes 23 and 23', and a pair of air supply tubes 24 and 24'. The inlet tube 22 has connection with a conventional air compressor (not shown). The tubes 22—23 communicate with orifices 25 and 26 formed in the walls of the cylinder 20. The inner wall of the cylin-

der 20 provides annular air passages 27 and 28 which have communication with the orifices 25 and 26, respectively.

The piston rod 16 provides spaced annular grooves 29 and 30. The groove 29 communicates through openings 32 with a longitudinal bore 31 formed in the upper end of the piston 16, to provide means for the escape of air from within the sleeve 29', there being formed in the plunger 15 escape openings 33.

A similar bore 34 is formed in the lower end portion of the piston rod 16 and communicates with openings 35 formed in the piston rod 16 and opening into the groove 30, likewise to provide for the escape of air.

The insert sleeve 29' has formed therein spaced rows of horizontal openings 36, 37 and 38. The openings 36 are adapted to communicate with the annular passage 27, and the openings 38 are adapted to communicate with the annular passage 28. The openings 37 are adapted to communicate with an annular passage 39 formed in the cylinder 20, which in turn has communication with the inlet tube 22.

FIG. 2 is a fragmentary sectional view similar to FIG. 4 but showing the parts thereof in different positions:

FIG. 5 is a fragmentary sectional view of the cylinder 43 on one side (right side as viewed in FIG. 2) of a plunger rod 45 reciprocally mounted in the cylinder 43, is the air supply tube 23, the air supply tube 23' communicating with the cylinder 43 on the opposite side (not seen) of the press P.

The rod 45 is mounted for reciprocation in a sleeve 46 connected to, as by welding, and extending longitudinally from the cylinder 43. Extending through a central bore 47 formed in the rod 45 is a flexible cord or cable 48 which has one end portion connected in any suitable manner at 49 to the plunger head 50 of the mechanism. Such cord or cable is made of such material as will best serve the purpose.

The outer end portion of the sleeve 46 carries a bearing head 51 including a grooved wheel 52 around which the cable 48 extends through an opening 53 formed in the head. The outer end portion of the cable 48 is connected as at 54 to the inside of a wrist band 55 which fits around the wrist of the operator of the press. Attached to the wrist band 55 is a strap 56 which extends between the index finger and thumb of the operator's hand. It should be understood, however, that any suitable harness for attaching the cable 48 to the operator's hand may be employed.

The cylinder 20 is connected to an adjacent portion 58 of the press by means of a suitable bracket 59 (FIGS. 1 and 2).

The use and operation of my improved safety device for punch presses and the like, operates substantially in the following manner:

In the inoperative position of the press P, the cam 14 will be disposed with the hill 14' thereof in bearing en-

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engagement with the plunger 15, forcing the plunger 15 inwardly with respect to the cylinder 20 against the action of the spring 21 and compressed air, as shown in FIGS. 2 and 5. In such position of the plunger 15, the piston rod 16 will be disposed with the chamber 40 thereof in communication with the air supply tube 22 and with the tubes 24 and 24', thereby to hold under air compression the plunger 15 in bearing contact with the cam hill 14'.

In such position, air being admitted into the cylinders 43 through the tubes 24, effects outward projection of the plunger rods 45, which in turn disposes the cords or cables 48 in a position to permit the operator to have free use of his hands within the work area.

Instantaneously upon rotation of the cam 14 in a clockwise direction by operation of the press P, the hill 14' will move from obstructing position with respect to the plunger 15, the latter then being instantaneously projected outwardly by the combined action of the spring 21 and compressed air. When the plunger 15 is projected outwardly, the piston 16 thereof is disposed with the chamber 40 in communication with the air supply tube 22 and the tubes 22-23'. Compressed air is thereupon admitted through these tubes to their respective cylinders 43 to forcibly drive the plunger rods 45 inwardly with respect to such cylinders to draw the cords or cables attached thereto through the tube 46 to forcibly withdraw the hands of the operator from within the work area to a safety zone.

From the foregoing description, it will be apparent that I have provided a safety device which will be highly efficient in use and effective for the purposes for which it is intended.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent are:

1. A safety device for a press or the like having a crank shaft and a work area, including:
   (a) a pair of hand-retracting mechanisms each comprising
   (b) a cylinder having a piston reciprocally mounted in the cylinder,
   (c) each of said pistons having connected thereto a plunger rod,
   (d) each of said rods having a harness connected thereto for movement therewith and for connection to the hands of the operator of the press,
   (e) a control valve including a casing,
   (f) said casing having spaced air passages formed therein and
   (g) said control valve including a reciprocatory valve member having an actuating plunger,
   (h) said valve member having a circumferentially extending air chamber located between its opposite end portions and adapted to alternately communicate with said passages,
   (i) an air tube communicating with one of said passages and with said cylinder on one side of said piston,
   (j) an air tube communicating with the other of said passages and with said cylinder on the opposite side of said piston,
   (k) an air supply tube communicating with said chamber,
   (l) means actuated by an element of said press and engageable with said actuating plunger to position said air chamber in communication with one of said air tubes to effect projection of said piston with respect to said cylinder of the retracting mechanism so that the hand connected to said harness will have free movement within said work area,
   (m) said chamber being located in communication with the other of said air tubes when said actuating plunger is disengaged from said actuating means to dispose said chamber in communication with the other of said air tubes to effect instantaneous retraction of said piston with respect to the cylinder of the retracting mechanism to withdraw from said work area the hand connected to said harness.

2. A safety device as defined in claim 1 wherein the means for moving said actuating plunger of said control valve comprises a cam on the crank shaft of said press and engaging with said actuating plunger.

3. A safety device as defined in claim 1 wherein each of said retracting mechanisms is provided with an adjustable bracket for adjusting connection of said mechanisms to an adjacent portion of said press.

4. A safety device as defined in claim 2 wherein each of said retracting mechanisms is provided with an adjustable bracket for adjusting connection of said mechanisms to an adjacent portion of said press.

5. A safety device as defined in claim 2 including spring means acting on said actuating plunger to yieldably engage said plunger with the hill of said cam.

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