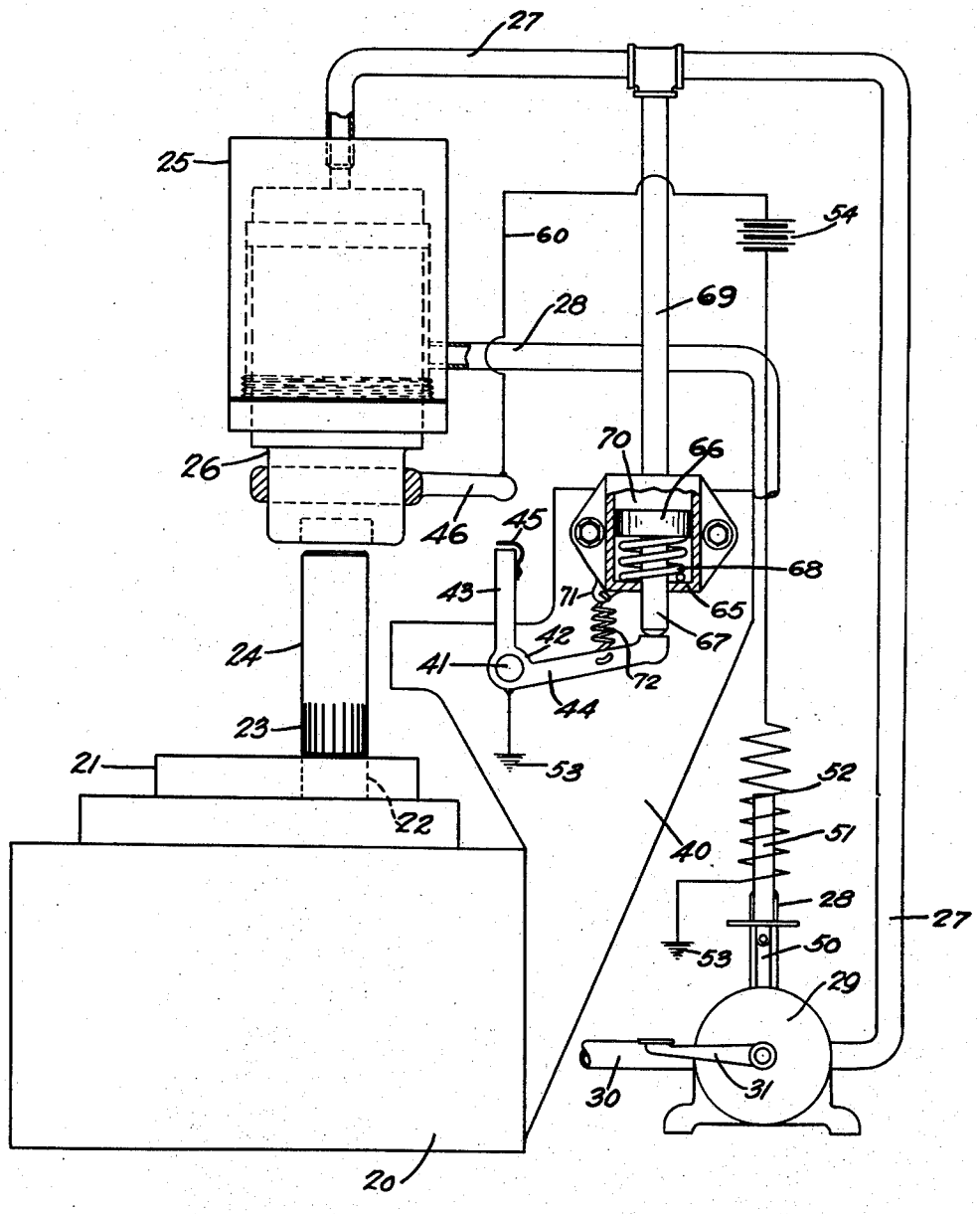
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PRESSURE REGULATOR FOR PRESSURE PRESSES

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PRESSURE REGULATOR FOR PRESSURE PRESSES

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This invention relates to improvements in pressing machines, and particularly to improvements in control devices for such machines.

It is among the objects of the present invention to provide a control device for a pressing machine which, if the work-piece is not properly operated upon by said machine, will automatically reverse the machine to discontinue its operation upon the work-piece and return it to normal inoperative position.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawing, on which the machine and its control device are diagrammatically shown, the numeral 20 designates the stationary base provided on the frame of the machine and which is adapted to support the work-piece 21. In the present instance this work-piece is an arm having a hole 22, into which the knurled end 23 of a shaft 24 is adapted to be pressed. A head 25 is provided on the machine in which a ram or plunger 26 is reciprocably supported, this ram being adapted to be moved by fluid pressure toward and away from the work-piece on the base 20.

Inasmuch as any standard form of hydraulic ram may be used, no detailed description of this will be given.

Two pipes 27 and 28 lead from a control device 29. Another pipe 30 leads into the control device. The pipe 30 is connected with a source of fluid pressure, pipe 27 directing said fluid pressure to one side of the ram 26 for moving it toward the work-piece, while pipe 28 leads the fluid pressure against another portion of the ram to move said ram away from the work-piece. The control device 29; provided with a pedal 31, is adapted to direct the fluid pressure from pipe 30 to either of pipes 28 or 27. When pedal 31 is depressed by the operator, then the fluid pressure may flow from pipe 30 through the control device to pipe 27 to operate the ram toward the work-piece and when the pedal 31 is returned to normal position, fluid pressure may flow from pipe 30 through the control device 29 and pipe 28 into the head 25 to move the ram 26 away from the work-piece or back to normal inoperative position.

The base 20 has a bracket 40 provided thereon, this bracket 40 supporting a pivot pin 41 to which a bell crank lever 42, having angular arms 43 and 44, is pivotally attached. A flexible contact member 45 is secured to the end of the arm 43 and lies within the path of movement of an arm 46 extending from the ram 26. As will be seen in the drawing, contact 45 is normally spaced from the ram arm 46, this spacing being such that the ram arm 46 will not engage said contact until the ram 26 has partially pressed the shaft 24 into the opening 22 of the arm 21. A rod 50 is provided on the control device for operating it independently of the pedal 31. Normally rod 50 will permit communication between pipes 30 and 27. The armature or core 51 of an electromagnet is attached to rod 50, this core having an electromagnet winding 52 about it, one side of which is grounded as at 53, the other being connected with a source of current 54 which is also connected with the ram arm 46. The bell crank lever 42 is grounded as at 53. This portion of the machine operates in the following manner:

If the operator depresses the pedal 31 to connect pipe 30 with pipe 27, fluid pressure, as has been described, will be directed to the one side of the ram 26 to move said ram toward the work-piece 24. The ram will engage the shaft 24 and press it into the opening 22 of the arm 21. After said shaft 24 has been pressed into the arm 21 a predetermined distance, ram arm 46 will engage the contact 45 (under certain conditions to be described) whereby the following circuit will be established:

From the battery 54 through the electromagnetic winding 52, ground 53, bell crank lever 42, contact 45, arm 46 via the wire 60 back to the battery 54. Under these conditions the electromagnetic winding 52 will be energized to attract the core 51 which, being connected to rod 50, will move it so as to operate the control device 29 to shut off communication between the pipes 30 and 27, automatically completing communications between the pipes 30 and 28 so that fluid pressure will now be directed to another portion of the ram 26 to move said ram away from the shaft 24, thus releasing pressure thereupon and consequently returning the ram to normal, inoperative position.

The above operation results if the insertion or pressure of shaft 24 into the opening 22 of arm 21 does not properly resist the ram pressure, or more specifically, if the ram pressure is not resisted a predetermined degree by the introduction of shaft 24 into the opening 22 of arm 21. If such insertion of shaft 24 into arm 21 sufficiently resists the ram pressure, then the following de-

scribed mechanism will become effective to render the electric control ineffective:

Bracket 40 carries a cylinder member 65 in which a piston 66 is reciprocably supported. This piston has a piston rod 67 extending to the outside of the cylinder 65. A spring 68, of predetermined tension, maintains the piston 66 in normal position as shown. A pipe 69 connects the cylinder chamber 70 with the pressure pipe 27 as the drawing shows. Piston rod or shaft 67 is engaged by the end of the arm 44 of the bell crank lever 42, said arm 44 being maintained in this engagement by the spring 72 interposed between said bell crank lever arm 44 and an ear 71 on the cylinder member 65.

If the ram pressure 26 upon the shaft 24, for its insertion into the arm 21 is not properly resisted by the work-piece shaft 24, then the pressure built up within the cylinder portion 70 will not be sufficient to move the piston 66 against the predeterminately tensioned spring 68 and consequently the bell crank lever 42 will be maintained in normal position in which its arm portion 43 carrying contact 45 lies in the path of movement of the ram arm 46. However, if the ram pressure is resisted by the work-piece to a predetermined degree, then there will be set up within the cylinder chamber 70 a pressure sufficient to move piston 66 against the predeterminately tensioned spring 68 so that the piston rod 67 will move the bell crank lever 42 clockwise as regards the drawing, resulting in the movement of the bell crank lever arm 43 and its contact 45 out of the path of movement of the ram arm 46. Under these conditions the arm arm 46 cannot engage the contact 45 and thus the electromagnet winding 52 will not be energized, consequently the connection between the pipes 30 and 27, for purposes of introducing fluid pressure to move the ram 26 toward the work-piece will be maintained. This permits the machine to operate through its entire cycle whereby shaft 24 will have its knurled end 23 completely introduced or pressed into the opening 22 of arm 21.

From the aforegoing it may be seen that applicant has provided a machine which will automatically cease machine operation, in fact cause the machine to reverse and return to normal, inoperative position if the work-pieces are not properly assembled, that is, if the introduction of one work-piece into the other does not properly resist the ram movement. This substantially prevents two improperly fitting work-pieces to be completely assembled, for the control of the machine, in accordance with the assembly of the work-piece, is obtained during an initial portion of the machine operation. Applicant's machine gauges the assembly of the work-pieces automatically, independently of the operator.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. In a device of the character described, the combination with a base for supporting a work-piece; a ram adapted to be moved toward the work-piece to exert pressure thereupon; means adapted to reverse said ram movement; and means rendered effective by a predetermined resistance to pressure for rendering the reversing means ineffective.

2. In a device of the character described, the combination with a base for supporting a work-piece; a ram adapted to be moved toward the work-piece to exert pressure thereupon; means for stopping the movement of the ram toward the workpiece; means for rendering the stopping means ineffective by a predetermined pressure upon the workpiece; means adapted to be engaged by the ram; and means responsive to the engagement of said aforementioned stopping means by the ram for reversing the movement of the ram.

3. In a device of the character described, the combination with a base for supporting a work-piece; a ram adapted to be moved toward the work-piece to exert pressure thereupon, a source of power applicable to the ram to move it in one direction or the other; means engageable by the ram during its one or pressure exerting movement for reversing said ram movement; and means adapted to render the aforementioned means unengageable by the ram in response to a predetermined resistance to the pressing movement of the ram.

4. In a device of the character described, the combination with a base for supporting a work-piece; a ram adapted to be moved toward the work-piece to exert pressure thereupon; a source of power adapted to be applied to different parts of the ram to move it in one or the other direction respectively; a control device for said power; means adapted to be engaged by the ram, for operating the control device to cause a reversal in the movement of the ram; and means responsive to a predetermined resistance to ram movement for rendering said aforementioned means unengagable by the ram.

5. In a device of the character described, the combination with a base for supporting a work-piece; a ram adapted to be moved into engagement with the work-piece to exert pressure thereupon; a source of power adapted to be applied to the ram to move it toward or away from the work-piece; a control device for said power application; means normally in the path of ram movement so as to be engageable thereby; means rendered effective by the engagement of said aforementioned means by the ram for operating the control device to reverse the movement of the ram; and means controlled by a predetermined amount of resistance by the work for moving the first mentioned means out of the path of ram movement to permit its operation through an entire cycle.

6. In a device of the character described, the combination with a base for supporting a work-piece; a ram operated toward and away from the work-piece by fluid pressure; a source of fluid pressure; a control device for directing said fluid pressure upon the ram; means adapted normally to be engaged by the ram while it is exerting pressure upon the work-piece; a device rendered effective by the engagement of said means by the ram for operating the control device to reverse the ram movement; and means controlled by a predetermined amount of resistance by the work for moving the first mentioned means out of the path of ram movement so as not to be engageable thereby, when the resistance by the work-piece to the ram pressure reached a predetermined value.

7. In a device of the character described, the combination with a base for supporting a work-piece; a fluid pressure operated ram; a contact member adapted to be engaged by the ram during the initial portion of its movement toward the work-piece; a device for controlling the ram

movement; electromagnetic means rendered effective to operate the device to reverse ram movement when the contact is engaged by the ram; and fluid pressure operated means to move the contact into a position in which it is not engageable by the ram when the resistance by the work-piece to the ram pressure during the said initial portion of its movement reaches a predetermined degree.

8. In a machine of the character described, the combination with a work-piece supporting base; a fluid pressure operated ram; manually operable means for controlling the fluid pressure directed to the ram; electrical means for operating the aforementioned means to reverse the ram movement; and fluid pressure operated means to render the electrical means ineffective if the ram pressure is resisted by the work-piece to a predetermined degree.

9. In a device of the character described, the combination with a base for supporting a work-piece; a ram; a source of power for operating the ram; a control device adapted normally to direct the power to operate the ram away from the work-piece but shiftable into another position to apply the power to the ram for moving it to exert pressure upon the work-piece; means adapted to be engaged by the ram after it has moved through an initial portion of its range of movement for operating the control device into its normal position; and means actuated by the power for moving the aforementioned means so as not to be engageable by the ram when the work-piece resists to a predetermined degree the pressure applied by the ram.

10. In a device of the character described, the combination with a base for supporting a work-piece into which another work-piece is adapted to be press fitted; a ram for pressing the one work-piece into the other; a source of power for operating the ram; a control device operable to direct the power to move the ram in one direction or the other respectively; manual means for actuating the control device to apply pressure exerting power; electromagnetic means for actuating the control device to apply power to retract the ram; and power operated means adapted to render the electromagnetic means ineffective in response to a predetermined degree of resistance by the workpiece to the pressing movement of the ram.

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