July 6, 1937. E. L. HYDE 2,086,268

PRESS CONTROL MECHANISM

Filed Jan. 11, 1936

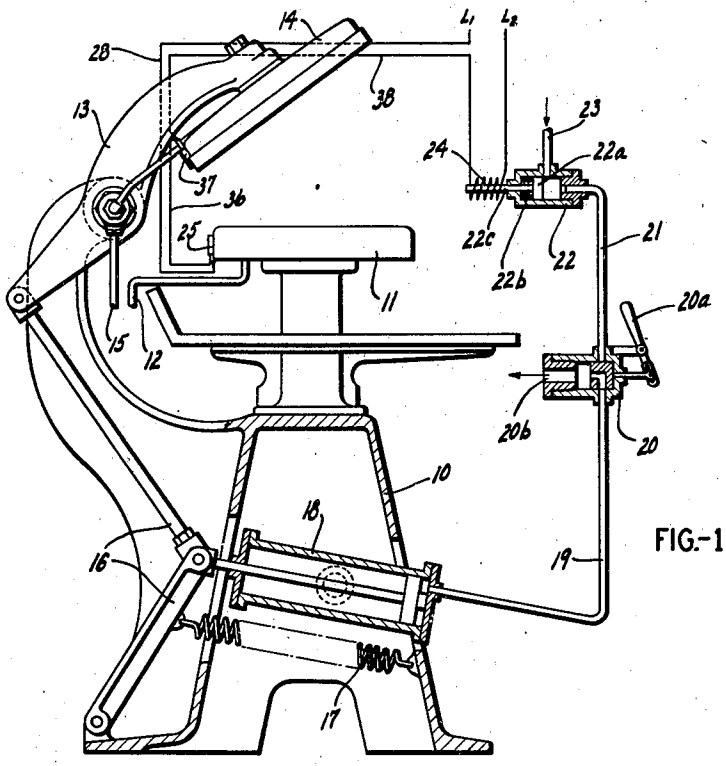


FIG.-1

FIG.-3

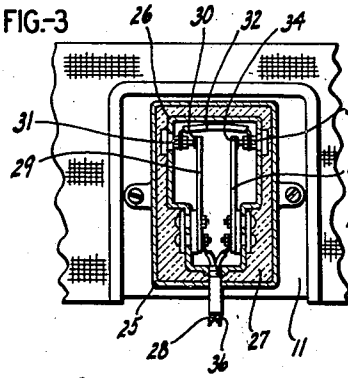
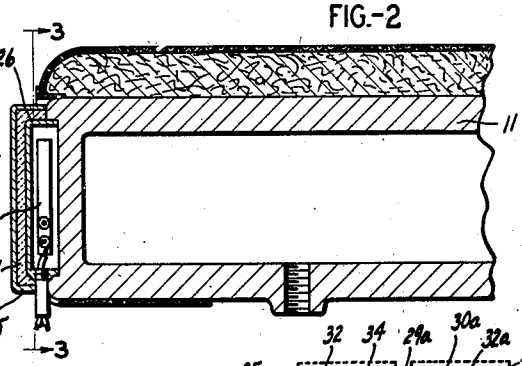


FIG.-2



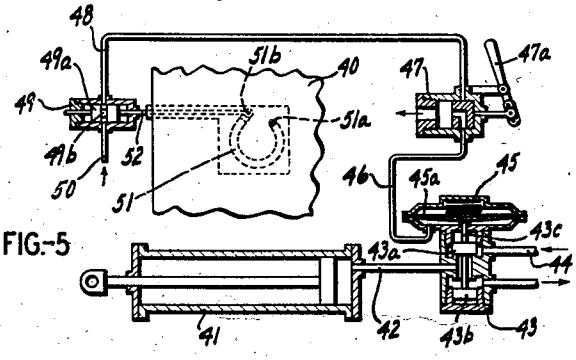


FIG.-5

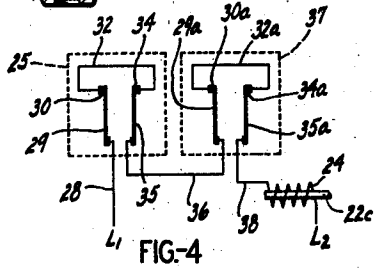


FIG.-4

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Patented July 6, 1937 2,086,268

UNITED STATES PATENT OFFICE

2,086,268

PRESS CONTROL MECHANISM

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Application January 11, 1936, Serial No. 58,684

7 Claims. (Cl. 38—40)

This invention relates to improvements in control mechanism for pressing machines.

An object of the present invention is the provision of control means for a pressing machine so arranged that the pressing machine cannot be operated except when the pressing members are at a desired temperature which is neither too hot nor to cold to produce the desired pressing operation.

Another object of the invention is to provide a control mechanism for a pressing machine having a pair of coacting pressing elements which provides means for disabling the press operating mechanism unless one or both of the pressing members is heated to a point within a predetermined temperature range.

Other objects and advantages of the present invention involve the provision of suitable control circuits for a press operating mechanism to provide the advantages above pointed out and the novel features of which will be pointed out in the appended claims.

In the drawing, Fig. 1 is an end elevation partly in section of a pressing machine embodying my invention with my improved control mechanism shown diagrammatically; Fig. 2 is a fragmental enlarged sectional view through one of the pressing members of Fig. 1; Fig. 3 is a view taken along the line 3—3 of Fig. 2; Fig. 4 is a diagram of a portion of the control circuit of Figs. 1, 2 and 3; while Fig. 5 is a diagrammatic layout of a modified form of press control mechanism.

In certain pressing machine operations it is desirable that the temperature of one or both of a pair of coacting pressing members be accurately controlled and it is also desirable to render the press operation impossible unless the pressing member or members are at the desired temperature. This necessity for closely controlled temperatures arises under various circumstances. For instance, in the production of starchless collars, layers of fabric are cemented together by the use of a cellulose derivative and a solvent or softener for this derivative. When the parts are arranged in suitable layers the entire assembly is then subjected to heat and pressure to cement the fabric layers together. In this operation close control of the temperature of the pressing members is necessary to produce the highest quality of work. It is desirable that the pressing members be neither too hot nor too cold and it is often desirable that a certain specified relationship be maintained between the two coacting pressing members, such for instance as maintaining one of these members at a slightly higher temperature than the other.

It is also desirable in some cases to guard against the operation of a pressing machine wherein one or both of the pressing members is too hot but it is also desirable that the machine be not operated if the pressing members are too cold as the work thus turned out is of a low quality.

My improved control mechanism insures that a pressing machine cannot be operated unless one or both of the pressing members is heated to a predetermined temperature, that is to say, that it is above a certain temperature and below a certain other temperature.

The machine shown for illustrative purposes comprises a frame 10 supporting a stationary pressing bed 11 which may be heated by a suitable heating fluid supplied at 12. Pivotally mounted on the frame is a head lever 13 for carrying a pressing head 14 into and out of pressing engagement with the bed 11. The head 14 may be supplied with heating fluid at 15. A pair of toggles 16 is provided for causing suitable movement of the pressing head and these toggles are biased in broken position by the spring 17 which normally maintains the press open. A cylinder and piston motor 18 is provided for straightening the toggles and carrying out a pressing operation. Motive fluid for motor 18 is supplied through conduit 19, valve 20, conduit 21, valve casing 22 and supply conduit 23. The valve 20 is a conventional representation of a valve which will stay in either open or closed position as it is moved by manipulation of manual 20*a*. With the press open the movable valve member is in the position shown in Fig. 1 which closes the inlet conduit and opens the motor 18 to exhaust through the port 20*b*. Valve casing 22 houses a normally closed inlet valve 22*a* biased to that position by a spring 22*b* and having a stem 22*c* which forms part of or is operatively connected with the core of a solenoid whose winding is represented at 24.

In the form shown, valve 22*a* normally prevents operation of the press control mechanism by cutting off the operating fluid for motor 18. To render the press operating mechanism effective it is necessary to supply electricity to the solenoid winding 24 to move valve 22*a* to its open position against the action of spring 22*b*. I provide an energizing circuit for this solenoid winding which is responsive to the temperature of one or both of the pressing members 11

and 14 so that the solenoid winding is energized only within a predetermined range of temperature. To this end I place a thermostatic element 25 in a position to be readily affected by the temperature of the pressing member 11. A suitable form of this thermostatic element is shown in Figs. 2 and 3 which comprises a casing 26 in intimate contact with the casting of the pressing bed 11 and surrounded preferably by heat insulating material 27 so as to prevent any effect from the outer atmosphere on the thermostatic element.

Various arrangements of thermostatic elements are suitable for carrying out my purpose but in the form shown an incoming lead 28 is connected to a bimetallic bar 29 which is adapted to make contact at 30 with an adjustable contact 31 which in turn is connected by a lead wire 32 with another adjustable contact 33 adapted to close a circuit at 34 with a bimetallic bar 35 which in turn is connected to the outgoing lead 36. The current carrying parts are suitably insulated from the pressing machine and the bimetallic elements 29 and 35 may be formed of dissimilar metals secured together in a well known manner. These elements are now provided in a form which renders them very sensitive to slight changes in temperature so that they are operative within one or two degrees to closely control the range of temperature. In the form shown the thermostatic element 29 preferably makes contact at a predetermined low temperature and the thermostatic element 35 is adapted to break contact at a predetermined high temperature so that within the normal operating range of the pressing member both contacts are closed. It will be obvious that with this connection for energizing the solenoid 24 that within the predetermined range of temperature the solenoid would be energized to hold valve 22a open and to permit operation of the pressing machine. Such a use of my device is possible but Figs. 1 and 4 illustrate a further carrying out of my idea by providing similar thermostatic elements on both of the pressing members 11 and 14. In other words, the thermostatic element 37 on the pressing head is similar in all respects to the member 25 on the pressing bed and the two are connected in series by wire 36. In the diagram in Fig. 4 the parts of the thermostatic element 37 are given similar reference numerals to those in thermostatic element 25 with the addition of the suffix *a*. The complete electrical operating circuit is then by way of L_1, 28, 29, 32, 35, 36, 29a, 32a, 35a, 38, 24, L_2.

With the arrangement shown, the contacts 31 and 33 would be set for the predetermined low and high temperature points desired in the pressing bed and the similar contacts for the pressing head would be adjusted to the same or different temperatures desired there. Then, upon heating up the pressing members, when the members reached the predetermined low temperature contact would be made between 30 and 31 on the pressing bed and the similar contacts on the pressing head. Inasmuch as the contacts 33 and 34 on the pressing bed and the similar contacts on the pressing head would be closed at the low temperature due to the construction of the thermostat, the solenoid 24 would then be energized by the circuit above set forth, valve 22a would be held open and the press would be operated by manipulation of manual 20a by the operator. If one or the other of the pressing members became too hot, thermostatic element 35 or 35a would break the circuit. If either of the pressing elements became too cold, thermostatic element 29 or 29a would break the circuit. The press is thus disabled except when both of the pressing members are within a predetermined range of temperature which may be set as closely as desired.

While I have shown a circuit in which the valve 22a is normally in closed position, it will be obvious to those skilled in this art that this valve might normally be held open and move to closed position by the supply of electrical energy to solenoid 24 when the pressing element or elements dropped below a certain temperature or rose above a certain temperature. This is only a reversal of the operation just described and I prefer the form shown because if the electric circuit fails, valve 22a will close and the press cannot be operated until the electrical system is re-established.

A modification is shown in Fig. 5 wherein 40 represents a pressing element of a pressing machine and 41 represents an operating motor functioning similar to motor 18 to close the press which would normally be biased in open position. Motive fluid is supplied to motor 41 through conduit 42, valve casing 43 and supply conduit 44 which provides high pressure fluid. The valve casing houses a normally closed inlet valve 43a and a normally open outlet valve 43b which are mounted on a common stem 43c operatively connected with a servo-motor 45 which is arranged to bias the valves in their normal position but to operate the valves into press closing position when fluid is supplied below diaphragm 45a by way of a supply conduit 46, valve casing 47, conduit 48, valve casing 49 and conduit 50 which preferably supplies a low pressure fluid. Valve 47 is similar in its function to valve 20 above described and is controlled by manipulation of the manual 47a.

In this modification the thermostatic element is a Bourdon tube 51 in heat receiving relationship with the pressing member with which it is associated. This tube has a fixed end 51a and a movable end 51b connected by rod 52 to the valve in casing 49. This valve is a piston valve 49a having a passage 49b which provides communication between conduits 50 and 48 only when the position of the Bourdon tube is that corresponding to the desired temperature of the pressing member. Fig. 5 shows the position of the parts when the pressing member is within the operating temperature range. If the pressing member becomes colder the Bourdon tube will contract and valve 49a will move to the right and cut off communication between conduits 50 and 48. If the temperature of the pressing member rises the Bourdon tube will expand and valve 49a will move to the left and also cut off communication between conduits 50 and 48. In either of these cases manipulation of manual 47a will be ineffective to provide press operation as a more sensitive operation of the thermostatically controlled valve 49a.

The only purpose in providing a lower pressure in the control circuit 50, 48, 46 is to achieve a more sensitive operation of the thermostatically controlled valve 49a.

It will be obvious without illustration that both of the coacting pressing members of a pressing machine may be provided with the Bourdon tube and piston valve 49a as illustrated in Fig. 5, the two valves being arranged in series to control the flow of fluid to conduit 48. This would be

analogous to the electrical circuit of Fig. 4 and arranged so that if either of the pressing elements became too hot or too cold the control circuit would be deenergized and it would be impossible to operate the press. As in the first described form, the Bourdon tube and valve controlled thereby on the head might be set for a different range of temperature than that on the bed.

What I claim is:

1. In a pressing machine, a pair of coacting relatively movable pressing members, operating means therefor, means for heating at least one of said pressing members, and control means for said operating means responsive to a predetermined low temperature of said heated pressing member and arranged to prevent effective actuation of said operating means at such temperature or at lower temperatures.

2. In a pressing machine, a pair of coacting relatively movable pressing members, operating means therefor, means for heating at least one of said pressing members, and control means for said operating means responsive to a predetermined high temperature and to a predetermined low temperature of said heated pressing member, said control means being arranged to render said operating means effective only between said predetermined temperatures.

3. In a pressing machine, a pair of coacting relatively movable pressing members, operating means therefor, means for heating said members, and control means for disabling said operating means responsive to a predetermined low temperature of either of said pressing members.

4. In a pressing machine, a pair of coacting relatively movable pressing members, operating means therefor, means for heating said members, and control means for disabling said operating means upon either of said pressing members reaching a predetermined high temperature or a predetermined low temperature.

5. In a pressing machine, a pair of coacting relatively movable pressing members, operating means therefor, means for heating at least one of said pressing members, a control member for disabling said operating means and normally in disabling position, power means for moving said control member into enabling position, a power supply for energizing said power means, control means in said power supply, and thermostatically controlled means responsive to the temperature of said heated member, said last named means having an operative connection with said control means for causing operation of the latter in power supplying direction only within a predetermined range of temperature of said heated member.

6. In a pressing machine, a pair of coacting relatively movable pressing members, operating means therefor, means for heating at least one of said pressing members, a control member for disabling said operating means and normally in disabling position, electrical power means for moving said control member into enabling position, an electric circuit for energizing said power means, a pair of contacts operatively associated with said circuit and adapted to open at a predetermined low temperature of said heated pressing member and to remain closed at higher temperatures, a pair of contacts operatively associated with said circuit and adapted to open at a predetermined temperature of said heated pressing member higher than said low temperature and to remain closed at lower temperatures, and thermostatic means responsive to the temperature of said pressing member for closing and opening said contacts.

7. In a pressing machine, a pair of coacting relatively movable pressing members, operating means therefor, controlling means for said operating means, means for heating at least one of said pressing members, and means responsive to the temperature of said heated pressing member for energizing said controlling means only within a predetermined temperature range.

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