CONTROL SYSTEM FOR PRESS WITH SLIDING BOLSTER PLATE

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References Cited

UNITED STATES PATENTS
3,446,106 5/1969 Ferris et al. 83/563 X
3,468,204 9/1969 Haas et al. 100/53 X

ABSTRACT

A control system utilizable in conjunction with a conventional press having a reciprocating ram wherein the press is equipped with a bolster plate movable from a retracted loading position to an advanced position cooperateable with the ram. The control system includes a mechanism which is manually controllable and which requires the operator’s hands to be in an out-of-the-way position both during the advance of the bolster plate and during the reciprocation of the ram. Failure to properly actuate the control mechanism results in the automatic retraction of the bolster plate and the rendering of the ram inoperable.

38 Claims, 6 Drawing Figures
CONTROL SYSTEM FOR PRESS WITH SLIDING BOLSTER PLATE

This invention relates in general to new and useful improvements in presses, and more particularly to a control system which may be utilized in any type of mechanism wherein a clamping action occurs on a workpiece and it is possible for an operator's hand to be clamped by the mechanism.

BACKGROUND OF THE INVENTION

For years machine operators have been maimed by having their hands caught within the mechanisms of the machines which they are operating. It has been recognized that the only solution to the problem is to construct the machine so that the operator of a machine cannot place his hands in the work area. This can be accomplished only by providing a loading position for the machine remote from the work performing position. However, notwithstanding the provision of this type of arrangement, there is still the tendency for a machine operator to place his hands within the work area. It is, therefore, the present universal desire to provide a system wherein all possibilities of the operator placing his hands in the work area are eliminated.

SUMMARY OF THE INVENTION

In accordance with this invention, a control system is provided for a machine of the type which includes a support member movable from a loading position to a work position wherein the operator's hands must be on manually actuable control devices for a major portion of the movement of the support member between the loading position and the work position thereof so as to prevent the operator's hands from being engaged within the mechanism, the control system including means for effecting the automatic retraction of the support member upon the early removal of either hand.

Another feature of the invention is the provisions of a control system for a machine of the type which includes a work support movable from a loading position to a work position and wherein there is associated with the work support a movable work performing member, the control system being of the type wherein both hands of the operator are required to effect the movement of the work performing member and if the control mechanism is improperly operated, the work performing member will not be actuated and the work support will be returned to its loading position.

In accordance with the foregoing, in order to effect operation of the work performing member, the control system includes a pair of spaced apart hand engageable control devices which must be substantially simultaneously actuated in order to effect operation of the work performing member and if the control devices are separately actuated, the work performing member will not be actuated and the work support will be retracted to its loading position.

A principal feature of the invention relates to the provision of a bolster plate assembly for incorporation in existing press structures of the type including a bed plate and a ram, wherein such a press may be readily converted to eliminate the entry of the operator's hands into the work performing area. If the press is provided with dies, the entry of the operator's hands into the die area may be eliminated.

In accordance with the foregoing, a conversion unit is provided which includes means for mounting a bolster plate for sliding movement between a retracted loading position and an advanced position cooperating with the ram. Normally, the bolster plate will be provided with suitable means for mounting a die thereon and such die will normally be cooperate with a complementary die carried by the ram although the invention is not so limited. The assembly will also include a control system which may be readily incorporated in the press structure with the control system controlling not only the operation of the bolster plate, but also the operation of the ram in conjunction with the bolster plate.

It is proposed to provide controls for the movement of the bolster plate between the retracted loading position thereof and the advanced work position wherein utilization of both of the operator's hands is required in order to effect the advancing of the bolster plate and wherein the operator's hands can be removed from the controls only after the bolster plate has reached a position adjacent the fully advanced position or at home position thereof. Further, the control construction is such that in the event one of the operator's hands should be removed from the control device prior to the bolster plate reaching the almost at home position thereof, the bolster plate will automatically be retracted.

The control system also includes the control of the actuation of the ram. In accordance with the requirements of the control system, although the controls for actuating the ram may be operated at such time as the bolster plate reaches the almost at home position, thus permitting the operator more time within which to prepare for the positioning of a next workpiece on the bolster plate, the timing sequence is such that it is physically impossible for the operator to move a hand from the remote position of the control device into the work area of the press.

Another feature of the control system is that actuation of the ram requires substantially simultaneous manipulation of the control devices by the two hands of the operator so that it is impossible for the operator to effect a one hand controlling of the actuation of the ram.

Further, in accordance with this invention, if the operator improperly actuates the control devices for the ram, in addition to the ram not operating, the bolster plate is returned to its retracted loading position. This arrangement has two advantages. First, it makes the operator conscious of the fact that he is improperly actuating the control mechanism and the lost production time assures that he will not continue to attempt the improper actuation of the control mechanism. Secondly, in the event the operator should view an improperly placed workpiece before he has actuated the control device to effect operation of the ram, he may effect the retraction of the bolster plate for the proper positioning of the workpiece.

Other features of the invention will be apparent from the following description, including the fact that the control system is a fool-proof one which precludes the possibility of an operator placing his hands in the work area and becoming tangled with the operating mechanism so as to be injured.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be
more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawings:

IN THE DRAWINGS

FIG. 1 is a front elevational view of a press including a reciprocable bolster plate and ram.

FIG. 2 is an enlarged horizontal sectional view taken generally along the line 2—2 of FIG. 1 and illustrates generally the mounting of the bolster plate and control devices of the control system.

FIG. 3 is a longitudinal vertical sectional view taken along the line 3—3 of FIG. 2 and shows further the details of the bolster plate assembly.

FIG. 4 is a transverse vertical sectional view taken along the line 4—4 of FIG. 3 and shows still further the details of the bolster plate assembly.

FIG. 5 is a wiring schematic of a control system in accordance with this invention.

FIG. 6 is a wiring schematic of still another control system in accordance with this invention.

Reference is now made to FIG. 1 wherein there is illustrated a conventional press which has been modified in accordance with this invention, the press being generally identified by the numeral 10. The press 10 includes a base 11 which has extending upwardly from the rear portion thereof a pair of frame members 12 and 13 which may be secured to the base 11 in any desired manner.

The frame members 12 and 13 are provided with bearings 14 in which there is mounted for rotation a crank 15 which has disposed between the bearings 14 an eccentric or cranked portion 16.

One end portion of the crankshaft 15 extends considerably beyond the adjacent bearing 14 and has rotatably mounted thereon a combined flywheel and pulley 17. The flywheel 17 is driven by means of belts 18 from a drive pulley 20 carried by a shaft 21 of a motor 22.

The motor 22 is suitably mounted on the frame members 12, 13 in any desired manner.

A ram 23 is mounted for vertical reciprocatory movement and is connected to the eccentric 16 by means of a connecting rod 24 having a split end portion 25 receiving the eccentric 16. The ram 23 is engaged with vertical guides 26 carried by the frame members 12, 13 to limit the movement of the ram 23 to vertical movement.

A plate 27 is carried by the lower end of the ram 23 and normally will have removably mounted thereon die members 28 for cooperation with die members 30 carried by a die holder 31.

In lieu of the die holder 31 being fixedly mounted on a support plate carried by the base 11, the upper part of the base 11 is provided with a plate 32 which, in turn, is fixedly mounted on a platform portion 33 of the base 11 by means of fasteners 34 in the manner best illustrated in FIGS. 3 and 4. The plate 32 has slidably mounted thereon a bolster plate 35. The bolster plate 35 is guided for straight line movement by means of a pair of guide rails 36 which are releaseably secured to the plate 32 by means of fasteners 37. It is to be noted that the guide rails 36 are undercut so as to cooperate with the plate 32 in preventing vertical movement of the bolster plate 35.

It is to be understood that the support 31 is mounted on the bolster plate 35 for movement therewith so that the die members 30 may be moved from an advanced position aligned with the die members 28 to a retracted loading position.

It is also to be understood that the press 10 includes a clutch 38 disposed between the flywheel 17 and the crankshaft 15. When engaged, the clutch 38 will effect a single complete revolution of the crankshaft 15 together with the flywheel 17. This will result in the ram 23 moving downwardly to cause cooperation between the die members 28 and the die members 30 and then return to an at rest position at which the bolster plate 35 and the associated die members are free to retract to the loading position.

It is to be understood that the press 10, as described above, is fully disclosed in our prior U.S. Pat. No. 3,446,106, granted May 27, 1969. Accordingly, further details of the press structure which in of themselves form no part of this invention are not illustrated and described herein. Reference may be had, however, to the press construction of our prior patent as to specific details and additional structure which may be a part of the press although not a part of the invention. Reference is here made to guards and like equipment which have not been disclosed in this application and form no part of the present invention.

Referring now to FIGS. 2, 3 and 4, it will be seen that secured to the rear surface of the plate 32 is a stop member 40 which is generally U-shaped in elevation. The stop member 40 is rigidly secured in place by means of a plurality of fasteners 41.

Projecting from the rear of the stop member 40 are a pair of shouldered spacers 42 each of which has a reduced forward portion 43 threaded into the stop 40. A mounting plate 44 is received over rear portions 45 of the spacers 42 and locked in place by nuts 46 threadedly engaged therewith.

An end cap 47 of a fluid cylinder 48 is suitably secured to the mounting plate 44 and has a piston rod 50 projecting forwardly therefrom, the piston rod 50 passing through a suitable opening 49 in the mounting plate 44 and passing over the stop 40. The forward end of the piston rod 50 is provided with a flexible coupling 51 which carries an extension shaft 52 threadedly engaged in a mounting plate 53. The mounting plate 53, in turn, is secured to the rear edge of the bolster plate 35 by means of fasteners 54.

The mounting plate 44 is also provided with a pair of rearwardly extending support bars 55 which are disposed on opposite sides of the cylinder 48 and which, if desired, may be secured to a rear cap 56 of the cylinder 48.

The end caps 47 and 56 have fluid fittings 57 and 58, respectively, connected thereto. A fluid line 60 is connected to the fitting 57 by way of a flow control valve 61 while a fluid line 62 is coupled to the fitting 58 by way of a flow control valve 63.

The mounting plate 53 is provided with a control actuator 64 projecting radially therefrom. The actuator 64 is in the form of a simple stop button and is engageable with any type of control device. However, in accordance with the preferred embodiment of the invention, the control device is in the form of a switch 65 which is carried by the mounting plate 44 and which has an actuating arm 66 carrying a roller 67. The roller 67, in turn, is engaged by the actuator or stop 64 to operate the switch 65 prior to the bolster plate 35 engaging the stop 40. The purpose of the switch 65 will be described in more detail hereinafter.
With particular reference to FIG. 3, it will be seen that each of the spacers 42 has a bore 68 therethrough in which a rod 70 is sidely mounted. The forward end of the rod 70 is provided with a buffer 71 projecting forwardly of the stop plate 40 and engageable by the bolster plate 35 as it approaches the stop plate 40. The buffer 71 is resiliently urged forwardly by means of a spring 72 telescoped over the rod 70 and resiliently engaging both the buffer 71 and the forward end of the associated spacer 42. It will be apparent that the buffers 71 absorb most of the shock of stopping the bolster plate 35 at it approaches the stop plate 40.

It is also to be noted that the rear end of each rod 70 is provided with an actuator 73. Each actuator 73 is aligned with a control device for actuating the same.

Referring once again to FIG. 2, it will be seen that in the preferred embodiment of the invention, which embodiment is illustrated herein, the control devices are in the form of switches 74 and 75 disposed on opposite sides of the cylinder 48. Each of the switches 74 and 75 are of the type having an actuating rod 76 with an enlarged adjustable head 77 engageable by the associated actuator 73 for operating the respective switch. Thus, when the bolster plate moves to its fully advanced position at home against the stop plate 40, the switches 74, 75 will be actuated through the buffers or stubbers 71, rods 70 and actuators 73.

Referring now once again to FIG. 1, it will be seen that suitably mounted on the upper part of the press 10 is a further control device in the form of a switch 78. The switch 78 is of a construction similar to the switch 65 and will include an actuating element 80 engageable by the split portion 25 of the connecting rod 24. It is to be understood that the switch 78 will be so positioned whereby it will be actuated at a time when mechanisms carried by the ram 23 are clear of mechanisms carried by the bolster plate 35.

It is also to be noted from FIG. 1 that mounted at the front of the base 11 are a pair of push button type actuators 81, 82. The actuators 81, 82 are manually actuated actuators and control the opening and closing of switch contacts in a manner to be described hereinafter.

Referring now to FIG. 5, it will be seen that there is illustrated a circuit diagram for the manual operation of the press 10 when equipped with the bolster plate 35. The circuit includes a pair of leads L1 and L2 with lead L1 having incorporated therein a suitable fuse 83.

In line 10 of the wiring diagram, there is incorporated in wire 84 a pilot light 85 to indicate when the supply lines L1, L2 are energized.

In line 11, there is a wire 86 which has connected therein in series and in order normally open contacts 87, 88, switch contact CS1 and a coil of relay R. In line 12, a wire 90 extends from supply line L1 to wire 86 intermediate contact 88 and switch contact CS1. Wire 90 has incorporated therein in sequence a normally open switch contact SS and a normally open relay contact R1. Wire 90 forms part of a holding circuit for the relay R.

In line 13, wire 91 has incorporated therein in series and in sequence normally open switch contact LTS, normally closed contacts 92 and 93, normally open relay contact R2 and the coil of a time delay relay AVR.

In line 14 wire 94 has coupled therein in series and in sequence normally open switch contact RTS, relay contact AVR1 and the coil of solenoid V.

In line 15, wire 95 has incorporated therein normally closed contacts 96, 97 which are coupled in parallel by wires 98, 100, norally closed relay contact R3, normally closed switch contact CS2 and the coil of OUT solenoid.

In line 16, wire 101 has incorporated therein normally open contacts 102 and 103, normally open relay contact R4 and the coil of IN solenoid.

It is to be noted that contacts 87, 92, 96 and 102 are coupled together for operation in unison by push button actuator 81. In a like manner, contacts 88, 93, 97 and 103 are coupled together for operation in unison by push button actuator 82.

OPERATION

At this time it is pointed out that the switch contact SS of line 12 of the wiring diagram of FIG. 5 is the contact of switch 65 and that switch contacts LTS and RTS of lines 13 and 14 are the contacts of switches 74 and 75, respectively. Also, switch contacts CS1 and CS2 are switch contacts of switch 78. Further, it is to be understood that OUT solenoid, when energized, will direct operating fluid through line 62 with there being return flow through line 60. On the other hand, when IN solenoid is energized, there will be fluid flow into the cylinder 48 through line 60 and out through line 62.

Further, solenoid V when energized, will actuate the clutch 38 in a conventional manner for a single rotation of the crankshaft 15.

When the press 10 is provided with the control circuitry of FIG. 5 and is otherwise in condition for operation, a workpiece (not shown) is loaded onto the die members 30 and the operator depresses the push button actuators 81, 82 with his two hands. In line 11, contacts 87, 88 are closed, completing a circuit through normally closed switch contact CS1 to energize relay R.

In line 16, contacts 102, 103 close and with the closing of relay contact R4, due to energization of relay R, coil of IN solenoid is energized introducing fluid into cylinder 48 through fitting 57 and urging bolster plate 35 towards an advanced position.

In line 12, when relay R is energized, contact R1 closes. When bolster plate 35 reaches its almost home position, switch 65 is actuated to close switch contact SS thereby completing the holding circuit to relay R through switch contact SS, relay contact R1 and switch contact CS1.

It will be readily apparent that if at any time prior to the closing of switch contact SS one of the push button actuators 81, 82 is released, the circuit to relay R will be opened and the circuit to IN solenoid will be opened by the opening of the contact R4.

Assuming the advance of the bolster plate 35 to be completed, switches 74 and 75 will be actuated, closing switch contact LTS and RTS in lines 13, 14. Further, in line 13, relay contact R2 will be closed. Then, when the push button actuators 81, 82 are released, contacts 92, 93 will close completing the circuit to relay AVR. When relay AVR is energized, switch contact AVR1 will close energizing solenoid V. Clutch 38 will then be energized for a single revolution of crankshaft 15 with
the result that switch contacts CS1, CS2 will be opened and then closed as the ram 23 reciprocates.

Opening of switch contact CS1 will destroy the holding circuit for relay R with the result that relay R will be de-energized and relay contacts R1, R2 and R4 will open while normally closed relay contact R3 will again close. In line 15, switch contact CS2 will open, preventing the accidental retraction of the bolster plate 35.

When the ram 23 has completed its cycle of operation, switch contacts CS1 and CS2 will again close. However, relay R will remain de-energized with the result that in line 15 relay contact R3 will remain closed and since normally closed contacts 96, 97 are now closed, the circuit to OUT solenoid will be completed and fluid will flow into the cylinder 48 through the fitting 58 and cause the retraction of the bolster plate to its loading position.

Should one of the push button actuators 81, 82 be released prior to the closing of the switch contact SS, that is prior to the bolster plate reaching its almost home position, the circuit to relay R will open with the result that normally closed relay contact R3 will again close and circuit to the solenoid of OUT solenoid will be completed through that one of the contacts 96, 97 which is completed by the release of the respective push button actuator. Thus, when one of the push button actuators 81, 82 is prematurely released, not only will the advance of the bolster plate 35 discontinue, but the bolster plate will be automatically retracted to its loading position.

It will be readily apparent from the foregoing that when operating the press 10, utilizing the circuitry of FIG. 5, while one of the push button actuators 81, 82 may be manually operated in advance of the other, if the push button actuators are not held depressed until the bolster plate reaches the almost home position, the net result of the premature releasing of one of the push buttons 81, 82 will be the automatic retraction of the bolster plate and failure of the ram to be actuated.

With the circuitry of FIG. 5, it is also possible to provide for the foot controlling of the ram when the bolster plate is locked in its advanced position. To this end, the wiring circuitry includes a wire 104 coupled in line 11 in a circuit by-passing contacts 87, 88 and having incorporated therein a normally open switch contact FS. Also, in line 13, a wire 105 is provided by-passing contacts 92, 93 with wire 105 having incorporated therein a switch contact B.

When it is desired to repeatedly press or punch strip stock which may be hand fed, it is merely necessary to lock the bolster plate 35 in its advanced position in any desired manner and to close switch contact B. Then each time foot switch FS is closed, relay R will be energized and in line 13 relay contact R2 will close energizing time delay relay AVR. Contact AVR1 will then close energizing solenoid V to actuate the clutch 38 for a single reciprocation of the ram 23.

Reference is now made to the modified wiring circuitry of FIG. 6 wherein supply lines L1, L2 are provided and supply line L1 is provided with a conventional fuse 105.

In line 20, wire 106 has incorporated therein a pilot light 107 to indicate that supply lines L1, L2 are energized.

In line 22, wire 108 has incorporated therein in series and in sequence normally closed switch contact PS, normally open contacts 110, 111, normally closed switch contact CS1 and the coil of relay R.

In line 21, wire 112 extends from supply line L1 to wire 108 between contact 111 and switch contact CS1, by-passing switch contact PS and contacts 110, 111. Wire 112 has incorporated therein switch contact FS.

It is to be understood that switch contacts PS and FS are provided so that the press 10 may be operated either with the use of the movement of the bolster plate or on strip material. This will be described in detail hereinafter.

In line 23, wire 113 is coupled to wire 108 between contacts 110, 111 and has incorporated therein the coil of relay RT.

A secondary supply line 114 is coupled in line 22 to the wire 108 between switch contact PS and contact 110 and extends down to line 26 of the wiring diagram.

In line 24, wire 115 extends from supply line 114 to wire 108 (line 22) between contact 111 and switch contact CS1. Wire 115 has incorporated therein normally open switch contact SS and normally open relay contact R1.

In line 25, wire 116 is connected to supply line 114 and is connected therein in series and in sequence normally open contacts 117, 118, relay contact R2 and the coil of IN solenoid.

In line 26, wire 120 is connected to supply line 114 and has coupled therein in parallel normally closed switch contacts 121, 122 by means of wires 123, 124, normally closed relay contact R3, normally closed switch contact CS2, normally open relay contact OR1 and the coil of OUT solenoid. Further, normally closed relay contact R3 is by-passed by wire 125 having normally open relay contact RT1 therein.

In line 27, wire 126 has incorporated therein in series and in sequence normally open switch contacts LTS and RTS, normally closed contacts 127, 128, normally open relay contact R4, normally closed relay contact OR2 and the coil of solenoid V.

In line 28, wire 130 extends from wire 120 between switch contact CS2 and relay contact OR1 to supply line L2 and has incorporated therein the coil of a time delay relay OR.

OPERATION

With the switch contact PS closed, when push button actuators 81, 82 are actuated, circuit in line 22 will be energized to energize relay R. At the same time, in line 23 relay RT will be energized.

In line 25, switch contacts 117, 118 will be closed by depressing the push buttons 81, 82 and when contact R2 closes due to the energization of relay R, IN solenoid will be energized so as to deliver fluid to the fitting 57 and cause the advance of bolster plate 35 towards its at home position. If push button actuators 81, 82 remain depressed until the bolster plate reaches its almost at home position so as to actuate switch 65 and close switch contact SS, circuit will be completed in line 24 through closed contact R1 to provide a holding circuit for relay R.

Thereafter, when the push button actuators 82 are substantially simultaneously released and the bolster plate 35 has reached its at home position actuating switches 74 and 75 closing switch contacts LTS and RTS, the closing of switch contacts 127, 128 will result
in the completion of a circuit in line 27 through then closed contact R4 and normally closed contact OR2. Solenoid V will be energized and clutch 38 will be actuated to effect a single reciprocation of ram 23.

When ram 23 reciprocates, switch contacts CS1 and CS2, controlled by switch 78, will open de-energizing relay R in line 22. Previously, when contact 110 was opened, relay RT in line 23 was open. Opening of switch contact CS2 in line 26 prevents the bolster plate from moving out.

When the single cycle of reciprocation of the ram has been completed, in line 26, circuit will be completed through normally closed contacts 121, 122, normally closed relay contacts R3 switch contact CS2 and through wire 130 in line 28 to energize time delay relay OR. After a slight delay, circuit through line 26 will be completed through closed relay contact OR1 to energize the OUT solenoid so as to direct fluid into the cylinder 48 through the fitting 58 and retract the bolster plate.

It is to be noted that at the time relay contact OR1 closes to permit the retraction of the bolster plate, relay contact OR2 opens so as to prevent the accidental actuation of the ram.

Referring now to line 26, it will be seen that during the initial phase of the operation of the press, with the bolster plate in its at home position, the ram will not be actuated until the two push button actuators 81, 82 have been released.

If one of the push button actuators, for example, the actuator 81, is first released, contact 121 will close and a circuit will be completed through the switch contact PS, contact 121, relay contact RT1, switch contact CS2 to energize the time delay relay OR. In the event the relay OR times out to close relay contact OR1 and open relay contact OR2, the bolster plate will automatically be retracted. Since normally closed contact OR2 opens, should the other push button actuator, in this instance actuator 82, be simultaneously released with the timing out of the relay OR, the ram will still not be actuated.

In accordance with the foregoing, it will be readily apparent that in order to effect the actuation of the ram, it is necessary that the push button actuators 81, 82 be released substantially simultaneously. If not, the bolster plate 35 will automatically be retracted and the operator will have to initiate the press operation all over again by depressing both of the push button actuators 81, 82. By having the push button actuators remote from the ram area and by requiring the push button actuators to be substantially simultaneously released, it will be readily apparent that it is physically impossible for an operator to place one's hand's within the die area in the case of a die press or within the ram area in general in the case of other mechanisms.

If it is desired to operate the press 10 by means of a foot switch in order to perform repeated press operations on strip material and the like, with the bolster plate 35 locked in its at home position, with switch contact FS open, and foot switch FS closed, the ram will be actuated. It will be seen that the closing of switch contact FS will complete a circuit to energize relay R with the result that in line 27 relay contact R4 will close energizing solenoid V to operate the clutch 38 for a single cycle operation of the ram. Further, if the switch FS is held closed, each time the ram returns to the end of its cycle, switch contact CS1 will close to again complete the circuit to energize relay R and close relay contact R4 to effect a next operation of the ram.

Although the invention has been specifically illustrated and described with respect to a press having a reciprocating ram, it will be readily apparent that the system will apply equally as well to other mechanism wherein it is necessary for a work support to move between a loading position and a work position and a second member to be actuated in conjunction with the work support. Further, while it is the primary intent of the invention to provide a bolster plate assembly which may be incorporated in existing presses so as to provide a loading position remote from the ram area, it is to be understood that such intent does not preclude the manufacture of new presses incorporating the system.

Although only several preferred embodiments of the bolster plate control system have been specifically illustrated and described herein, it is to be understood that minor variations may be made in the system without departing from the spirit and scope of the invention, as defined by the appended claims.

We claim:

1. A control system for a machine of the type including a first member movable from a first position to a second position and return and a second member movable from a first position to a second position for cooperation with the first member and return, said control system comprising first means responsive to operation of a manual actuator to move said first member from the first position thereof towards the second position thereof, second means for automatically returning said first member to the first position thereof upon the release of said manual actuator, and third means responsive to said first member reaching a predetermined position relative to the second position thereof at least temporarily rendering said second means inoperative.

2. The control system of claim 1 wherein said first and second means include a common means for effecting movement of said first member in opposite directions.

3. The control system of claim 1 wherein said predetermined position is adjacent to but in advance of said first member second position.

4. The control system of claim 1 wherein said first member is a movable die support, and said second member is a press member.

5. The control system of claim 1 wherein said manual actuator includes two spaced apart control members, and the release of either of said control members will actuate said second means.

6. The control system of claim 1 wherein said control means includes actuating means responsive to the actuating means of said control system in a predetermined time interval between the separate actuation of said two control devices operable to effect return of said first member to its first position.

7. The control system of claim 6 wherein said fifth means have components in common with said second means.

8. The control system of claim 6 wherein said fifth means also includes means for rendering said fourth means inoperative to effect movement of said second member.
9. For use in combination with a press of the type including a reciprocable ram, a bolster plate cooperable with said ram, means mounting said bolster plate for guided movement between a retracted loading position and an advanced position cooperable with said ram, drive means connected to said bolster plate for selectively reciprocating said bolster plate between said loading position and said advanced position, a control system comprising first means operable for actuating said drive means to move said bolster plate from said retracted position towards said advanced position, second means operable for actuating said drive means to return said bolster plate to said retracted position upon deactivation of said first means, and third means operable upon said bolster plate reaching a predetermined position relative to said advanced position for rendering said second means inoperative.

10. The control system of claim 9 wherein said drive means include means for slowing the rate of movement of said bolster plate as said bolster plate approaches said advanced position.

11. The control system of claim 9 wherein fourth means requiring substantially simultaneous actuation of two control devices control the movement of said ram, and fifth means responsive to the exceeding of a predetermined time interval between the separate actuation of the two control devices operable to effect return of said bolster plate to its retracted position.

12. The control system of claim 11 wherein said fifth means also includes means for rendering said fourth means inoperative to effect movement of said ram when said fifth means are energized.

13. A bolster plate assembly for converting a press of the type having a reciprocable ram to a press having a loading station remote from the general path of the ram, a bolster plate, means for mounting said bolster plate on a press for movement between a retracted loading position and an advanced position generally aligned with the path of movement of the ram, drive means coupled to said bolster plate for effecting controlled movement of said bolster plate between said retracted and advanced positions and return, and a control system, said control system comprising first means operable for actuating said drive means to move said bolster plate from said retracted position towards said advanced position, second means operable for actuating said drive means to return said bolster plate to said retracted position upon deactivation of said first means, and third means operable upon said bolster plate reaching a predetermined position relative to said advanced position for rendering said second means inoperative.

14. The assembly of claim 13 wherein said drive means include means for slowing the rate of movement of said bolster plate as said bolster plate approaches said advanced position.

15. The assembly of claim 13 wherein fourth means requiring substantially simultaneous actuation of two control devices control the movement of said ram, and fifth means responsive to the exceeding of a predetermined time interval between the separate actuation of the two control devices operable to effect return of said bolster plate to its retracted position.

16. The assembly of claim 15 wherein said fifth means also includes means for rendering said fourth means inoperative to effect movement of said ram when said fifth means are energized.

17. The assembly of claim 13 wherein said drive means is in the form of a double acting fluid motor of the cylinder and piston type having a predetermined stroke.

18. The assembly of claim 13 wherein said drive means is in the form of a double acting fluid motor, and said control system is electrical.

19. The assembly of claim 18 wherein said first means includes an electrical circuit having a manually closeable contact therein, said second means includes an electrical circuit having a manually closeable contact and a normally closed contact therein, a common actuator for the manually operable contacts, and said third means includes means for opening said normally closed contact when said bolster plate has advanced to said predetermined position.

20. The assembly of claim 19 wherein said normally closed contact is controlled by a relay and openable in response to energization of said relay by closing said manually closeable contact, and said third means includes a holding circuit for said relay including a bolster plate controlled contact closeable when said bolster plate reaches said predetermined position.

21. The assembly of claim 19 wherein said first means includes a second manually closeable contact and said second means includes a second manually openable contact controlled by a common actuator, said manually closeable contacts being in series whereby both of said manually closeable contacts must be closed to advance said bolster plate, and said manually closeable contacts are in parallel whereby only one of said manually closeable contacts need be closed to retract said bolster plate.

22. The assembly of claim 21 wherein said normally closed contact is controlled by a relay and openable in response to energization of said relay by closing said manually closeable contact, and said third means includes a holding circuit for said relay including a bolster plate controlled contact closeable when said bolster plate reaches said predetermined position.

23. The assembly of claim 21 wherein said second means includes a contact operable only after a delay in response to the closing of one of said manually closeable contacts to retract said bolster plate.

24. The assembly of claim 19 wherein said first means includes a second manually closeable contact and said second means includes a second manually openable contact controlled by a common actuator, said manually closeable contacts being in series whereby both of said manually closeable contacts must be closed to advance said bolster plate, and means operable upon the closing of one of said manually closeable contacts materially in advance of the other to retract said bolster plate.

25. The assembly of claim 19 together with fourth means for actuating said ram in response to closing of a pair of manually closeable contacts.

26. The assembly of claim 25 wherein said fourth means includes a further contact operable to prevent operation of said ram in response to the separate closing of the contacts of said pair of manually operable contacts at a time interval beyond a predetermined time interval.

27. The assembly of claim 26 wherein said further contact is controlled by a relay of the time delay type.

28. The assembly of claim 26 wherein said further contact is controlled by a relay, said second means in-
includes a further contact, and said further contacts are controlled by a single relay.

29. The assembly of claim 25 wherein said fourth means includes a normally open contact closed when said bolster plate is in its advanced position.

30. The assembly of claim 19 together with a further normally closed contact opening during the movement of an associated ram to prevent retraction of said bolster plate while the ram is in an interfering position.

31. A press comprising a frame, a ram carried by said frame for reciprocatory movement, a bolster plate carried by said frame for movement between a retracted loading position and an advanced position cooperable with said ram, and control means for moving said bolster plate to said advanced position and effecting reciprocation of said ram when said bolster plate is in an advanced position, said control means including dual manually actuated control means operable to actuate only said ram when actuated in unison and to retract said bolster plate when actuated sequentially.

32. The press of claim 31 wherein said dual manually actuated control means include a pair of remotely disposed hand actuated control members, and control system means coupled to said control members.

33. The press of claim 32 wherein said control system means are electrical and include a time delay relay.

34. A bolster plate assembly for converting a press of the type having a reciprocable ram to a press having a loading station remote from the general path of the ram, said assembly comprising a bolster plate, means for mounting said bolster plate on a press for movement between a retracted loading position and an advanced position generally aligned with the path of movement of the ram, drive means coupled to said bolster plate for effecting controlled movement of said bolster plate between said retracted and advanced positions and return, and a control system, said control system including dual manually actuated control means operable to actuate only said ram when actuated in unison and to retract said bolster plate when actuated sequentially.

35. The assembly of claim 34 wherein said dual manually actuated control means include a pair of remotely disposed hand actuated control members, and control system means coupled to said control members.

36. For use in a press of the type including a reciprocable ram and a bolster plate movable between a retracted loading position and an advanced position cooperable with said ram, a control system comprising dual manually actuated control means operable to actuate only said ram when actuated in unison and to retract said bolster plate when actuated sequentially.

37. The control system of claim 36 wherein said dual manually actuated control means includes a pair of remotely disposed hand actuated control members, and control system means coupled to said control members.

38. The control system of claim 37 wherein said control system means are electrical and include a time delay relay.

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