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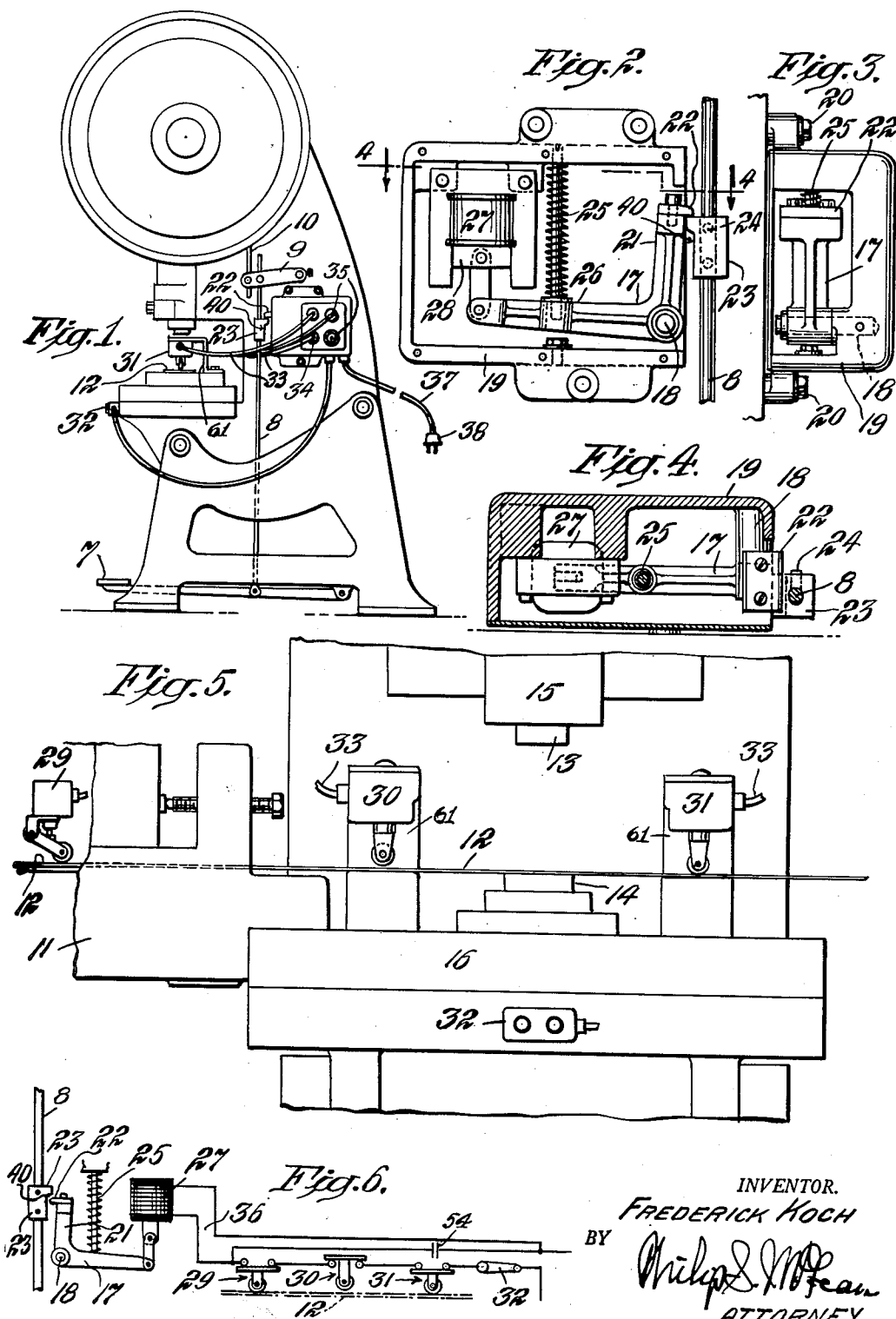
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PROTECTIVE SYSTEM FOR PUNCH PRESSES OR OTHER MACHINES

Filed Aug. 22, 1951

2 Sheets-Sheet 1



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Fig. 7.

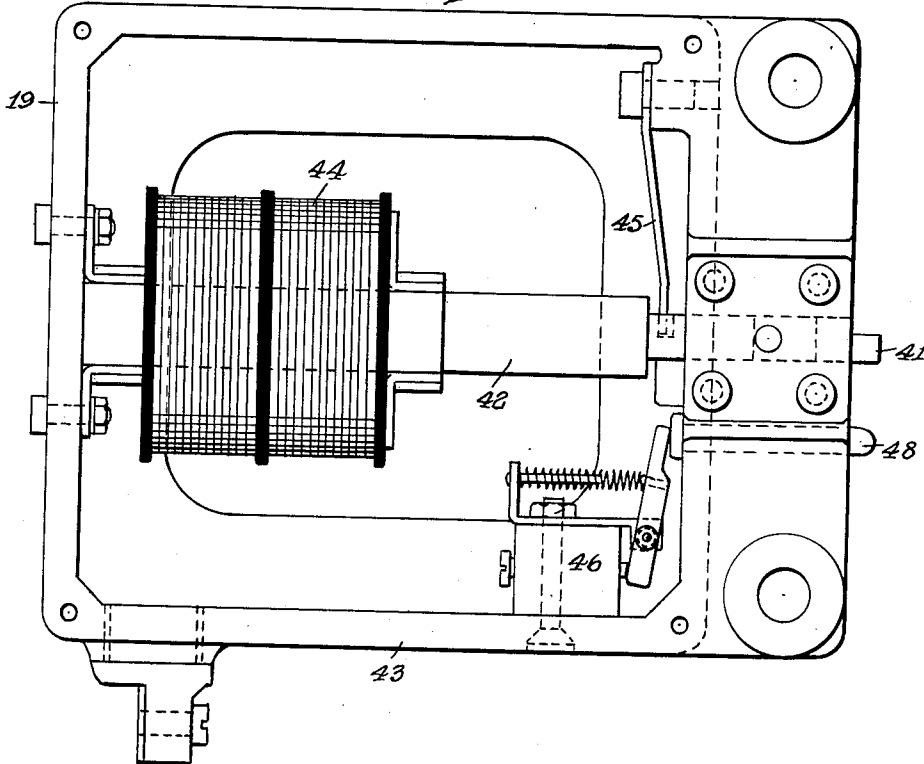


Fig. 8.

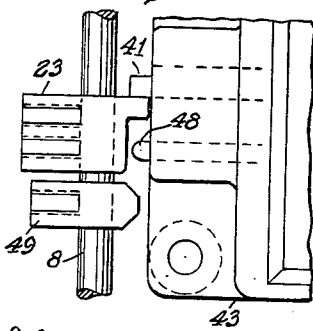


Fig. 9.

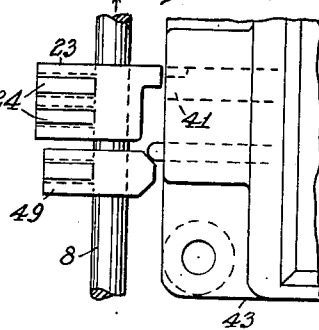


Fig. 10.

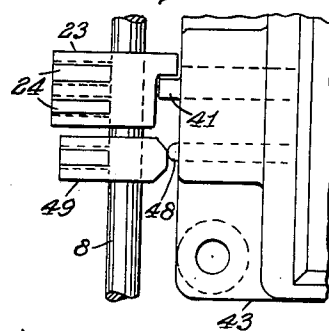
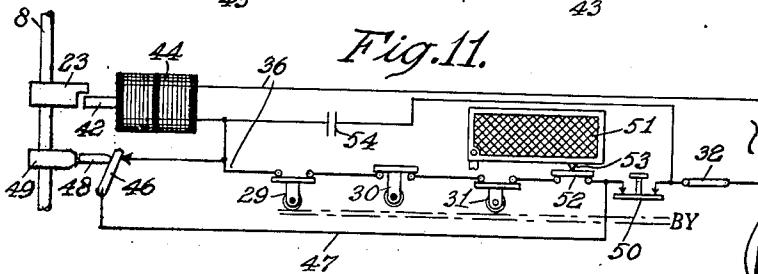


Fig. 11.



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1 Claim. (Cl. 192-127)

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The invention herein disclosed relates to the protection of punch presses and other machines against inaccuracies or failure in the feeding of stock thereto.

Particularly the invention is concerned with presses equipped with means such as a slide feed for automatically supplying the machine with stock.

The general purpose of the invention is to provide such a machine with means which will automatically stop the machine if for any one of several reasons the stock is not being properly fed.

Such reasons might be the buckling of the stock between the feed unit and the die, punch or other tool portion of the press, failure to impart a full feed stroke to the stock, reaching the end of the stock or the stock being too thick or too thin or too wide or too narrow.

These and other failures or inaccuracies are guarded against in the present invention by the provision of appropriately placed detector switches all connected in such relation that the action of any one of them will serve to trip or stop the press or other machine.

Particularly it is an object of the invention to provide such a protective system in a simple, practical form readily applicable to machines in use.

Other desirable objects attained by the invention are set forth or will appear in the course of the following specification.

The drawings accompanying and forming part of the specification are illustrative of present commercial embodiments of the invention but structure and arrangement may be modified and changed as regards such illustration, all within the true intent and scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawings is a side elevation of a power press having the invention applied thereto and showing the press in normal running condition with the starting pedal held down by the automatic trip mechanism;

Fig. 2 is an interior view of the control box removed from the press and showing the parts as they appear in Fig. 1;

Fig. 3 is an end view of the control unit;

Fig. 4 is a horizontal sectional view on substantially the plane of line 4-4 of Fig. 2;

Fig. 5 is a broken front elevation of the press showing two of the detector switches and the main control switch mounted thereon;

Fig. 6 is a wiring diagram;

Fig. 7 is an internal view of a modified form of control box;

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Figs. 8, 9 and 10 are broken detail views illustrating operation of this second form of the invention; Fig. 8 showing position of parts with the machine locked in running position; Fig. 9 showing the machine tripped, with the solenoid deenergized and the trip rod moving upward; and Fig. 10 showing the stopped position with the trip rod up and locked in that relation by reenergization of the solenoid;

Fig. 11 is a wiring diagram showing parts as in the locked, Fig. 10, position.

In Fig. 1 a power press is shown having a foot pedal 7 for starting and controlling the same. This may be considered a one-revolution press with the pull rod 8 extending from the pedal, connected with a rock lever 9 having a trip connection 10 extending to the one-revolution clutch of the press.

Further, it may be considered that this press is equipped with a slide feed, partly shown at 11 in Fig. 5, operated from the press and arranged to advance strip stock 12 step-by-step to the companion die members 13, 14, carried by the ram 15 and bolster 16.

The invention includes mechanism for latching and holding the pedal down so long as stock is being properly fed, and for automatically releasing the pedal to stop the press if stock is not properly advanced or some other defect is detected.

The hold-down latch is shown as a bell crank lever 17 pivoted at 18 in a box or case 19 adapted to be bolted at 20 over the side of the press and carrying on the upright arm 21 of the same a projecting lug 22 to engage over a stop block 23 adjustably secured on the pull rod 8 by set screws 24.

A spring 25 acting on the horizontal arm 26 tends to retract the hook or nose end of the bell crank and a magnet 27 having its armature 28 connected with this arm acts to rock the detent outward into holding engagement with the trip rod.

By arranging feeler switches for testing different conditions and by connecting these all in series with the latching and tripping magnet, the machine may be made to stop when any one or all of the conditions guarded against occurs.

In the present illustration there is a runout switch 29 positioned to detect the end of the stock, a switch 30 for detecting buckling of the stock between the feed device and dies and a switch 31 positioned to detect short feeding of the stock.

These may be microswitches, the runout switch 29 constructed and positioned to be held closed

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by the stock and the buckle switch 30 normally closed and arranged to be pushed open by the upward buckling of the stock. Additionally, an "on" and "off" switch 32 may be located in convenient position on the front of the press for rendering the protective system operative or inoperative.

The various feeler switches may be connected in circuit when and if required, by flexible electric cords 33 equipped with attachment plugs 34, Fig. 1, adapted to be engaged in plug receptacles 35 on the front of the control box 19.

The wiring for these series connected receptacles while not shown in detail, is illustrated generally in the wiring diagram, Fig. 6, which shows the three feeler or detector switches in use as connected in series in the supply line 36 for the trip magnet 27.

Fig. 1 shows the supply line for the holding magnet as completed by an electric cord 37 equipped with an attachment plug 38 for engagement with a plug receptacle in an ordinary wiring circuit.

In the case illustrated the control box is equipped with four plug outlets 35. Only three of these are shown as in use. The circuit at the fourth outlet may be temporarily closed by a jumper or connection of some sort, such as a fuse plug. Instead of using jumpers for the plug outlets not in service, these outlets may be of the normally closed or short circuited design which will open up to connect an extension cord in circuit when the plug of such cord is inserted in the receptacle. In such a construction the circuit at the plug receptacles will be normally closed but an extension cord circuit may be connected at any time by simply plugging it into one of the receptacle outlets.

The invention makes it possible to readily convert an ordinary punch press with a stock feeding unit into an automatic production machine which will continue in operation unattended so long as the right stock is properly fed to the same, and which will automatically stop, with the ram lifted, if stock is not present or is defective or is improperly fed.

The control box is a simple but substantial unit which can be bolted to the side of the machine and in that relation provides a rugged and reliable means for holding the machine in operation and for tripping the machine and saving it from improper operation.

The microswitches may be mounted in position to detect various irregularities or faults in feeding, by the use of suitable mounting clamps, brackets or the like such as shown at 61, Figs. 1 and 5, and they are connected in circuit by simply plugging them into open receptacles on the control box.

Figs. 1, 2 and 6 show the stop block 23 as having a bevel or incline 40 at the under side of the same, opposed to the hook portion 22 of the bell crank to act as a cam to force the bell crank back, against the pull of the magnet, so that with the magnet energized, after setting up the press, the foot pedal may be depressed to start the press.

The second form of the invention illustrated in Figs. 7 to 11, includes as an additional safety factor, means for locking the press in the stopped position and requiring purposeful, manual action on the part of the operator to again start the press.

Fig. 11 shows the holding latch in the form of a sliding bolt 41 carried by a solenoid core

42 and arranged to be projected from the control box 43 by solenoid winding 44 and to be retracted by flat spring 45.

The solenoid may be connected in the energizing circuit 36 in series with the several control units, as shown in Fig. 11, so that as in the first instance, it will be energized when all these switches are closed and will be deenergized when any one of them is opened.

Figs. 7 and 8 illustrate the normal running position of parts with the solenoid energized and the bolt 41 projected over the top of the stop block 23, holding the rod 8 down with the treadle of the press down in the running position.

Fig. 9 illustrates a tripped, temporary condition of the parts in which the solenoid has been deenergized, the bolt 41 withdrawn by the retracting spring 45, releasing the stop block and permitting the treadle rod 8 to move upward under impulse of the spring for yieldingly supporting the treadle in the upper, stopped position of the press.

Fig. 10 shows the rod 8 all the way up, in the fully tripped position and held in that relation by the slide bolt 41 projected in this case, beneath the holding shoulder of the stop block 23.

This projection of the bolt for securing the press in stopped condition is automatically effected in the illustration by a switch 46 located in the control box, Fig. 7, which, as shown in the wiring diagram, Fig. 11, is connected in a jumper circuit 47 bridging the several control switches and arranged to be closed by a plunger 48 positioned to be actuated by a trip block 49 in the upward movement of rod 8.

This trip block 49 is secured in position on the rod so that it will only actuate the holding switch 46 after the block 23 on the rod has passed up above bolt 41, and will then retain plunger 48 in position holding the switch closed.

Consequently in the form of invention shown in Fig. 7, the solenoid will be automatically energized to secure and hold the press stopped any time any one of the control switches has been actuated through any fault in the feeding of the press.

To again start the press the solenoid is deenergized, in the case illustrated, by a special release push-button 50 shown in wiring diagram, Fig. 11, connected to interrupt the jumper circuit 47.

This arrangement requires that the operator of the machine take positive action to unlock the control mechanism before he can start the press again. In this case the switch button 50 must be pushed and held while the foot pedal is being depressed to start the machine. If conditions then are in proper order the machine will start and continue to operate, but if any of the control switches are open the machine will again be stopped and be locked in the stopped relation.

In addition to control switches already mentioned, other controls may be provided such as the guard indicated at 51 in Fig. 11 and which is in the nature of a gate to swing down into position, closing access to the dies and which gate when swung down, closes a control switch 52 connected in series with the other control switches.

This safety gate form of control may be plugged into the control box by a cord connection such as that indicated at 33 in Fig. 1.

In setting up this safety guard form of control the gate may be equipped with a point or pro-

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jection such as shown at 53 in Fig. 11, to extend through an opening in the stationary structure in order to operate the switch 52, to prevent accidental or unintentional closing of this switch.

Other forms of safety devices may be employed, the invention enabling these to be quickly plugged into service relation on the control box.

The circuits shown in Figs. 6 and 11 are representative, it being realized that these may be modified and changed in various ways. They may include various forms of protective or safety devices such as fuses and the like, and condensers or resistors may be connected, as indicated at 54, to prevent arcing and to otherwise take care of loads or surges occasioned by the control switches.

While normally closed circuits have been illustrated, it will be understood that the system may be designed for operation on a normally open circuit, with the control switches arranged in parallel, open circuit relation.

In the two examples illustrated in Figs. 2 and 7, the holding bolts are projected by magnets in the form of solenoids and retracted by springs.

This arrangement may be varied, for one instance, gravity be employed in place of spring force for retracting the holding bolt.

What is claimed is:

A unitary attachment for converting a power press, or like stock handling machine, having a control member which, when held depressed, will keep the machine in continuous operation and comprising a control box having means for mounting the same in fixed relation on the machine adjoining said control member, an abutment on said depressible control member, a latch in said control box projectible to engage over said abutment to hold the control member in the machine-running position and retractable to release said abutment to permit the control member to stop the machine, said latch in the projected position being yieldable under engagement by the abutment to permit the control member being depressed to start the machine when the latch is in the projected relation and whereby said latch will then hold the control member in the de-

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pressed position when the machine is started by depressing the control member, an electromagnet in said box arranged to effect release of the latch from holding engagement with the abutment on the control member, electric receptacle outlets on said control box, stock detecting switches, brackets for mounting said switches in different positions on the machine for detecting different stock feeding conditions, said stock detecting switches having cord connections terminating in attachment plugs insertable in the different receptacle outlets on the control box and electrical connections within the control box for connecting any one or any number of said stock detecting switches plugged into one or more of said outlets in controlling relation with said electromagnet, and whereby said stock detecting switches may be set up on the machine to detect different faults in the feeding of stock, and the control member may thereupon be depressed to start the machine and the unit will keep the machine in operation so long as no stock feeding fault, which any one of said switches will detect, occurs and whereby when any such fault arises the electromagnet will effect release of the latch from holding engagement with the abutment to permit the released control member to stop the machine.

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