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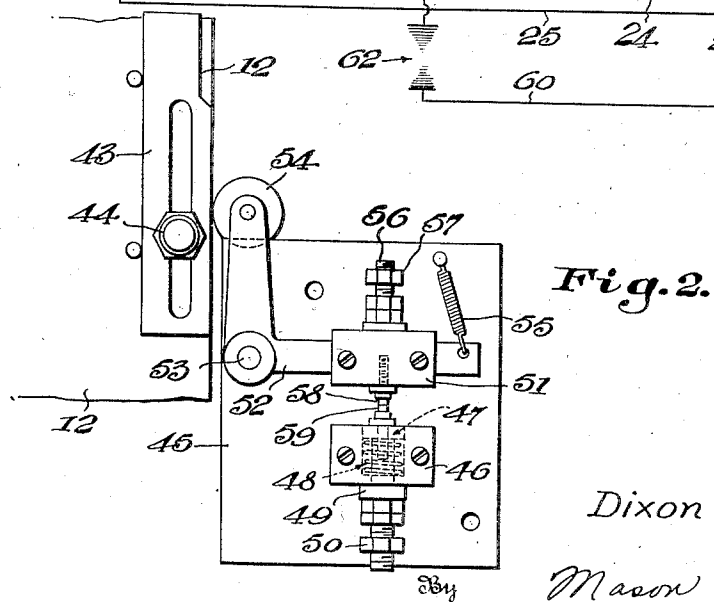
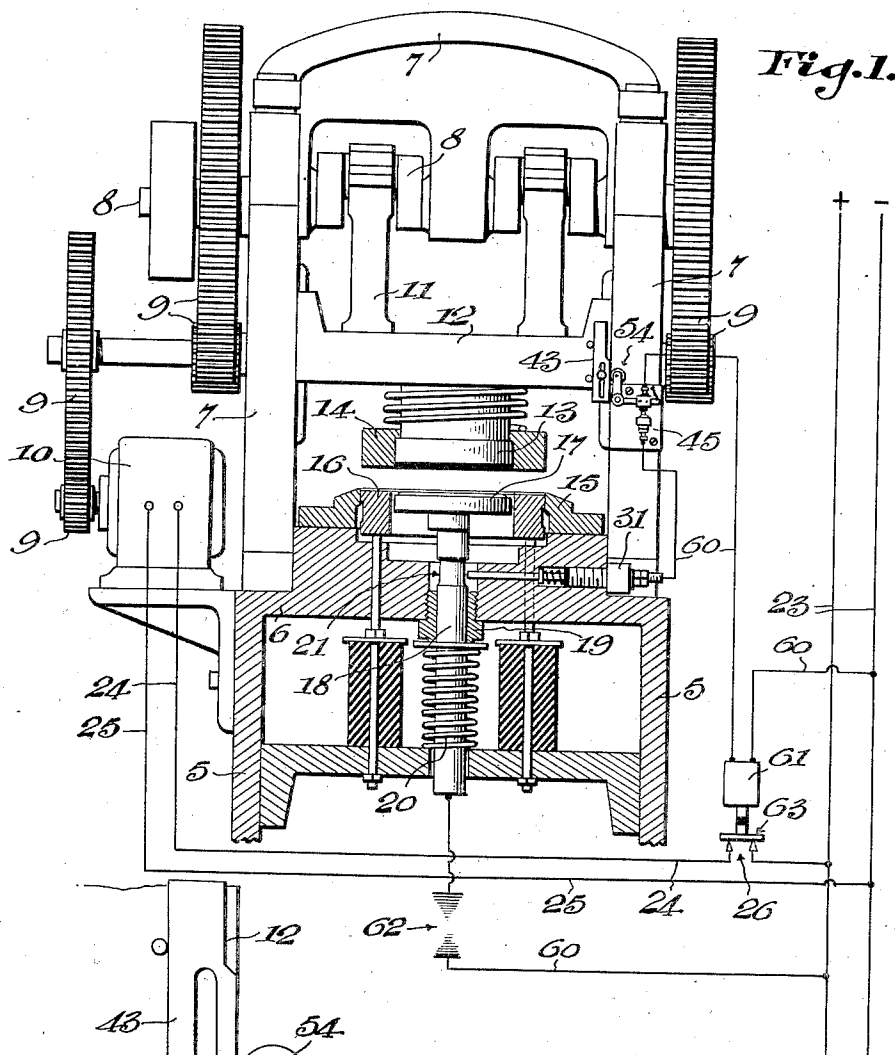
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STOP MECHANISM FOR PRESSES

Filed Aug. 20, 1937

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 5.

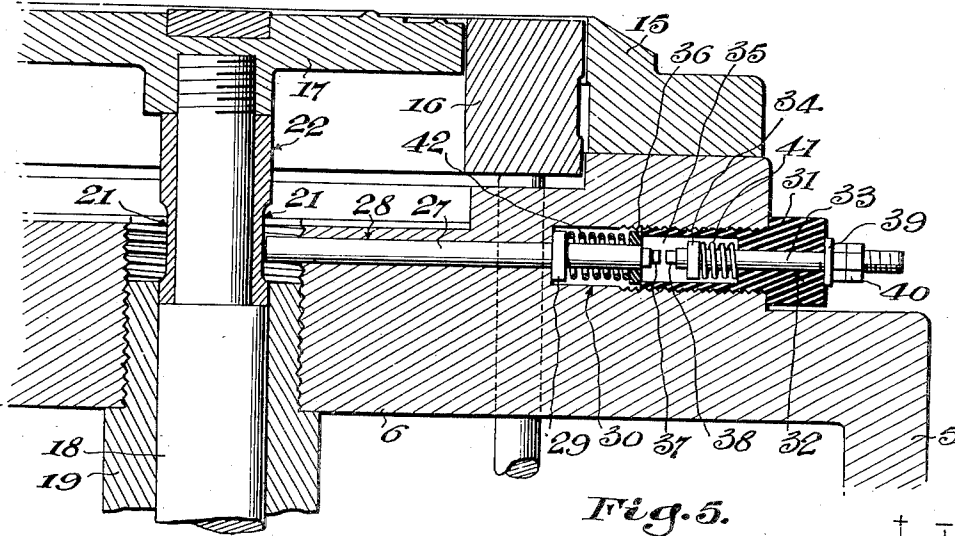
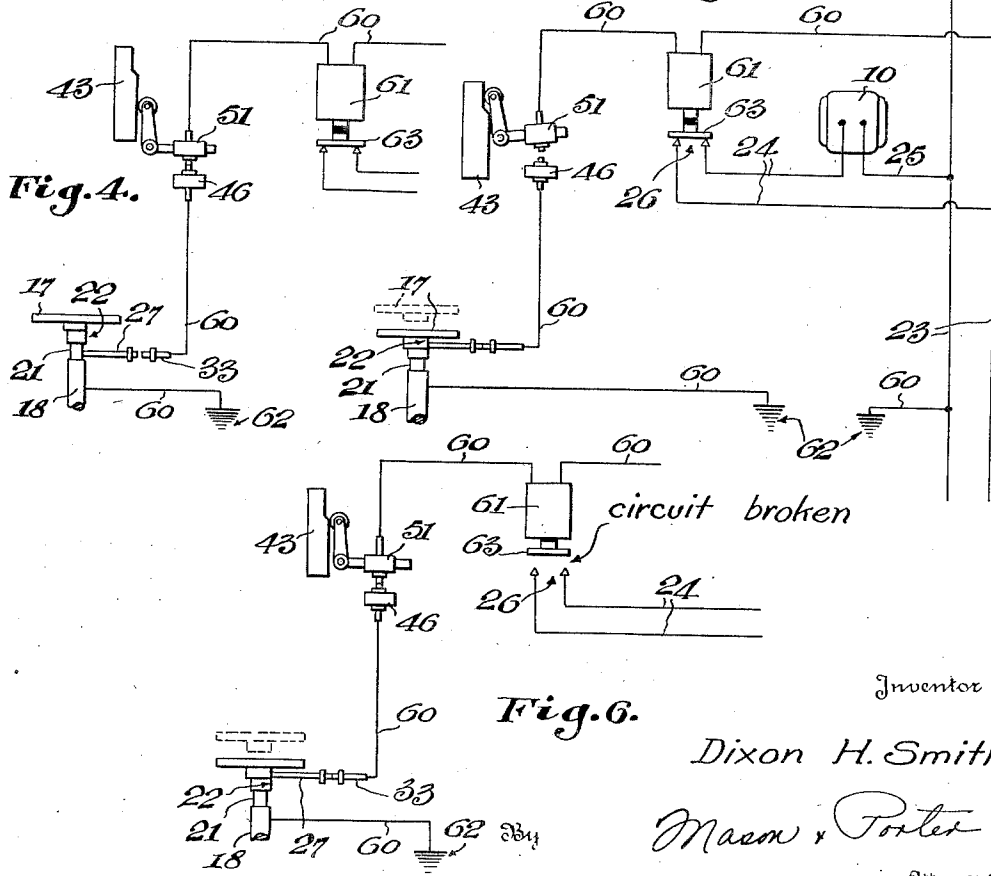


Fig. 5.



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STOP MECHANISM FOR PRESSES

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6 Claims. (Cl. 113—38)

The invention relates generally to presses, or more particularly to presses of the deep drawing type, and primarily seeks to provide a novel safety stop mechanism adapted to automatically stop the press whenever a jamming of parts is likely to occur.

In a press of the character stated, there is provided a reciprocable crosshead, a die block carried by the crosshead, and a draw ring on which a blank to be drawn and shaped is supported and into which said blank is pressed by the block in opposition to a knockout pad which becomes effective upon recession of the block to knock out the drawn end unit or strip it from said ring. Occasionally, in drawing a one piece can or cover, excessive friction set up by the drawn sides of the formed unit against the draw ring causes the pad to stick and fail to eject said formed unit. Obviously, when such a jamming of parts occurs, should another blank be fed into the press and the press continue in its operation, great damage is likely to be the result. My invention seeks to avoid this condition.

In its more detailed nature, the invention resides in the provision of a pair of electrical make and break contact devices or switches connected in series with a power cut off means for discontinuing a press motion likely to cause damage following a jamming of the pad, and respectively associated with the crosshead and the pad whereby one switch is closed when the crosshead is raised and the other when the pad is lowered, the circuit through said switches being completed only when the pad remains abnormally lowered when the crosshead is raised.

With these and other objects in view which will hereinafter appear, the nature of the invention will be more clearly understood by following the description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings,

Figure 1 is a somewhat diagrammatic front elevation and part vertical section illustrating a press embodying the invention.

Figure 2 is an enlarged detail face view of the crosshead actuated switch unit.

Figure 3 is an enlarged fragmentary detail vertical section illustrating the pad actuated switch unit.

Figure 4 is a diagrammatic view illustrating the positions of the switch units when the crosshead and pad are elevated.

Figure 5 is a view similar to Figure 4 illustrating the positions of the switch units when the crosshead and the pad are lowered.

Figure 6 is a view similar to Figure 4 illustrating the positions of the switch units when the crosshead is elevated and the pad is stuck in its lowered position.

In the drawings in which like numerals of reference indicate like parts in all of the figures, I have illustrated the invention applied to a conventional form of press including a base frame 5 having the usual table or bed 6, and a superstructure 7 in which the crank shaft 8 has rotative bearing. The crank shaft is driven by power transmitting connections 9 from a motor 10 and is connected by pitmen 11 with a crosshead 12 reciprocally guided in the superstructure 7. The crosshead 12 carries the usual die block equipment including the plunger 13 and the blank cutting and holding ring 14.

Upon the bed 6 is mounted the usual blank cutting ring 15, the draw ring 16, and the knockout pad 17. The pad 17 is carried by a plunger or stem 18 vertically slidable in a bearing 19 and held in its raised position, shown in Figure 1, by a spring equipment 20.

The stem 18 is provided with a recessed portion 21 and a flattened switch closing face 22. See Figures 1 and 2.

Power input lines are diagrammatically indicated at 23 and these lines are connected by wires 24 and 25 with the motor 10. A cut out switch 26 is connected in either of the lines supplying current to the motor, and it will be obvious that whenever this switch is open, and the motor circuit thus broken, operation of the motor and of the press as a whole will be discontinued. While I have illustrated the invention arranged to discontinue motor operation, it is to be understood that my improved automatic stop control devices are applicable to control the operation of any means movable to perform a function incident to operation of the press, for example, a blank feeding means.

In the practical development of my invention, I provide a switch unit which is pad-actuated, and a switch unit which is crosshead-actuated, the former being closed each time the pad is pressed inwardly or lowered, and the latter being closed each time the crosshead is raised.

The pad-actuated switch unit includes a plunger 27 reciprocable horizontally in and through a bore 28 formed in the bed 6, the inwardly extended end of said plunger extending into the recess 21 with which the pad stem 18 is provided. An abutment head 29 is carried by the plunger 27 and engages the bed wall in a counterbore 30 to determine the position of the

plunger end in the pad stem recess 21. The counterbore is internally threaded to receive an insulating bushing 31 having a bore 32 to slidably receive another contact plunger 33 having an abutment head 34 disposed in a counterbore 35 in said bushing. An insulating washer 36 closes the open end of the counterbore 35 and forms a switch chamber therein. The outer end of the contact plunger 27 projects through the washer into the switch chamber where it is equipped with a breaker point 37 opposed to a similar breaker point 38 carried by the plunger 33. At its outer, exposed end the plunger 33 carries an abutment head 39 and circuit wiring connecting nuts 40. A spring 41 yieldably holds the plunger 33 opposed to the plunger 27, the head 39 determining the normal position of said plunger, and a spring 42 holds the abutment head 29 against the bed wall to position the contact member 27 in the pad stem seat as previously described. The breaker points 37 and 38 are separated whenever the pad is in the raised position shown in Figure 1, and will be brought into circuit making engagement each time the pad is depressed.

The crosshead-actuated switch unit equipment includes an actuating cam member 43 adjustably secured as at 44 to the crosshead so as to be movable therewith. A mounting plate 45 is secured to the press frame superstructure 7 adjacent the path of travel of the crosshead cam member 43 as shown in Figure 1. On said plate there is affixed a contact block 46, of insulating material, which carries a contact member 47 yieldably supported therein as at 48 and equipped with an abutment head 49 determining the position thereof, and circuit wiring connecting means 50. Another contact block 51, of insulating material, is secured upon one arm of a bell crank lever 52 which is pivotally mounted on the plate 45 as at 53. The other arm of the bell crank carries a roller 54 which is engaged by the crosshead cam member 43 to move the block 51 toward the block 46 each time the crosshead is elevated. A spring 55, connected to the plate 45 and to an arm of the bell crank, tends to move the block 51 away from the block 46. The block 51 carries a contact member 56, having provision at 57 for connection with suitable circuit wiring, and a breaker point 58 engageable with a similar breaker point 59 carried by the contact member 47. See Figure 2.

Suitable circuit wiring 60 connects the switch units in series with the power lines 23 through a solenoid 61. The circuit wiring may include frame ground connections 62 if desired, and it will be noted that the pad stem 18, engageable by the contact plunger 27, is included in the circuit connections. See Figures 1 and 4 to 6. A make and break member 63 is movable with the core of the solenoid 61 which is positioned so that each time the solenoid winding is energized the core will be moved to break the motor circuit across the switch 26 as shown in Figure 6.

In Figures 4 and 5 of the drawings, positions of normal operation of the press are shown. In Figure 4 the crosshead is elevated and its associated switch unit 46, 51 is in the closed position. The pad is elevated and its associated switch unit 27, 33 is in the open, circuit breaking position. The motor circuit is closed across the switch 26.

In Figure 5, the crosshead is lowered and its associated switch unit 46, 51 is in the open, circuit breaking position. The pad is depressed or lowered and its associated switch unit 27, 33 is

in the closed position. The motor circuit is closed across the switch 26.

Thus it will be seen that during all normal functions of the press the solenoid energizing or power cut off controlling circuit 60 will be broken by one or the other of the two switch units 46, 51, or 27, 33 as shown in Figures 4 and 5.

It sometimes happens that a formed article will jam in the press due to excessive frictional engagement in the draw ring 16, and the pad will stick in its depressed or lowered position. Obviously, if more blanks are fed to the press and the press is allowed to continue in operation, serious damage will be the result. Under these conditions my improved stop control becomes effective to prevent damage by cutting off the supply of electrical energy as illustrated in Figure 6.

In Figure 6, I have diagrammatically illustrated what happens when the pad 17 jams or sticks in its depressed position. It will be recalled that in this position of the pad the associated switch unit 27, 33 is closed. As the crosshead rises following the stroke which jammed the press and caused the pad to stick, it will close its associated switch unit 46, 51, as shown in Figure 6, and with both switch units closed, the circuit 60 is completed and the solenoid 61 will be energized and the member 63 moved to break the power circuit 24, 25. This power circuit breaking operation can take place only during an abnormal, jammed condition of the press when the pad 17 sticks in its depressed position, holding its associated switch unit closed, and the crosshead rises to its elevated position, closing its associated switch unit, thus completing the power cut off controlling circuit 60 through both switch units.

I claim:

1. In a press, the combination of a reciprocable crosshead, a forming die carried by said crosshead, forming means engageable by said die and including a knockout pad movable inwardly with the die during the forming operation and returnable upon withdrawal of the die to eject the formed article, and means effective upon sticking of said pad to stop operation of the press, said last named means including a switch movable to a circuit closing position when the pad is in its inwardly moved position and a switch movable to a circuit closing position when said cross head is in a die retracted position.

2. In a press, the combination of a reciprocable crosshead, a forming die carried by said crosshead, forming means engageable by said die and including a knockout pad movable inwardly with the die during the forming operation and returnable upon withdrawal of the die to eject the formed article, and means effective upon sticking of said pad to stop operation of the press, said last named means including a pair of switches connected in series in a power stop control circuit one said switch being movable to a circuit closing position when the pad is in its inwardly moved position and the other said switch being movable to a circuit closing position when said crosshead is in a die retracted position.

3. In a press, a crosshead movable between projected and retracted positions, a forming die carried by said crosshead, forming devices engageable by said die and including a knockout pad movable inwardly with the die and returnable upon retraction of said die to eject the formed article, power applying means for driving said crosshead, a control circuit for disabling said

means and including control devices effective only when an inward position of the pad coincides with a retracted condition of said crosshead.

5 4. In a press, a crosshead movable between projected and retracted positions, a forming die carried by said crosshead, forming devices engageable by said die and including a knockout pad movable inwardly with the die and return-
10 able upon retraction of said die to eject the formed article, means for imparting motion to the press, a control circuit for disabling said means and including a pair of switches respectively actuated by movement of said pad and
15 crosshead and cooperatively effective only when an inward position of said pad coincides with a retracted condition of said crosshead.

5. In a press, the combination of two elements reciprocable incident to a pressing operation,
20 power applying means for imparting movement to at least one said element, and control means for said power applying means including two de-

vices actuated by movement of said elements and collectively effective to discontinue operation of the power applying means, said devices being actuated alternately during normal movement of said elements and collectively only when one said
5 element sticks abnormally at its device actuating position whereby power will be cut off whenever such sticking occurs.

6. In a press, the combination of two elements reciprocable incident to a pressing operation, 10 power applying means for imparting movement to at least one said element, and control means for said power applying means including an electrical control circuit and two control switches
15 connected in series in said circuit, and means actuated by movement of said elements for opening one switch and closing the other at each stroke of reciprocation of the elements whereby
20 upon sticking of one element both switches will be closed to energize said control circuit.

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