

March 13, 1945.

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AUTOMATIC CONTROL FOR PUNCH PRESSES

Filed July 23, 1941

2 Sheets-Sheet 1

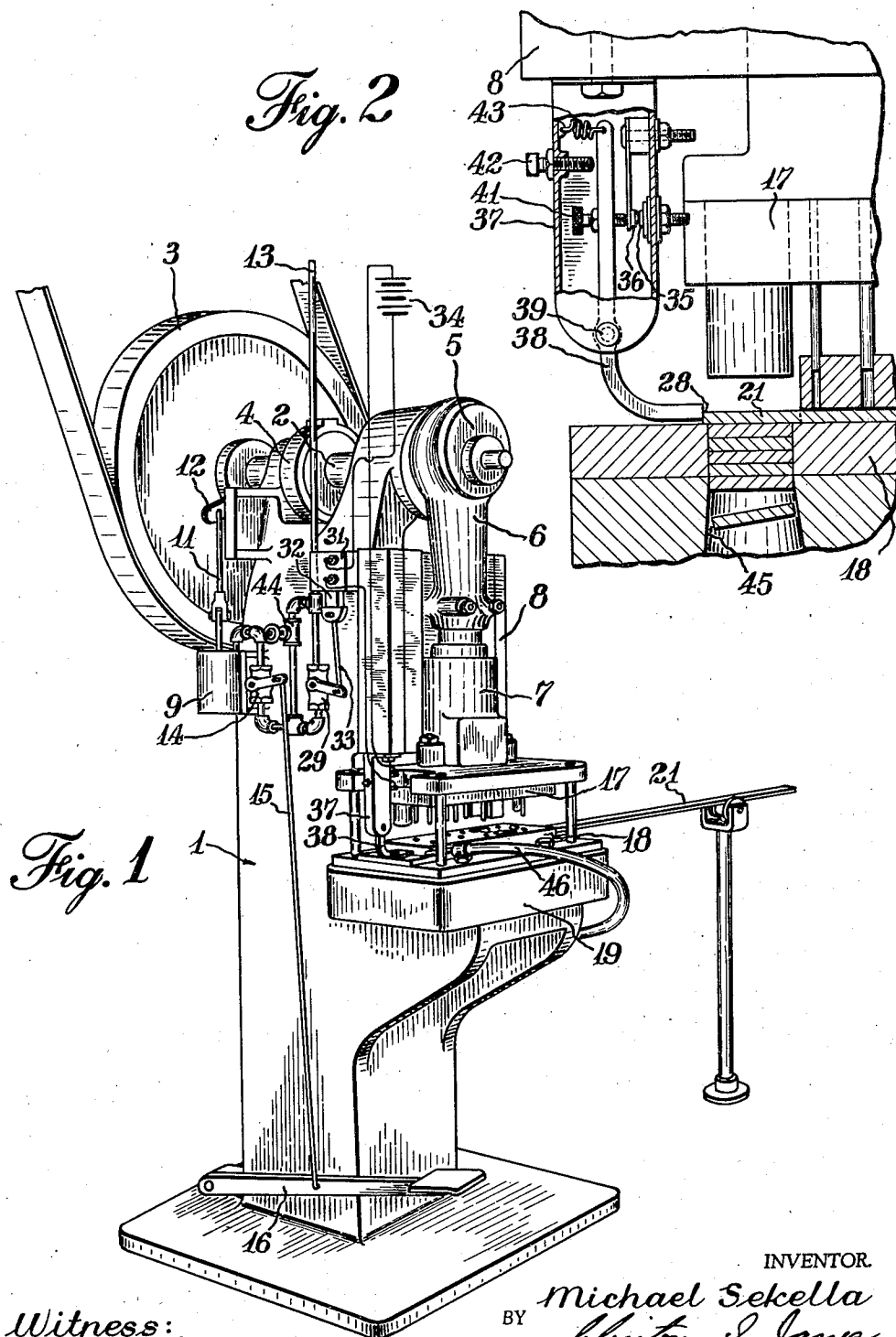


Fig. 1

Fig. 2

Witness:
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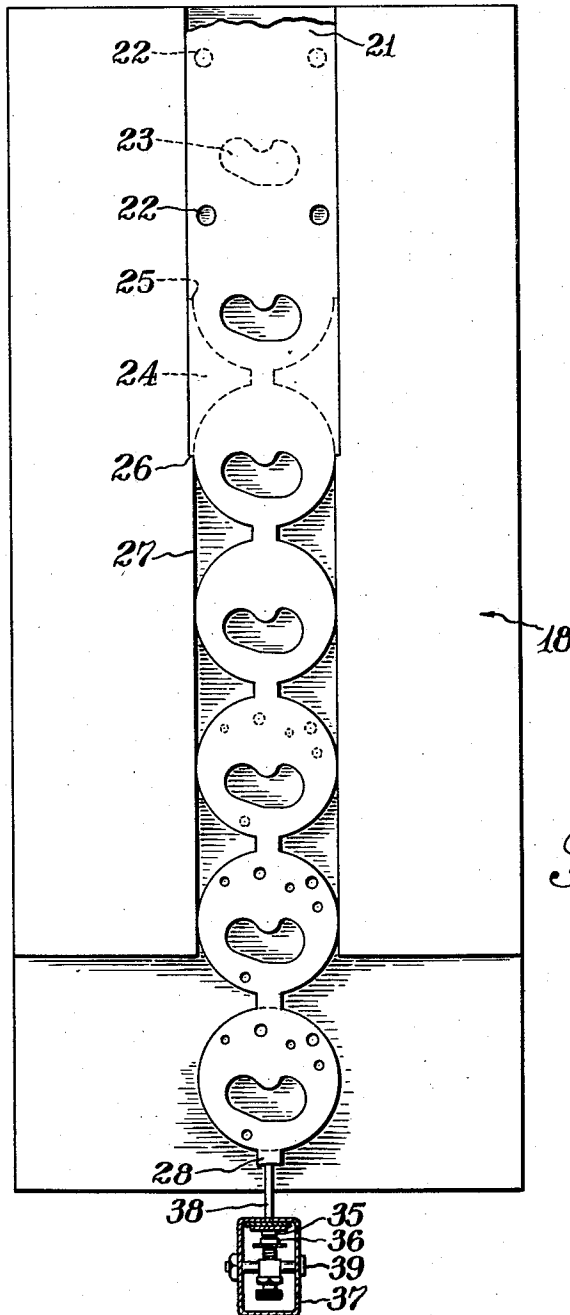


Fig. 3

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UNITED STATES PATENT OFFICE

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AUTOMATIC CONTROL FOR PUNCH PRESSES

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4 Claims. (Cl. 164—21)

The present invention relates to an automatic control for punch presses and more particularly to a device for preventing the operation of a punch press until the work is properly positioned therein.

In the operation of punch presses, particularly where die sets of the multiple stage type are employed, it is essential that the work be accurately positioned prior to the actuation of the ram, since otherwise, the work may be imperfectly formed, and the die may be injured.

Multiple stage dies commonly comprise a complicated structure including a plurality of shearing and forming members, positioning dowels, etc. When strip stock is fed into such a die the stock will occasionally fail to advance completely to the next position after each operation due to interference by chips or other causes, and if the ram is then operated, pilots may be bent or broken, edges of the die may be nicked or distorted, or the die may be warped or otherwise injured.

It is an object of the present invention to provide a novel control for punch presses which prevents the operation of the press except when the work is properly positioned therein.

It is another object to provide such a device in which the work, when in operative position, is arranged to engage a contact actuating device for controlling the trip of the press.

It is a further object to provide such a device in which the automatic trip control is separate and distinct from the manual control but operates in conjunction therewith.

It is another object to provide such a device which is efficient and reliable in operation and readily adaptable to commercial types of press without interference with the normal operation thereof.

Further objects and advantages will be apparent from the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a perspective view of a press employing a preferred embodiment of the invention;

Fig. 2 is an enlarged detail in side elevation partly broken away and in section showing the trip controlling contacts and the actuating means therefor;

Fig. 3 is an enlarged top plan view of a multiple stage die cut away to show the work seated therein, together with the trip controlling contacts actuated thereby.

In Fig. 1 of the drawings there is illustrated a conventional form of power press comprising a frame 1 on which is journaled a horizontal shaft

2 driven from a flywheel 3 by means of a clutch mechanism 4 and having an eccentric 5 adapted to operate a pitman 6 universally connected to a ram 7 slidably mounted on vertical guides 8.

Means for tripping the clutch 4 to operate the press is provided in the form of a fluid actuating means 9 connected by linkage 11 to a clutch lever 12. Fluid such as compressed air is supplied to the actuating means 9 from a conduit 13. A valve 14 for controlling admission of fluid is inserted in the conduit 13 and connected by a linkage 15 to a treadle 16 for actuation by the operator.

A multiple stage die set is arranged to be actuated by the ram 7, said set comprising a punch 17 connected to the ram and a die 18 fixedly mounted on an anvil 19 forming part of the press frame 1. Strip stock 21 is arranged to be fed laterally by the operator into the die 18, the stock being advanced to a new position between each actuation of the punch. In Fig. 3 the various stages in the formation of a disc member from strip stock are illustrated. As will be noted, the original stock 21 is somewhat wider than the diameter of the disc to be formed therefrom. Positioning openings 22 are first formed therein, then the stock is advanced to a position where the openings 22 are engaged by pilots or dowels in the punch, and the irregular shaped opening 23 is formed. In the next operation the boundary members 24 are punched out forming shoulders 25 which at the next operation engage against shoulders 26 formed by the narrowing of the guiding surface 27 of the die. The advancement of the work at each stage is thus limited by the engagement of shoulders 25 and 26. The subsequent operations of straightening, punching further openings in the disc, and shaving the large irregular opening are thereafter performed in turn until the work advances into position for the final operation which consists of a shaving of the entire periphery of the disc and severance of the end projection 28 therefrom. It will be understood that the several operations thereafter are performed simultaneously on successive portions of the work at each operation of the press, the advances of the work between each operation bringing the portions into position for the successive operation. It will be further understood that the lower plate of the die is provided in the conventional manner with openings for receiving the scrap, the edges of the openings being shaped as shown in dotted lines in Fig. 3, and serving to shear the scrap from the stock as the ram descends. This operation as applied

to the completed piece is shown in the sectional portion of the view in Fig. 2.

It will be readily appreciated that any interference with the advance of the work into proper position for the next operation such as might occur by wedging of chips or shavings in the guide-way of the die would be likely to cause serious trouble if the punch were operated. According to the present invention means are provided for insuring against such untimely operation irrespective of the action of the treadle 16 by the operator.

As here shown a second control valve 29 is inserted in the conduit 13 in series with the manually actuated valve 14, and a solenoid 31 is mounted on the press frame 1 and arranged to actuate a plunger 32 connected by linkage 33 to the valve 29. Means for energizing the solenoid 31 when the work is properly positioned in the die is provided in the form of an electrical circuit comprising a source of power 34 and a pair of normally open insulated contacts 35 and 36 (Fig. 2) mounted in a casing 37 fixed to the guide 8 of the punch press.

Means for closing contacts 35, 36 when the work is properly positioned is provided in the form of a lever 38 pivoted at 39 in the casing 37 and having an adjustable abutment member 41 engageable with the contact 36 to close the contacts. Lever 38 is normally held against a back stop 42 by yielding means such as a spring 43. The free end of the lever 38 is bent into position to engage the projection 28 on the end of the work when the work is properly positioned for actuation of the punch, such engagement being arranged to move the lever 38 sufficiently to cause closure of contacts 35, 36 as shown in Fig. 2. A manually operated valve 44 is provided for by-passing the automatic control valve 29 in order to permit manual control of the press during the initial operations of starting a new strip of stock in the press.

In the operation of the press, the work strip 21 is advanced by the operator until the shoulder 25 formed on the work by the previous operation of the press engages the shoulder 26 of the die. At this time the projection 28 on the end of the work engages the free end of the lever 38, causing closure of contacts 35, 36, and consequent actuation of solenoid 31 to open the automatic control valve 29. Depression of the treadle 16 to open valve 14 then causes the clutch 4 to be tripped by the fluid operative device 9, thus causing actuation of the punch in the usual manner, the completed disc being forced through the opening of the die into the escape chute 45 as shown in Fig. 2.

If for any reason the advance of the work strip is prevented, contacts 35, 36 remain open

and the press is maintained inoperative irrespective of the actuation of treadle 16 by the operator. The work strip may thereupon be withdrawn and the obstruction removed by suitable means such as a compressed air jet 46.

Although but one embodiment of the invention has been shown and described in detail, it will be understood that other embodiments are possible and that various changes may be made in the design and arrangement of the parts without departing from the spirit of the invention as defined in the claims appended hereto.

What is claimed is:

1. In a punch press for strip stock a multiple stage die having means for stopping the work in position for successive operations, a punch adapted to cooperate with the die in forming the work, a ram for operating the punch, means for actuating the ram, means preventing the actuation of the ram except when the work is properly positioned for the next operation, said means including means actuated when the work has engaged with the stopping means for controlling the operation of the actuating means.

2. In a punch press for strip stock a multiple stage die for slidably receiving the stock, having means for forming stop shoulders on the stock, means for engaging said shoulders to position the stock for each operation, means producing operation of the press, and means other than the shoulder engaging means, actuated by the final movement of the stock simultaneously with the engagement of said shoulders with the positioning means for rendering said producing means inoperative.

3. In combination with a multiple stage die set comprising a punch and die for progressively forming articles from strip stock, a power press for operating the punch, said die having means for stopping the stock in position for each operation, manual and automatic controlling means for the press so arranged that both controlling means must be operated jointly to actuate the press, electrical means for actuating the automatic controlling means including a pair of contacts and means engaged by the stock in its final movement to operative position for actuating said contacts.

4. In a power press a ram, operating means for the ram including a clutch, fluid trip means for the clutch including a manually operated control valve and a mechanically operated control valve so arranged that operation of both valves is necessary to trip the clutch, an electrical circuit for the mechanically operated valve including a pair of contacts and means to operate said contacts by movement of the work to operative position.

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