March 20, 1928. 1,663,018

C. D. McDONALD

AUTOMATIC DIE PRESS

Original Filed Jan. 20. 1926 2 Sheets-Sheet 1

Fig. 1.

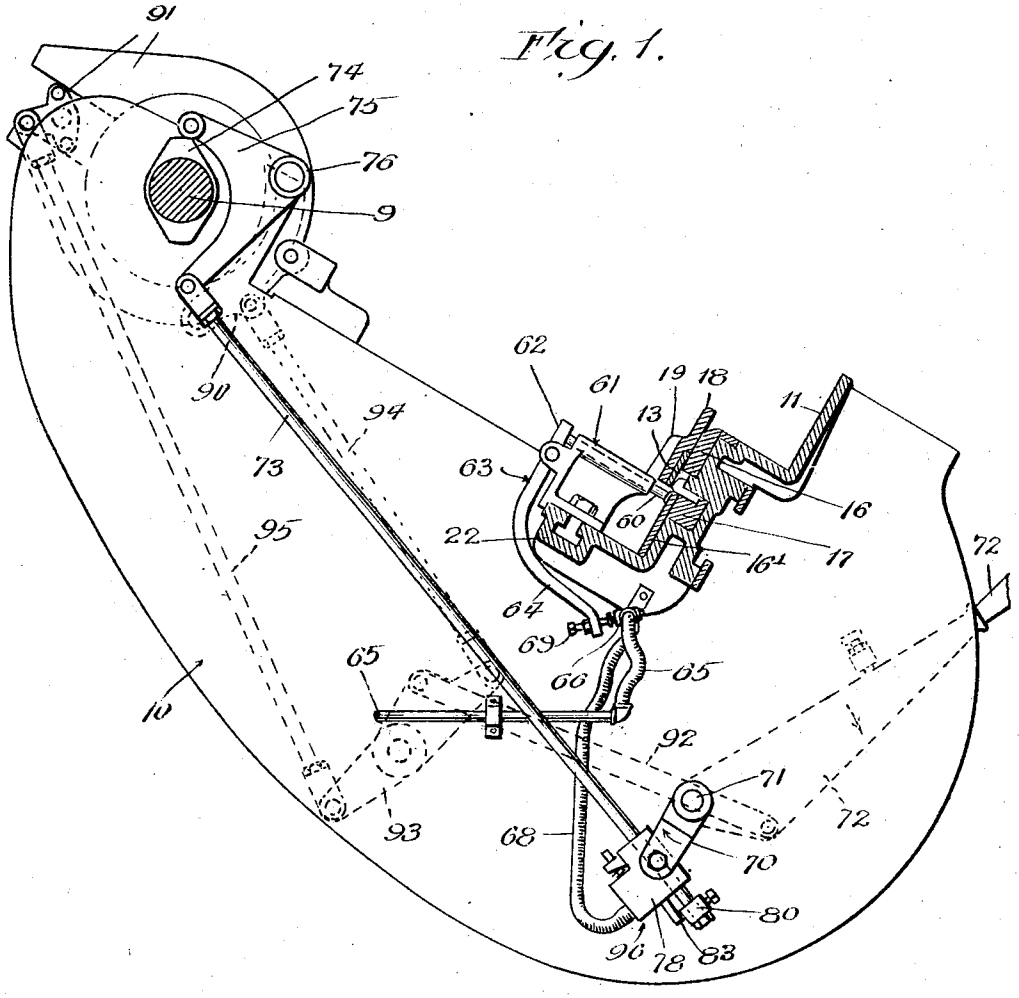

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Fig. 2.

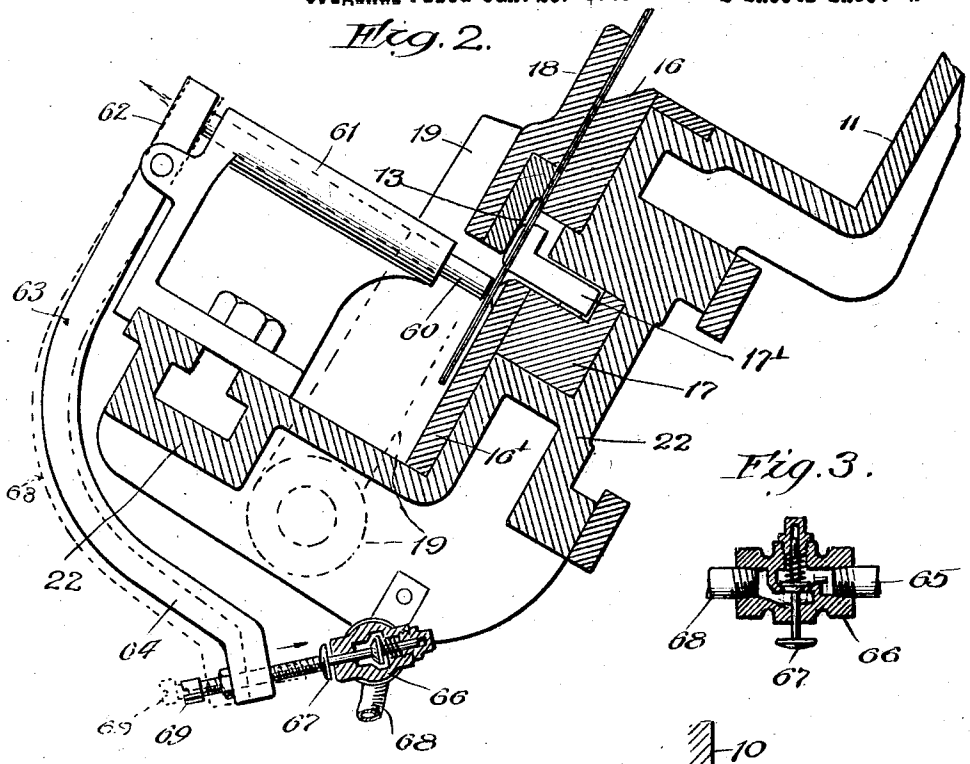


Fig. 3.

Fig. 4.

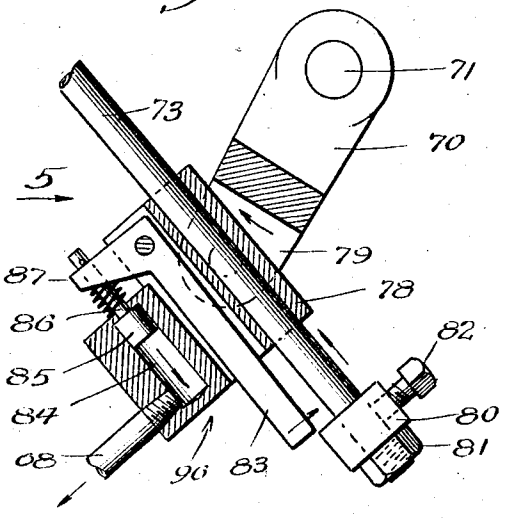
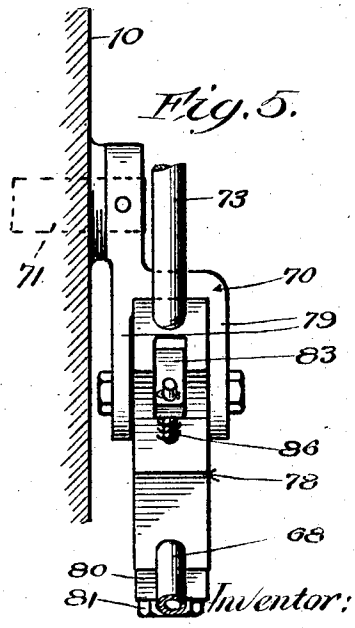


Fig. 5.



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Patented Mar. 20, 1928. 1,663,018

UNITED STATES PATENT OFFICE.

CHARLES D. McDONALD, OF CHICAGO, ILLINOIS, ASSIGNOR TO McDONALD MACHINE CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AUTOMATIC DIE PRESS.

Original application filed January 20, 1926, Serial No. 82,395. Divided and this application filed September 30, 1926. Serial No. 138,626.

This invention relates to automatic die presses, and its principal object is to provide automatic mechanism for stopping the press mechanism in case of abnormal conditions in the feed way for the work. The invention is in the nature of a safety device which may be applied to various types of automatic die presses, but more particularly to that type of press shown and described in my prior Patents No. 1,252,278 dated January 11, 1918, and No. 1,529,031 dated March 10, 1925, to which reference is hereinafter made. The subject matter of this application has been divided out of my pending application for patent on automatic die presses filed January 20, 1926, Serial No. 82,395.

In presses of this type, metal strips are fed, one at a time, from a stack of strips to a feed way, in which the strip is fed forward to the dies, in a step by step fashion, by suitable finger bar mechanism, and sometimes two strips are accidentally inserted into the feed way at the same time, which results in imperfect work. One object of the present invention is to provide automatic press stopping mechanism, which is automatically set in motion when an abnormal number of strips is placed in the feed way. Inasmuch as the metal strips operated upon by the press are very thin, extreme sensitiveness is required of the setting mechanism, for the press stopping mechanism, since it is desired that the press operate continuously while under normal conditions, but that when two strips are accidentally inserted into the feed way, the press stopping mechanism shall be set into operation instantaneously to thereby stop the press immediately after the abnormal condition arises. Another object is to provide mechanism for this purpose which is simple, inexpensive, reliable and not likely to get out of order. With these and other objects and advantages in view, this invention consists in automatic press stopping mechanism, controlled by the presence of an abnormal number of strips in the feed way. The invention further consists in the several novel features hereinafter fully set forth and claimed.

The invention is clearly illustrated in the accompanying drawings, in which:

Fig. 1 is a view partly in side elevation and partly in vertical cross section of an automatic die press of common and well known form, stripped of much of the operating mechanism for the purpose of clarity, and illustrating a simple embodiment of the present invention applied to the press; Fig. 2 is an enlarged detail cross section showing the feed way of the press and certain members of the emergency press stopping mechanism; Fig. 3 is a detail longitudinal section through a valve, which forms part of the vacuum system illustrated, and is employed in the press stopping mechanism; Fig. 4 is a view, partly in side elevation and partly in section, of certain members of the emergency press stopping mechanism and Fig. 5 is an end view of the parts seen in Fig. 4 looking in the direction of Fig. 5.

Referring to said drawings, which illustrate a simple embodiment of the invention applied to an automatic die press of the type illustrated in the above mentioned patents, the reference character 10 designates the press body, 11 the table for holding the metal strips, and 13 the feed way into which metal strips are inserted by suitable strip inserters (not shown). The feed way has a stationary side wall 16, 16^1 and a movable side wall 18, the latter being pivotally secured to the base portion 22 of the table 11 (see Fig. 2) by arms 19, whereby the movable side wall 18 may be swung back to expose the feed way for any purpose. Projecting into the feed way 13 are the fingers 17^1 of the finger bar mechanism and the bar 17 of said finger bar mechanism is reciprocated by mechanism so as to feed the metal strip (with which the fingers engage in succession) in a step by step fashion toward the die mechanism (not shown).

As in the presses of my prior patents there is a crank shaft 9 for actuating the dies, and manually operated press starting and stopping mechanism, consisting briefly of clutch mechanism 90, and brake mechanism 91, and a hand lever 72 fulcrumed on one side of the press body and connected to the clutch and brake mechanism by link mechanism 92, 93, 94, 95 as in my prior patents.

The mechanism thus far described conforms generally to that illustrated in my prior patents and pending application above referred to. The mechanism for automatically stopping the press in case of an ab-

normal condition in the feed way will now be described.

Projecting into the feed way is the setting element of said mechanism. It is here shown as comprising a pin 60 having one end projecting into the feed way 13 and standing in the path of movement of the thin metal strips as they are being inserted into the feed way (see Fig. 2). Said pin 60 is slidably mounted in a bearing bracket 61 supported upon the table portion 22, and engages with one arm 62 of a lever 63 which is shown as fulcrumed upon the bracket 61 to swing in a plane transversely to the feed way. The other arm 64 of the lever 63 is considerably longer than the arm 62, whereby any slight movement of the shorter arm will be multiplied many times in the longer arm 64. This is because the movement imparted to the pin 60 by the thin strip of metal is very slight, and a longer stroke of the long arm is thereby obtained, which in many forms of operating mechanism is required. In its present form the lever 63 is employed to open an air valve 66, of a vacuum line, or an air pressure line, which leads to the cylinder 84 of a suitably constructed connecting device 96, which operates to connect a continuously reciprocating rod 73 with a clutch throwing arm 70 whenever the lever 63 is actuated.

Referring now to Figs. 1 and 2, a vacuum pipe 65 leads from a vacuum pump (not shown), and in case the die press is equipped with a vacuum pump, the pipe may lead therefrom, otherwise it may lead from any other suitable source. In the vacuum pipe 65 is interposed an air valve 66 (see Fig. 3) which is normally closed. The valve 66 is placed in a position in which its valve stem 67 will stand in front of the end of the long arm 64 of the lever 63, in position to be engaged thereby whenever the lever 63 is moved by the pin 60. Whenever the lever 63, is moved by the pin 60, it actuates the valve stem and unseats the valve, thereby permitting the vacuum (present in the vacuum pipe 65 up to the valve) to extend to the clutch throwing arm connecting device 96 and thereby setting it in active position for actuating the clutch throwing arm 70. A vacuum pipe 68 connected to one side of the air valve 66 leads to said connecting device 96. To afford adjustment between the lever 63 and valve stem 67, an adjustment stud 69 (see Fig. 2) is threadedly secured in the end of the arm 64 of the lever 63. This adjustment stud can be adjusted nicely so as to make the action of the lever 63 very sensitive. It is to be understood that the parts are so adjusted that when one metal strip at a time is inserted into the feed way, the lever 63 remains inactive and the air valve remains closed. When, however, two or more strips are fed into the feed way as seen in Fig. 2, the pin 60 is thereby moved endwise to the left, as viewed in Figs. 1 and 2, the long arm of the lever 63 thereby swung to the right, the valve stem depressed and the valve opened. Opening the vacuum line to the connecting device for the clutch throwing arm 70, causes a detent 83, to become interposed between the clutch throwing arm and a continuously moving arm actuating mechanism, whereby said arm is actuated in a direction to operate the clutch mechanism and stop the press mechanism.

The clutch throwing arm 70, is secured upon one end of a rock shaft 71, which in the form of the invention illustrated, extends through the press body and is secured, at its other end, to the clutch throwing lever 72. A continuously moving element, as for instance a reciprocating rod 73 is provided for actuating the clutch throwing arm 70 whenever an abnormal condition arises in the feed way, said rod being normally disengaged from the clutch throwing arm and reciprocating freely with respect thereto. For reciprocating the rod 73 I provide a cam block 74 on the crank shaft 9 of the press, which engages with an arm 75 of a bell crank lever 76, or a roller thereon, the other end of the roller being connected to the rod 73. Obviously, engagement of the rotating cam or cams of the cam block with the arm 75 of the bell crank lever 76 causes reciprocation of the rod 73. Other equivalent means may be substituted for the rod reciprocating means described, as is well understood and I do not wish to be understood as intending to limit myself to the exact form of means shown.

The rod 73 extends down to the clutch throwing arm 70 and passes loosely through a block 78 which is secured to and fulcrumed between the forks 79 of the clutch throwing arm 70. On the lower end of the rod 73 is a shoulder or stop member 80, here shown in the form of a block secured to the rod 73 by a nut 81, threaded on the rod below the shoulder 80, and a set screw 82 threaded in the block 80 and bearing against the rod.

Pivotally supported in a hollow space in the block 78 is a detent 83, normally held out of the path of movement of the shoulder 80, by a spring or otherwise, but arranged to be moved into the path of movement of said shoulder, for engagement therewith, whenever an abnormal condition arises in the feed way. In the form of means shown for actuating the detent 83, a vacuum cylinder 84 is employed, which cylinder may be formed in the block 78, if desired, and in said cylinder is a plunger 85 which is connected to the detent by a stem 86. The detent and cylinder are shown as extending in a direction generally parallel with the rod 73, and the detent is shown as formed with an arm 87, arranged at right angles to the main body

of the detent, and engaging with the stem 86 of the plunger 85. Downward movement of the plunger in the cylinder acts to swing the lower end of the detent to the right (as viewed in Fig. 4) in position for engagement with the shoulder 80, on its up stroke. The vacuum pipe 68 leads from the vacuum cylinder 84 to the air valve 66, as has been heretofore explained. When the air valve is opened, a partial vacuum is created in the cylinder 84, the plunger 85 is drawn down therein, the detent swung into position for engagement with the shoulder 80 on the rod 73, which on its next up stroke, engages the detent, lifts it and therewith the block 78, and swings the clutch throwing arm 70 upward, which turns the rock shaft 71 and swings down the starting lever 72, thereby actuating the clutch and brake mechanism 90, 91 and stopping the press. As soon as the air valve 66 is closed, the vacuum is shut off, the detent moved to normal position and the hand lever is again free to be manipulated to start the press.

In the operation of the press the hand lever 72 is raised to the position shown in Fig. 1 thereby releasing the brake and actuating the clutch, whereby the press mechanism is set in operation. The continued rotation of the crank shaft 9 causes a continuous reciprocation of the rod 73 of the emergency press stopping mechanism, but inasmuch as the detent 83 is held out of the path of the movement of the shoulder, or collar 80 on the rod 73, said collar moves idly past the detent. The strips are fed into the feed way 13 in the usual manner and the emergency press stopping mechanism remains inactive, so far as any stoppage of the press is concerned, so long as only one thickness of the work is fed into the feed way 13. If, however, two thicknesses of the work, that is to say if two strips of metal are accidentally fed into the feed way at the same time, the pin 60 is operatively engaged thereby and is moved lengthwise of itself in the direction of the arrow in Fig. 2 thereby swinging the long end of the lever 63 in the direction of the arrow, and because of its engagement with the stem 67 of the valve 66 it opens the valve thereby establishing communication between the vacuum pump and cylinder 84 of the emergency press stopping mechanism, whereupon the air is exhausted from said cylinder, the plunger 85 moved down therein, thereby moving the detent 83 into the position to be engaged by the shoulder, or collar 80 of the rod 73, which upon its next upstroke engages the detent and moves it and therewith the block 78 and arm 70 in the direction of the arrow in Figs. 1 and 2, and thereby swinging down the hand lever 72, the movement of which in a downward direction operates to set the brake and release the clutch through the instrumentality of the clutch and brake throwing mechanism, whereupon the press mechanism is immediately stopped. As soon as the superfluous strip, or strips are removed, the valve 66 closes, the detent 83, is returned to its normal or inactive position thereby permitting the hand lever 72 to be again raised for the purpose of starting the press. Said upward movement of the lever returns the arm 72 into position to be again engaged by the detent 83 in case a superfluous strip enters the feed way.

More or less variation of the exact details of construction is possible without departing from the spirit of this invention, I desire, therefore, not to limit myself to the exact form of the construction shown and described, but intend, in the following claims, to point out all of the invention disclosed herein.

I claim as new, and desire to secure by Letters Patent:

1. In an automatic die press, the combination with a continuously moving press element, a feed way for the work and clutch and brake throwing mechanism for starting and stopping the press, of normally inactive emergency press stopping mechanism having means for positively actuating a member of the clutch and brake throwing mechanism and positively operated by said moving press element and a movable element extending into said feed way and arranged to set the emergency press stopping mechanism into action whenever operatively engaged by a superfluous metal strip entering said feed way.

2. In an automatic die press, the combination with a continuously moving press element, a feed way for the work and clutch and brake throwing mechanism for starting and stopping the press, of a normally inactive actuating member operatively connected to and moving with said clutch and brake throwing member, normally inactive means operated by said moving press element, and capable of positively actuating said clutch and brake actuating member, and therewith stopping the press, a movable element extending into said feed way and arranged to be operatively engaged by an abnormal number of strips entering said feed way, and operative connections between said element and said actuating member for setting the same in action whenever said movable element is engaged by a superfluous strip entering the feed way.

3. In an automatic die press, the combination with a continuously moving press element, a feed way for the work and clutch and brake throwing mechanism for starting and stopping the press, of a normally inactive arm, operatively connected to and moving with a member of said clutch and brake throwing mechanism, arm actuating

means operated by said moving press element and including a normally inactive connecting member between said arm and arm actuating means, a movable element extending into said feed way and arranged to be operatively engaged by an abnormal number of metal strips entering said feed way, and operative connections between said movable element and said connecting member.

4. In an automatic die press, the combination with a continuously moving press element, a feed way for the work and clutch and brake mechanism for starting and stopping the press, of a normally inactive actuating member operatively connected to and moving with a member of said clutch and brake throwing mechanism, said actuating member being operated by said moving press element and acting to transmit movement from said press element to said clutch and brake mechanism, a movable valve operating element extending into said feed way, an air conducting pipe having a valve therein, operative connections between said valve operating element and valve for opening said valve whenever said element is operatively engaged by a superfluous number of metal strips entering said feed way, and an air operated connecting device interposed between said actuating member and the actuating means therefor, said connecting device being interposed in said air pipe.

5. In an automatic die press, the combination with a continuously moving press element, a feed way for the work and clutch and brake throwing mechanism for starting and stopping the press, of a normally inactive member operatively connected to and moving with a member of said clutch and brake throwing mechanism, means operated by said moving press element for positively actuating said normally inactive member, and including a normally inactive connecting member for actuating said normally inactive member, a vacuum cylinder and a plunger therein connected to said normally inactive connecting member, a movable element extending into said feed way, and arranged to be operatively engaged by a superfluous number of metal strips entering said feed way, a vacuum pipe extending into said vacuum cylinder and having a valve interposed in the vacuum pipe, and operative connections between said movable element and valve for opening said valve whenever said movable element is operatively engaged by a superfluous number of strips entering the feed way.

6. In an automatic die press, the combination with a continuously moving press element, a feed way for the work and manually operated clutch and brake throwing mechanism, including its hand lever, of emergency, press stopping mechanism having actuating means operated by said continuously moving press element, said emergency press stopping mechanism including an arm rigidly connected with said hand lever, and a normally inactive connecting medium between said actuating means and said arm and controlled by a movable member which enters said feed way and is adapted to be operatively engaged by a superfluous strip entering said feed way.

7. In an automatic die press, the combination with a continuously moving press element, a feed way for the work and clutch and brake throwing mechanism for starting and stopping the press, of normally inactive, emergency, press stopping mechanism actuated by said moving press element and having means positively operated by said moving press element for positively actuating a member of the clutch and brake throwing mechanism to therewith stop the press, and actuating means for setting the emergency press stopping mechanism into action and embodying a movable element extending into said feed way and arranged to set the press stopping mechanism into active condition whenever said movable element is engaged by a superfluous strip entering said feed way.

8. In an automatic die press, the combination with a continuously moving press element, a feed way for the work and clutch and brake throwing mechanism for starting and stopping the press, of normally inactive, emergency, press stopping mechanism, having means operated by said continuously moving press element for actuating a member of the clutch and brake throwing mechanism, and means for setting in active position the means which actuates said member of the clutch and brake throwing mechanism, including a movable element extending into said feed way and arranged to be actuated by a superfluous strip entering said feed way, and a lever having relatively long and short arms, the short arm being engaged by said movable element.

9. In an automatic die press, the combination with a continuously moving press element, a feed way for the work, and manually operated clutch and brake throwing mechanism for starting and stopping the press, of emergency press stopping mechanism, having actuating means operated by said continuously moving press element for operating said clutch and brake throwing mechanism and including a normally inactive connecting member between said clutch and brake throwing mechanism and said actuating means, and setting means for setting said connecting member into active position, and embodying a throw amplifying lever which is actuated by a superfluous strip entering the feed way of the press.

10. In an automatic die press, the combination with a continuously moving press

element, a feed way for the work, and manually operated clutch and brake throwing mechanism for starting and stopping the press, of emergency press stopping mechanism, having actuating means operated by said continuously moving press element for operating said clutch and brake throwing mechanism and including a normally inactive connecting member between said clutch and brake throwing mechanism and said actuating means, and setting means for setting said connecting member into active position, and embodying a throw amplifying lever capable of being actuated by a superfluous strip entering the feed way of the press, and operative connections between said lever and said connecting member for setting the latter into active position, when said throw amplifying lever is actuated by a superfluous strip entering the feed way.

11. In an automatic die press, the combination with a continuously moving press element, a feed way for the work, and manually operated clutch and brake throwing mechanism for starting and stopping the press, of emergency press stopping mechanism, having actuating means operated by said continuously moving press element for operating said clutch and brake throwing mechanism and including a normally inactive connecting member between said clutch and brake throwing mechanism and said actuating means, and setting means for setting said connecting member into active position, and embodying a throw amplifying lever capable of being actuated by a superfluous strip entering the feed way of the press, an air line, having an air actuated plunger for operating said connecting member and a valve in said air line arranged to be actuated by said throw amplifying lever.

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