Sept. 14, 1943. E. V. CRANE 2,329,392

DETECTING MEANS FOR PRESSES

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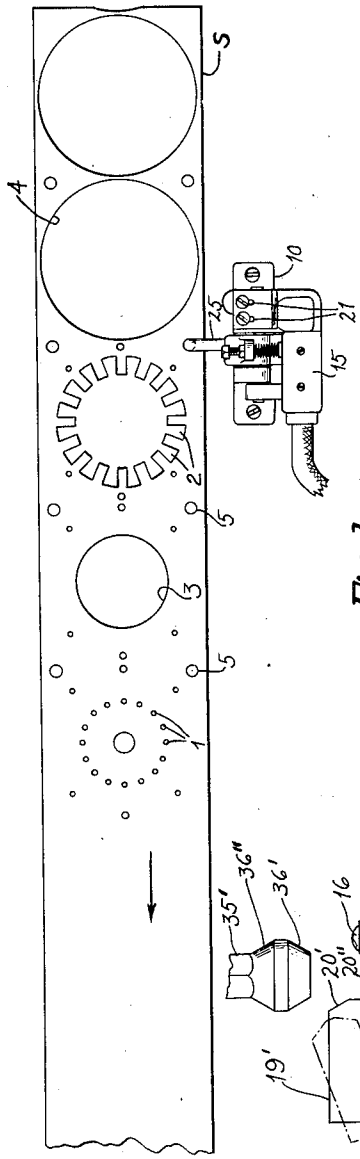


Fig.1.

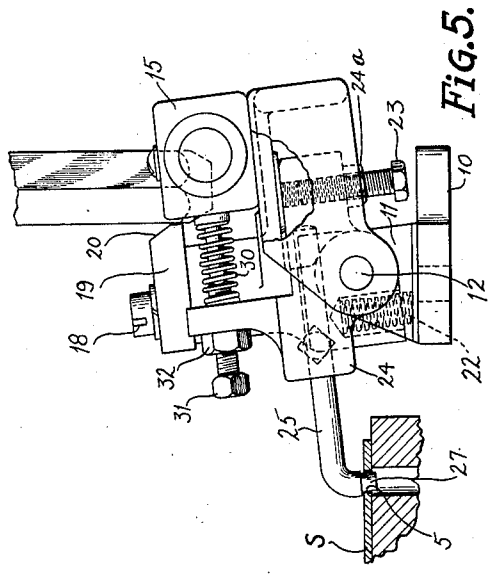


Fig.5.

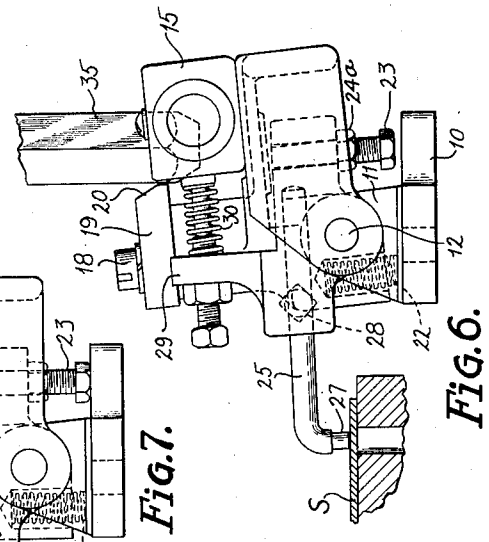


Fig.6.

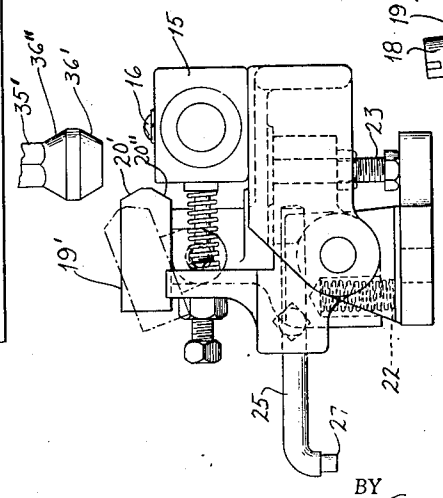


Fig.7.

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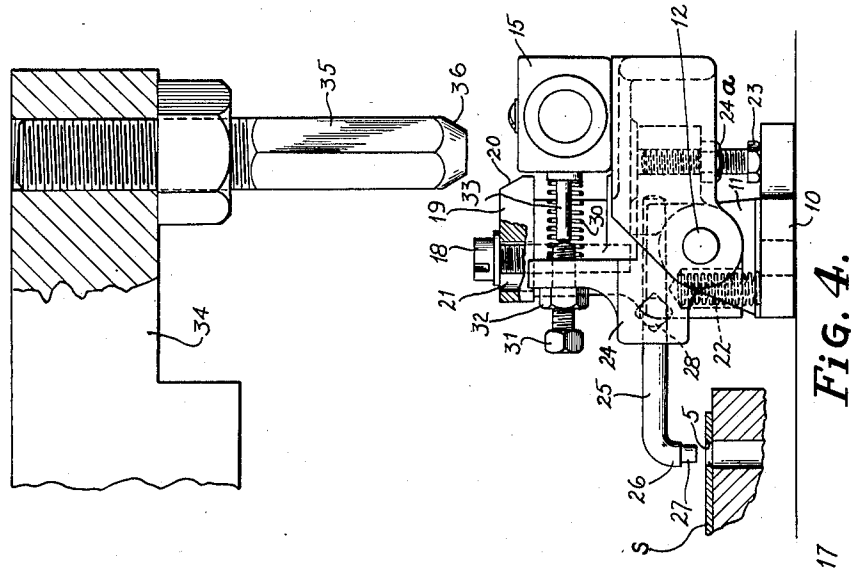


Fig. 4.

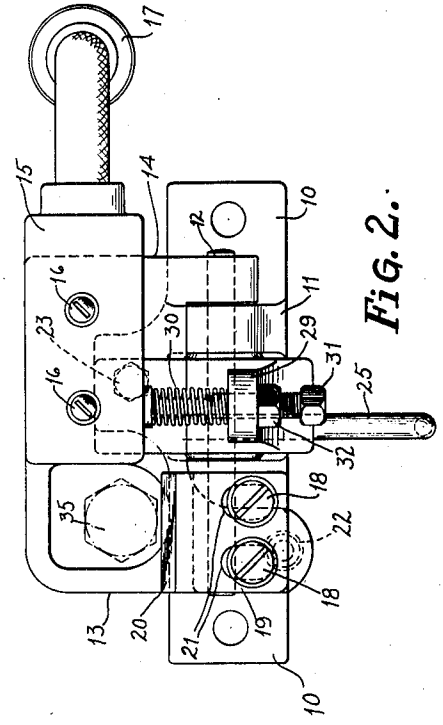


Fig. 2.

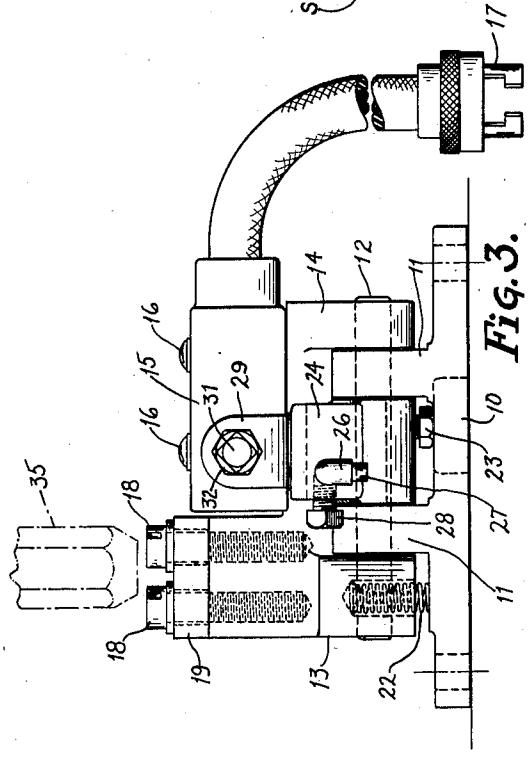


Fig. 3.

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DETECTING MEANS FOR PRESSES

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Application January 7, 1941, Serial No. 373,453

9 Claims. (Cl. 164—20)

This invention relates, as indicated, to detecting means for presses, but has reference more particularly to an electrically operated protective detector for use in connection with presses in which progressive dies are employed.

It is customary in feeding strip to presses for forming by progressive dies, for the operator to visually inspect the strip as it is fed in order to insure that the strip is fed forwardly just the right amount at each step, to prevent damage to the dies or spoilage of elements already acted upon by the dies. At slow speeds of the press, this visual inspection is feasible, but nevertheless is not dependable, since it relies to too great an extent on the human factor or element. In presses used at high speeds manual control is not possible and automatic means of control must be provided.

It has been a primary object of the present invention, therefore, to provide detecting means which will insure accurate feeding of the strip, during high speed operation of the press, and which, therefore, will result in elimination of waste or spoilage of the strip.

A further object of the invention has been to provide a detector which is inexpensive and simple in construction, and which can be readily attached to and removed from a press without disturbing, to any appreciable extent, the press as a whole.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims; the annexed drawings and the following description setting forth in detail certain structure embodying the invention, such disclosed structure constituting, however, but one of various forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a plan view illustrating a metal strip as it passes through a press, in which are incorporated progressive dies, and the detecting means of the present invention associated with said press;

Fig. 2 is an enlarged plan view of the detector;

Fig. 3 is a front elevation of the detector;

Fig. 4 is a side elevation of the detector in its normal condition and showing the means for actuating the detector;

Fig. 5 is a view similar to Fig. 4, but showing the manner in which the detector operates when the strip has been properly fed;

Fig. 6 is a view similar to Fig. 4, but showing the manner in which the detector operates when the strip has been improperly fed; and

Fig. 7 is a view similar to Fig. 4, but showing a modified form of the detector.

The detector comprises a base 10 having a pair of spaced upstanding ears 11 in which is mounted a pin 12. This base is adapted to be mounted on the die shoe or the bolster of the press.

Mounted for pivotal or rocking movement about the pin 12 is a member 13, a portion 14 of which constitutes a platform for a normally open micro-switch 15, secured to such platform as by means of screws 16, and provided with the usual plug connection 17 for a 110 or 220 volt line.

Secured to the member 13, as by means of cap screws 18, is a cam plate 19 having a beveled edge 20 at the rear for a purpose to be presently described. The plate 19 has slots 21 therein through which the screws 18 extend, these slots extending in a direction to permit adjustment of the plate in a forward and rearward direction, so as to change the position of the cam edge 20 in accordance with the location of the detector holes in the strip of metal, which is being punched.

The member 13 is normally in a horizontal position as shown in Fig. 4. It is held in this position by the combined action of a coil spring 22 interposed between the base plate 10 and member 13; the spring tends to bias said member in clockwise direction, but is counteracted by a screw 23 which is secured to member 13 near the other end thereof and is adapted to abut the base plate 10. The major portion of spring 22 is disposed within a socket in the member 13 and is therefore concealed, as well as prevented from shifting laterally. A lock-nut 24a maintains the screw 23 in any adjusted position.

Pivotally mounted on the pin 12 between the ears 11 of the base 10 is a pilot holder 24, preferably made of aluminum, in which is mounted a feeler 25, which projects forwardly from the holder and is provided with a down-turned portion 26, terminating in a finger 27 of reduced diameter. The feeler 25 is adjustable relatively to its holder, and is maintained in adjusted position by means of a set screw 28.

The holder 24 is provided with an upstanding ear 29, between which and the micro-switch 15 is interposed a coil spring 30. Extending through said ear 29, in alignment with said spring 30, is an adjustable contact screw 31, maintained in adjusted position by means of a lock-nut 32.

The shank of this screw is adapted, at times, to actuate the switch-actuating terminal **33** of the micro-switch **15**, which terminal extends into the spring **30**, in axial alignment with the screw **31**.

The micro-switch **15**, as previously stated, is normally open, and is connected to the circuit which operates the press on which the detector is mounted.

Adjustably secured to the punch plate **34** of the press in connection with which the detector is used is a pusher rod **35** having a beveled lower end **36**.

The use of the detector will now be described.

The strip S is intermittently moved through the press so as to be operated upon by means of dies progressively arranged in the press. In one operation, for example (see Fig. 1), the perforations and notches or recesses **2** of two different commutator elements will be punched out. The strip will then be moved sufficiently to bring these parts of the strip into position for operation upon by a second set of dies which punches out a portion of the strip defined by the opening **3**, which portion contains the perforations **1**, and, at the same time, punches out a ring-shaped piece of metal, defined by the opening **4**, which piece of metal has the notches or recesses **2**.

In order to insure that the strip S will be moved the exact distance necessary between the successive operations just described the margin of the strip is provided at spaced intervals with detector openings **5**, the use of which will now be described.

The strip is fed in the direction indicated by the arrow, see Fig. 1, by means of well-known feeding mechanism and the feed is momentarily stopped as the perforations and recesses **2** are punched out of the strip. The strip is then moved forwardly to a position in which the portions of the strip defined by the openings **3** and **4** are punched out, this position being determined by the opening **5**, which, if in proper position, receives the finger **27** of the pilot **25**. As the punch plate **34** descends to punch out the aforesaid portions of the strip, the pusher rod **35** simultaneously descends, and the beveled end **36** of the latter engages the beveled edge **20** of the plate **19**, thereby rocking the member **13** about the pivot pin **12**. At the same time, the micro-switch **15** is rocked in the same direction as the member **13**, and the switch, through the intermediary of the switch finger **33**, screw **31**, and holder **24**, causes the feeler **25** to move downwardly towards the strip S.

If the opening **5** is in the proper position to receive the feeler finger **27**, such finger will enter the said opening, as illustrated in Fig. 5, and the micro-switch circuit will not be disturbed, the press continuing to operate in the normal manner.

If, however, the opening **5** is not in a position to receive the detector feeler **27**, such feeler, as the pilot **25** moves downwardly, will engage the upper surface of the strip S, as shown in Fig. 6, the strip thereby setting up a resistance to further movement of the pilot with the result that the screw **31** remains stationary. The micro-switch will, however, continue to move, resulting in compression of the spring **30** and a sufficient retraction of the switch finger **33** to close the micro-switch, thereby opening the press-operating circuit and stopping the press. It is to be understood that the micro-switch is in the circuit that supplies the electric current to the motor that operates the press. The strip S can then be adjusted to proper position before resetting the micro-switch and starting the press.

It will be apparent from the foregoing description that the use of the detector, in that it checks the feed stroke accuracy of the strip at each press stroke, will permit faster press operation, and will permit speed of the press to be increased without making it necessary or difficult for the operator to determine what is taking place as such speeds are increased.

In that form of the invention shown in Fig. 7, the detector is adapted for use with specially timed feed mechanisms. For instance, if feeding takes place principally on the up-stroke of the press, referred to in the claims as the return stroke, then detection may take place as the feed is completed or during the return stroke of the press. In normal operation feed is completed on the advancing stroke of the press and is followed by the detection operation. For this purpose, the plate **19'** is mounted for pivotal movement, and has two beveled edges **20'** and **20''**, the first of which is adapted to be engaged by the **36'** of the pusher rod **35'**, and the second of which is adapted to be engaged by the edge **36''** of said rod.

As a part of the present invention there is involved a method of detection which is accomplished by forming a shoulder on the strip being fed and then using that shoulder to control the operation of the feeler member. In the present disclosure the hole **5** is first pierced in the strip as it is fed to the press and then that hole **5** is used in conjunction with the feeler **25** to govern the feeding of the press through successive stages.

It will be apparent that the present invention is not confined in its use to presses, but may be used in other mechanisms where a fabricating step of similar nature is performed on a piece of material. It follows from the description that the feeler finger or member may be adjusted to operate at any time in the stroke of the mechanism with which it cooperates, thus providing a latitude in operation hitherto unattainable. Likewise it will be seen that I have provided a simple mechanism for detection which may be readily attached to existing devices, and need not be built therein as an inherent part of the whole.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a mechanism for performing a plurality of successive fabricating operations on a strip of material, a detecting means comprising a switch adapted to control the transmission of an electrical impulse, a shiftably mounted feeler member responsive in movement to the position of said strip with respect thereto to actuate said switch, means operative in timed relation to the operative cycle of said mechanism to actuate said feeler member and means to vary the time of actuation of said feeler to take place at any time in the operative cycle of said mechanism.

2. In a mechanism for performing a plurality of successive fabricating operations in advancing and returning cycles on a strip of material, a detecting means comprising a switch adapted to control the transmission of an electrical impulse, a shiftably mounted feeler member responsive in movement to the position of said strip with respect thereto to actuate said switch, index means

on said strip to engage with said feeler member when the strip is properly positioned, means operative in timed relation to the operative cycle of said mechanism to actuate said feeler member and means to vary the time of actuation of said feeler to take place at any time in the advancing portion of the operative cycle of said mechanism.

3. In a mechanism for performing a plurality of successive fabricating operations in advancing and returning cycles on a strip of material, a detecting means comprising a switch adapted to control the transmission of an electrical impulse, a shiftably mounted feeler member responsive in movement to the position of said strip with respect thereto to actuate said switch, index means on said strip to engage with said feeler member when the strip is properly positioned, means operative in timed relation to the operative cycle of said mechanism to actuate said feeler member and means to vary the time of actuation of said feeler to take place at any time in the returning portion of the operative cycle of said mechanism.

4. In a mechanism for performing a plurality of successive fabricating operations on a strip of material, a detecting means comprising a switch adapted to control the transmission of an electrical impulse, a pivotally mounted feeler member responsive in movement to the position of said strip with respect thereto to actuate said switch, index means on said strip to engage with said feeler member when the strip is properly positioned and means operative in timed relation to the operative cycle of said mechanism to actuate said feeler member.

5. In a press embodying a punch with a reciprocating stroke for performing a plurality of successive fabricating operations on a strip of material and having a ram for driving said punch, a detecting means comprising a switch adapted to control the transmission of an electrical impulse, a shiftably mounted feeler member responsive in movement to the position of said strip with respect thereto to actuate said switch, index means on said strip to engage with said feeler member when the strip is properly positioned, means carried by said ram and operative to actuate said feeler member, a strip engaging finger on said member and mechanism including a wiper cam operatively connecting said member and said punch at a predetermined time in the cycle of operation of said press to impart a motion to said finger shorter than the stroke of said punch.

6. In a mechanism for performing a plurality of successive fabricating operations on a strip of material, a detector comprising a base, a switch-carrying member mounted for pivotal movement relatively to said base, means to actuate said switch-carrying member in timed relation to the operating cycle of said mechanism and means for maintaining said member normally immovable with respect to said base, said means comprising a spring interposed between said base and member at one side of the base, and a screw interposed between said base and member at the other side of said base.

7. In a mechanism for performing a plurality of successive fabricating operations on a strip of material, a detector comprising a base, a switch-carrying member mounted for pivotal movement relatively to said base, said member having a cam plate mounted thereon, and means connected to said mechanism for actuating said cam in timed relation to the operating cycle thereby moving said member toward engagement with said strip.

8. In a mechanism for performing a plurality of successive fabricating operations on a strip of material, a detector comprising a base, a member mounted for pivotal movement with respect to said base, a micro-switch mounted on said member, a second member shiftably mounted for movement relative to said base, but independently of the movement of said first-named member, a feeler secured to said second member, said feeler being capable of engaging with indicia means on said strip when the strip is properly positioned.

9. In a mechanism for performing a plurality of successive fabricating operations on a strip of material, a detector comprising a base, a member mounted for pivotal movement with respect to said base, a cam plate secured to said member, a micro-switch mounted on said member, said switch having a finger projecting therefrom, a second member shiftably mounted for movement with respect to said base but independently of said first-named member, means mounted on said second member and engageable by said finger for actuating said switch, a feeler carried by said second member, said feeler being capable of engaging with indicia means on said strip when the strip is properly positioned.

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