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SAFETY DEVICE FOR CHECKING THE CORRECT POSITION OF STOCK IN A PUNCH AND DIE

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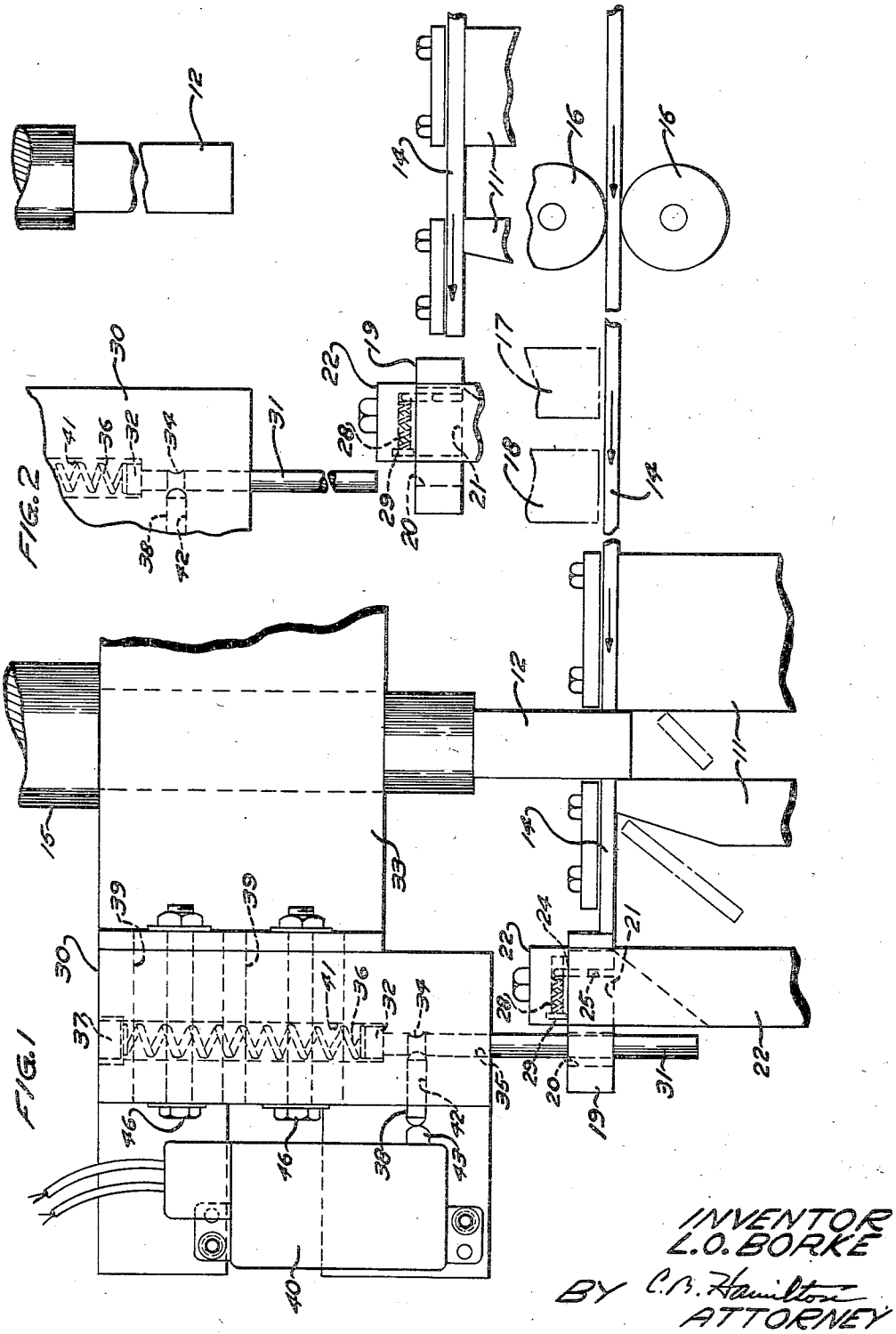



FIG. 2

FIG. 1

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# SAFETY DEVICE FOR CHECKING THE CORRECT POSITION OF STOCK IN A PUNCH AND DIE

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8 Claims. (Cl. 164—59)

This invention relates to safety devices for checking the correct position of stock in work position and more particularly to a detecting apparatus for rendering a machine inoperative when stock to be fabricated is not fed into proper fabricating position.

An object of this invention is to provide an improved detecting control means which insures that an intermittently advanced stock strip is fed into proper position to have work done on it.

Another object of this invention is to provide a device for rendering a machine inoperative if the work is not fed into a predetermined position.

An apparatus illustrating certain features of the invention may include, in a device for cutting portions of a predetermined length off the end of a strip as it is intermittently advanced to a cutting tool, or punch and die, a slidably mounted apertured block positioned in alignment with the strip so as to contact and be displaced from its normal position by the end of the strip as the strip is advanced to the cutting position, said block being urged by a spring in a direction opposite to the direction of advance so as to resist displacement by the end of the strip, a notched rod adapted to be lowered with and in advance of the cutting tool or punch and positioned so as to pass into the aperture in the block if the strip has been advanced to the proper position, and a switch connected by a pin to the notch in the rod so as to be opened to render the cutting machine inoperative if the strip does not displace the block to a point where the rod will enter the aperture in the block.

A complete understanding of the invention may be obtained from the following detailed description of the apparatus forming a specific embodiment thereof, when read in conjunction with the appended drawings, in which

Fig. 1 is a front elevation of the device in position over a properly positioned strip to render the machine operative, and,

Fig. 2 is a fragmentary front elevation.

Referring now in detail to the drawings there is shown a stationary lower die 11 and a movable upper punch 12 positioned to cooperate with each other to shear or cut a portion off the end of a strip of stock 14. A ram 15 of a press is provided to move the upper punch 12 into cooperation with the lower die 11 and to raise the punch 12 after the cutting operation. The strip 14 is advanced by driven feed rolls 16 when the punch 12 is in a raised position.

Various operations may be performed on the stock 14 at stations 17 and 18, since it advances intermittently, each advance being equal to the length of the portion sheared off the end of the strip. Any desired number of stations may be set up, the tools at said stations being raised and lowered with the punch 12.

A feeler member block 19 having a vertical aperture 20 is slidably mounted in the lower portion of an opening 21 in a frame 22 and positioned in alignment with the strip 14 so as to contact and be displaced by the end of



the strip as it is being advanced to the punching or shearing position. An upright pin 24 is fastened in a hole 25 in the feeler member block 19 and projects into the upper portion of the opening 21 in the frame 22. A first compression spring 28 is positioned between a plug 29 and the pin 24 to urge the pin and block 19 toward the end of the strip 14.

A support member 30 for carrying a feeler member rod 31 and a switch 40 is secured by a clamp 33 or other convenient means to the ram 15 in a position above the frame 22 in such a manner as to be raised and lowered with the punch 12, said support member 30 being secured to the clamp 33 by bolts 46 which pass through slots 39 in the support member. By loosening bolts 46 the end of the feeler member rod 31 may be raised or lowered relative to the punch 12 to vary the position of the punch at the time when the rod 31 engages the block 19. The rod 31, being of slightly smaller diameter than the aperture 20 and having an enlarged cylindrical head 32 and a circumferential reentrant notch 34, is slidably supported in a vertical cylindrical hole 35 in the support member 30 in such a position that the rod 31 projects downward from the support member 30 past the punch 12 and, when the punch is lowered, will enter the vertical aperture 20 in the block 19 if the strip 14 has been advanced to the proper work position or will engage the top of the block if the strip has not been advanced to the proper position to be worked on, the placement of the block 19 depending on the position of the end of the stock strip. The upper end of the hole 35 has a counterbored portion 41 for acceptance of the head 32 of the rod 31. In this manner, downward movement of the feeler member rod 31 relative to supporting member 30 is limited by abutment of the head 32 with the lower end of the counterbored portion 41 of the hole 35. A second compression spring 36 is maintained by a plug 37 on any other convenient means in the counterbored portion 41 of the hole 35 above and in engagement with the head 32 of the rod 31 to urge the head toward abutment with the end of the counterbored portion 41 of the hole 35. This structure allows the rod 31 to remain in its lowermost position relative to the support member 30 under normal operation, this rod entering the aperture 20 in the block 19 if the strip 14 has been advanced to the proper work position. If the stock strip has not been advanced to the proper work position, the end of the rod 31 then engages the top surface of the block 19 and is stopped in its downward movement. As the support member 30 continues downward, the rod will be pushed upward relative to the support member to compress the spring 36. The size of the aperture 20 may be increased in relation to the diameter of the rod 31 to allow a greater tolerance in the accuracy with which the end of the strip must be positioned relative to the die 11.

A pin 38 is slidably positioned in a small horizontal bore 42 in the support member 30 which hole intersects the vertical hole 35 at the lowermost position of the notch 34 whereby one end of the pin 38 projects from the support member 30 and the other end of the pin engages the notch 34 when the feeler member rod 31 is in its lowermost or normal position. A limit switch 40 having an actuator 43 is secured to the support member 30 in such a position that the actuator 43 abuts with the projecting end of the pin 38. The limit switch 40 may be connected in any desirable circuit which will render the ram 15 inoperative by the opening of the said switch through operation of the actuator 43.

In operation, the stock strip 14 is advanced into work position in the die 11 by feed rollers 16 or other means, the end of the feeler member strip engaging and dis-

placing the block **19**. After the strip is advanced, the ram **15** is actuated to lower the punch **12** with the support member and its associated control mechanism, the feeler member rod **31** thereof projecting downward a sufficient distance to engage the block **19** before the punch **12** engages the strip **14**. If the strip has been advanced to the proper predetermined work position, the rod **31** enters the aperture **20** and the punch **12** continues downward to cut a portion off the end of the strip. If, however, the stock strip **14** has not been advanced to the proper work position, the lower end of the rod **31** will engage the top of the block **19** and its downward movement be stopped, while the support member **30** continues downward, compressing the spring **36**. Thus, the rod **31** remains stationary while the supporting member **30** and its pin **38** continues downward to force the end of the pin **38** out of the notch **34** to operate the actuator **43** to open the limit switch **40**. The opening of the limit switch stops the press and renders the ram **15** inoperative to prevent the punch **12** from engaging the strip **14**. Thus, the cutting operation does not take place unless the stock strip is advanced to the proper work position in the die **11**. The switch **40** may be used in the same manner to control any operations which are performed at other work fabricating stations **17** and **18**.

It is to be understood that the above described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and the scope thereof.

What is claimed is:

1. In a device with a movable tool for fabricating stock, a protective device for checking the position of the stock comprising a first feeler member engaging said stock and responsive to the position of the stock, a second feeler member carried by the movable tool into cooperation with the first feeler member whereby said second feeler member is responsive to the position of the first feeler member, and means responsive to the said second feeler member for rendering the movable tool inoperative when the stock is not in a fabricating position.

2. In a safety control device for a machine having a reciprocating holder for a tool for fabricating stock moved into a predetermined work position, supporting means secured to and movable with said reciprocating tool holder of the machine, a feeler means mounted on the supporting means, means controlled by the feeler means for rendering the machine inoperative to stop movement of the tool and holder, and means positioned by the stock for operating the feeler means to actuate the controlled means to stop actuation of the machine when the stock is not properly positioned for work by the tool.

3. In a machine having a movable tool for fabricating stock, a detecting means for checking the position of the stock comprising a movable apertured block in abutment with and positioned by the stock which is to be fabricated, a feeler element movable with the tool and positioned to abut with the block or enter the aperture therein, and a switch responsive to the feeler element to render the punch inoperative if the said feeler element abuts with the block.

4. In a safety control device for a machine having a movable tool for fabricating stock moved into a predetermined work position, a displaceable apertured block positioned by the end of the stock to be fabricated, means



for urging the block against the end of the stock, a feeler member carried by the movable tool and positioned to abut with the block if the strip is improperly positioned or to enter the aperture in the block if the strip is properly positioned, and a switch responsive to the position of the feeler member for rendering the cutter inoperative when said feeler member engages the block.

5. In a safety control device for an apparatus having a reciprocating tool for fabricating a strip, a detecting means for checking the position of the strip comprising a feeler member, means for reciprocating the feeler member with the tool, a slidably mounted apertured block in abutment with the end of the strip and positioned by it for engaging the feeler member, and a switch responsive to abutment of the feeler member with the apertured block for rendering inoperative the apparatus.

6. In a protective control device for a machine having a movable tool for fabricating stock, a first feeler element, means for moving the first feeler element with the tool, a second feeler element responsive to the position of the stock to be fabricated, said first feeler element engaging said second feeler element when the stock is not in the proper predetermined work position, and a switch responsive to the first feeler element for rendering the machine inoperative when the first feeler element engages the second feeler element.

7. In a safety control device for an apparatus having a reciprocating cutter for cutting a strip, a detector for checking the position of the strip comprising a rod reciprocated with the cutter, resilient means for urging the rod to a predetermined position relative to the cutter, means for varying the predetermined position of the rod relative to the cutter, a slidably mounted apertured plate abutting with and positioned by the end of the strip for abutment with the rod if the end of the strip is improperly positioned, means for urging the plate against the end of the strip, and a switch responsive to abutment of the rod with the plate.

8. A safety control device for a machine having a reciprocating holder for a tool which fabricates stock moved into a predetermined work position, comprising an apertured plate adapted to be displaced from inoperative position by stock moved into work position, means urging said plate toward its inoperative position, an apertured supporting member carried by the tool holder for reciprocation therewith, a depending notched rod slidably mounted in the aperture in the supporting member and adapted to engage the displaceable plate if the end of the stock is improperly positioned or to enter said aperture in the plate if the stock is properly positioned when the tool is lowered, resilient means for urging the notched rod to a predetermined position in the supporting member, a pin slidably mounted on the supporting member and having one end positioned in the notch in the rod whereby said end of the pin is forced out of the notch if the downwardly moving rod engages the plate, and a switch engaging the pin for rendering the machine inoperative if the rod engages the plate.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 772,113 | Osswald | Oct. 11, 1904 |
| 1,776,256 | Harney | Sept. 23, 1930 |
| 2,507,448 | McLaughlin | May 9, 1950 |
| 2,507,453 | Moore | May 9, 1950 |
| 2,647,580 | Connolly | Aug. 4, 1953 |