Nov. 15, 1949 J. F. KOPCZYNSKI 2,488,205

TOOL

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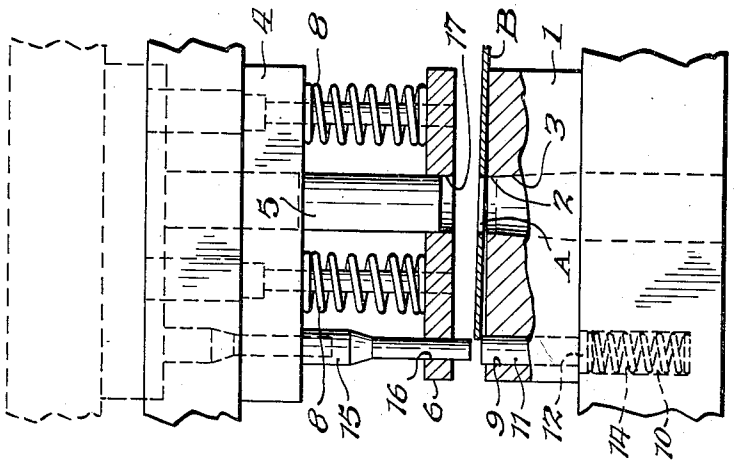


Fig. 3.

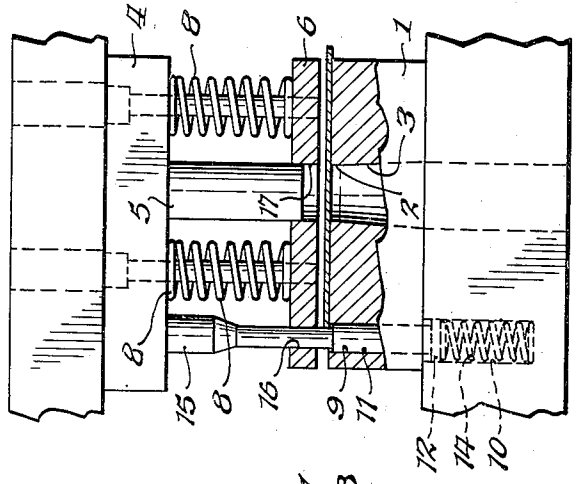


Fig. 2.

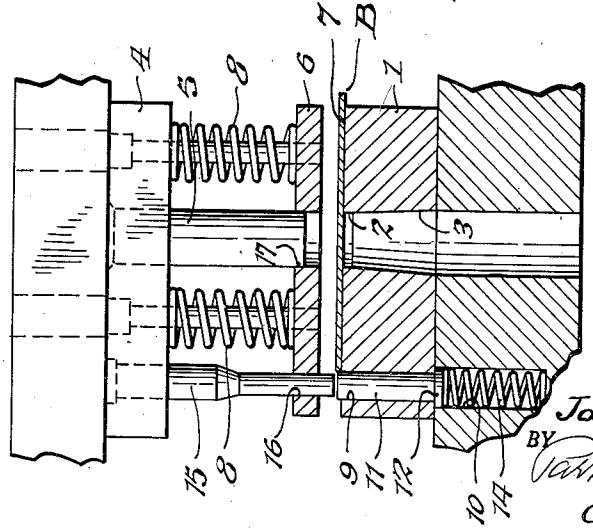


Fig. 1.

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TOOL

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7 Claims. (Cl. 164—59)

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This invention relates to punching apparatus and particularly to apparatus for punching successive apertures in a stock or blank of metal or other material that is fed progressively through punching position.

An object of the invention is to provide an improved and simple stop which will effectively and automatically locate the blank for successive punching operations; which will require a minimum of change in existing constructions in order to obtain this added feature; which will be fully automatic in action and require little or no attention in servicing; and which will be simple, practical and inexpensive.

Other objects and advantages will be apparent from the following description of one embodiment of the invention, and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawing:

Fig. 1 is a sectional elevation of a punch constructed in accordance with this invention, with the parts in an intermediate step in a punching operation;

Fig. 2 is a similar view but with the parts in positions occupied at an intermediate step in the punching operation; and

Fig. 3 is a similar view at the end of the punching operation.

In the illustrated embodiment of the invention, the punching apparatus may be as any suitable or desired construction including a die base 1 mounting a die opening 2 with an enlarged discharge passage 3 extending from the lower end of the opening 2 through which slugs may be discharged. A die head 4 is mounted, as usual in punches, for movement towards and from the base 1 and carries in a depending relation thereto a punch element 5 which is aligned with the die opening 2. A stripper plate or member 6 is disposed above the base 1 either by mounting it on the base 1 in spaced relation to the upper face 7 of the base, or the stripper member 6 may be, as shown, a pressure stripper in which it is carried by the die head 4 and yieldingly urged by springs 8 into the position such as shown, where its movement away from the head is limited by the heads of screws. These pressure strippers are well known in the art and do not need further explanation because it is immaterial to this invention whether or not the stripper member 6 is attached to the base 1 or to the head 4.

A piece of stock or blank B is disposed upon the upper face 7 of the base 1 and fed over the same and over the die opening 2, that is, between

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the die opening 2 and the punch element 5. This invention relates to improved means for stopping this blank or piece of stock B successively in different punching positions. To this end the base 1 is provided with a recess 9 opening through the upper face 7 and having a larger recess 10 below the first mentioned recess 9. A stop pin 11 is slidingly mounted in the recess 9, and at its lower end carries a head 12 which is disposed in the larger recess 10, so that by engagement of head 12 with the shoulder 13, the upward or outward movement of the stop pin 11 may be limited to that shown in Fig. 1. A spring 14 is disposed in the bottom recess 10, and is compressed between that bottom and the head 12 on the lower end of the pin 11, so as to yieldingly urge the stop or pin 11 into its projecting position shown in Fig. 1 where it lies in the path of an advancing edge of the stock B.

Also mounted on the die head 4 is a depressing element or piston 15 which depends parallel to the punch element 5 and in approximate alignment with the pin 11. This piston 15 extends through the stripper member 6 and at its lower end is substantially in advance of the free or lower end of the punching element 5. The lower end of the piston 15 is smaller in cross sectional area than the pin 11, so that when it engages endwise against the pin 11 there will be a shoulder between the lower end of the piston 15 and the top end of the pin 11. The piston 15 may enter the recess 9 and depress the pin 11 a substantial distance, the recess 10 being deep enough to allow a very substantial movement of the pin 11 downwardly in the die base. When the die head 4 is in its normal elevated position as shown in Fig. 3, the piston 15 will be elevated as well as the die element 5, and the pin 11 will be in its upward projecting position where it engages the forward edge of the blank or stock B and limits its movement.

When the die head 4 descends, the piston 15 will engage with the pin 11 and depress it fully into the base 1 a substantial distance before the advancing end of the die element 5 engages the blank or stock B, and before the stripper member 6, if a pressure stripper as shown engages the stock as shown in Fig. 2. The stock or blank B is urged yieldingly and continuously to the left in each of the figures, and therefore as soon as pin 11 is depressed below the surface 7 of the base 1 and before punch element 5 engages stock B, the stock B will be shifted automatically to the left until the forward edge engages against the lower end of the piston 15 which is of smaller

diameter than the pin 11. This will present the forward edge of the blank slightly on top of the outer end face of the pin 11, as shown in Fig. 2, and this position of the stock will be maintained while the die head 4 continues to descend, during which the die element 5 will engage the blank and pierce it, the stripper plate engaging the blank at about the same time or just prior thereto.

It will be understood that the stripper member 6 has an aperture 16 through which the piston 15 reciprocates, and it also has another aperture 17 through which the die element 5 moves. After the blank is pierced and as the die head 4 is elevated to the position shown in Fig. 3, the punch element 5 will first be withdrawn from the blank and during the same upward movement of the die head 4, the piston 15 will gradually release the pin 11. The spring 14 will project the pin 11 upwardly into the normal position shown in Fig. 1, during which it slightly lifts the advance end of the blank B, as shown in Fig. 3.

As soon as the piston 15 leaves the pin 11, the stock B will be immediately shifted to the left, in the drawings, until the aperture A just formed in the stock, (see Fig. 3) moves into alignment with the pin 11. When that happens, the blank or stop B will descend over the pin 11 and an edge of the perforation will engage edgewise of itself against the pin 11 and be stopped for a new punching operation. When the die head 4 again descends, the pin 11 will be depressed and the blank or stock B will be shifted slightly to the left, until it slightly overruns the end face of the pin 11 as shown in Fig. 2, before punch element 5 engages the stock B, and then the operation continues as just described. It will be seen that the pusher 15 and stop pin 11 with their operating mechanism function as cooperating escapement parts or elements and are operated by relative movement of the dies alternately into and out of the path of travel of the blank.

It will be understood that various changes in the details, materials and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention, as expressed in the appended claims.

I claim:

1. An automatic stop for stock in perforation punching apparatus which comprises a die base for mounting a female die, a die head for mounting a male die and movable towards and from said base, a stripper disposed above said base, said base having a recess in its face across which the stock moves, a stop pin slidable endwise in and out of said recess and limited in its outward movement to a position in which it projects slightly beyond said face, means resiliently urging said stop outwardly, a pusher carried by said die head for movement therewith toward and from said base, having an advancing end of lesser cross sectional area than the outer end of said pin and movable into endwise engagement with said pin and into said recess, before the male die engages the stock, whereby an edge of the stock stopped by engagement with said pin is released for forward movement until stopped by said pusher in which it overlies the end of said pin when the pusher depresses said stop pin before the male die engages the stock, and the stock is free to advance across the end of the pin as soon as the pusher leaves the pin.

2. In a punch device of the type having a die base for mounting a female die, a die head movable towards and from said base for mounting a punch element in alignment with said female die, that improvement which comprises said die base having a recess in its face across which the stock is urged edgewise, a stop pin disposed in said recess and yieldingly urged in an outward direction in which its outer end projects into the path of an edge of the stock, but movable well into said recess, and a pusher carried by said head in a position parallel to said punch element for movement therewith, and having its free end in advance of the punching end of said punch element, aligned with said pin and of substantially smaller cross sectional area than that of said pin, whereby said pin, when engaged by an edge of the stock, limits movement of the stock until the pusher depresses the pin below the die base top, and said stock may advance until said edge engages said pusher and slightly overlies the outer end face of said pin before the punch element engages the stock, and when the die head moves away from said base after each punching operation and the pusher element leaves said pin, the stock may move across the end face of the projected pin until another edge of the stock engages against the projecting end of said pin.

3. In a punch device of the type having a die base for mounting a female die, a die head movable towards and from said base for mounting a punch element in alignment with said female die, that improvement which comprises said die base having a recess in its face across which the stock is urged edgewise, a stop pin disposed in said recess and yieldingly urged in an outward direction in which its outer end projects into the path of an edge of the stock but movable well into said recess, a pusher carried by said head in a position parallel to said punch element for movement therewith and having its free end in advance of the punching end of said punch element, aligned with said pin end of substantially smaller cross sectional area than that of said pin, said recess having a shoulder intermediate its outer and inner ends and said pin having a flange engaging said shoulder to limit such outward movement of the pin, and a spring in said recess and resiliently urging said pin outwardly to the extent allowed by engagement of said flange with said shoulder, whereby said pin, when engaged by an edge of the stock, limits movement of the stock until the pusher depresses the pin below the die base top and said stock may advance until said edge engages said pusher and slightly overlies the outer end face of said pin before the punch element engages the stock, and when the die head moves away from said base after each punching operation and the pusher element leaves said pin, the stock may move across the end face of the projected pin until another edge of the stock engages against the projecting end of said pin.

4. An automatic stop for blanks in perforation punching apparatus which comprises a pair of cooperating relatively movable dies between which a blank to be perforated thereby moves step by step, a stop associated with the relatively stationary one of said dies and movable relatively thereto into and out of the path of said blank at one side of the dies, a spring yieldingly urging said stop into said path, a pusher operated with the relatively moving one of said dies into and out of engagement with said stop and into and out of said path to push said stop out

of said path and release it during relative movements of the dies, said pusher and stop having their surfaces which are engaged by the blank offset relatively to each other in the direction of the travel of said blank, whereby relative movements of the stop and pusher will act as an escapement to permit step by step advances of said blank past the dies.

5. An automatic stop for blanks in perforation punching apparatus which comprises a pair of cooperating relatively movable dies between which a blank to be perforated thereby moves step by step, cooperating escapement parts operated by relative movement of said dies in each punching cycle, alternately into and out of the path of travel of said blank between the dies for alternate engagement with edges of successive apertures in the blank to limit advances of the blank, said parts having their surfaces which engage said aperture edges offset in the direction of relative movement of the blank between the dies, whereby the blank will be released for advance movements by the relative movements of the dies.

6. An automatic stop for blanks in perforating mechanism employing relatively moving, cooperating punching dies between which each blank to be perforated moves, step by step, to

cause apertures to be punched in succession in the blank, and cooperating escapement parts operated alternately in opposite directions by relative movement of said dies in punching operations for releasing said blank for controlled, step by step movements between said dies.

7. An automatic stop for blanks in perforating mechanism employing relatively moving, cooperating punching dies between which a blank to be perforated is moved step by step, a stop resiliently urged into the path of movement of the blank to enter perforations therein and limit advancing movement of the blank, and a member operable with the relatively movable die for engaging said stop and operating it out of the path of said blank, and itself movable into said path and into an aperture of the blank to stop advance of said blank to a selected extent following its release by said stop.

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