To all whom it may concern:

Be it known that I, Eugene W. Way, a citizen of the United States, and resident of Seattle, King County, Washington, have invented certain new and useful Improvements in Automatic Stops for Punching Machines, of which the following is a specification.

My invention relates to punching machines, and particularly to an automatic stop therefor.

It is an object of my invention to provide means which will automatically engage the work as it is fed forward, to stop it in position for the next operation and which, during the completion of the succeeding operation, is released from engagement with the work and made ready to reengage the work and to position it for the following operation.

I have shown my invention in association with a punching machine, which in this particular showing employs a pair of punches which reciprocate towards and from a fixed die, the two punches being carried upon a reciprocating tool carrier and the work being fed past the fixed die. In connection with such a machine it is an object of my invention to provide means which can be readily attached to, or formed as part of the fixed die, and which will carry the automatic stop, the said automatic stop being engageable with a previously punched hole in the work as it is fed forward, and the tool carrier having attached thereto a finger or like member which during the working stroke of the tool carrier will release the stop. In this connection it is an object of my invention, also, to provide such means which are readily attached to or removed from common forms of punching machines, and which may be attached to machines now built and in use.

A further object is to save the operation of such an automatic stop, that it is certain in operation, so that it will not permit advance of the materials prior to proper operation of the punch and die, but which will release the stop preferably prior to disengagement of the die and punch, so that it is ready to reengage the work immediately it is advanced. In this connection it should be noted that it is an object to provide means for adjusting such an automatic stop that the work will be exactly and properly positioned, and so that the several steps will be completed in proper sequence.

My invention comprises the novel parts and combinations thereof as shown in the accompanying drawings, described in this specification, and particularly defined by the claims terminating the same.

In the accompanying drawings I have shown my invention in a form which is now preferred by me, and in association with parts of a common form of punching machine.

Figure 1 is a side elevation, parts being broken away and shown in section, illustrating the normal operative position of the automatic stop.

Figure 2 is a like view showing the punch and die in engagement and the stop released.

Figure 3 is a plan view, substantially along the line 3-3 of Figure 1.

My invention is intended for operation particularly upon punching machines or power presses such as embody a reciprocable tool carrier, as 90, movable toward and from a bed 91 upon which is secured a die 92. The tool carrier 90 has secured thereon punches or like devices 9 which cooperate with recesses 93 in the die 92 to work upon a piece of material which is fed between the punches and the die. In the form shown the punches 9 perforate the strip of material W which is fed through a work guide 94. It is immaterial to the operation of my invention whether the work be fed by automatic means or by hand, although generally my device would be employed with punching machines requiring hand feeding.

In such machines considerable time is consumed between each operation in properly positioning the work for the next operation. My invention is designed to engage the work as it is advanced and automatically to stop it in proper position, thus permitting continuous operation of the machine. For this purpose means are provided to engage the work as it is advanced, and preferably these means engage at the forward end of a previous perforation in the strip of work W.

The work-engaging means comprises a dog 1 in the form of a lever pivoted at one end and having its other end adapted to rest upon the upper surface of the die 92 in the path of movement of the work. The
pivot pin 10 for the dog 1 is engaged in a suitable support 2, this support having a slot 21, extending in the direction of movement of the work W, for receiving the pivot pin 10, whereby the dog 1 is permitted to move longitudinally of the direction of movement of the work.

Suitable means are provided for holding the dog in its normal position in the path of the work, such means, as shown, comprising a spring 3 interposed between the support 2 and an upstanding arm 11 of the dog 1. This spring may be guided by a rod 31 secured to the arm 11 and reciprocable in the support 2. By means of this spring the work-engaging end of the dog 1 is held down upon the upper surface of the die 92 in a position to intercept the work in its advance, and the dog likewise is urged, though yieldingly, in the direction from which the work advances. Separate yieldable means for accomplishing these two results might be employed. Engagement of the dog 1 with the advancing edge w of a previous perforation will cause the dog to be bodily retracted against the spring 3, and by reason of the pin and slot connection 10, 21. Such retraction, however, does not disengage the dog and the edge w.

Disengagement of the dog from the work is accomplished through movement of the tool carrier 90, and any suitable means for accomplishing this object may be employed. It is necessary so to time the release of the dog that it will not disengage the work prior to secure engagement of the punches 9 therewith, but preferably it should be left free to reengage the work prior to disengagement of the punches from the work. This I have found can best be accomplished by means of a finger 4 which is secured in a suitable bracket 40, the bracket being detachably secured at one side of the tool carrier 90. The finger 4 may be made to directly engage the dog 1 to release it, but preferably, in order to insure greater accuracy, and in order to quickly move the dog, this finger engages a trip lever 5 fixedly pivoted at 50 between its two ends. One end 54 of the trip lever is positioned to be engaged by the downwardly pointed finger 4 and the other end is provided with a ledge 51 which engages beneath the dog 1 to raise it. The trip lever 5 is made double for strength. The dog is slidable over the ledge 51 of the trip lever.

As the position of the dog 1 when retracted governs the position of the work relative to the die apertures 93, and as the position of the dog is controlled by the position of the slot 21 carried by the support 2, it is desirable that the support should be adjustable in the direction of movement of the work. I have therefore shown it as slidable along a guide 22, movement thereof being effected, at least in one direction, by a screw 23. The trip lever 5, however, is preferably not adjustable but is positioned immediately beneath the finger 4. The length of the finger 4 may, however, be adjustable in order to properly time its engagement with the trip lever, an adjusting nut 42 being employed for the purpose.

In the normal operation of the punching machine the tool carrier 90 may be made to reciprocate continuously past the die apertures but the work must be held momentarily while it is being perforated or otherwise operated upon. The dog 1, being normally urged downward by the spring 3, engages the advancing edge of a previous perforation and prevents further advance of the work, the dog during this operation being retracted until its pivot pin 10 is at the end of the slot 21 farthest removed from the direction from which the work is fed (at the right, as seen in Figure 1). As the tool carrier moves downward the finger 4 secured thereto finally contacts with the end 54 of the trip lever. Preferably prior to this, however, the punches 9 have perforated the strip of work W and have entered the die apertures 93, as is shown in Figure 2. The work is thus securely held by the engagement of the punches and die apertures, but immediately the ledge 51 of the trip lever is raised the dog 1 is likewise raised, and through the action of the spring 3 is moved bodily forward until its work-engaging tip is beyond the forward face w of the perforation with which it has been engaged. As the tool carrier 90 is retracted the finger 4 is likewise retracted and the dog 1 is permitted to rest upon the top of the work W. Immediately the punches and dies are free of each other the feeding pressure, from the left in the drawings, will cause the work W to advance. Pressure of the spring 3, however, serves to force the dog 1 downward and this, as soon as it reaches the perforation which has just been made, enters the same and again engages the advancing edge thereof to stop the work in proper position.

The device preferably operates from above, although it might be made in such a way as to operate from below. If operated from below it would have the disadvantage of engaging a surface which is somewhat burred from the punch, and therefore it is preferable to engage the dog with the upper surface of the work, which surface is always clean and free of burrs. By means of the screw 23, or like members, the position of the work relative to the die apertures 93 may be very accurately determined, while by proper adjustment of the finger 4 the time of release of the dog 1 may be accurately fixed. Timing of such a device is of considerable importance, for the dog must hold the work until the punch
is well engaged therewith, yet the dog must then be disengaged and ready to reengage the work prior to release of the punch from

5  What I claim as my invention is:

1. An automatic stop for punching machines comprising a dog normally positioned to engage a previously punched hole, supporting means for said dog permitting its movement towards and from the work and bodily in the direction of movement thereof, means operable upon formation of a new hole to move said dog from engagement with the previously punched hole, and means operable upon release of the dog from the previously punched hole to advance it therebeyond, said first means being operable thereafter and prior to withdrawal of the tool from the work to release the dog to permit it to resume its normal position upon advance of the work.

2. An automatic stop for punching machines comprising a dog normally engageable with a previously punched hole, a support, said dog being pivotally connected to said support and said pivot connection permitting bodily movement of the dog in the direction of movement of the work, a spring tending to maintain said dog in normal position for engaging the work and advanced towards the work, said spring being yieldable to permit retraction of the dog in the direction of and when engaged by the work, and means movable with the tool carriage for pivotally swinging said dog from engagement with the previously punched hole, said spring being operable thereupon to advance said dog beyond such previously punched hole.

3. An automatic stop for punching machines comprising a dog, a support therefor, said dog and its support having a pin and slot connection permitting bodily movement of the dog in the direction of movement of the work, a spring tending to maintain said dog in position to engage a previously punched hole in the work and advanced towards the work, said dog when in operative position being retracted by pressure of the work, and means operable upon the working stroke of the tool carrier to swing said dog upward upon its pivot to disengage it from a previously punched hole and to permit its advance beyond such hole under the influence of said spring.

4. An automatic stop for punching machines comprising a dog, a support therefor, one end of said dog and its support having a pin and slot connection permitting bodily movement of the dog in the direction of movement of the work, a spring yieldably urging said dog forward towards the work and downward into the path thereof, a trip lever engaging said dog between its ends to raise it, and means timed with the tool carrier and operable upon its working stroke to raise said dog, thereby to release it from the work and to permit advance thereof.

5. An automatic stop for punching machines, which include a fixed die and a moveable punch, comprising a dog, a support therefor, said dog and its support having a pin and slot connection permitting bodily movement of the dog in the direction of movement of the work, yieldable means urging said dog forward towards the work and downward into the path thereof, means timed with the tool carrier and operable upon its working stroke to raise said dog, thereby to release it from the work and to permit advance thereof, and means for adjusting said support in the direction of movement of the work.

6. An automatic stop for punching machines comprising a support, a dog connected thereto by a pin and slot connection permitting bodily movement of the dog in the direction of movement of the work, a spring yieldably urging said dog forward towards the work and downward into the path thereof, a trip lever pivoted upon said support and engaging beneath said dog to raise it, and a finger fixed to the tool carrier and engageable with said trip lever on its downward stroke to release said dog from engagement with the work and to permit its advance thereafter prior to its reengagement with the work.

Signed at Seattle, King County, Washington, this 8th day of August, 1924.

EUGENE W. WAY.