Aug. 3, 1943. H. E. VAN NESS ET AL 2,326,106

AUTOMATIC CUT-OFF AND SWAGING MACHINE TOOL

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Fig. 1

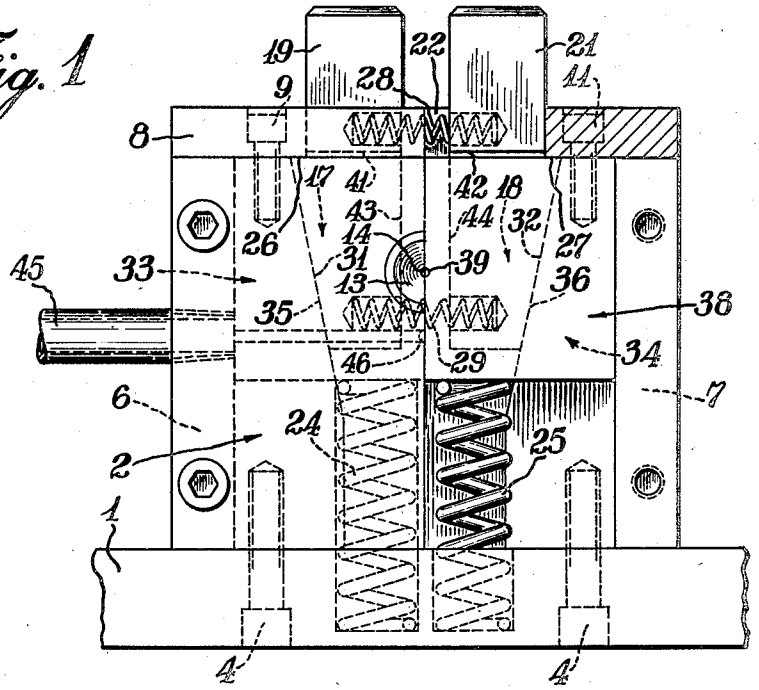


Fig. 2

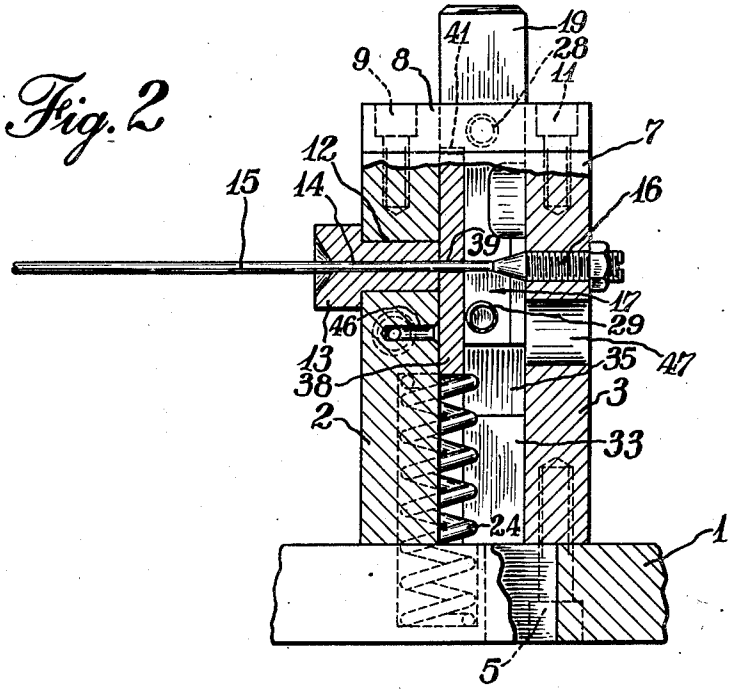


Fig. 6



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Fig. 3

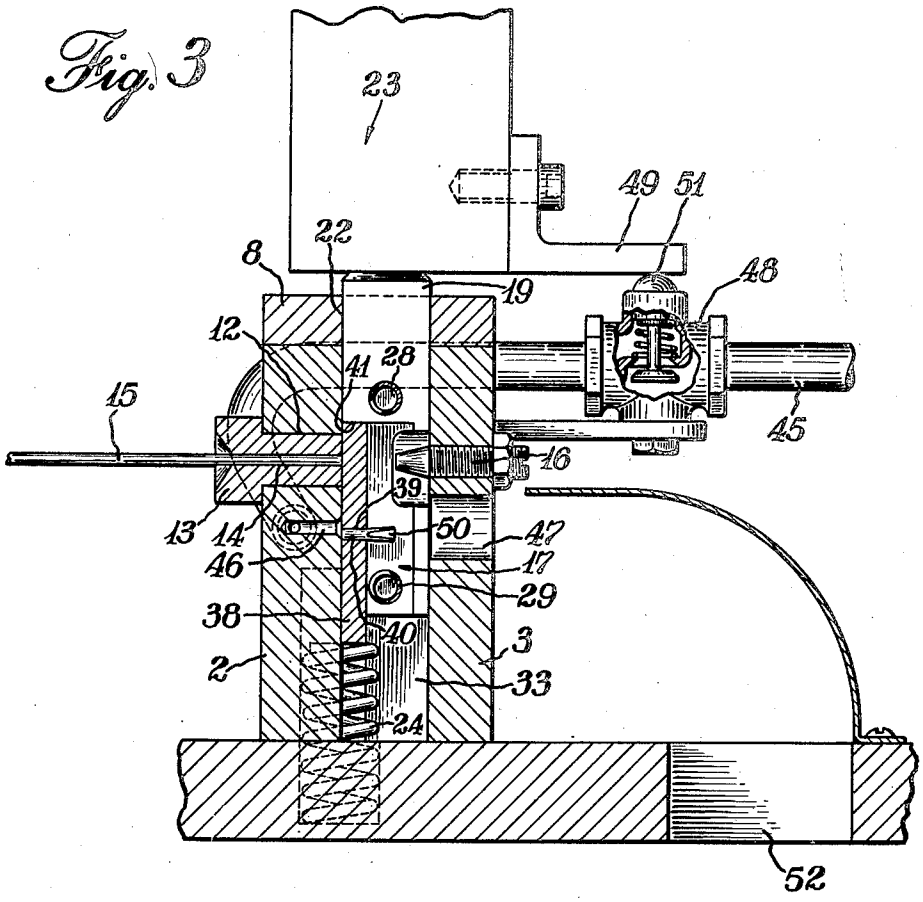
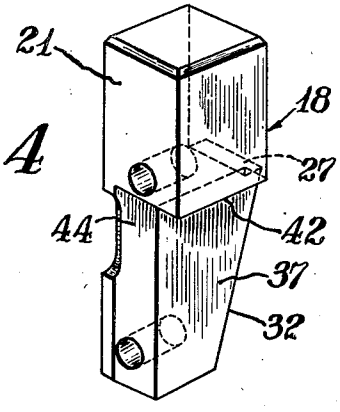


Fig. 4



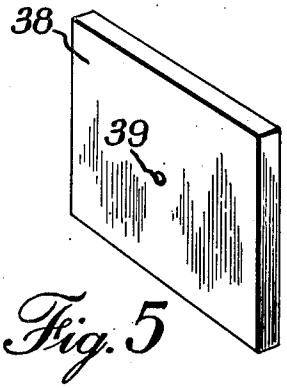


Fig. 5

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2,326,106

AUTOMATIC CUTOFF AND SWAGING MACHINE TOOL

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Application September 17, 1942, Serial No. 458,754

5 Claims. (Cl. 78—17)

The present invention relates to an automatic cut-off and swaging machine tool, and more particularly to a tool to be operated by a punch press for cutting pins from wire stock and flattening one end of each pin in a single operation of the press.

It is an object of the present invention to provide a novel machine tool of the above type which is efficient in operation, simple in construction and easily assembled and adjusted.

It is another object to provide such a device which is arranged to perform the two operations by means of a simple form of cut-off and swaging die.

It is a further object to provide such a device in which the die is a unitary structure that does not have to be lined up with the ram of the press.

It is another object to provide such a device in which the cut-off tool is seated in the swaging jaws and reciprocates vertically therewith.

It is another object to provide such a device including means for readily adjusting the length of the pin produced.

It is another object to provide such a device including a simple and efficient means for removing the formed pin during the initial part of the return stroke of the ram.

Further objects and advantages will be apparent from the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a front elevation of an automatic die constituting a preferred embodiment of the invention, parts being broken away and shown in section for the sake of clarity;

Fig. 2 is a side elevation of the same, also partly broken away and in section, the parts being illustrated in normal or idle position;

Fig. 3 is a view similar to Fig. 2 showing the parts in the positions assumed at the end of the power stroke of the ram;

Fig. 4 is a detail in perspective of one of the swaging jaws;

Fig. 5 is a detail in perspective of the cut-off die, and

Fig. 6 is a detail in perspective of a pin as cut off and formed by the automatic die.

In Figs. 1 and 2 of the drawings there is illustrated a die holder including a base 1, a front plate 2 and a back plate 3 fixed thereon by suitable means such as cap screws 4, 5, a pair of end plates 6, 7 fixed to the front and back plates in any suitable manner and a top plate 8 fixed to the front and back plates by means of cap screws 9, 11.

The front upright plate 2 is provided with an opening 12 in which is mounted a bushing 13 drilled as shown at 14 to slidably receive the stock 15 from which the pins are to be formed. The back plate 3 is provided with an adjustable abutment 16 in alignment with the opening 14 in bushing 13, this abutment thereby determining the length of stock which may project within the die beyond the bushing 13.

A pair of jaw members 17, 18 are slidably mounted between the upright plates 2, 3, and have portions 19, 21 extending upward through an opening 22 in the top plate 8 in position to be engaged by the ram 23 of the punch press (Fig. 3) in which the die is to be used. These jaw members are normally maintained in their upper position as shown in Fig. 1 by means of springs 24, 25, this upper position being defined by the engagement of shoulders 26, 27 on said jaws with the under surface of the top plate 8. The jaws are normally held apart by means of springs 28, 29 which are seated in mating recesses in said jaws so as to permit the jaws to be brought together.

The portions of the jaws within the body of the die are provided with oppositely inclined surfaces 31, 32 and cam members 33, 34 having correspondingly inclined surfaces 35, 36, are mounted in the die holder and so arranged that downward movement of the jaw members 17, 18 will cause them to be cammed together.

The portions of the jaws within the die frame are reduced in thickness as shown at 37 in Fig. 4, forming shoulders 41, 42 thereon, and a cut-off die in the form of a plate 38 is mounted to slide vertically in the die holder and to seat against said shoulders. The plate 38 is provided with an aperture 39 which aligns with the opening 14 in bushing 13 when the parts are in idle position so as to permit passage of the work therethrough. Springs 24, 25 bear on the lower edge of the plate 38, pressing it against the shoulders 41, 42 of jaws 17, 18 to thereby yieldingly hold the parts of the die in idle position.

The thickness of the reduced portions 37 of jaws 17, 18 and of the plate 38 are such that said plate bears snugly against the inner surface of the front plate 2. The inner end of the bushing 13 is flush with said surface, so that when the plate 38 moves down the work is sheared off flush with the end of the bushing as shown in Fig. 3.

The swaging operation is performed on the pin

by compressing the projecting portion of the pin between the adjacent surfaces of swaging jaws 17, 18 as the downward movement of the jaws brings them together due to the action of cams 33, 34.

The adjacent surfaces 43, 44 of the interior portions of the jaws are bevelled slightly as best shown in Fig. 4 so that when the work is compressed therebetween it will be progressively flattened so as to assume a tapered form as shown in Fig. 6.

According to the present invention means are provided for removing the work from the die during the initial part of the return movement of the jaw members. As here shown this is accomplished by conducting compressed air from a conduit 45 (Fig. 3) to a nozzle 46 in the front plate 2, which is adapted to align with the opening 39 in the cut-off die plate 38 when the jaws have moved upward from their lowermost position sufficiently to release the work. An opening 47 is formed in the rear plate 3 to permit the ejection of the work by the air jet into a suitable receptacle 52. In order to conserve air pressure, a valve 48 is preferably inserted in the air line 45, and a bracket 49 placed on the ram 23 in position to engage the plunger 51 of the valve and open the valve as the ram approaches its lowermost position.

In operation, a length of stock 15 is inserted in the die when the parts are in idle position as shown in Fig. 2 and a moderate longitudinal pressure maintained thereon by any suitable means. The work is thus caused to traverse the opening 39 in the cut-off die 38 and pass between the swaging jaws 17, 18 until it engages the end of the abutment 16. Operation of the ram causes the jaw members 17, 18 to move down, carrying with them the cut-off die 38 which shears off a pin 40 from the stock. Further downward movement of the jaws causes them to be brought together so as to compress the end of the pin therebetween as shown at 50 in Fig. 3.

As the ram 23 approaches the lower end of its stroke, the bracket 49 engages the plunger 51 of the air valve 48, thus supplying compressed air to the nozzle 46. As the ram starts back up, the springs 24, 25 raise the cut-off die 38 and jaws 17, 18 bringing the pin 40 into alignment with the nozzle 46 at the same time that the jaws are separated by springs 28, 29 so as to release the pin. The jet of air proceeding from the nozzle 46 then projects the pin out of the cut-off die 38 through opening 47 into the receiving hopper 52. Inasmuch as the cut-off die has a continuous bearing engagement on the front plate 2 in order to perform its intended function, it is obvious that it also acts as a slide valve, preventing the escape of air from the nozzle 46 except when the opening 39 is in registry therewith.

When the opening 39 of the cut-off die 38 comes once more into alignment with the opening 14 in bushing 13, the work is again advanced into engagement with the abutment 16 in preparation for the subsequent operation.

It will be seen that there is here provided a unitary tool for measuring, cutting off, swaging and ejecting the work automatically with each stroke of the press, and that this tool requires no lining up of the ram, or other adaptation of the press except the attachment of the bracket 49 to the ram for actuating the ejector air valve.

Although but one embodiment of the invention has been shown and described in detail, it will be understood that other embodiments are possible and various changes may be made in the design and arrangement of the parts without departing from the spirit of the invention as defined in the claims appended hereto.

What is claimed is:

1. In a tool for cutting and swaging pins, a die holder, a cut-off die slidably mounted therein, a stop for positioning the work in the die, a pair of jaws mounted in the holder to slide with the cut-off die straddling the work and having a compressive cam connection with the holder, and a ram engaging the jaws to simultaneously actuate the cut-off die and close the jaws.

2. A combined cut-off and swaging die assembly including a holder, a cut-off die slidably mounted therein, a stop for positioning the work in the die, a pair of swaging jaws mounted in the holder to slide with the cut-off die and having a cam connection with the holder, abutment means defining the idle position of the jaws, and yielding means including a spring acting on the cut-off die to return the parts to idle position.

3. A cut-off and swaging die assembly as set forth in claim 2, including further, means for ejecting the finished work as soon as it is released by the jaws.

4. A combined cut-off and swaging die assembly as set forth in claim 2 including further, means providing a jet of compressed air for blowing the work out of the die, a ram for actuating the die, and valve means for the jet controlled by said ram.

5. In a pin-forming machine a die holder having a work-receiving opening and an inner flat face, a cut-off die slidably mounted in the holder having a cooperating flat face and a work-receiving opening normally aligned with that of the holder, a pair of jaw members having recesses for receiving the cut-off die slidably mounted in the holder and having a cam connection therewith for controlling the opening of the jaws, stop means for limiting the projection of the work through the die and between the jaw members, and means for moving the die and jaw members simultaneously to shear off the work and flatten the end thereof which projects between the jaw members.

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