June 30, 1942. I. A. WILLIAMS 2,288,308

PUNCH AND DIE

Filed April 7, 1941

Fig. 1

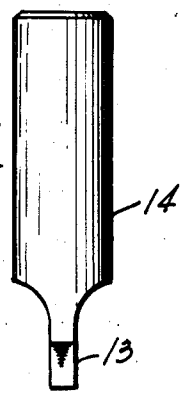


Fig. 2

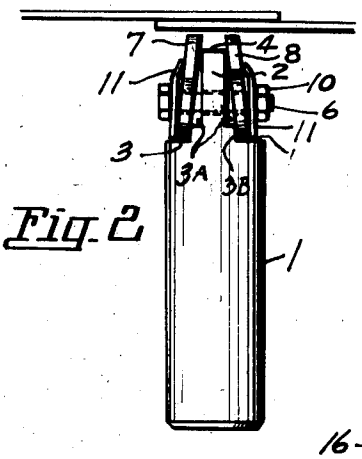


Fig. 3



Fig. 4

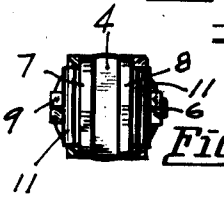


Fig. 5

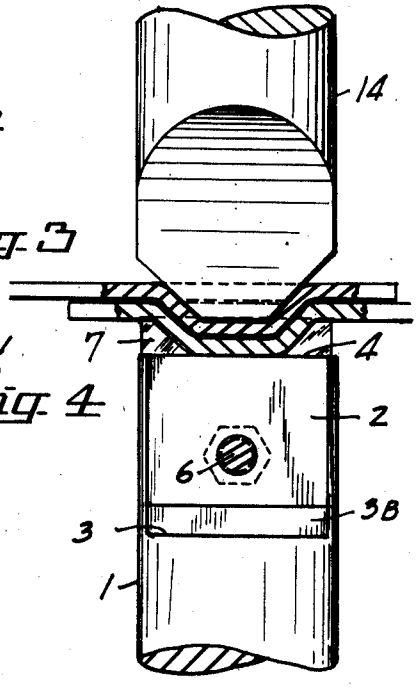


Fig. 6

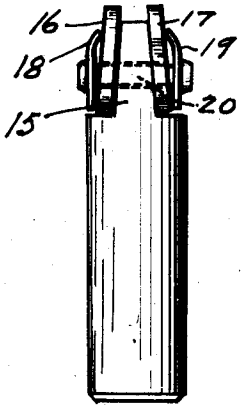
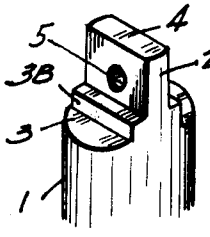


Fig. 7



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PUNCH AND DIE

Ivan A. Williams, Portland, Oreg.

Application April 7, 1941, Serial No. 387,182

6 Claims. (Cl. 78—1)

This invention relates to improvements in punches and dies for producing the type of metal fastening elements shown and described in my co-pending application, Serial No. 234,210, filed October 10, 1938.

As therein pointed out, the means for uniting the pieces of metal or material together is formed by advancing a punch through the material to produce a number of incisions, in most cases, preferably only two incisions. The metal between the incisions is, simultaneously with the punching operation, displaced to a plane beneath the lowermost surface of the bottom piece of metal, and by further advancement of the punch, is spread laterally to engage beneath the lowermost surface of the bottom piece of material.

In order to spread the displaced metal laterally with respect to the die or the incisions, it is necessary to move or spread the walls of the die to compensate for the lateral expansion of the material. Accordingly, it is one of the principal objects of the present invention to provide a die with two yieldingly mounted and expansive elements which are normally spaced apart a predetermined distance to form incisions of the proper width, then to spread the die elements apart sufficiently to accommodate the expansion of the metal to a width greater than the distance between the incisions so that the displaced and expanded material may engage beneath the lowermost edges of the incisions.

These and other objects will appear as my invention is more fully hereinafter described in the following specification illustrated in the accompanying drawing, and finally pointed out in the appended claims.

In the drawing:

Figure 1 is a side elevation of a punch.

Figure 2 is a side elevation of a die yieldingly mounted to an anvil.

Figure 3 is a bottom plan view of Figure 1.

Figure 4 is a top plan view of Figure 2.

Figure 5 is an enlarged front elevation of the punch, die and material shown in Figures 1 and 2, after the punch and die have come together and formed incisions through the material and have forced and expanded the material between the incisions against the anvil of the die.

Figure 6 is a modified form of die and anvil.

Figure 7 is a fragmentary perspective detail view of the anvil.

Referring now more particularly to the drawing:

In Figure 2, reference numeral 1 indicates generally a die formed at its upper end with a projection 2 having a shouldered portion 3 to render the base of the projection wider than its top and to also provide spaces 3A to enable dirt, scale, and the like, to work out from between the die members. The upper end of the projection constitutes an anvil 4. The projection 2 is apertured, as at 5, to receive a bolt 6. The die consisting of two halves, 7 and 8, is yieldingly attached to both sides of the projection 2 by means of the bolt 6 and its head 9 and nut 10. Spring plates 11 are interposed between the head and nut of the bolt and the two halves, 7 and 8, of the die. In small sizes of dies, made in accordance with my invention, I may prefer to use rivets, instead of bolts, to attach the two die members, 7 and 8, to the projection 2. When rivets are used, the spring plates, of course, would be interposed between the heads of the rivet and the die members; or, in some cases, I may prefer to use a shaft with cotter pins at either or both ends with the spring plates interposed between the pins and the elements of the die. Instead of spring plates, I may also prefer to use spring washers.

Normally, the two halves, 7 and 8, of the die are held firmly, but yieldingly against the projection 2. Both halves, 7 and 8, are firmly seated against the shouldered portion 12 of the body 1; and the die elements, it will be noted, converge upwardly therefrom into contact with the outer edges of the anvil 4 and in contact with the tapering surfaces 3B extending from the shoulders 3 down to the shoulder 12. It is to be understood, of course, that I do not wish to limit myself to the tapering shouldered portions, since I may choose to arrange them vertically, if so desired or necessary. The body of the die is securely anchored or supported in suitable punch and die equipment. When the two halves, 7 and 8, are normally bearing against the projection 2, the distance between them is no greater than the width of the punching end 13 of the punch, generally indicated at 14. The width of the punching end 13 determines the width of the fastening element it produces.

Between the punch and the die, I have shown fragments of two pieces of metal or material in position to have formed therein a fastening element produced by my punch and die and to be joined together thereby. With reference to Figure 5, it will be seen that as the punch comes down, it forms the incisions, and presses the two pieces of material against the halves, 7 and 8, where they will be securely held by the downward pressure of the punch. Further downward

movement of the punch, will shear through both pieces of the material as the punch advances into the space between the two halves, **7** and **8**, of the die. The metal between the incisions, thus displaced by the punch, is forced downwardly against the anvil and spread laterally with respect thereto. This spreading of the metal between the incisions forces the metal outwardly to a distance greater than that between the incisions, and the result is that the displaced and laterally expanded metal engages beneath the edges of the incisions in the lower piece of metal. Accordingly, it is necessary that the portions, **7** and **8**, of the die be adapted to yield outwardly from the anvil to accommodate the laterally spread and displaced metal between the incisions.

In the modified form of die, shown in Figure 6, the projection **15** is tapered on both sides throughout its length to provide converging surfaces for the halves, **16** and **17**, of the die.

The spring plates, **18** and **19**, may be held in place by either a shaft **20**, riveted at both ends, as shown, or by means of a bolt and nut, as in the other form.

While I have shown a particular form of embodiment of my invention, I am aware that many minor changes therein will readily suggest themselves to others skilled in the art without departing from the spirit and scope of the invention. Having thus described the invention, what I claim as new and desire to protect by Letters Patent is:

1. A composite tool comprising a punch and die for forming fastening elements through pieces of material to be joined together, said punch being provided with cutting edges at one of its ends, said die comprising a plurality of yieldable members having cutting edges spaced apart a distance substantially equal to the distance between the cutting edges of the punch.

2. A composite tool comprising a punch and a yieldable die supported upon an anvil, said punch adapted to form incisions through material placed upon the die and adapted to advance the material between the incisions downwardly against the anvil and to expand the same against the yielding members of the die.

3. A die comprising an anvil, a plurality of die forming members yieldingly mounted to the anvil and adapted to yield laterally to the expansion of material compressed against the anvil and between said die forming members.

4. A die comprising a main body member reduced in thickness at one of its ends and terminating in an anvil, a pair of die forming elements converging upwardly with respect to the anvil and yieldingly mounted thereto.

5. A die comprising a main body member reduced in thickness at one of its ends into an anvil, said anvil being wider at its bottom than at its top, a pair of die forming members converging upwardly with respect to the anvil and yieldingly and adjustably mounted thereto.

6. A composite tool comprising a punch and a yieldable die supported upon an anvil, said die comprising a main body member terminating in an anvil at one of its ends, a plurality of yieldingly mounted die members converging upwardly with respect to the anvil and having their outermost ends spaced apart a distance equal to the width of the punch, whereby upon advancement of the punch through the material being dealt with to form incisions therein and the advancing of the material between the incisions and the lateral spreading of the same against the anvil, said die members will yield outwardly to accommodate the spreading of the material.

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