May 16, 1944. C. L. BEARD 2,348,875

PUNCH AND DIE

Filed June 11, 1943

FIG. 1.

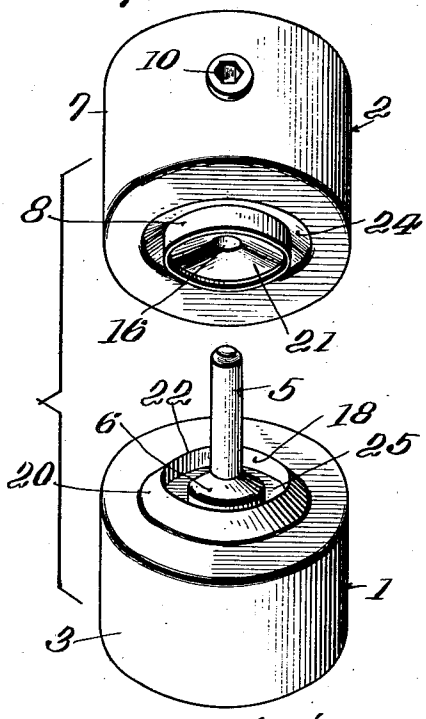


FIG. 2.

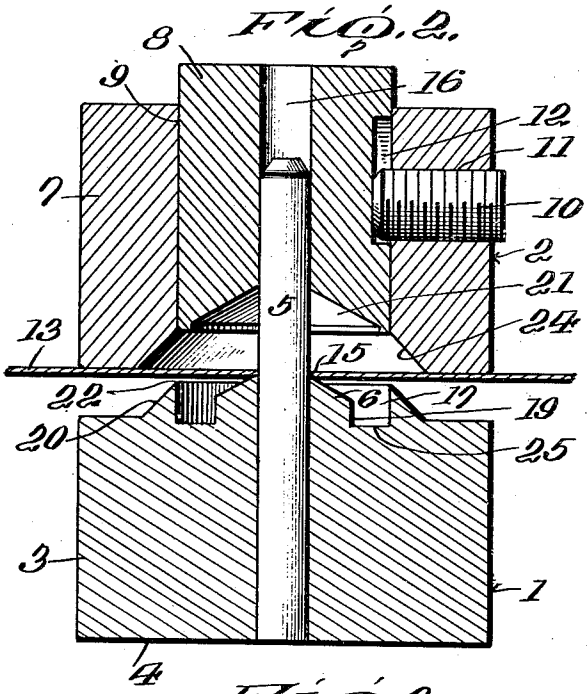


FIG. 3.

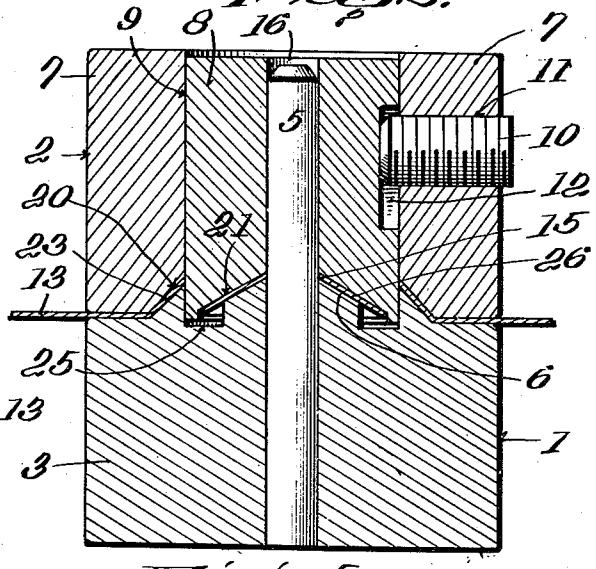


FIG. 4.

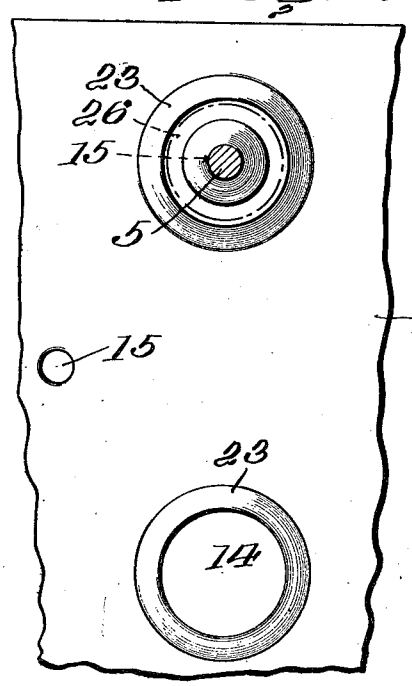
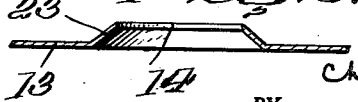


FIG. 5.



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PUNCH AND DIE

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2 Claims. (Cl. 164—29)

My invention relates to a tool for punching holes in sheet metal and simultaneously forming a raised peripheral flange around such holes.

It frequently happens that a workman is called upon to provide a sheet metal plate or other work piece with one or more holes. Where these holes are designed to guide cables or the like it is necessary to form the edge of the material surrounding the hole with a smooth reinforcing and guiding flange.

One of the principal objects of the invention is to provide a simply constructed punch which cuts a hole of the desired dimension and then simultaneously forms a peripheral guiding and strengthening collar or flange and at the same time irons out the crimped or roughened areas around the flanged hole caused by the punching operation.

Other objects and advantages will be apparent as the description is considered in connection with the accompanying drawing, in which:

Figure 1 is a perspective view of the punch and base parts or members prior to insertion of work piece therebetween;

Figure 2 is a longitudinal sectional view through the punch and base parts showing the work piece in place but prior to the application of pressure;

Figure 3 is a view similar to Figure 2, but showing the parts in the position assumed after the application of pressure in a press or vise;

Figure 4 is a plan view of a work piece showing a flanged hole completed and another such hole after it has been formed but before removal of the sheet from the base member; and

Figure 5 is a fragmentary view of the work piece showing a flanged hole formed therein.

Referring more particularly to the drawing 1 and 2 denote a cylindrical base and a punch part, respectively, preferably of similar diameter. The base has a preferably rounded body portion 3 and a flat bottom 4, and is formed with a central recess 25. A beveled shoulder 6 and a guide pin 5, project upwardly from the bottom wall of recess 25, and centrally of the latter, the bottom of the recess being in a plane slightly below the plane of the top face of the base member 3. There is also an angle shoulder 20, the inner peripheral wall 18 of which encircles the beveled shoulder 6, referred to more fully hereinafter.

The top or punch part 2, consists of an outer hollow cylindrical collar member 7, and an inner plunger member 8, snugly but slidably sleeved within the bore 9 of the member 7. A set screw 10, threadedly received in a transverse threaded opening 11, formed in collar 7, loosely extends at its inner end into a longitudinal groove 12, formed in the plunger 8. The movement of the plunger within the collar is thus restricted to the desired degree. When the parts 1 and 2 are assembled in superposed relation, the guide pin will be slidably received within the concentric bore 16, of the plunger member.

In order to provide the sheet metal work piece 13, shown in Figures 2 and 4, with one or more flanged holes 14, a small pilot hole 15 is punched in the sheet at the desired point with the aid of any suitable hand tool, not shown. The sheet is then positioned upon the part 1, the guide pin 5, passing through the previously punched hole 15, thus assuring proper positioning of the work. The part 2 is now assembled upon the part 1 with the guide pin centered within the central opening 16 of the plunger member 8. The assembly is then placed in an arbor press or vise, not shown.

Application of pressure forces the plunger 8 downwardly into the circular space or groove 17 which lies between the inner peripheral wall 18 of angle shoulder 20 and the peripheral wall 19 of beveled shoulder 6, thus shearing off a circular slug of material 26, and forming the enlarged hole 14. This slug is prevented from becoming jammed in the base member by the action of beveled shoulder 6, which shrinks the slug and permits it to lie on the shoulder and freely within the recess 25, formed in the upper end of the base 1, and from which it can be readily removed, as by inverting the base. The cutting or shearing operation is effected by the sharp upper cutting edge 22, of the angle shoulder 20, as the work is forced thereagainst during the working stroke of the plunger.

The angle shoulder 20 flanges the metal of sheet 13, at 23, around the punched hole 14, and the inclined shoulder 24 formed in the lower end of the collar 7 cooperates with the angle shoulder 20, on the base member 3, in ironing out or smoothing the flange.

Having thus described my invention, what I claim is:

1. A tool of the kind described comprising a base member and a punch member, said base member having a flat top face provided with a central recess, a beveled shoulder in said recess, a pilot pin projecting upwardly from said beveled shoulder, said shoulder and guide pin being concentrically disposed within said recess, an angle shoulder on the upper face of said base member encircling said beveled shoulder, said

beveled shoulder projecting slightly above said angle shoulder the punch member comprising a collar and a plunger sleeved therein for relative reciprocatory movement with respect to said collar, said collar having a flat bottom face corresponding to the flat top face of the base member and formed with an inset angle shoulder corresponding in angularity with and opposing the angle shoulder of the base member, the plunger member being bored to receive the pilot pin and formed with a recess in its lower end in which the beveled shoulder of the base member is received, the lower end of the plunger being tightly received between the beveled shoulder and the circular wall of said central recess.

2. A tool of the kind described comprising a base member and a punch member, said base member formed with a central recess in its upper end, a beveled shoulder in said recess and a pilot pin projecting upwardly from and concentric with said beveled shoulder, an angle shoulder on said base member terminating in a cutting edge and spaced from and concentric with said beveled shoulder, the top of said beveled shoulder projecting slightly above the top cutting edge of the angle shoulder, the punch member comprising a collar and a plunger reciprocably sleeved within said collar, said plunger having a longitudinal groove formed therein and means extending through said collar for engagement in said groove for locking said collar and plunger together and for limiting forward and return movement of said plunger within the collar, the base member and the punch member having opposed cooperating smooth top and bottom faces respectively and the collar member having an inlet angle shoulder opposing and corresponding in angularity with the angle shoulder of the base member, the plunger member being bored to receive the pilot pin and formed with a cavity into which the said beveled shoulder extends, and the diameter of the plunger approximating the diameter of the said central recess.

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