

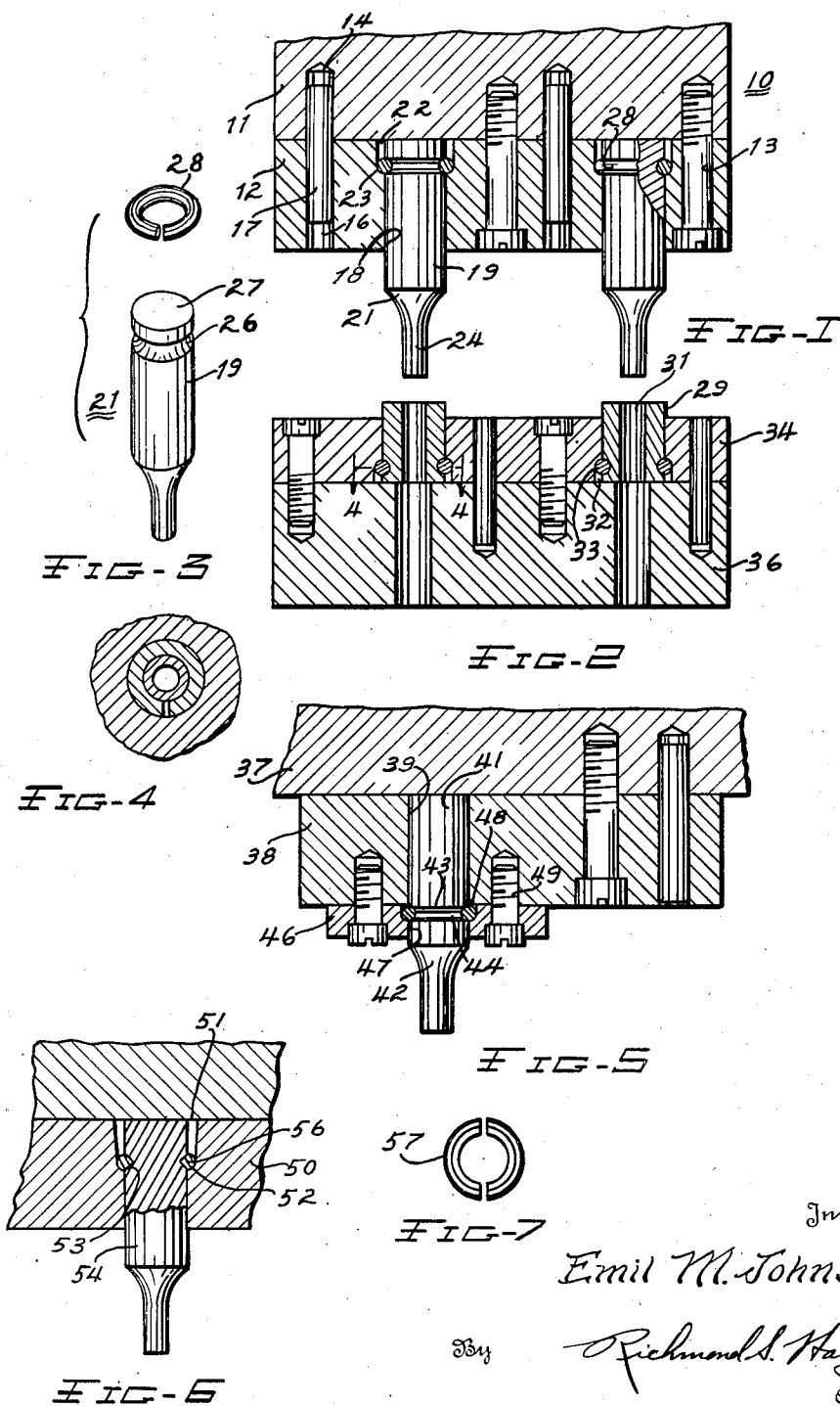
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TOOL ATTACHMENT

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TOOL ATTACHMENT

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This invention relates to improvements in machine tools and more particularly to punch and die supports and retainers.

One form of the invention discloses a support and retainer for punches and dies in which the punch and die are firmly and rigidly held in position of use and yet may be readily removed and replaced as found convenient or necessary.

It has been the general practice, prior to this invention, in the making of tools of this class, to provide a punch or die mounting plate with a ledged aperture for receiving a correspondingly shaped portion of a punch or die. The aperture in the plate, together with the corresponding parts of a punch and die, must be accurately machined to prevent even the slightest relative displacement when these parts are assembled for use. The purpose of providing an enlarged portion on the punch or die that interfits with an opening in the plate is to prevent axial displacement after the punch and die have cooperated in a piercing operation.

Several attempts have been made to simplify punch and die structures by eliminating the enlarged end that interfits with the mounting plate and substituting therefor wedge or key means for preventing displacement after the piercing operation. This structure was intended to have the advantage of ready removability of the punch and die as found convenient or necessary to replace a damaged tool or change the type of tool. In practice, however, it was found that the means for securing the punch and die in this plate, under the severe pounding to which these tools are subjected, caused jamming and wedging of the once disassociable parts to such an extent that it was more difficult to separate a punch and die from its plate by this method than would have been required had the older and more generally known type of mounting for punch and dies been resorted to.

It is one of the objects of the present invention to provide improved means for retaining a punch or die in a support of the type now in common use in machines of this class.

Another object of the invention lies in the provision of retaining means for a punch or die that greatly simplifies the manufacture of these parts without sacrifice of accuracy.

Another object of the invention lies in the provision of means for retaining a die or punch in a supporting member that is inexpensive to manufacture and is readily applicable to machines of this class now in use.

Another object of the invention lies in the

provision of means for rigidly mounting a punch or die in such a manner that, as found convenient or necessary, the punch or die may be readily removed.

Other objects and advantages of the invention will be more fully understood and appreciated from a consideration of the following specification, taken in conjunction with the accompanying drawing; and in which

Figure 1 is a vertical sectional view through a punch support and retainer illustrating one form of the invention;

Figure 2 is a vertical sectional view of a die support and retainer embodying one form of the invention, this figure being positioned with respect to Figure 1 to indicate the relationship of punch and die;

Figure 3 is a perspective view of a punch and retainer ring prior to assembly;

Figure 4 is a horizontal sectional view of a die and retainer ring, being taken substantially on the line 4—4 of Figure 2;

Figure 5 is a vertical sectional view of a modification of a punch and retainer;

Figure 6 is a fragmentary vertical sectional view illustrating a modification of the punch securing means; and

Figure 7 shows a retainer ring formed in two parts.

Reference is now had to the drawing wherein the numeral 10 is employed to designate that portion of a press in which punch tools are mounted. A conventional member 11 is adapted to mount a punch retaining plate 12, suitable studs 13 being provided for this purpose. As is conventional, accurately aligned openings 14 and 16 are made in the support and plate 11 and 12, and dowels 17 inserted into these openings serve to prevent lateral displacement of the plate.

The plate 12 is formed with one or more vertical openings 18 that are the diameter of the body portion 19 of a punch 21. Adjacent the upper face of the plate is an opening 22 centered with the opening 18 and of slightly larger diameter. The meeting edges of the walls of openings 18 and 22 are formed to provide a rounded annular shoulder 23. The punch 21, beneath the body portion 19, is formed with a piercing end 24 of any desired shape and size. Adjacent the upper end of the body portion 19 a semi-circular annular groove 25 is produced. The lower edge of this groove is spaced from the flat top 27 of the punch a distance substantially equal to the depth of the opening 22 of the plate 12.

A split retainer ring 28 is adapted to be sprung into place in groove 26 of the punch 21. This ring when so positioned projects beyond the body portion 19 and is engageable with the annular shoulder 23.

When it is desired to assemble one or more punches embodying the invention, each punch is fitted with a ring 28, as described, and projected into the opening 18 of the plate 12 from its upper face. The ring 28 serves as a stop to locate the punch with the flat top 27 flush with the upper face of the plate 12. The plate 12 may now be secured to the support 11 by studs 13, after which, and in accordance with the conventional practice, dowels 17 are inserted into the openings provided therefor. It will be noted that the top or head 27 of the punch bears directly against the support 11, thus no strain is placed on the retainer ring 28 during a perforating operation. However, on the up stroke—that is during removal of the piercing end 24 from the pierced material—there is a downward pull on the punch and this is resisted by the ring 28. There can be no tendency for the retainer ring 28 to jam when it is desired to remove the punch, since the force applied in the piercing operation is in a direction to release the retainer ring and, furthermore, sufficient surface of the body portion 19 is engaged with the walls of the opening 18 of the plate to prevent misalignment of the punch with respect to the die, and distortion of the ring.

Under circumstances where special accuracy is required, it is found desirable to utilize removable dies such as indicated by the numeral 29 in Figure 2 of the drawing. These dies are each provided with an opening 31 corresponding to the size and shape of the piercing end 24 of the punch. At the lower end of each die is an annular recess 32, substantially identical with the recess 26. A split ring 33 is mounted in the recess and the die and ring inserted in the opening in a plate 34 mounted on a support 36 in the manner already described in connection with support 11 and plate 12. The ring 33 takes no part of the force of the piercing blow of the punch but, rather, serves to prevent upward withdrawal of the die from the plate 34 when the punch is being removed following the piercing operation. Since no damage can occur to the recess of the die, ring 33, or walls of the opening in the plate 34, the die may be readily removed when the plate has been removed from the support 36.

Attention is now directed to Figure 5 of the drawing wherein a modification of the structure above described is shown. In this instance, a support 37 mounts a plate 38 in the conventional manner shown. Plate 38 is provided with one or more punch receiving apertures 39. A punch 41 is provided adjacent its piercing end 42 with an annular recess 43 into which is fitted a split ring 44. The punch is then placed in the opening 39, the upper end contacting the support 37, ring 44 being adjacent to the under face of the plate 38. A small plate 46 is provided, being formed with a central opening 47, the diameter of the body of the punch. The upper end of this opening is enlarged, as at 48, to receive the retainer ring 44. Suitable studs 49 secure the plate 46 to the plate 38. In this modification it is to be noted that the body of the punch 41 has unbroken engagement with the walls of the plate opening throughout the depth of said plate. Thus the punch is firmly supported. Also the force

applied to the punch during the piercing operation is to no extent conveyed to the plate 46 or retainer ring 44 and, consequently, at such time as it is desired to remove the punch, no difficulty is encountered by reason of the parts being out of alignment or in any way distorted.

Referring to Figure 6 of the drawing, it will be noted that a supporting plate 50 may be formed with an upper enlarged opening 51, the walls of which are slightly tapered and terminate in a shoulder 52. In this modification of the invention an annular recess 53 of somewhat different proportions is provided in a punch 54. This recess receives a correspondingly shaped portion of a split retainer ring 56. By reason of the slightly tapered walls of the opening 51, the retainer ring, when the punch is projected through the plate 50, is caused to firmly engage the walls of the recess 53. Here again it will be noted that the means for securing the punch against removal following the piercing operation in no wise receives any of the force applied during the piercing operation. It is also contemplated, as suggested in Figure 7, that a retainer ring 57 may be provided which will be made in two or more parts, as may be found most suitable under certain conditions of use.

Although applicant has shown and described only one useful application of the invention, it will be understood by those skilled in the art that the structure may be modified without departing from the spirit and scope of the invention as defined in the hereunto annexed claims.

Having thus set forth my invention what I claim as new and for which I desire protection by Letters Patent is:

1. A tool attachment comprising a plate having an opening therethrough, a tool having a diameter such as to engage the walls of said opening, and means carried by said tool, said means being firmly engageable with said plate in one direction to prevent withdrawal of said tool from said opening and freely disassociable from said plate in the opposite direction.

2. A tool attachment comprising a plate attachable to a supporting member, said plate having an opening therethrough, a tool having a body portion of a diameter to snugly engage the walls of said opening, means on said body portion cooperating in one direction with a portion of the walls of said opening to secure said tool against axial displacement and in the opposite direction to be readily disassociable from the walls of said opening.

3. A tool attachment comprising a plate attachable to a supporting member and having a tool receiving opening therein, an annular shoulder adjacent one end of said opening, a tool having a body portion projectable through said opening, and means on said tool engageable in one axial direction of said tool with said shoulder whereby to prevent displacement of said tool from said plate.

4. A tool attachment comprising a plate attachable to a supporting member and having a tool receiving opening therein, an annular shoulder formed by an enlargement adjacent one end of said opening, a tool having a body portion projectable through said opening, said body portion having an annular groove, a split ring engageable with said groove, said ring being located within the enlargement and adapted to abut said shoulder to secure said tool against axial displacement in one direction with respect to said plate.

5. A tool attachment comprising a plate attachable to a supporting member and having a tool receiving opening therein, a tool having a body portion of a diameter to snugly engage the walls of said opening, a shoulder formed by an enlargement of said opening adjacent said supporting member, a retainer ring secured to said tool adjacent one end of said body portion, said ring being of a diameter to enter the enlargement of said opening and engage said shoulder whereby to secure said tool against displacement from said plate in one direction.

6. A tool attachment comprising a plate attachable to a supporting member and having a tool receiving opening therein, a tool having a body portion of a diameter to snugly engage the walls of said opening, one end of said body portion being surfaced to receive the operating force of said member, a shoulder formed by an enlargement of said opening adjacent said supporting member, said body portion having an annular groove, a split ring engageable with said groove, said ring being of a diameter to enter the en-

largement of said opening and engage said shoulder whereby to secure said tool against axial displacement from said plate in one direction.

7. A tool attachment comprising a plate attachable to a supporting member and having a tool receiving opening therein, a tool having a body portion of a diameter to snugly engage the walls of said opening, one end of said body portion being substantially flat to abut and receive the operating force of said supporting member, said opening being of enlarged diameter adjacent said member and producing an annular shoulder in the walls thereof, the body portion of said tool being formed with a semi-circular annular groove, a ring of generally circular cross section engaged with and projecting beyond the walls of said groove, the projecting portion of said ring being engageable with the shoulder of said opening whereby to secure said tool against axial displacement in one direction from said plate.

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