Dec. 16, 1930. C. C. RICHARD 1,785,495

PUNCH AND DIE RETAINER

Filed Oct. 22, 1927 2 Sheets-Sheet 1

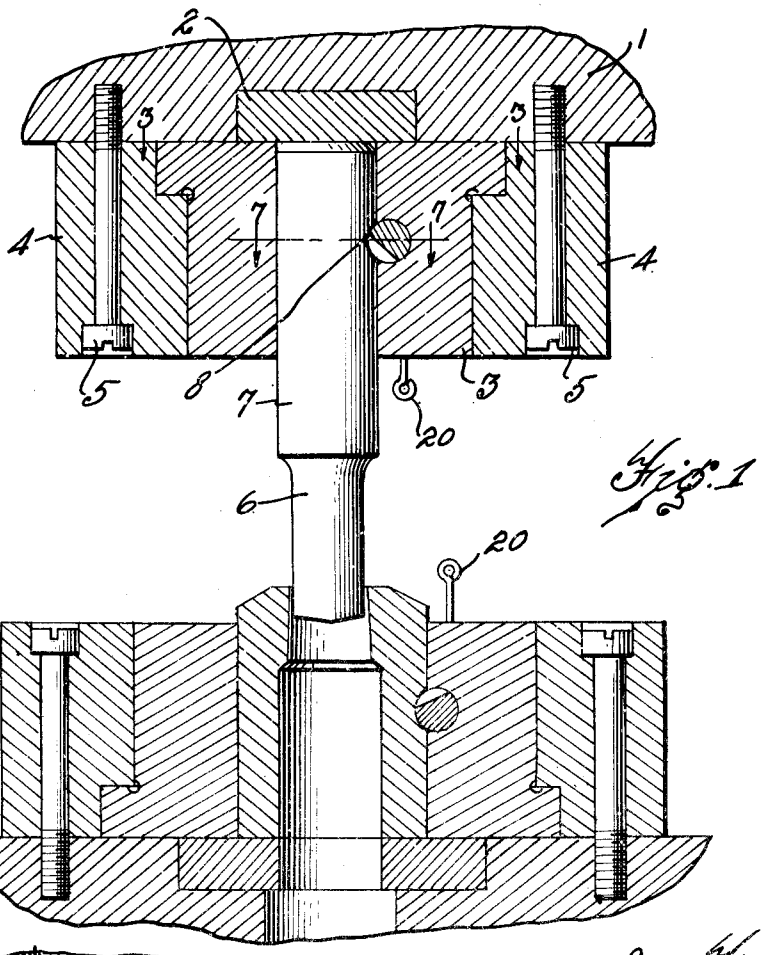

Fig. 1

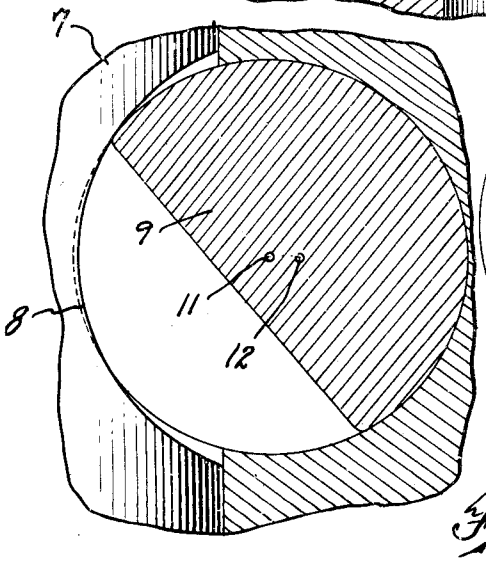

Fig. 2

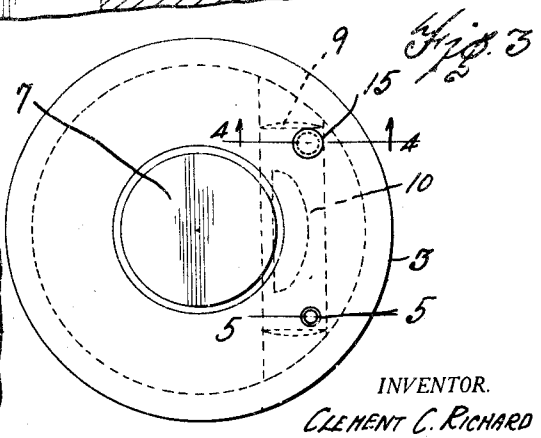

Fig. 3

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PUNCH AND DIE RETAINER

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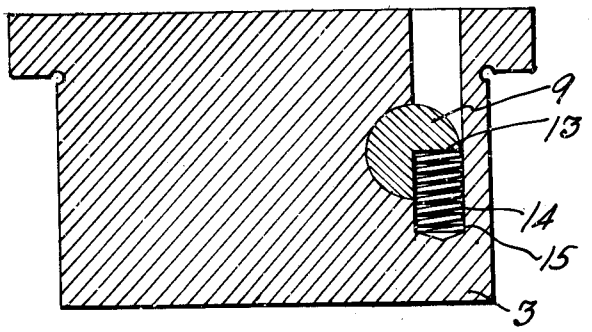

Fig. 4

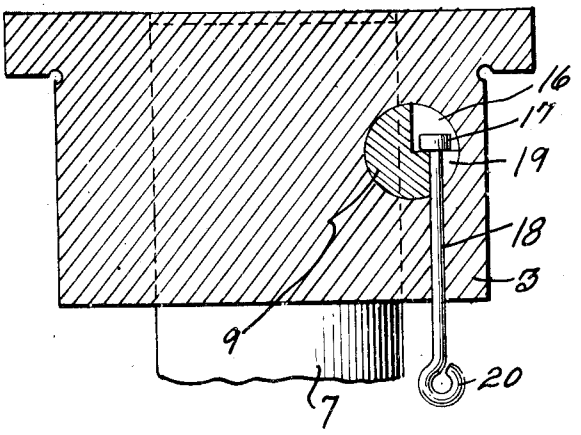

Fig. 5

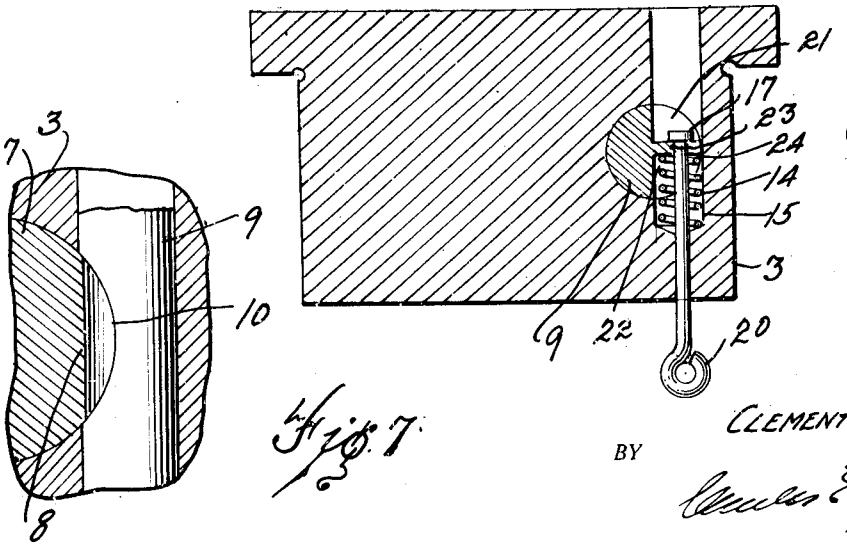

Fig. 6

Fig. 7

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UNITED STATES PATENT OFFICE

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PUNCH AND DIE RETAINER

Application filed October 22, 1927. Serial No. 228,095.

This invention relates to punch and die retainers and the object of the invention is to provide a retainer for punch and dies in which the punch and die may be readily secured or removed and firmly held in position when secured therein.

A further object of the invention is to provide a punch and die retainer in which the punch or die is locked in its retainer and which may be easily unlocked to allow removal or replacement.

Another object of the invention is involved in the construction in which the punch or die is provided with a groove in the outer surface thereof extending transversely to its longitudinal axis and adapted to be engaged by a rotatable lock member carried by the retainer, the lock member being cut out so that when turned to a certain position the punch or die may be readily removed from its retainer.

Another object of the invention is to provide a cylindrical lock member having a slightly smaller radius than the radius of the notch in the punch or die, the said member being adapted to be turned by means of a spring to engage in the notch in the punch or die to place a transverse pressure on the punch or die.

A further object of the invention is to provide a punch or die retainer having a cylindrical lock member which is spring actuated to engage the punch or die and which may be manually released against the tension of the spring to allow removal or replacement of the punch or die.

A further object of the invention is to provide a means for maintaining a binding pressure on the punch or die while it is held in its retainer.

A further and primary object and feature of the invention is to provide a tool retainer having an aperture for the tool shank and a second aperture opening thereinto on one side in which a lock device is supported to turn on an axis eccentric to the axis of an arcuate notch provided in the tool shank to receive the same whereby a wedging relation between the lock member and tool shank is secured preventing longitudinal displacement of the tool in its aperture.

These objects and the several novel features of the invention are hereinafter more fully described and claimed and the preferred form of construction by which these objects are attained is shown in the accompanying drawings in which—

Fig. 1 is a section through a punch and die retainer embodying my invention.

Fig. 2 is an enlarged section through the lock member similar to that shown in the upper part of Fig. 1.

Fig. 3 is a section taken on line 3—3 of Fig. 1.

Fig. 4 is an enlarged section taken on line 4—4 of Fig. 3.

Fig. 5 is an enlarged section taken on line 5—5 of Fig. 3.

Fig. 6 is a similar section showing the spring and manual release lever combined at one point in relation to the lock member.

Fig. 7 is an enlarged section taken on line 7—7 of Fig. 1 showing the lock member in the unlocked position.

As shown in Fig. 1 a retainer is used for both the punch and the die. The punch is provided with a back plate 1 having a hardened steel insert 2 against which the punch shank seats. The retainer 3 is secured to the back plate 1 by means of a member 4 having cap screws 5 extending therethrough and threaded into the back plate 1. The punch 6 is provided with a cylindrical shank 7 fitting in the aperture provided therefor in the retainer 3 and the shank 7 is provided with an arcuate notch 8 in the outer surface thereof extending transversely to its longitudinal axis. A cylindrical lock member 9, shown more particularly in Fig. 7, is rotatably mounted in the retainer 3 and normally extends into the notch 8 in the punch shank 7. This member 9 is provided with an arcuate notch 10 which is cut on a radius equal to the radius of the aperture for the punch shank in the member 3 so that this member 9 may be turned with the notch 10 aligning with the wall of the punch shank aperture in the member 3. This arrangement allows the punch shank to be inserted in its aperture in

the retainer. When the punch shank has been inserted in the aperture the cylindrical member 9 may be turned into the notch 8 in the punch shank as shown in the upper part of Fig. 1 to prevent the removal of the punch. As it will be noticed in Fig. 2 the notch 8 is cut on a radius greater than the radius of the cylindrical member 9, the radius for the member 9 being struck from the center 11 and the radius for the notch 8 being struck from the point 12. The notch 8 is cut so that its inner surface is nearer the point 11 than the outer surface of the member 9 so that when the solid portion of the member 9 is turned into the notch 8 it places a pressure on the shank 7 and holds it in binding engagement with the wall of its aperture. In other words, the axes of the two notches are in an eccentric relation and for this reason the member 9 is limited in its turning movement on its longitudinal axis and usually only turns part way into the notch 8 due to its binding action. The member 9 as shown in Fig. 4 is provided with a notch 13 and a coil spring 14 is positioned in the recess 15 in the retainer 3 and engages in the notch 13 tending to turn the member 9 in a counter clockwise direction to the position shown in the upper part of the Fig. 1. This spring places a tension on the member 9 which provides a pressure for turning the member 9 into the notch in the punch shank. At the opposite end, as shown in Fig. 5, the member 9 is provided with a notch 16 for the head 17 of the release lever 18 and the release lever 18 extends through a slot 19 provided in the member 9. The lower end 20 of the release lever extends downwardly through the retainer 3 and this end may be grasped by the operator and may be pulled down to turn the member 9 in a clockwise direction against the tension of the spring 14 at the opposite end of the member 9 to bring the notch 10 into alignment with the punch shank aperture in the retainer. At this time the punch may be readily removed from the retainer 3 and replaced by a new punch, whereupon the operator releases the lever 20 allowing the spring 14 to turn the member 9 in a counter clockwise direction engaging the solid part of the member 9 in the notch 8 of the punch shank as shown in the upper part of Fig. 1.

In the form shown in Fig. 6 the release lever and spring are combined at one point in the retainer. In this case the cylindrical member 9 is provided with a notch 21 at the top for the head 17 of the release lever and a notch 22 beneath the notch 21 for the spring 14. This provides a partition 23 which is slotted at 24 for the release lever and the spring 14 tends to turn the member 9 into locking engagement in the notch 8 of the punch shank while the member 9 may be turned in the opposite direction by drawing the release lever 20 downwardly.

The retainer shown in the lower part of Fig. 1 is an exact duplicate of the retainer shown in the upper part of the said figure, the only difference being that the retainer and member 9 are reversed in position and the die is held by the retainer instead of the punch. The particular use of this invention in punch and die work is that in work of this type in withdrawing the punch from the die considerable pressure is exerted as the punch tends to remain in the die and frequently the punch is pulled out of its retainer instead of being pulled out of the die. The object of this invention is to so firmly lock the punch and die in the respective retainers that they cannot be drawn out of the retainers during operation and to provide a means for holding the punch and die in the retainer so that they are in absolute alignment for punching operations. While I have described this retainer as used for a punch and die, it is applicable for many other uses in which it is desired to firmly secure a member in its support so that it cannot be withdrawn except when released by the operator.

Due to the eccentric relationship of the lock member, the arcuate notch in the tool shank, and the spring tending to turn the lock member into the notch of the tool shank, the tool is held against its seat provided by the insert 2 and is held from longitudinal movement due to the wedging relationship of the lock member and tool shank which forces the same against the shank aperture opposite the point of engagement by the lock member. With punches, for instance, considerable strain is imposed on the tool upon its withdrawal from a punched aperture and if any lost motion is permitted between the tool shank and the insert the parts are soon out of condition and it is to prevent such lost motion that this lock member is provided. Under the arrangement described the spring so acts on the lock member as to turn the same into the tool shank aperture. On insertion of the tool shank into its aperture the lock member is turned out of the locking position, and as the notch of the shank comes to registration, it is automatically forced to the wedging relation with the tool. The device may therefore be made without any manual means for turning the lock member out of possible engagement with the tool. For convenience, however, a release lever is provided for manually turning the lock member when desired.

A feature of this invention is to provide a retainer plate having a cylindrical aperture providing a sliding fit for the cylindrical shank of a tool having a notch on one side of such form and relation to a lock member mounted in the retainer that, by a mere turning of the lock member on its axis into the notch, a wedging relationship therewith is assumed whereby any strains im-

posed upon the tool tending to withdraw it from its aperture is resisted due to the pressure engagement of the tool shank on that side of the aperture opposite the lock member.

From the foregoing description it becomes evident that the device is very simple and efficient in operation, will not easily get out of order, provides a means for firmly locking a member in its support and provides a device which accomplishes the objects described.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In a retainer for punches, dies and similar tools, a member having an aperture for a tool shank or body, a lock member having a seat in the said first named member and having a part movable into the aperture for the shank, said tool shank having an arcuate notch formed therein on one side, the radius of which is greater than the radius of the part of the lock member turning thereinto and the axis of which is eccentric to the axis about which the lock member turns whereby by a mere turning of the lock member on its axis it may assume a wedging relation relative to the notch to prevent longitudinal movement of the tool in its aperture, and a spring tending to turn the lock member on its axis to locking engagement with the notch of the shank, the said first member, lock member, and notch of the tool being so complementally formed and arranged as to hold the tool shank from rotative movement in its aperture in said first member.

2. In a retainer for punches, dies and similar tools, a member having an aperture for a tool shank or body, a lock member having a seat in the said first named member and having a part movable into the aperture for the shank, said tool shank having an arcuate notch formed therein on one side, the radius of which is greater than the radius of the part of the lock member turning thereinto and the axis of which is eccentric to the axis about which the lock member turns whereby by a mere turning of the lock member on its axis it may assume a wedging relation with the notch to prevent longitudinal movement of the tool in its aperture, and means tending to turn the lock member on its axis to locking engagement with the notch of the shank, the said first member, lock member, and notch of the tool being so complementally formed and arranged as to hold the tool shank from rotative movement in its aperture in said first member.

3. In a retainer for punches, dies and similar tools, a member having a cylindrical aperture providing a sliding fit for a cylindrical tool shank or body, a lock member having a seat in the said first named member at one side of the said aperture and having a part movable thereinto, said tool shank having a notch formed therein on one side into which the lock member may turn when the notch is in registration therewith, the surface of the notch being so shaped relative to the lock member that a mere turning of the lock member on its axis causes a wedging engagement with the notch to thereby force the tool shank into pressure engagement with that side of its aperture opposite the lock member, and a spring tending to turn the lock member on its axis to engage the notch in the shank, the said first member, lock member and notch of the tool being so complementally formed and arranged as to prevent rotation of the tool shank in its aperture.

In testimony whereof I sign this specification.

CLEMENT C. RICHARD.