Aug. 3, 1937. H. O. REICHHARDT 2,089,166

TOOL HOLDER

Original Filed June 12, 1934

Fig. 1.

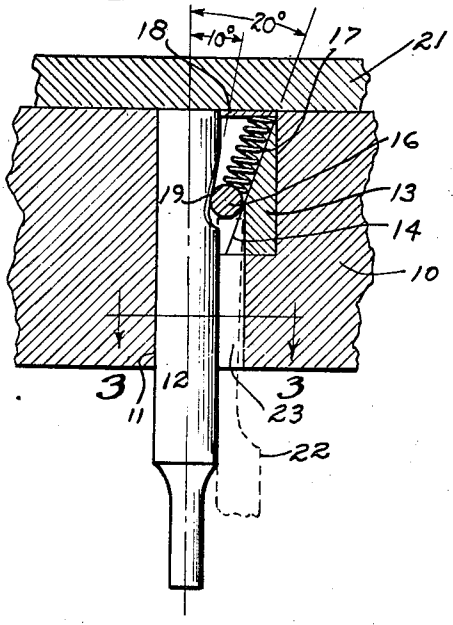
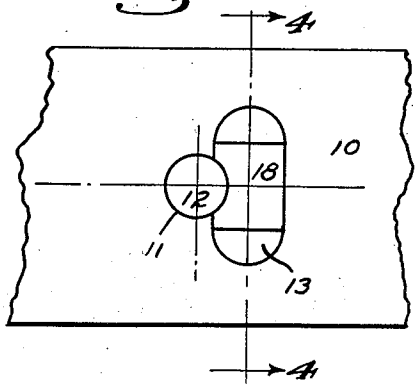


Fig. 2.



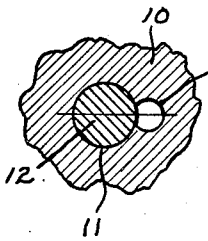


Fig. 3.

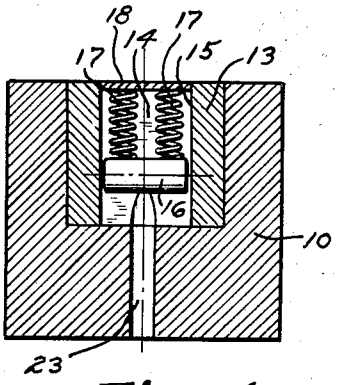


Fig. 4.

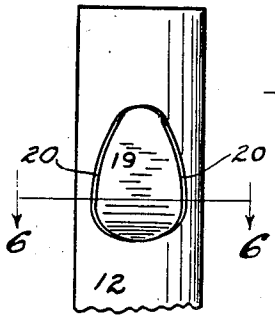


Fig. 5.

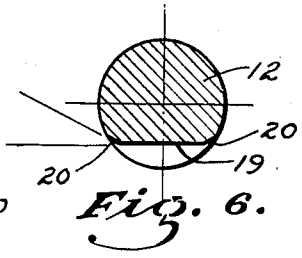


Fig. 6.

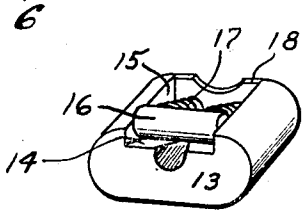


Fig. 7.

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2,089,166

TOOL HOLDER

Hugo O. Reichhardt, Highland Park, Mich.

Application June 12, 1934, Serial No. 730,286
Renewed November 21, 1936

2 Claims. (Cl. 279—30)

The object of my invention is to provide a tool holder of simple, durable and inexpensive construction.

A further object of my invention is to provide a tool holder especially suitable for detachably securing tools, such as punches, dies, reamers or similar articles, in fixtures adapted to receive same. This device in general consists of a spring urged roller which is wedged between an inclined track on the fixture and a cam face formed on the tool to thereby lock the tool into its fixture. The applicant is aware that in the past many devices have been constructed to accomplish this purpose, some of which employed spring urged balls and rollers in a manner somewhat similar to the applicant's construction; however, in all of such devices, known to the applicant, certain objections were inherent which limited the commercial application of the devices.

The use of all former locking devices invariably required hardened surfaces both on the tool and on the fixture, and inasmuch as the fixtures in many cases were constructed of relatively large blocks of steel, capable of holding many tools, these fixtures became very costly to manufacture. It is ordinary shop practice to provide a tool holding fixture in which many punches, for example, are secured. These punches are frequently spaced a considerable distance apart so that when it is required that the fixture be hardened considerable extra expense is involved. The tool receiving openings must be ground to correct for the warpage inevitable in the hardening process and more expensive steel must also be used.

The applicant overcomes these objections by providing a hardened steel removable insert which is adapted to be fitted into a suitable recess in a fixture block. Consequently, the fixture may be constructed of inexpensive soft steel which need not be hardened to thereby produce a very satisfactory device at a very low cost. This feature is of special importance in connection with relatively large fixture blocks which contain several punches spaced a considerable distance apart, as are used to a large extent in punching sheet metal stampings. Still further, in case of the failure of any one tool retaining device, the applicant may easily insert a new unit in his fixture block; whereas, with usual devices of this character, an entirely new block must be made.

The second improvement made by the applicant comprises means for preventing distortion or peening of the punch shank due to the pressure of the retaining ball so that the tool may be readily removed when desired. In the past the applicant has experienced great difficulty in removing rotary operated tools, such as drills, reamers and the like which have been retained in their socket by ball type retaining devices. Invariably, the ball is used to prevent rotation of the tool in its socket so that this rotating torque sets up enormous strains between the ball and the tool. This condition enlarges the face of the tool which coacts with the ball thereby distorting the shank of the tool at this point. Consequently, when it is desired to remove the tool great difficulty is experienced in forcing the distorted portion of the shank outwardly through the undistorted portion of the retaining opening. The applicant overcomes this objectionable feature; first, by the provision of a roller instead of a ball, which roller coacts with the tool along a line contact instead of a point contact as produced by a ball; and secondly, the edges of the tool's cam face are beveled so as to allow room for expansion of the tool face without causing distortion of the bearing portion of the shank. Consequently, even after long use tools secured in place by the applicant's device may readily be removed. This feature is of special importance in connection with production machinery as it minimizes to a large extent the time the machine is tied up for necessary sharpening or renewal of drills, reamers or the like, associated therewith.

With these and other objects in view, my invention consists in the arrangement, construction, and combination of the various parts comprising my improved device, as described in the specification, claimed in my claims and illustrated in the accompanying drawing, in which:

Figure 1 shows a vertical central sectional view through a fixture and tool having my improved retaining device installed thereon.

Figure 2 is a top view of the device shown in Figure 1, illustrating the desirable proportions between the retaining device and the tool secured therein.

Figure 3 is a cross sectional view, taken on the line 3—3 of Figure 1.

Figure 4 is a sectional view, taken on the line 4—4 of Figure 2.

Figure 5 is an enlarged view of the tool shank, illustrating the cam face which is formed thereon.

Figure 6 is a sectional view, taken on the line 6—6 of Figure 5, and

Figure 7 is a perspective view, illustrating the removable insert used in this device.

Referring to the accompanying drawing, I have used the reference numeral 10 to indicate a fixture block which may be of any desired shape or

size. This block is provided with an annular tool receiving bore 11 which extends therethrough, in which bore the shank of a tool 12 extends. The tool 12 may be either a punch, as shown, or a drill, reamer, end mill or similar device, my tool retainer preventing not only the unintentional withdrawal of the tool but also preventing rotation of the tool in the fixture.

The retainer proper comprises a rectangularly shaped insert of hardened steel 13 having a groove 15 extending across one of its flat sides, the bottom of this groove being inclined twenty degrees from the vertical so as to extend substantially diagonally through the block. The bottom of the groove forms an inclined runway 14. The ends of the insert 13 are cylindrical in shape so as to be more conveniently inserted in the fixture 10. It will be apparent that to insert the block 13 in the fixture 10 it will be only necessary to drill two openings, spaced from each other, and to then mill out the metal between these two openings so as to form an elongated recess. This recess should intersect one side of the tool receiving opening 11. It is desirable that the width of the groove 15 be somewhat wider than the diameter of the opening 11 so as to prevent removal of the wedging roller through the opening 11. The insert 13 is assembled in the fixture block 10 with the shallow end of the groove 15 at the bottom and a roller 16 is provided in the groove 15 upon the inclined runway 14, this roller being resiliently urged downwardly by means of a pair of compression springs 17 which are retained in position in the groove by means of a plate 18 which is secured over the top end of the groove.

The shank of the tool 12 is provided with an inclined face 19, the angle of this face being approximately ten degrees from the axis of the shank. Consequently, the roller 16 will be wedged by the springs 17 between the faces 14 and 19 to retain the tool shank in the opening 11.

It will be noted that the two side edges of the face 19 are beveled at 20, the purpose of which is to prevent distortion of the cylindrical part of the shank because of the pressure caused by the roller 16.

In order to assemble the device, the unit, as shown in Figure 7, which includes the insert 13, roller 16, springs 17 and plate 18, is inserted into the elongated opening in the fixture 10. Due to the elongated opening intersecting one side of the opening 11, the roller 16 will partially obstruct this opening. If now it is desired to insert a tool, the shank 12 is simply pushed up into the opening 11 thereby compressing the spring 17. As soon as the face 19 becomes aligned with the roller, the latter will be forced into wedging engagement between the faces 19 and 14 and thus prevent the removal of the tool shank. A backing plate 21 is provided which resists the downward thrust of the tool so that the roller 16 solely prevents the removal of this tool.

When it is desired to remove the tool from the fixture a key, as shown by dotted lines 22, is inserted upwardly through an opening 23 formed in the fixture 10 which tool moves the roller 16 upwardly against the action of the springs 17.

I have shown my improved device when used to retain a punch in a fixture; however, it will be apparent that the die, associated with this punch may be likewise retained in a similar fixture block so that both punch and die may be conveniently replaced.

Among the many advantages arising from the use of my improved device, it may be well to mention that I have provided a relatively inexpensive hardened steel insert which may be conveniently secured in a relatively soft fixture block. Thus, the expense of special steel, hardening, heat treating the block, and grinding the tool receiving openings therein is dispensed with.

Still a further advantage results in that binding of the tool due to the distortions in the shank are negligible even when drills, reamers or milling cutters are used.

Some changes may be made in the arrangement, construction and combination of the various parts of my improved device without departing from the spirit of my invention and it is my intention to cover by my claims such changes as may reasonably be included within the scope thereof.

I claim as my invention.

1. A device of the character described comprising, a fixture having a pair of intersecting openings therein, one of said openings being cylindrical and being adapted to receive the shank of a cylindrical tool, while the other of said openings is of elongated cross section and so positioned that one flat side thereof intersects said tool opening, to an extent substantially less in width than the diameter of said tool receiving opening, a tool retaining unit of substantially the same size and shape as said elongated opening adapted to removably fit into said elongated opening, said tool retaining unit comprising a block having an inclined runway therein, a roller adapted to roll along said runway to position where it partially obstructs the tool receiving opening, said roller being longer than said line of intersection between said openings, said block having roller retaining edges on each side of said runway, and a pair of springs resiliently urging said roller into its obstructing position, said block and roller and springs being readily inserted as a unit into said fixture.

2. A device of the character described comprising, a fixture having a pair of intersecting openings therein, one of said openings being cylindrical and being adapted to receive the shank of a cylindrical tool, while the other of said openings is of elongated cross section and so positioned that one flat side thereof intersects said tool opening to an extent substantially less in width than the diameter of said tool receiving opening, a tool retaining unit of substantially the same size and shape as said elongated opening adapted to removably fit into said elongated opening, said tool retaining unit comprising a block having an inclined runway therein, a roller adapted to roll along said runway to position where it partially obstructs the tool receiving opening, said roller being longer than said line of intersection between said openings, said block having roller retaining edges on each side of said runway, the width of said runway and the length of said roller being both materially greater than the diameter of said retaining tool opening, a pair of springs resiliently urging said roller into its obstructing position, and a plate fixed to one end of said block which forms a support for said pair of springs, said plate forming a unit with said block and roller and springs, said block and roller and springs being readily inserted as a unit into said fixture.

HUGO O. REICHHARDT.