Dec. 5, 1933. C. C. RICHARD 1,938,440

TOOL RETAINER

Filed March 11, 1931

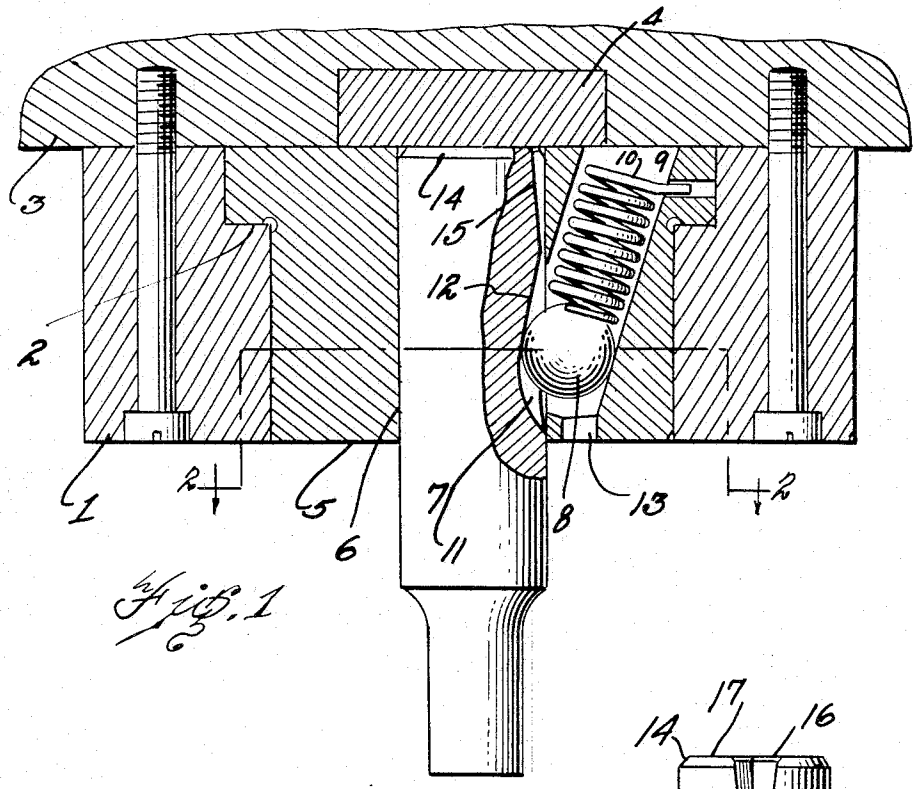


Fig. 1

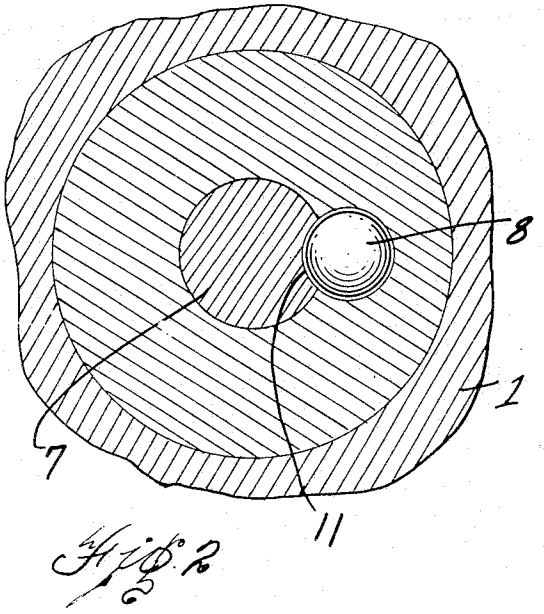


Fig. 2

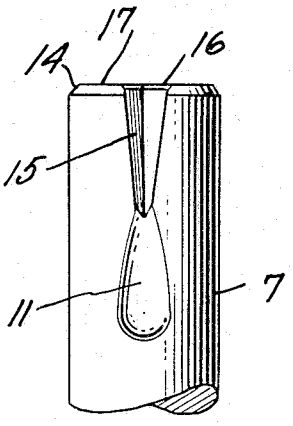


Fig. 3

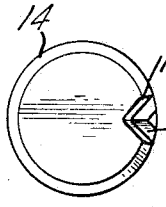


Fig. 4

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TOOL RETAINER

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3 Claims. (Cl. 279—30)

This invention relates to tool retainers, and the object of the invention is to provide a new and improved retainer for tools, such for instance as a punch or a die, in which the tools are interchangeable and arranged for releasably locked relation therewith.

More specifically the invention relates to an improved means for guiding the tool to its seat in the retainer in a predetermined position rotatively of its axis to receive the lock member and is similar in some respects to the construction shown in the pending application for United States Letters Patent of myself and Otis K. Richard, Serial No. 61,818, filed Ocober 10, 1925, Patent No. 1,821,770, issued September 1, 1931. The lock member providing the means for holding the tool from longitudinal and rotative movement when seated in the retainer is here shown as being of the same general character of construction as shown in the United States patent to myself and Otis K. Richard, No. 1,621,811 of March 22, 1927 but, in so far as this invention is concerned, the lock member may have various forms adaptable for the same function, the essential feature being that the lock member is spring-pressed to project a portion thereof into the recess for the tool for automatic engagement with its seat in the tool shank. As shown in the U. S. Patent No. 1,621,811, a seat for the ball or lock member is provided in the surface of the tool and in which the lock member engages upon insertion of the tool.

In the construction shown in the said former patent, to insert the tool in the recess in the retainer therefor, there is no way for the operator to ascertain the relative position of the lock member about the axis of the tool recess which in fact may, as is oftentimes the case, occupy various positions circumferentially about the recess. In such former construction the workman in attempting to introduce the tool shank (which is a close or sliding fit in the tool recess), the end of the tool engages the lock member under such condition that a considerable pressure is required to cause the lock member to be retracted and then after the tool has seated in the recess it is oftentimes necessary for the workman to rotate the tool on its axis to bring the seat therein for the lock member to registration therewith in order that the tool shall be locked in place. In the construction shown in the said pending application Serial No. 61,818, a notch is provided of greatest depth at the end of the tool and coming to the surface short of the point where the notch for the lock member approaches the surface of the tool shank and thus there is a point in the insertion of the tool where the lock member is wholly retracted and the tool readily turned and thereby turn the seat for the lock member out of registration therewith in the further insertion of the tool for the purpose.

A feature of this invention is in the provision of a guide notch or raceway opening through the end of the shank of the tool whereby as the tool is inserted until the end thereof engages the lock member it may then be rotated while free from pressure of the lock member until the guide notch registers with the lock whereupon the tool may be moved longitudinally to its seat. With the guide groove constructed as hereinafter described, the guide notch opens through or into the seat or notch in which the lock member is to be finally engaged whereby at no point during the insertion of the tool, subsequent to the engagement of the lock member in the guide notch, is the tool shank free to rotate on its axis.

It is further an object and feature of the invention to provide a guide notch of a new form whereby the lock member is not entirely or completely retracted from insertion into the tool aperture.

These and other objects and novel features of the invention are hereinafter more fully described and claimed, and the preferred form of construction of a tool retainer embodying my invention is shown in the accompanying drawing in which—

Fig. 1 is a vertical section of my improved retainer and form of tool cooperative therewith.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is an elevation of the end of the tool shank showing the guide notch and the notch providing a seat for the lock member.

Fig. 4 is an end view of the tool showing the guide notch.

The retainer may be of any preferred form of construction here shown as consisting of a ring 1 having a shoulder 2 formed between the central bore and the counter bore and attachable to the punch plate 3 which plate is recessed to receive a hardened steel strike plate 4. The ring supports the retainer proper indicated at 5 having a center bore 6 for the tool shank 7 which is a sliding fit therein. In the construction shown, the lock member consists of a ball 8 riding in an angular raceway 9 therefor and a spring 10 is utilized to urge the ball down the raceway, the said raceway opening into the recess 6 for the tool shank so that the ball has a portion there-

of projecting through the said recess for engagement with a notch 11 in the shank of the tool. This notch, in the construction shown, is preferably provided with a straight line surface 12 at an angle to the axis of the raceway 9 of from twelve to fifteen degrees which is the angle at which the ball will lock the tool from longitudinal movement and yet permit the ball to be freed by introduction of a pin or rod through an aperture 13 opening through the lower face of the retainer and by which the ball may be forced upwardly of its raceway to release the tool.

As previously stated, the object of this invention is to provide a means for guiding the lock member (here shown as a ball) to its seat in the notch 11. Heretofore, as previously stated, it has been necessary with a tool having no guide notch to insert the tool into the recess therefor by pressure of the end of the tool against the ball and thereby force the ball out of the tool aperture. The operator, not knowing whether or not the notch is in alignment with the lock member and upon the tool reaching its seat against the strike plate 4, will rotate the tool until the notch 11 registers with the lock member into which it is urged by the spring. This invention is similar in general respects to the invention shown in the said pending application Serial No. 61,818 in that the end of the tool shank is chamfered as indicated at 14 and differs from the disclosure of the said pending application in that the guide notch 15 also has the upper edge thereof chamfered as indicated at 16 in Figs. 3 and 4. This chamfer at the end of the tool and of the notch permits the tool, whatever its relative rotative position may be, to be introduced into the aperture in the retainer 5 until the flat end surface 17 of the tool is above (or below if the device be inverted) the point such surface would be positioned if the tool end were not chamfered. When in this position with the chamfered end of the tool engaging the ball or lock member, rotation of the tool on its axis by the fingers of the operator in the insertion thereof brings the open chamfered end of the notch 15 to registration with the ball and thus, if a slight end pressure be imposed on the tool in its rotative movement, the tool instantly moves longitudinally as the ball enters the guide groove.

The guide notch at the end of the tool is of such size relative to the portion of the lock member engageable therein as not to necessitate retracting the lock member upon initial engagement therewith which therefore without material pressure seats in the notch. The notch in its preferred form is V shaped in cross section and of greatest depth at the end of the tool with the bottom of notch inclined to the tool axis as will be understood from Fig. 4 and engages the ball or lock member at two points and, by pressure longitudinally of the tool to cause the same to seat against the strike plate and due to the fact that the V member is tapered substantially as shown to extend toward the surface of the tool at a distance from its end, the lock member 1 is gradually retracted very readily and by minimum effort. Further, due to the fact that the guide notch opens into or through the surface of the notch 11 in which the lock member eventually seats, the tool is held from rotative movement throughout this longitudinal movement in seating the same from the time the lock member enters the guide notch until it is finally seated in the lock notch. By this arrangement therefore the possibility of accidental rotation of the tool at a time when the lock member is retracted is avoided. Although it is not impossible to rotate the tool while the lock member engages the guide notch, yet if such guide means be provided requiring intentional rotation of the tool by pressure, the workman in inserting the tool is greatly aided and accidental rotation of the tool under the conditions stated is prevented.

In the construction shown, the lock member 8 is a ball and the seat 11 therefor in the tool shank is also arcuate in cross section and thus the lock member prevents rotative movement of the tool when the parts are in the relationship shown in Fig. 1. Whatever the form of the lock member, the construction of the seat should be complemental to that of the portion of the lock member projecting thereinto to itself prevent relative rotative movement of the tool. It is further pointed out that this invention is not restricted to the form of lock member shown as other forms adaptable for the purpose may be utilized, the essential characteristic, however, being that the lock member act as a wedge upon force being applied to the tool tending to move the same longitudinally out of its aperture whereby the shank is held in pressure contact with the side of its aperture opposite that through which the lock member projects.

From the foregoing description it is believed evident that the various objects of the invention are attained by the construction described particularly the guide notch which by opening through or into the notch in which the lock member seats guides the tool in its longitudinal movement to bring the lock notch to registration with the lock element whereupon the tool is automatically held in its seat against the strike plate.

Having thus briefly described my invention, what I claim and desire to secure by Letters Patent of the United States is—

1. A tool having a shank adapted for longitudinal insertion in an aperture of a retainer therefor provided with a strike plate against which the end of the shank may seat and having a spring-pressed lock member formed with a portion extendible into the shank aperture at a distance from the strike plate, said shank having a seat for the spring-pressed member at a distance from its end approximately equal to the distance of the lock member from the strike plate, said shank further having a guide groove formed in the shank surface extending from the end thereof and opening through the said seat whereby on insertion of the tool shank with the end thereof engaging the lock member, rotation thereof by the operator brings the guide groove to engagement with the lock member in such relation that during subsequent longitudinal movement the tool is held by pressure of the lock member from rotation until the seat for the lock member is in position for locking engagement therewith.

2. A tool for use in conjunction with a retainer element having an aperture to receive the tool by longitudinal movement to engagement with a seat in the retainer for the tool end, a spring pressed member having a seat in the retainer and extendible into the tool aperture at a distance from the surface thereof, said shank having a seat at a distance from its end engaged by the spring pressed member upon final insertion of the tool to engagement with the said seat in the retainer, the relationship of the

seat in the tool shank and the lock member being such that pressure exerted upon the tool to withdraw the same from its shank aperture is resisted by the lock member, and a guide means permitting the operator to introduce the tool in its aperture with the seat aligned for final registration with the lock member comprising a groove V shaped in cross section formed in the tool surface opening through the end thereof to first receive the lock member, the groove extending longitudinally of the tool at an angle to the longitudinal axis thereof and opening into the seat for the lock member, the walls of the groove at the surface of the tool being of less distance apart at the point of cutting through the seat than at the end of the tool whereby, during engagement of the lock member in the guide groove, the tool is held from rotative movement and when freed therefrom rides to locking engagement with its seat.

3. A tool having a cylindrical shank longitudinally insertible in a cylindrical aperture of a retainer provided therefor in which the shank may be rotated, said retainer having a strike plate against which the end of the shank may seat and further having a spring pressed lock member formed with a portion extendible into the shank aperture at a distance from the strike plate and removable from such position, said shank having a seat for the spring pressed member at a distance from its end engaged by the lock member upon final insertion of the tool shank in the retainer aperture, and a guide means provided by forming a groove therein opening through the said end of the shank and through the seat notch, the groove being substantially triangular in cross section with the bottom line forming the apex extending from the end of the tool to the seat at an angle to the axis of the tool and the side edges of the notch converging at a point beyond the point the guide notch cuts through the seat, said guide means acting to hold the tool from rotation by engagement of the spring-pressed member with the said converging walls, the said converging walls further providing a means for partially retracting the lock member as the tool is moved longitudinally to position the final seat for the lock member to receive the same upon release from the guide notch.

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