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RETAINER FOR TOOLS AND THE LIKE

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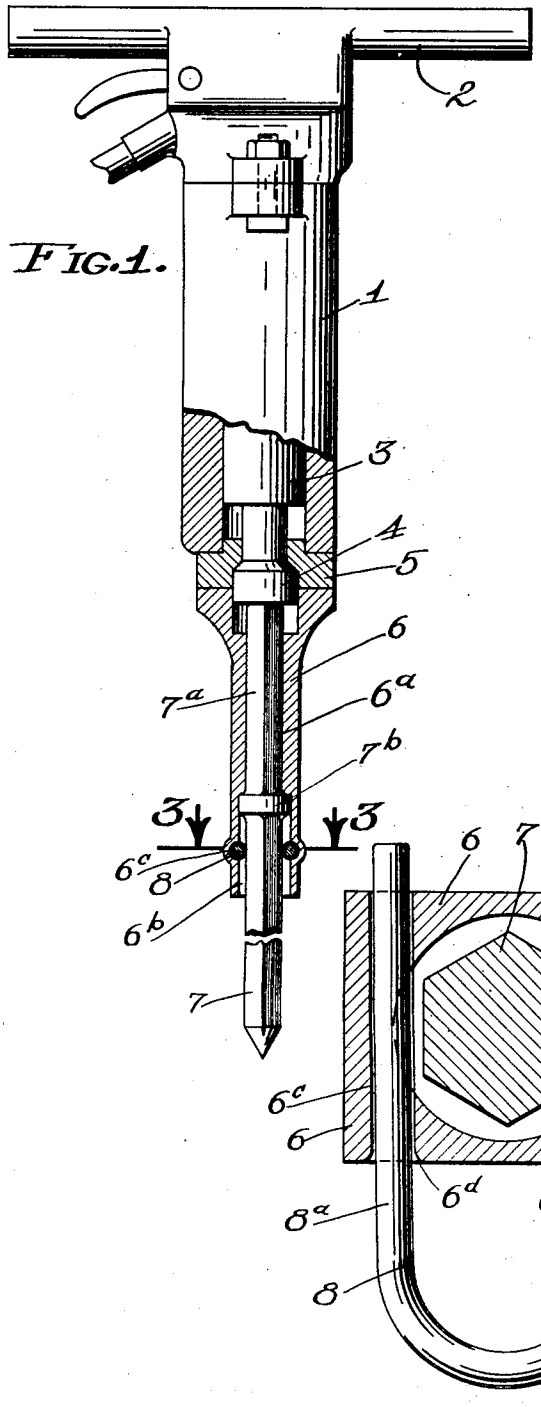


FIG. 1.

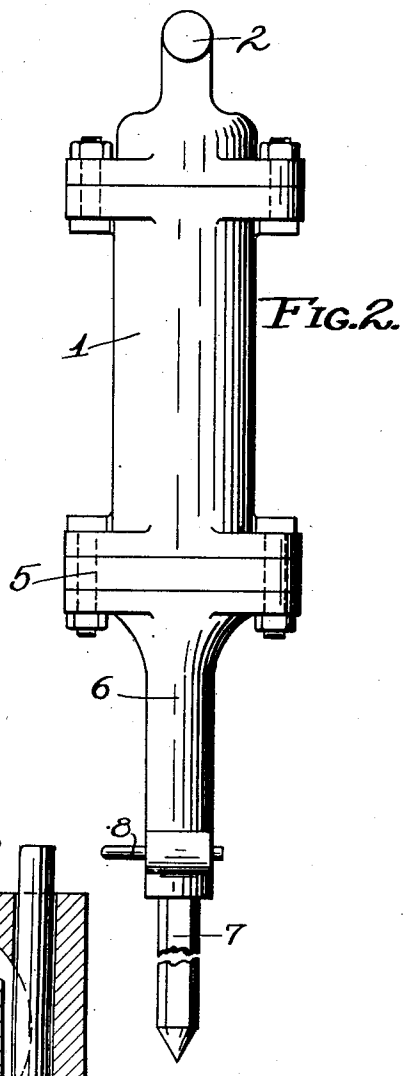


FIG. 2.

FIG. 3.

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RETAINER FOR TOOLS AND THE LIKE

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10 Claims. (Cl. 121—32)

My present invention relates to retainers for retaining tools or other members in sockets and more particularly for retaining drill steels in the chucks or front heads of pneumatic hammers or tools. However, my present invention is not restricted to such limits.

The objects of this invention are: first, to provide an extremely simple and economical means for retaining a drill steel, tool, or other member in the chuck or front head of a pneumatic tool or other device, or other socket member; second, to provide a device or means of this class which is particularly applicable to mechanisms or devices subjected to continuous vibration, and which device or means is so constructed that the key or retainer will not be shaken loose or free by continuous vibration even though the key or retainer may be easily withdrawn with one finger; third, to provide a device or means of this class whereby a shank is retained within a socket by a loose key or retainer having no catch or other securing means in connection therewith, and which may be withdrawn from the socket without effort and without any preliminary operation; fourth, to provide a retainer of this class in connection with pneumatic hammers or tools, and which, even though struck with a considerable blow by the steel or tool held thereby, will not be distorted to any appreciable extent; and, fifth, to provide as a whole a novelly constructed retaining means of this class, and one which is durable, and which will not readily deteriorate or get out of order.

With these and other objects in view, as will appear hereinafter, my invention consists of certain novel features of construction, combination and arrangement of parts and portions as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawing and to the characters of reference thereon which form a part of this application in which;

Figure 1 is a fragmentary side elevational view of a pneumatic hammer, commonly called a pavement breaker, embodying my invention, showing a drill steel fragmentarily in the chuck of the pneumatic hammer, and showing a portion thereof broken away and in section to facilitate the illustration; Fig. 2 is another side elevational view thereof but taken at a right angle to that of Fig. 1; and Fig. 3 is a considerably enlarged transverse sectional view thereof, taken through 3—3 of Fig. 1, showing in detail a specific embodiment of my invention.

Like characters of reference refer to similar parts and portions throughout the views of the drawing.

The pneumatic hammer or tool, shown in the drawing and in which my invention is incorporated in this instance, is a pavement breaker, and consists essentially of a cylinder 1, a grip means or handle 2 at the normally upper end of the cylinder, a hammer 3 reciprocally mounted in the cylinder, an anvil block 4 coaxial with and adapted to be engaged by the forward end of the hammer, an anvil block seat member 5 secured to the forward end of the cylinder for guiding the anvil block and limiting the inward position thereof, and a front head or socket member 6 secured to the front side of the anvil block seat member and coaxial therewith. The front head or socket member 6 is provided with an axial bore, socket, or recess, 6*a* for receiving, guiding and hold the shank 7*a* of the tool or drill steel 7 employed in breaking up concrete, pavement, or for other purposes.

The forward or outer end of the front head or socket member 6 is counterbored, as indicated by 6*b*, for the reception of a collar 7*b* on the drill steel adjacent the shank end of the drill steel. This collar forms the retaining portion of the drill steel, in this instance.

My retaining means is incorporated with and forms a part of the outer end of the front head or socket member 6. This head or socket member is provided with a pair of holes 6*c* positioned preferably in the same plane and preferably transversely with respect to the longitudinal axis of the bore or socket of the member 6, and intermediate the ends of the counterbored portion 6*b* thereof. One of these holes is positioned at each side of the axis of the counterbore and at the opposite sides of the counterbore or recess, the longitudinal axes of the holes being substantially tangent to the wall forming the counterbore. The axes of the two holes 6*c* are positioned at an angle with respect to each other, as will be more specifically defined hereafter. The retaining member is a U-shaped member made preferably of round, slightly resilient cold rolled steel, or any other suitable special stock. The legs 8*a* of the retainer 8 are slightly less in diameter than the diameter of the holes 6*c* into which the legs are adapted to be inserted. I have found that where the diameter of the legs 8*a* is $\frac{7}{16}$ths of an inch, the diameter of the hole should be approximately $\frac{1}{32}$nds of an inch. The legs 8*a* diverge preferably from their connected ends, as shown in Fig. 3, the angle between the legs being substantially identical with the included

angle of the axes of the holes 6c, so that, when the legs 8a of the retainer are in their normal position in the holes the legs are loose and are free to move a slight distance lengthwise inwardly or outwardly therein as well as laterally. In order to facilitate the insertion of the ends of the legs into the holes 6c the ends of the holes positioned closest to each other are countersunk, as indicated by 6d in Fig. 3, or, if desired, the ends of the legs may be considerably rounded or beveled.

The theory of operation is as follows: When the tool is in operation its vibration causes the retainer to shake transversely in the socket member. By reason of the diverging relation between the holes and the corresponding relation of the legs, engagement of either leg with the radially inner side of its hole causes a resulting force which is at right angles to the axis of the holes and almost radially outward, hence there is a small moment towards the converging ends of the holes; similarly, when the outer sides of the legs engage the radially outer sides of the holes, the resulting force is likewise at right angles but almost radially inward, hence producing a slight moment towards the diverging ends of the holes. Now, when the retainer is axially outward from its normal position, only the radially outer sides of the holes and outer sides of the legs engage because the holes are larger in diameter than the legs. Also, when the retainer is axially inward from its normal position only the radially inner sides of the holes and inner sides of the legs engage. Therefore, in the first case the retainer tends to work inwardly to its normal position and in the second case tends to work outwardly to its normal position. When in such normal position, the radially inner side of one leg engages the corresponding side of its hole at precisely the same instant that the radially outer side of the other leg engages the corresponding side of its hole, and conversely; hence, the axial moments cancel each other.

With this construction, no additional retaining means is necessary, even though the angle between the legs of the retainer is so slight that the retainer may be easily withdrawn from the socket member with one finger.

The portions of the legs intermediate the ends thereof, that is, the portions thereof which extend through the counterbored portion 6b of the socket member, receive the blow of the hammer by the engagement therewith of the outer side of the collar 7b. But since the legs 8a rest on the bottom sides of the holes 6c, there can be no material distortion of such legs of the retainer when struck by the collar 7b.

Though I have shown and described a particular construction, combination and arrangement of parts and portions, I do not wish to be limited to this particular construction, combination and arrangement, but desire to include in the scope of my invention the construction, combination and arrangement substantially as set forth in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a device of the class described, the combination with a shank provided with a retaining portion near one end, of a socket member having a deep recess adapted to receive the portion of the shank from the end thereof to the portion beyond the retaining portion, said socket member having a pair of spaced apart holes positioned at a slight angle with respect to each other and extending transversely to the longitudinal axis of the recess, one hole being positioned at each side of the axis and intersecting the recess adjacent the opposite sides thereof, and a U-shaped retainer having legs slightly smaller in cross section than the cross section of the holes, said legs being positioned substantially at the same angle with respect to each other as the axes of the holes with respect to each other, said legs being loosely positioned in said holes and adapted to be engaged intermediate their ends by the retaining portion of the shank for retaining the shank within the recess.

2. In a device of the class described, the combination with a shank provided with a retaining portion near one end, of a socket member having a deep recess adapted to receive the portion of the shank from the end thereof to the portion beyond the retaining portion, said socket member having a pair of spaced apart holes positioned at a slight angle with respect to each other and extending transversely to the longitudinal axis of the recess, one hole being positioned at each side of the axis and intersecting the recess adjacent the opposite sides thereof, and a U-shaped retainer having legs slightly smaller in cross section than the cross section of the holes, said legs being positioned substantially at the same angle with respect to each other as the axes of the holes with respect to each other, said legs being loosely positioned in said holes and adapted to be engaged intermediate their ends by the retaining portion of the shank for retaining the shank within the recess, the coincident ends of said holes having countersunk portions to facilitate the introduction of the free ends of the legs of the U-shaped retainer into said holes.

3. In a device of the class described, the combination with a shank provided with a retaining portion near one end, of a socket member having a deep recess adapted to receive the portion of the shank from the end thereof to the portion beyond the retaining portion, said socket member having a pair of spaced apart diverging holes and extending transversely to the longitudinal axis of the recess, one hole being positioned at each side of the axis and intersecting the recess adjacent the opposite sides thereof, and a U-shaped retainer having legs slightly smaller in cross section than the cross section of the holes, said legs diverging outwardly from their secured ends at substantially the same angle with respect to each other as the axes of the holes with respect to each other, said legs being loosely positioned in said holes and adapted to be engaged intermediate their ends by the retaining portion of the shank for retaining the shank within the recess.

4. In a device of the class described, the combination with a shank provided with a retaining collar near one end, of a socket member having a deep recess adapted to receive the portion of the shank from the latter end thereof to the portion beyond the retaining collar, said socket member having a pair of spaced apart holes positioned at a slight angle with respect to each other and extending transversely to the longitudinal axis of the recess, one hole being positioned at each side of the axis and intersecting the recess adjacent the opposite sides thereof, and a U-shaped retainer having legs slightly smaller in cross section than the cross section of the holes, said legs being positioned substantially at the same angle with respect to each other as the axes of the holes

with respect to each other, said legs being loosely positioned in said holes and adapted to be engaged intermediate their ends by the retaining collar of the shank for retaining the shank within the recess.

5. The combination with the front head of a pneumatic tool having a longitudinally extending socket, and a drill steel having a collar at one end, said drill steel adapted to be inserted with the end thereof provided with the collar into said socket, said head having a pair of spaced apart holes positioned at a slight angle with respect to each other and extending transversely to the longitudinal axis of the socket, one hole being positioned at each side of the axis and intersecting the socket adjacent the opposite side walls thereof, of a U-shaped retainer having legs slightly smaller in cross section than the cross section of the holes, said legs being positioned substantially at the same angle with respect to each other as the axes of the holes with respect to each other, said legs being loosely positioned in said holes and adapted to be engaged intermediate their ends by the collar of the drill steel for retaining the drill steel within the socket.

6. The combination with the front head of a pneumatic tool having a longitudinally extending socket, and a drill steel having a collar at one end, said drill steel adapted to be inserted with the end thereof provided with the collar into said socket, said head having a pair of spaced apart holes positioned at a slight angle with respect to each other and extending transversely to the longitudinal axis of the socket, one hole being positioned at each side of the axis and intersecting the socket adjacent the opposite side walls thereof, of a U-shaped retainer having legs slightly smaller in cross section than the cross section of the holes, said legs being positioned substantially at the same angle with respect to each other as the axes of the holes with respect to each other, said legs being loosely positioned in said holes and adapted to be engaged intermediate their ends by the collar of the drill steel for retaining the drill steel within the socket, the coincident ends of the holes having countersunk portions to facilitate the introduction of the free ends of the legs of the U-shaped retainer into said holes.

7. In a device of the class described, the combination of the front end of a pneumatic tool having a longitudinally extending socket, a drill steel provided with a retaining portion near one end, said socket adapted to receive said end of the drill steel and the retaining portion thereof and provided with a pair of spaced apart holes diverging with respect to each other and extending transversely to the longitudinal axis of the socket, one hole being positioned at each side of the axis and intersecting the socket adjacent the opposite sides thereof, and a U-shaped retainer having legs slightly smaller in cross section than the cross section of the holes, said legs diverging outwardly with respect to each other from their secured ends and at substantially the same angle with respect to each other as the axes of the holes with respect to each other, said legs being loosely positioned in said holes and adapted to be engaged intermediate their ends by the retaining portion of the drill steel for retaining the drill steel within the socket.

8. In a tool retainer, a retainer member including a pair of diverging leg portions, a tool receiving means having a pair of diverging holes disposed at substantially the same angle as said leg portions and adapted to loosely receive said leg portions, said tool receiving means also having a tool receiving socket therein intersecting said holes.

9. In a tool retainer, a retainer member including a pair of diverging leg portions of substantially constant section, a tool receiving means having a pair of diverging holes adapted to receive said leg portions, said holes being constant and larger in section than said leg portions, the angle between said holes being substantially the same as the angle between said leg portions, said tool receiving means also having a tool receiving socket therein intersecting said holes.

10. In a tool retainer, a tool receiving means including a tool receiving socket and retainer receiving bores intersecting said socket, a retainer including a pair of leg portions adapted to fit loosely in said bores, said bores disposed in slight angular relation with each other, and said leg portions disposed in similar angular relation.

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