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3,011,794

SOCKET RETAINER

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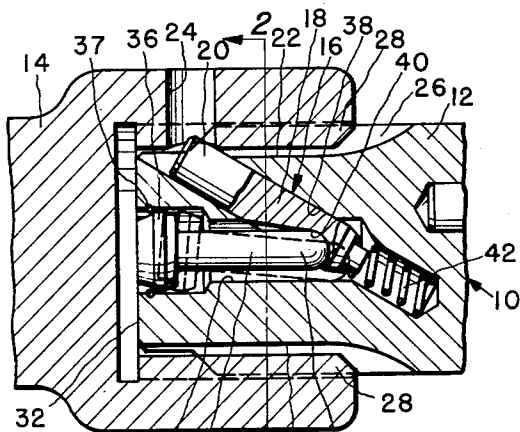


FIG. 1

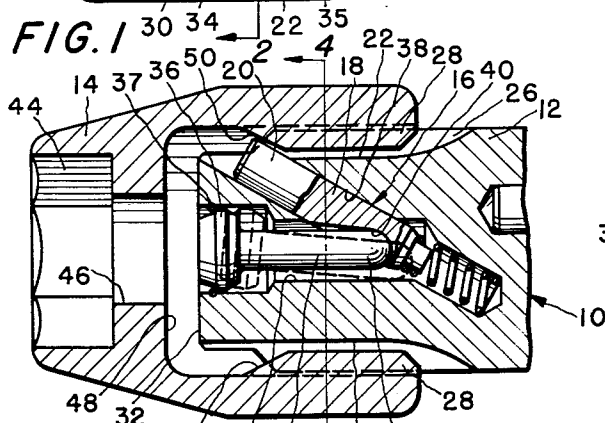


FIG. 3

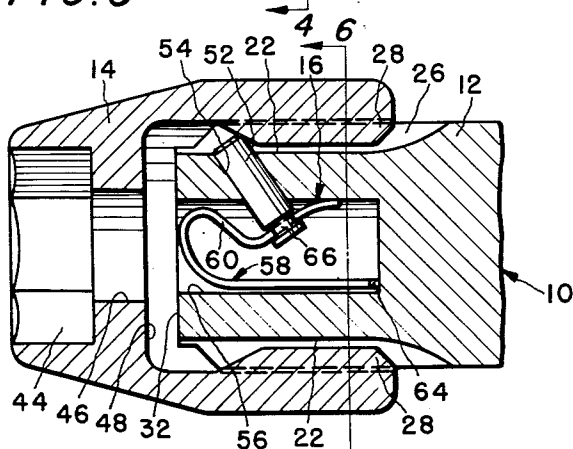


FIG. 5

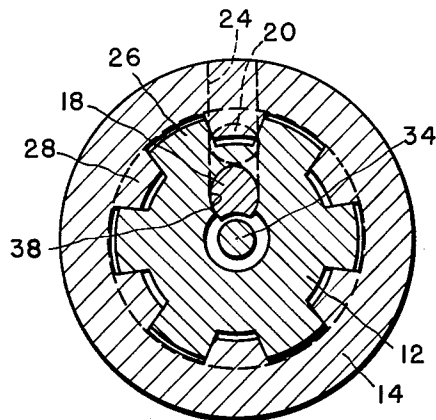


FIG. 2

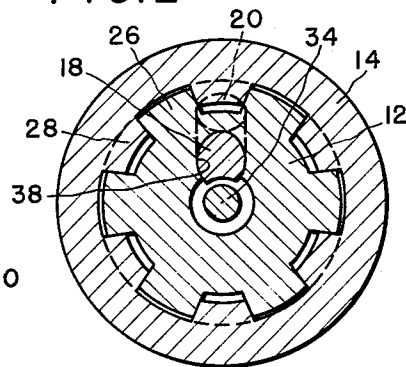


FIG. 4

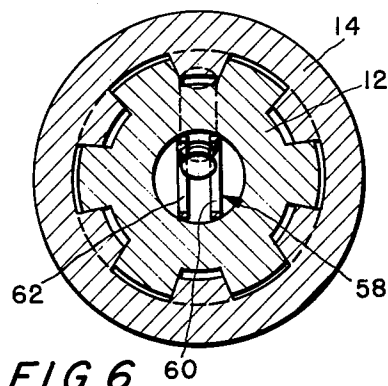
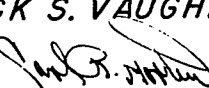


FIG. 6

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SOCKET RETAINER

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This invention relates in general to rotary tools, and more particularly to the means of holding an attachment for such tool releasably in driving relation with the driving end of the tool.

It is then an object of this invention to provide an improved type retaining device for a rotary tool, compared to the presently known retaining arrangements in use.

Another object of this invention is to provide a retaining device for a rotary tool that is reliable and simple in structure.

The advantages of this invention will appear more fully from the following specification made in connection with the accompanying drawings, in which:

FIGURE 1 is a longitudinal sectional view of the retaining device showing the forward end portion of a rotary hand tool connected to a driven member,

FIG. 2 is a cross sectional view taken along the line 2-2 of FIG. 1 and looking in the direction of the arrows,

FIG. 3 is a longitudinal sectional view of the retaining device showing the forward end portion of a rotary hand tool connected to a socket wrench,

FIG. 4 is a cross sectional view taken along the line 4-4 of FIG. 3 and looking in the direction of the arrows,

FIG. 5 is a longitudinal sectional view of the retaining device showing the forward end portion of a rotary hand tool connected to a socket wrench, and

FIG. 6 is a cross sectional view taken along the line 6-6 of FIG. 5 and looking in the direction of the arrows.

Referring now more particularly to the drawing, 10 designates a portion of a rotary hand tool of a commonly known type having a first member or rotary driving member 12 at its forward end. A second member or driven member 14, such as a socket wrench or an extension, of a commonly known snap-on type is releasably connected to the driving member 12 to be rotated thereby. The driven member 14 is releasably held in driving relation with the driving member 12 by means of a retaining device 16, and one embodiment of this invention as shown in FIGS. 1 and 2 includes a pin 18 having its outer end portion 20 projecting from the side 22 of the driving member 12 into a bore 24 drilled through the side of the driven member 14.

The driving connection between the driving and driven members, 12 and 14 respectively, is of a commonly known socket type, the inner end portion of the driving member 12 slidably fitting the socket shaped end portion of the driven member 14. The transmission of rotary motion between the driving and driven members includes splines 26 on the outer periphery of the inner end portion of the driving member, and corresponding splines 28 on the inner periphery of the socket shaped end portion of the driven member. The splines 26 and 28 cooperate to form a slidable interlocking connection between the driving and the driven members.

According to this invention the retaining device 16 comprises a first bore 30 leading from the inner end 32 of the driving member axially towards the rear end of the driving member. A T-shaped element 34 is positioned in the bore 30, the element 34 having a collar 36 at its inner end portion slidably fitting the bore 30 while its outer end portion 35 is loosely disposed in the rear end portion of the bore 30. A snap ring 37 in the inner end portion

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of the bore 30 serves to prevent the element 34 from moving out of the bore 30.

A second bore 38 is drilled in the driving member leading angularly relative to the bore 30 from the side 22 of the driving member into and beyond the bore 30. The outer end of the bore 38 is positioned substantially opposite the inner end of the bore 24 drilled through the side of the driven member 14.

The aforementioned pin 18 slidably fits in the bore 38 and is provided at its rear end portion with a depression 40 which is adapted to receive and support the rear end portion 35 of the element 34. A spring 42 in the rear end portion of the bore 38 serves to hold the pin 18 in a position projecting out of the bore 38 and partly into the bore 24.

The end portion 35 of the element 34 is loosely disposed in the bore 30 to permit sideways movement of the end portion 35 when the pin 18 is forced inwardly as will be explained in detail hereinafter.

It is to be noted that the splines 28 of the driven member are bevelled at their outer ends, and, when the driven member is to be connected to the driving member and the inner end portion of the driving member is inserted into the socket shaped end portion of the driven member, the bevelled ends of the splines 28 will force back the pin 18 against the spring 42. The pin 18 is held in such position until the outer end of the bore 38 is approximately opposite the bore 24. In this instance the spring 42 will then force the pin 18 outwardly of the bore 38 and partly into the bore 24. As the bore 24 is drilled through the side of the driven member 14 such that the bores extends through one of the splines 28, the pin 18 engages the associated spline and holds the members 12 and 14 against longitudinal movement relative to each other.

When the driven member 14 is to be disconnected from the driving member 12, the pin 18 may be forced inwardly of the bore 38 by any elongated tool, such as a screw driver, to permit the inner end of the pin 18 to pass the edge of the bore 24 and ride on the splines 28 until the splined portion of the driving member is out of contact with the splined portion of the driven member 14.

The element 34 and the pin 18 cooperate with each other such that either one of them can be moved inwardly in order to disengage the pin 18 from the driven member. This arrangement has been made for the disengagement of the pin 18 from the driven member when access to the retaining device is provided either through the side of the driven member, such as the bore 24, or through the inner end of the bore 30 as will be explained hereinafter in connection with other embodiments of this invention.

Another embodiment of this invention is illustrated in FIGS. 3 and 4 in which the driven member 14 is shown as a socket wrench having a hexagonal recess 44 to engage and rotate a fastener (not shown). A hole 46, leading from the bottom of the recess 44 to the inner end 48 of the socket 14, is provided as an access to the element 34.

In order to hold the members 12 and 14 in engagement with each other the inner end 50 of each spline 28 of the driven member 14 is bevelled and terminate such that the pin 18, when projecting out of the bore 38, engages the bevelled edge of one of the splines 28. With this arrangement the driving member can be inserted into the driven member irrespective of the position of the pin 18 relative to any one of the splines 28.

When the members 12 and 14 are to be disengaged from each other, the element 34, being accessible from the recess 44 through the hole 46, is pushed inwardly causing the pin 18 to move inwardly and to be disengaged

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from the associated spline. When the pin 18 is moved inwardly by the element 34, the end portion 35 of the element 34 will follow a path of the resultant movement of the pin and the element and move sideways as shown in dotted lines in FIGS. 1 and 3. This sideways movement of the end portion 35 of the element 34 is made possible by making the diameter of the pin 34 substantially smaller than the diameter of the bore 30.

Yet another embodiment of this invention is illustrated in FIGS. 5 and 6, in which the retaining device comprises a pin 52 slidably fitted in a bore 54 which extends from the side 22 of the driving member into a longitudinal bore 56 leading from the inner end 32 towards the rear end of the driving member 12. A spring 58 including opposed arms 60 and 62 having a closed end 64 connecting the arms 60 and 62 is positioned in the bore 56. The spring 58 is adapted to hold the head 66 of the pin 52 in a position projecting out of the bore 54 and engaging one of the splines 28 of the driven member 14.

When the members 12 and 14 are to be disengaged from each other, the spring 58, being accessible from the recess 44 through the hole 46, is pushed inwardly causing the pin 52 to move inwardly and to be disengaged from the associated spline of the driven member 14.

While I have shown and described specific forms of my invention, it is to be understood that various changes and modifications may be made without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A retaining device in combination with a first member and a second member having a socket in at least one end thereof to receive one end of said first member and having only one opening communicating with said socket, said retaining device comprising a first bore extending inwardly from said one end of said first member and in direct communication with said opening in said second member so as to be accessible through said opening, a second bore in said first member and communicating at one end with said first bore and at the opposite end with said socket, means disposed for slidable movement within said second bore and projecting from the second bore into said socket and engaging said second member to prevent movement of said first member from said socket, and second means movably disposed within said first bore and accessible through said opening in the second member for movement, said second means being in engagement with said first mentioned means to slidably move said first mentioned means within said second bore and out of engagement with said second member and thereby permit withdrawal of the first member from the socket.

2. The apparatus of claim 1 wherein said first mentioned means is a pin biased in a direction toward said socket.

3. The apparatus of claim 1 wherein said second bore is disposed to extend angularly with respect to said first bore toward said one end of said first member.

4. The apparatus of claim 1 wherein said first mentioned means is a pin and said second means is a substantially U-shaped resilient member, and wherein said pin engages at one end one leg of said U-shaped resilient member so as to be biased in a direction toward said socket.

5. A retaining device in combination with a driving member and a driven member having a socket in at least one end thereof to slidably receive one end of said driving member and having a single opening communicating with the exterior and the socket thereof, said recess and said one end of said driving member having means for engaging each other to provide for conjoined rotary mo-

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tion of said driving member and said driven member, said retaining device comprising a first bore extending inwardly from said one end of said driving member and in direct communication with said opening in the driven member so as to be accessible through said opening, a second bore in said driving member angularly disposed with respect to said first bore and communicating at one end with said first bore and at the opposite end with said socket, a pin disposed for slidable movement within said second bore and projecting at one end from the second bore into said socket, receiving means in said driven member for engaging the projecting one end of said pin to prevent withdrawal of said driving member from the socket of said driven member, and second means movably disposed within said first bore and accessible through said opening in the driven member movement, said second means being in engagement with said pin to slidably move the latter within said second bore to cause the projecting end portion of said pin to disengage from said receiving means and thereby allow slidable withdrawal of the driving member from the socket of the driven member.

6. A retaining device in combination with a driving member and a driven member having a socket in one end thereof to slidably receive coaxially therewith one end of said driving member and having an opening communicating with the exterior and the socket thereof, said socket and said one end of said driving member having means for rotatably connecting the driving and driven members together, said retaining device comprising, a first bore extending inwardly from said one end of said driving member and in direct communication with said opening in the driven member so as to be accessible through said opening, a second bore in said driving member disposed angularly with respect to said first bore and extending from a point in communication with said first bore toward the said end of said driving member and in communication with said socket, a pin disposed for slidable axial movement within said second bore and projecting at one end from the second bore into said socket, receiving means in said driven member for engaging the projecting end of said pin to prevent slidable withdrawal of said driving member from the socket of said driven member, and second means movably disposed within said first bore and accessible through said opening in the driven member, said second means being in engagement with said pin to slidably move the latter within said second bore to cause the projecting end portion of said pin to disengage from said receiving means and thereby allow slidable withdrawal of the driving member from the socket of the driven member.

7. The apparatus of claim 6 wherein said second means is a substantially U-shaped resilient member with the U-bend portion thereof disposed adjacent the end of said driving member and the legs thereof extending inwardly in the first bore, and wherein said pin engages one of said legs of the U-shaped resilient member to be biased in a direction toward said socket.

8. The apparatus of claim 6 wherein said second means is another pin disposed for slidable movement in said first bore and wherein said pin in said second bore is provided with a depression to receive the inner end of said another pin and form a shoulder against which the inner end of said another pin bears to slidably move said pin in the second bore upon inward movement of said another pin.

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