

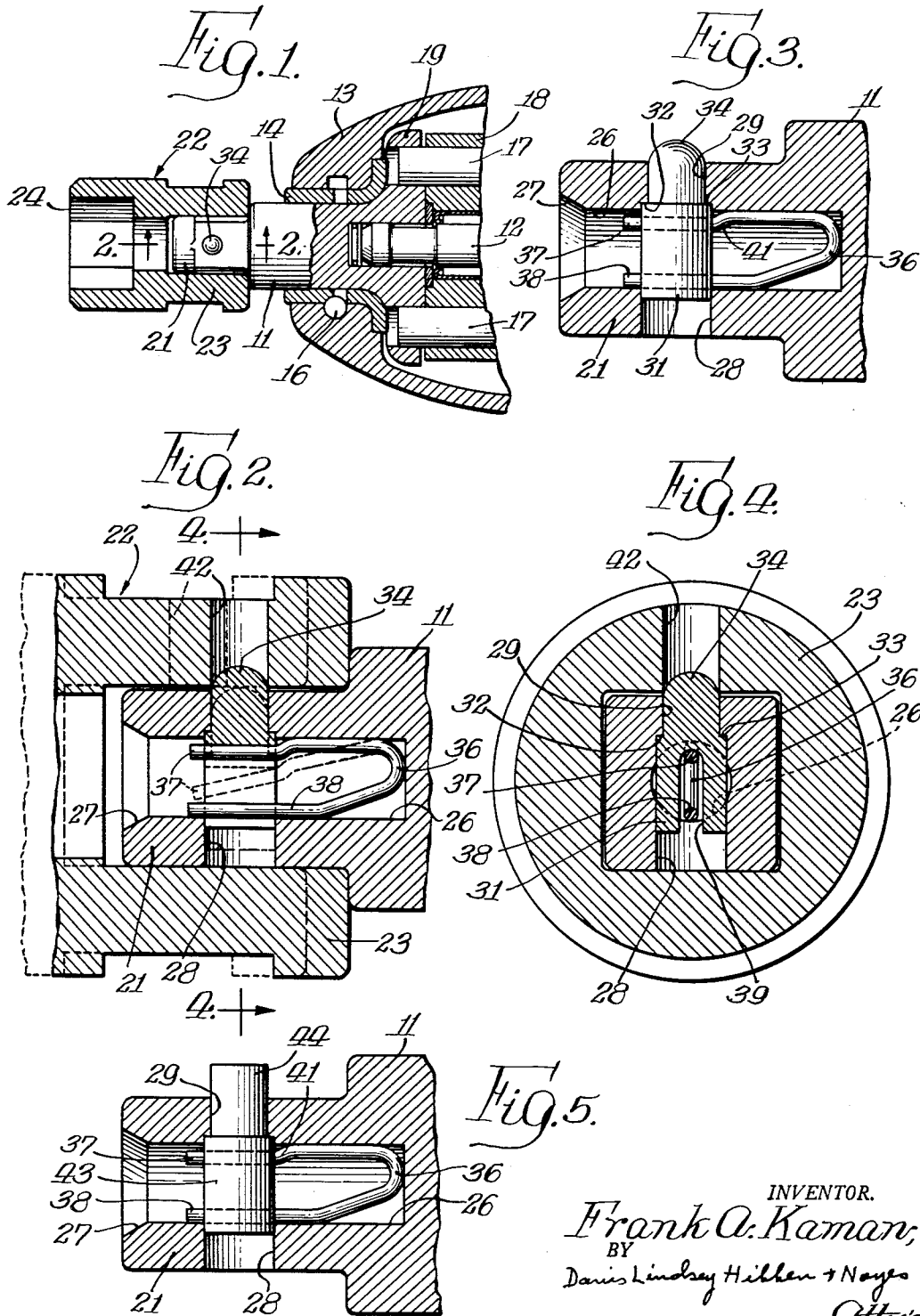
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F. A. KAMAN

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SOCKET RETAINER FOR ROTARY POWER TOOLS

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INVENTOR.
Frank A. Kaman;
BY
Doris Lindsey Hilken + Noyes
Attys.

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SOCKET RETAINER FOR ROTARY POWER TOOLS

Frank A. Kaman, Aurora, Ill., assignor to Thor Power Tool Company, Aurora, Ill., a corporation of Delaware

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2 Claims. (Cl. 287—119)

This invention relates to improvements in portable power operated tools and more particularly to a novel and improved socket retainer for such tools.

A portable power operated tool of the rotary impact type is commonly provided with a rotating impact spindle or anvil which extends beyond the forward end of the tool for mounting a tool member such as a nut or bolt-engaging socket or the like. In order to permit wide flexibility in the use of the tool, it is desirable that the projecting forward end of the spindle be provided with suitable means for securely holding the socket or other tool member on the spindle but at the same time permitting rapid removal of the same when desired. Thus, sockets or tool members of different types and sizes are readily interchangeable to permit use of the same tool for a variety of purposes.

Heretofore, such releasable socket retention has usually been accomplished by means of a depressible detent adapted to project laterally or radially from the spindle into an aperture in the wall of the socket member. However, the constructions most frequently used have been subject to serious disadvantages. For example, in some cases a helical spring has been disposed in a diametric or transverse aperture in the spindle and arranged coaxially with the detent to actuate the latter, but this arrangement has not proved to be entirely satisfactory because of the difficulty of permanently retaining the spring in the spindle aperture and also because assembly of the structure is not sufficiently simple. In other cases, a resilient rubber plug has been provided in the spindle for coaction with the detent, but the effect and operation are not as satisfactory as with a spring and in time the rubber tends to lose its resiliency.

Accordingly, a primary object of my invention is to provide a novel and improved means for releasably retaining a socket member or the like on a rotating spindle.

Another object of the invention is to provide a novel and improved socket retaining means for a rotary impact tool.

An additional object of the invention is to provide an improved spring-actuated socket retainer for rotary power tools or the like having a self-retaining spring member which cannot be displaced inadvertently during use of the tool.

A further object of the invention is to provide a novel socket retainer structure for a rotary power tool or the like which is characterized by a durable, simple, and inexpensive construction and which can be readily assembled.

Still another object of the invention is to provide an improved socket retainer of the spring-pressed detent type which is characterized by highly effective spring action, complete support for the detent at all times, freedom from undesirable cocking or sticking of the detent, and a relatively large extent of travel and projection of the detent.

Other objects and advantages of the invention will become apparent from the subsequent detailed description

taken in conjunction with the accompanying drawing, wherein:

Fig. 1 is a fragmentary longitudinal sectional view of the forward end of a rotary impact tool with a socket member mounted thereon and showing one specific embodiment of the retainer means comprising my invention;

Fig. 2 is an enlarged fragmentary sectional view taken along line 2—2 of Fig. 1 and showing the retainer means in its different operating positions;

Fig. 3 is a sectional view similar to Fig. 2 but with the socket member detached from the spindle;

Fig. 4 is a transverse sectional view taken along line 4—4 of Fig. 2; and

Fig. 5 is a view similar to Fig. 3 but showing a modified form of the invention.

Referring now to the drawings, Fig. 1 illustrates the forward end portion of a rotary impact tool of the type having an impact spindle or anvil 11 mounted at the end of a drive shaft 12 and extending forwardly beyond the tool housing, indicated at 13. A bushing 14 is provided around the rotating spindle 11 and is retained in place in the housing 13 by means of a setscrew 16. Rotary movement of the spindle or anvil 11 is effected by means of a pair of impact rods 17 carried in a rotatable hammer member 18, the rods 17 being engageable at their forward ends with complementary impact-receiving surfaces provided in a radially extending flange portion 19 at the inner end of the spindle 11. The general mode of operation of a rotary impact tool of this character will be understood by those skilled in the art and need not be described here in detail. Reference is made to a copending application, Serial No. 81,966, filed March 17, 1949, by Walter G. Mitchell, now Patent No. 2,585,486, issued February 12, 1952 for a more complete description of a tool of this type.

The spindle 11 has a forward end portion 21 of generally square cross-section which is of reduced size adapted to fit into a detachable socket member or other tool member. In Fig. 1 such a socket member is designated generally at 22 and is provided with an attaching portion 23 at one end which is adapted to receive the square end portion 21 of the spindle 11. The opposite end of the socket member 22 has a hexagonal socket portion 24 for engaging a nut or bolt in the usual manner.

In Figs. 2 to 4, the construction and operation of the connecting and retaining means is illustrated in detail. The square end portion 21 of the spindle is formed with an endwise axial bore 26 having an outwardly tapered or flared inlet 27. The end portion 21 of the spindle is also provided with a pair of oppositely disposed apertures 28 and 29 for receiving a shiftable plunger or detent 31. The inner end portion of the aperture 29 has an enlarged diameter whereby to provide a shoulder 32 in the wall of the spindle which coacts with a similar shoulder 33 on the detent 31 for limiting the extent of outward movement of the latter. The outer end of the detent 31 has a rounded or bullet-shaped contour, as indicated at 34, for the reasons hereinafter described.

A generally U-shaped one-piece spring member 36 is disposed within the axial bore 26 of the spindle with the leg portions, indicated at 37 and 38, of the spring extending toward the inlet 27 of the bore 26 and being received in an endwise axial slot 39 (Fig. 4) provided at the inner end of the detent 31. As will be readily seen from the drawing, the leg 38 of the spring member 36 abuts the inner wall of the spindle bore 26 while the oppositely spring leg 37 engages the detent 31 at the end or base of the slot 39 for normally urging the detent into its extended or outwardly projecting position, as illustrated in Fig. 3. The leg 37 has a slight inwardly offset bend 41 so that the portion of the leg 37 which is in engage-

ment with the end of the detent slot 39 is spaced from the adjacent wall of the spindle bore 26 and the bent portion 41 serves to prevent the spring 36 from escaping axially from the bore 26.

In Fig. 2 the device is shown with the socket member 22 in place on the spindle and it will be seen that the outwardly extending rounded end 34 of the detent 31 is received within a radial aperture 42 in the wall of the socket member 22 so that the latter is securely retained against inadvertent axial movement relative to the spindle. It will be understood that by positive movement of the socket member 22 axially relative to the spindle, the detent 31 can be cammed inwardly against the action of the U-shaped spring 36 to permit the socket member 22 to be mounted on or detached from the spindle. This condition is illustrated in dotted lines in Fig. 2, and it will be seen that when the detent 31 is depressed sufficiently to clear the socket aperture 42, the spring leg 37 is pressed toward the opposite leg 38. The rounded end 34 on the detent 31 facilitates rapid attachment and detachment of the socket member 22 by reason of the camming action of the curved end surface against the inner end of the socket member 22 or the edge of the aperture 42 therein. Thus, the movement of the socket member itself relative to the spindle serves to cam the detent 31 into its fully retracted position during attachment and detachment of the socket member. This form of detent with the rounded nose is therefore particularly adapted for situations in which it is necessary or desirable to make frequent changes of the socket member or other tool member.

In Fig. 5 there is illustrated a modified form of detent, designated at 43, wherein the reduced outer end of the detent is cylindrical in shape, as at 44, and has a square corner edge rather than the rounded nose shown in Figs. 2 to 4. It will be understood that this type of detent does not provide the camming action described above in connection with Figs. 1 to 4. Consequently, this form of the device requires complete depression of the detent by the operator by the insertion of a suitable tool or instrument through the aperture 42 in order to permit attachment and detachment of the socket member. The Fig. 5 modification of the invention is, therefore, best suited to those uses in which it is unnecessary to change the socket member frequently.

As hereinbefore mentioned, a highly important advantage of the present invention resides in the fact that the spring member 36 is self-retaining within the axial bore 26 of the spindle. In one type of spring-pressed detent arrangement heretofore employed, a helical spring was disposed coaxially with the detent and in the same bore therewith. One end of the spring acted against the detent, and a cap or enclosure was provided in the detent bore to retain the opposite end of the spring. However, it was found that the closure frequently became dislodged from the spindle during use of the tool with the result that the spring and detent could readily become detached from the tool. In my invention, the construction of the spring member, particularly the U-shaped form thereof illustrated by way of example in the drawings, coacts with the axial bore in the spindle in such a manner as to avoid inadvertent or unintentional displacement of the spring from the spindle. Consequently, it will be seen that the invention provides a durable and rugged construction which is well adapted to remain in proper operating relation during use of the tool.

The invention herein described also has numerous other advantages as compared with the retaining devices heretofore proposed. For example, it will be seen from Fig. 2 that in both the extended and retracted positions of the detent, there is complete peripheral support at both ends of the detent inasmuch as the detent is in bearing contact with the apertures 28 and 29 at all times. Thus, there can be no undesirable looseness or lateral

play during shifting movement of the detent since it is effectively guided and supported at both ends thereof. Another advantage of the present construction resides in the fact that the elongated construction of the spring member permits a substantially longer path of travel of the shiftable detent between its fully extended and fully retracted positions thereby utilizing the spring effect to full advantage. In addition, the relatively greater degree of permissible travel or movement of the detent allows a greater degree of outward projection of the outer end of the detent so as to insure a completely effective locking engagement of the detent within the socket aperture.

Another important advantage of the construction herein described resides in the great ease with which the retainer may be assembled. By reason of the slotted construction of the detent, it will be seen that the detent 31 can first be slipped into place in the aligned apertures 28 and 29 with the slot 39 in axial alignment within the spindle bore 26, and thereafter the spring member 36 is easily inserted through the open end of the bore 26 and forced inwardly through the slot 39 into seated position adjacent the base of the bore 26. During insertion of the spring member 36, the outwardly tapered inlet 27 to the bore 26 greatly facilitates the introduction of the spring member, it being understood that the leg portions 37 and 38 are compressed toward each other slightly during insertion of the U-shaped spring member so that the spring is under tension when the retainer is fully assembled.

Although the invention has been described in connection with certain specific structural embodiments thereof, it will be understood that various modifications and equivalent structures may be resorted to without departing from the scope of the invention as defined in the appended claims.

I claim:

1. In combination, a rotary spindle having an axial bore extending into the end portion of the spindle and a transverse bore intersecting said axial bore whereby to provide a pair of aligned transversely apertured portions on opposite sides of said axial bore, and means for releasably retaining a socket member on said spindle comprising a shiftable detent extending transversely through said apertured portions, said detent having an axially extending slot at one end thereof, and a generally U-shaped spring member disposed in said axial bore with the leg portions of the spring member extending through the slot in said detent, one of said leg portions engaging the interior of said axial bore at opposite sides of said transverse bore and the other leg portion of said spring member engaging said detent at the base of said slot for normally urging the detent outwardly for projection thereof into an aperture provided in the socket member, said detent being depressible against the action of said spring member for disengaging the detent from the socket aperture, and said detent being slidably supported at both ends thereof by said apertured portions in both the projected and depressed positions of the detent.

2. In combination, a rotary spindle having an axial bore extending into the end portion of the spindle and terminating in an end wall and a transverse bore intersecting said axial bore in spaced relation from said end wall whereby to provide a pair of aligned transversely apertured portions on opposite sides of said axial bore, and means for releasably retaining a socket member on said spindle comprising a shiftable detent extending transversely through said apertured portions, said detent having an axially extending slot at one end thereof, and a generally U-shaped spring member disposed in said axial bore with the closed end of the spring member abutting said end wall and with the leg portions of the spring member extending through the slot in said detent, one of said leg portions engaging the interior of said axial bore at opposite sides of said transverse bore and the other

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leg portion of said spring member having an inwardly offset bend with the outer end of said other leg portion in engagement with said detent at the base of said slot and said bend engaging the inner corner edge at the base of said slot for retaining the closed end of the spring member in abutment with said end wall whereby the spring member is prevented from inadvertent axial displacement from said axial bore and whereby said detent is normally urged outwardly for projection thereof into an aperture provided in the socket member, said detent being depressible against the action of said spring member for disengaging the detent from the socket aperture and said detent being slidably supported at both ends thereof

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by said apertured portions in both the projected and depressed positions of the detent.

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