

[54] **SOCKET RELEASE CONSTRUCTION FOR SOCKET WRENCH**

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 [51] Int. Cl.B25b 13/00, B25g 1/00
 [58] Field of Search.....81/121, DIG. 1, 57.39, 58.1, 81/60-62, 177 R, 177 G

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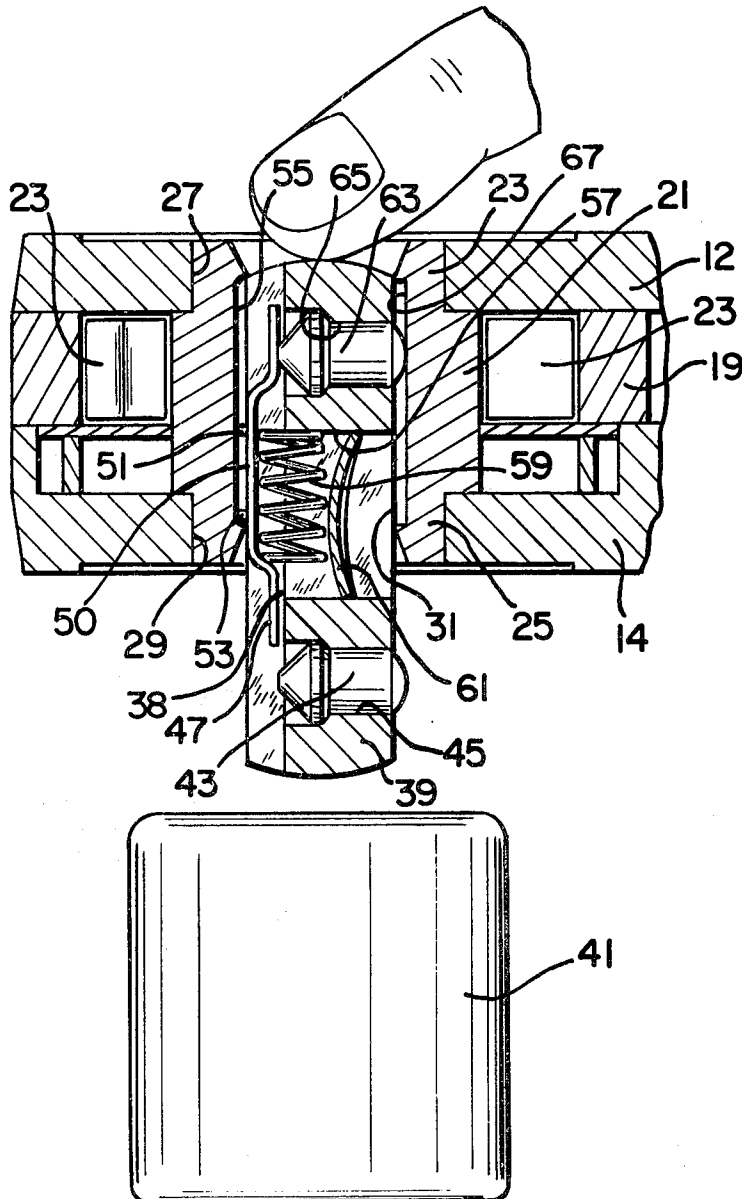
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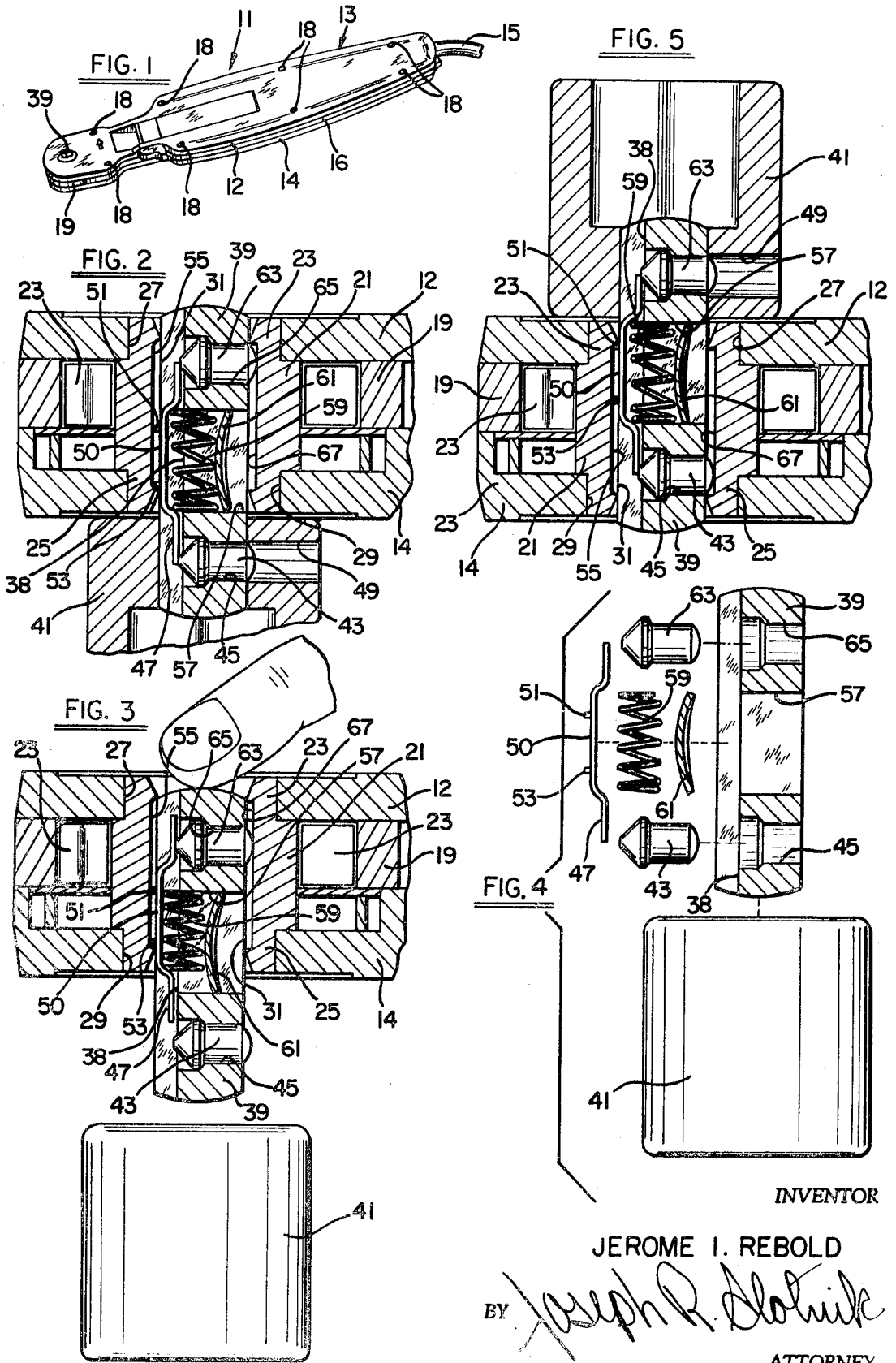
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[57] **ABSTRACT**

A wrench comprising an elongated housing having a transverse output rotary shaft at one end thereof. An oscillating pneumatic motor is disposed within the housing and is connected by a one-way clutch to the shaft to rotate the latter. A socket shaft extends through the output shaft and is adapted to extend beyond one end or the other of the output shaft and to have a socket mounted thereon. The socket shaft includes novel detent means to retain the socket thereon and to readily release the socket therefrom when desired.

14 Claims, 5 Drawing Figures





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SOCKET RELEASE CONSTRUCTION FOR SOCKET WRENCH

SUMMARY OF THE INVENTION

The present invention is directed to a novel socket release construction, including a drive shaft and a socket shaft to which a wrench socket is to be attached, for a socket-type wrench. The socket shaft is constructed to allow the socket to be snapped in place and facilitates quick release of the socket therefrom so that the socket can be removed without pulling. In this way, sockets can readily be removed and/or replaced with one hand even when the operator's hands are greasy or wet. In addition, the shaft assembly, which includes the drive and socket shafts, may be of the reversible drive type, i.e., one in which the drive shaft can be driven in either direction, or it may be of the double-ended, i.e., one in which the drive shaft is driven in only one direction but sockets can be attached to either end of the socket shaft. Furthermore, this shaft assembly can be used in a powered tool, a handtool, or one which employs both power and hand driven techniques commonly referred to as a nut runner.

Main objects of the present invention, therefore, are to provide a novel socket wrench shaft assembly including a socket release construction, which securely holds a socket in place thereon but which facilitates quick release and easy removal of the sockets therefrom.

Further important objects of the invention are to provide a novel socket wrench shaft assembly and socket release of the above character which is adapted for use in both hand and power operable wrenches, and in both single ended reversible, and double ended unidirectional socket wrenches.

Additional objects are to provide a novel shaft assembly and socket release of the above character which is relatively inexpensive to manufacture, rugged in construction, and reliable in use.

Other objects and advantages of the invention will become more apparent from a consideration of the detailed description to follow taken in conjunction with the drawings annexed hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating a powered nut runner embodying the invention;

FIG. 2 is an enlarged sectional view of a portion of the tool of FIG. 1 and shown with a socket in place thereon;

FIG. 3 is a view, similar to FIG. 2, and showing the parts in position during socket release;

FIG. 4 is an exploded view illustrating the socket shaft, socket, and detent assembly; and

FIG. 5 is a view similar to FIG. 2 but showing the socket shaft and socket in position for reverse operation.

BROAD STATEMENT OF THE INVENTION

Broadly described, the present invention relates to a socket wrench of the type which includes an elongated body, a transverse shaft assembly disposed adjacent one end of said body and including a push-through shaft having opposite ends adapted to extend laterally beyond said body selectively at opposite sides thereof, means interconnecting said shaft assembly and said body for conjoint rotation in one direction, socket means cooperatively engageable with the selected end of said push-through shaft and rotatable therewith, and means retaining said socket means in position on the selected extended end of said push-through shaft; the improvement which includes manually pushable means movable in the direction of the selected extended end of said push-through shaft and operable to release said retaining means from said socket means at said selected extended ends.

In another aspect, the present invention relates to a socket wrench comprising an elongated body having a socket shaft extending transversely thereto at one end thereof, said socket shaft extending outwardly of said body at one side for cooperative engagement with a socket, detent means on said

socket shaft and engageable with said socket to retain it in position on said socket shaft, resilient means normally biasing said detent means into retaining engagement with said socket, the other end of said socket shaft being accessible at the other side of said body and adapted to be manually pushed in one direction transversely of said body, said resilient means being restrained against movement in said one direction and being withdrawn from said detent means upon movement of said socket shaft in said one direction, whereby movement of said socket shaft in said one direction retracts said resilient means from said detent means and releases said socket from said socket shaft.

In yet another aspect, the present invention relates to a socket wrench comprising an elongated body, a rotatable shaft assembly extending transversely of said body at one end thereof, one-way clutch means between said body and said shaft assembly, said shaft assembly including an elongated socket shaft adapted to extend laterally from alternate sides of said body, detent means on both ends of said socket shaft and adapted to releasably retain a socket on the extended end thereof and to retain said socket shaft in a transverse position relative to said body thereon, spring means normally holding said detent means in a socket retaining position, said socket shaft being capable of relatively limited movement transversely of said body by manually pushing the nonextended end thereof, said spring means being restrained against transverse movement when said socket shaft undergoes said relatively limited movement releasable from the detent means at an opposite end of said socket shaft from said pushed end, whereby to release said last-mentioned detent means from a socket means at said opposite socket shaft end; said socket shaft being capable of relatively extended movement transversely of said body by manually pushing on the extended end thereof, whereby to cause the other end of said socket shaft to extend laterally of said body, said detent means operable to releasably retain a socket on the now extended end of said socket shaft and to retain said socket shaft in its now transverse position relative to said body.

DETAILED DESCRIPTION

Referring now more specifically to the drawings, a socket wrench embodying the present invention is illustrated generally at 11 in FIG. 1. The particular wrench 11 illustrated is known as a nut runner which, in one method of operation, utilizes an internal motor to drive a socket shaft to which a socket is attached, while in another method of operation, the socket shaft and socket are manually coupled to the body of the tool and are turned with the tool body using the latter as a handle. The present invention, however, transcends the particular nature of the wrench and finds use both in powered wrenches, hand wrenches, and those which are operable by hand or power.

With this in mind, the wrench 11 is seen to include an elongated body 13 including top and bottom covers 12, 14 and a spacer 16 secured together in sandwich fashion disposed therein and powered by compressed air supplied thereto through a conduit 15. The motor (not shown) oscillates a lever which includes a ring 19 rotatably supported at one end of the body 13 (see also FIG. 2). A driven shaft 21 is disposed within the ring 19 and has reduced end portions 23, 25 rotatably supported in openings 27, 29 in the top and bottom covers 12, 14 respectively.

For a detailed explanation of this motor construction, reference may be made to the copending application of Russell A. Fritts and Jerome I. Rebold, Ser. No. 44,068, filed June 8, 1970, and owned by the assignee of the present application.

The lever is connected to the shaft 21 by a one-way clutch 23 disposed within the ring 19 and around the shaft and this clutch 23 is designed to transmit rotation from the ring 19 to the shaft 21 in one direction while allowing the ring 19 to turn freely relative to the shaft 21 in the other direction. Thus, the one-way clutch 23 transmits both powered movement of the

lever 17 and hand rotation of the body 13 in one direction to the shaft 21 while allowing free relative movement between the shaft 21 and the lever 17 and body 13 in the other direction.

The shaft 21 includes a generally rectangular through opening 31 having an elongated socket shaft 39 nonrotatably disposed therein. The socket shaft 39 extends outwardly beyond one side of the driven shaft 21 and body 13 and is adapted to have a socket 41 nonrotatably fitted thereon. The outer end of the socket 41 is adapted to nonrotatably fit over a workpiece to be rotated such as a nut or bolt. Thus, the workpiece (not shown) is turned either by actuating the motor to oscillate the lever, or by manually turning the body 13 about the axis of the lever 19.

Conventionally, these sockets 41 are held in place on the socket shaft 39 by detent means so that one socket can be removed from the socket shaft and another different sized socket attached thereto quickly and easily. Thus, as shown, in FIG. 2, the socket shaft 39 has a stepped detent pin 43 positioned in a stepped bore 45 therein. A leaf-type spring 47 is disposed in a longitudinal slot 48 in the socket shaft 39 and bears against a conical rearward end of the pin 43 and normally maintains the other end slightly radially extended from the socket shaft 39. The socket 41 has a complimentary recess 49 therein which receives the extended end of the pin 43 in detent fashion to releasably hold the socket 41 in place on the socket shaft. The extended end of the detent pin 43 is rounded, as shown, for easy attachment of the socket 41 thereto.

Normally, these sockets are removed from their socket shaft by grasping and pulling on the socket, or by using, for example, a screwdriver or similar tool to pry the socket off the socket shaft. It will be appreciated that when the operator's hands are wet or greasy, it may be difficult for him to pull the socket off the socket shaft, and to use a screwdriver or other similar tool to pry the socket loose from the socket shaft requires keeping a special tool handy. In the construction of the present invention, the socket 41 can be so removed by grasping and pulling thereon; however, the present invention provides for ready release of the detent pin 43 from holding relation with the socket 41 so that the latter is quickly and easily removed from the socket shaft 39 with one hand and without pulling, and without any special tools.

As shown in FIG. 2, the leaf spring 47 includes an offset center portion 50 provided with a pair of tabs 51, 53 struck outwardly therefrom. The tabs 51, 53 are disposed in a longitudinal recess 55 in the driven shaft 21 and limit lengthwise movement of the spring 47 with the socket shaft 39 and relative to the driven shaft. In addition, the socket shaft 39 has a center cavity 57 with a coil spring 59 disposed therein. The spring 59 is held with a portion thereof positioned in the offset center portion 50 of the leaf spring 47 by a dished retainer 61 pressed into cavity 57.

In use, a socket 41 is pushed on the socket shaft 39 until the detent pin 43 snaps into the socket recess 47. When it is desired to remove the socket 41, the operator pushes the end of the socket shaft 39 opposite the end having the socket 41 thereon. The socket shaft 39 moves slightly, as shown in FIG. 3, whereas the leaf spring 47 cannot because of the position of tab 53 in the end of the recess 55. As the socket shaft 39 moves relative to the leaf spring 47, the coil spring 59 is compressed and the end of the leaf spring 47 moves clear of the tapered rearward conical end of the detent pin 43. Now, the detent pin 43 no longer holds the socket 41 which falls freely from the socket shaft 39. When the operator releases the socket shaft 39, the coil spring 59 returns it to the FIG. 2 position with the leaf spring 47 in engagement with the conical end of the detent pin 43.

The socket shaft 39 has another stepped detent pin 63 substantially identical to the pin 43 and disposed in another stepped bore 65 therein near the end of shaft 39 opposite the stepped bore 45. Like the detent pin 43, the pin 63 has a conical rearward end normally engaged by the leaf spring 47 while

its other end is rounded and normally extends radially from the socket shaft 39.

In the position of the parts shown in FIG. 2, the rounded end of detent pin 63 is located in the upper end of a recess 67 in the driven shaft 21 and together with the tab 53, which is positioned at the lower end of the recess 55, holds the socket shaft 39 with its lower end extending outwardly of the shaft 21 as shown. Since the shaft 21 is driven in one direction only, (through the one-way clutch 23), a socket 41 on this extended end of the socket shaft 39 is driven in this one same direction. When it is desired to turn a workpiece in the opposite direction, the socket shaft 39 is shifted to position its upper end extending outwardly beyond the shaft 21, and a suitable socket 41 is attached thereto. This is achieved by pushing on the lower end of the socket shaft 39 (after the socket 41 has been removed therefrom) and moving it transversely of the tool 11 until the detent pin 63 is moved into recess 67. This type of socket shaft is sometimes referred to as a "push-through" socket shaft. The parts will now be positioned as shown in FIG. 5 and a socket 41 is now positionable on the upper end of the socket shaft 39 and is retained in place by detent pin 63.

When it is desired to remove a socket 41 from this end of the socket shaft 39, the same technique is applied, that is, the operator presses on the other (lower) end of the socket shaft 39. This causes the socket shaft 39 to move slightly relative to the driven shaft 21 while the tab 51, now at the upper end of the recess 55, prevents the spring 47 from so moving. Thus, the spring 47 is withdrawn from the detent pin 63 and the socket 41 readily falls away therefrom.

By the foregoing, there has been disclosed a novel socket release assembly calculated to fulfill the inventive objects hereinabove set forth, and while a preferred embodiment has been illustrated and set forth in detail, various additions, substitutions, modifications and omissions may be made thereto without departing from the spirit of the invention.

We claim:

1. In a socket wrench of a type which includes an elongated body, a transverse shaft assembly disposed adjacent one end of said body and including a push-through shaft having opposite ends adapted to extend laterally beyond said body selectively at opposite sides thereof, means interconnecting said shaft assembly and said body for conjoint rotation in one direction, socket means cooperatively engageable with the selected extended ends of said push-through shaft and rotatable therewith, and means retaining said socket means in position on the selected extended end of said push-through shaft; the improvement which includes manually pushable means movable in the direction of the selected extended end of said push-through shaft and operable to release said retaining means from said socket means at said selected extended end.

2. A socket wrench comprising an elongated body having a socket shaft extending transversely thereto at one end thereof, said socket shaft extending outwardly of said body at one side for cooperative engagement with a socket, detent means on said socket shaft and engageable with said socket to retain it in position on said socket shaft, resilient means normally biasing said detent means into retaining engagement with said socket, the other end of said socket shaft being accessible at the other side of said body and adapted to be manually pushed in one direction transversely of said body, said resilient means being restrained against movement in said one direction and being withdrawn from said detent means upon movement of said socket shaft in said one direction, whereby movement of said socket shaft in said one direction, whereby movement of said socket shaft in said one direction retracts said resilient means from said detent means and releases said socket from said socket shaft.

3. A socket wrench comprising an elongated body, a rotatable shaft assembly extending transversely of said body at one end thereof, one-way clutch means between said body and said shaft assembly, said shaft assembly including an elongated socket shaft adapted to extend laterally from alternate sides of

said body, detent means on both ends of said socket shaft and adapted to releasably retain a socket on the extended end thereof and to retain said socket shaft in a transverse position relative to said body, spring means normally holding said detent means in a retaining position, said socket shaft being capable of relatively limited movement transversely of said body by manually pushing the nonextended end thereof, said spring means being restrained against transverse movement when said socket shaft undergoes said relatively limited movement and being releasable from the detent means at an opposite end of said socket shaft from said pushed end, whereby to release said last-mentioned detent means from a socket means at said opposite socket shaft end, said socket shaft being capable of relatively extended movement transversely of said body by manually pushing on the extended end thereof, whereby to cause the other end of said socket shaft to extend laterally of said body, said detent means operable to releasably retain the socket on the now extended end of said socket shaft and to retain said socket shaft in its now transverse position relative to said body.

4. A wrench as defined in claim 1 wherein said retaining means includes detent means normally biased by spring means into retaining engagement with said socket means, said manually pushable means being operable to withdraw said spring means from said detent means, whereby to release said socket means.

5. A wrench as defined in claim 4 wherein said push-through shaft includes a socket shaft, said manually pushable means comprising the nonextended end of said socket shaft.

6. A wrench as defined in claim 4 wherein said spring means includes a leaf-type spring, said socket shaft includes another detent means normally engaged by said leaf-type spring, said another detent means being engageable with means in said body when said socket shaft extends outwardly of said body at the other side thereof, whereby said first-mentioned detent means engages with said means in said body and said another detent means is adapted to retain a socket on said socket shaft at the other side of said body.

7. A wrench as defined in claim 1 wherein said shaft, assembly includes a driven shaft rotatably supported on said body, said push-through shaft comprising a socket shaft extending nonrotatably through said driven shaft and adapted to extend laterally beyond one end or the other of said driven shaft, detent means on either end of said socket shaft and adapted to releasably retain a socket on the extended end of said socket shaft said manually pushable means including the nonextended end of said socket shaft, said detent means being releasable from said socket when said socket shaft is pushed relative to said driven shaft toward said extended end.

8. A wrench as defined in claim 7 wherein said detent means includes a detent pin at either end of said socket shaft, spring means engageable with and normally biasing each said detent pin into a position to retain a socket on the extended end of said socket shaft, said spring being withdrawn from said detent

pin adjacent said extended end of said socket shaft when said socket shaft is displaced laterally toward said extended end relative to said driven shaft.

9. A wrench as defined in claim 8 which includes one-way clutch means between said shaft assembly and said body, said socket shaft being laterally displaceable relative to said driven shaft in a direction opposite said first-mentioned direction by manually pushing on said one end thereof, whereby to position said first-mentioned detent pin in cooperative engagement with said driven shaft and whereby said second detent pin is exposed for cooperative engagement with said socket.

10. A wrench as defined in claim 9 wherein said spring means includes a leaf-type spring extending generally lengthwise of said socket shaft, said detent pins being disposed in transverse bores in said socket shaft and each having one end engageable by said leaf-type spring, means limiting movement of said leaf-type spring lengthwise with said socket shaft, whereby said leaf-type spring is withdrawn from the detent pin in engaging relation with said socket when said socket shaft is pushed in said one direction.

11. A wrench as defined in claim 1 wherein said shaft assembly includes a driven shaft rotatably supported upon said housing, said push-through shaft comprising a socket shaft extending nonrotatably through said driven shaft, a detent member extending transversely through said socket shaft adjacent each end thereof, resilient means normally biasing said detent members in one direction to retain a socket member on the extended end of said socket shaft, said pushable means comprising the nonextended end of said socket shaft which is pushable to move said socket shaft transversely of said body toward said extended end, means restraining movement of said resilient means in said direction, whereby said resilient means is withdrawn from the detent member at said extended end to release said socket member.

12. A wrench as defined in claim 11 wherein said resilient means includes a relatively flat spring extending lengthwise of said socket shaft, said restraining means including cooperable shoulder means on said flat spring and said driven shaft.

13. A wrench as defined in claim 12 which further includes a coil spring carried by said socket shaft and engaged with said flat spring, whereby to normally bias said socket shaft in a direction toward said nonextended end.

14. A wrench as defined in claim 11 wherein said resilient means normally biases the detent adjacent said nonextended socket shaft end into engagement with recess means in said driven shaft to resiliently restrain said socket shaft against movement transversely of said body toward said nonextended end, said socket shaft being movable by pushing said extended end toward said nonextended end, whereby the detent previously engaged with said driven shaft recess means now is operable to releasably retain a socket on said socket shaft, and the detent previously operable to releasably retain a socket on said socket shaft is engageable with said driven shaft recess means.

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CERTIFICATE OF CORRECTION

Patent No. 3,638,519

Dated FEBRUARY 1, 1972

Inventor(s) JEROME I. REBOLD

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

AT COLUMN 4, LINE 67, "SOCKET SHAFT IN SAID ONE DIRECTION, WHEREBY MOVEMENT OF SAID" SHOULD BE OMITTED.

Signed and sealed this 19th day of September 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents