United States Patent [19]

Smyers, Jr. et al.

[11] **3,777,596**

[45] **Dec. 11, 1973**

[54] **RESILIENT QUICK RELEASE FOR SOCKET WRENCH**

[75] Inventors: **William H. Smyers, Jr.; Ronald D. Russo,** both of Wethersfield, Conn.

[73] Assignee: **The New Britain Machine Company,** New Britain, Conn.

[22] Filed: **Sept. 20, 1972**

[21] Appl. No.: **290,441**

[52] **U.S. Cl.** ..... **81/177 G**

[51] **Int. Cl.** **B25b 13/00**

[58] **Field of Search** ..... 81/177 R, 177 G, 81/121 R, 180 R, 57.39, 58.1, 60–62, DIG. 1; 287/DIG. 9, 119 R; 248/407–409; 24/211 R, 211 N

[56] **References Cited**

UNITED STATES PATENTS

1,660,989	2/1928	Carpenter	81/177 G X
3,638,519	2/1972	Rebold	81/177 G

Primary Examiner—Othell M. Simpson
Assistant Examiner—James G. Smith
Attorney—Robert S. Smith et al.

[57] **ABSTRACT**

A socket wrench has a driving member with a detent member projecting therefrom which may be retracted to quickly release the socket. Longitudinally disposed in the driving member for sliding movement, is an elongated pin having a resilient member carried thereon and engaging the detent member. The resilient member limits the outward movement of the detent member. Longitudinal displacement of the elongated pin forces the resilient member against an inclined surface of the detent member and urges the detent member into a withdrawn position. The resilient member allows manual removal of the socket from the driving member without damage to the detent member.

10 Claims, 5 Drawing Figures

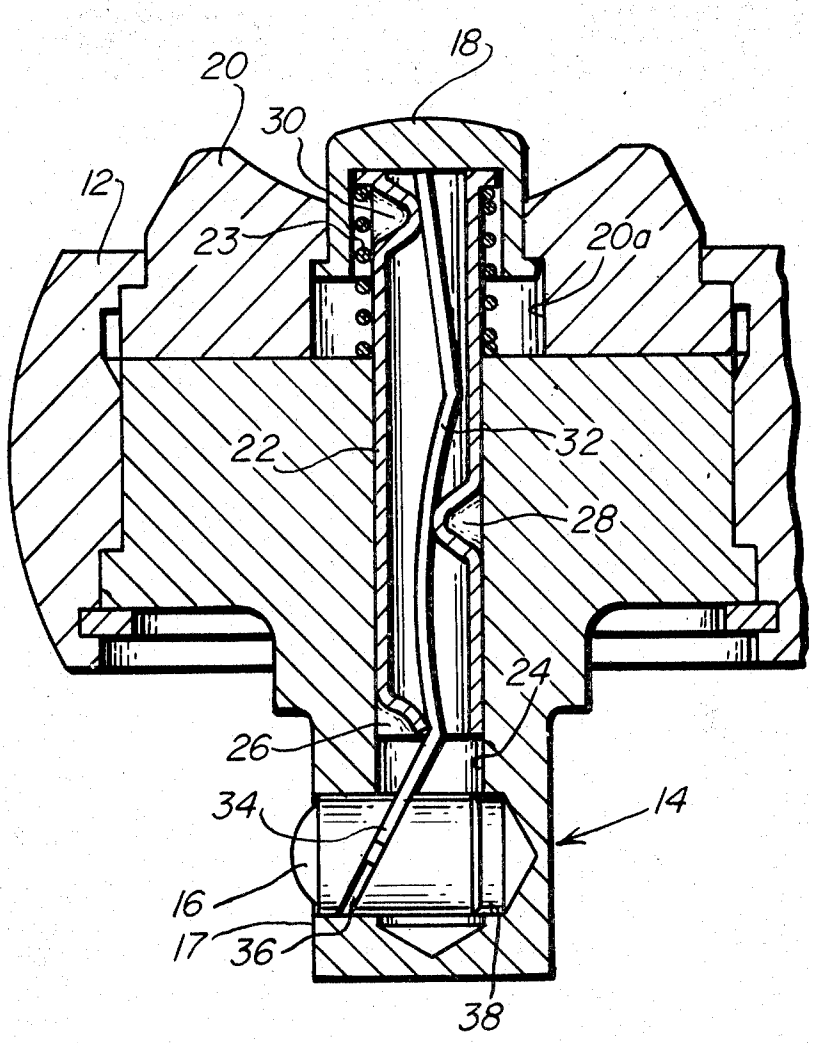
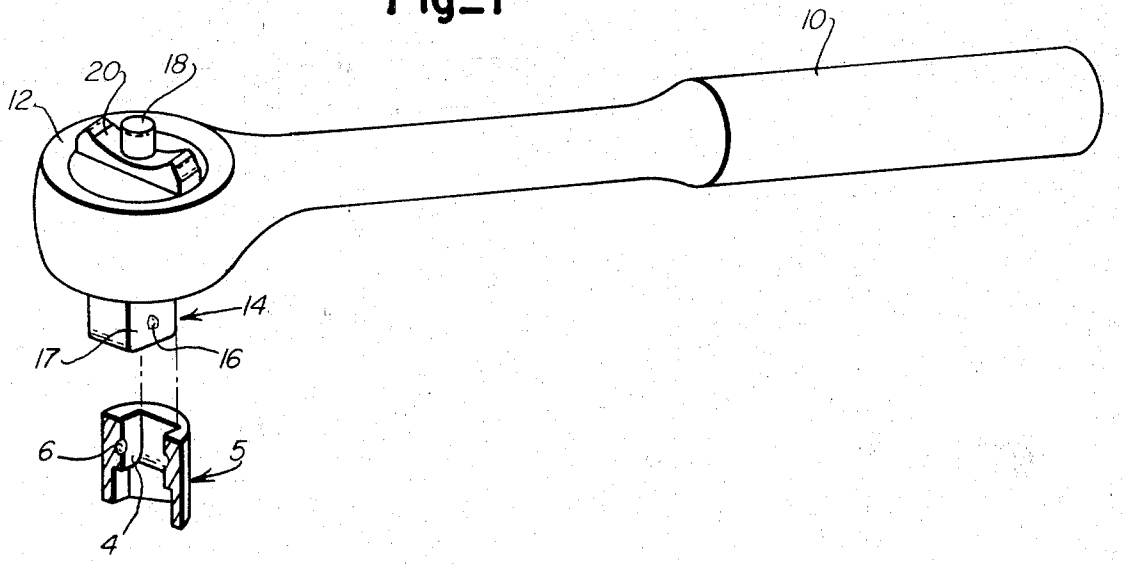


Fig_1



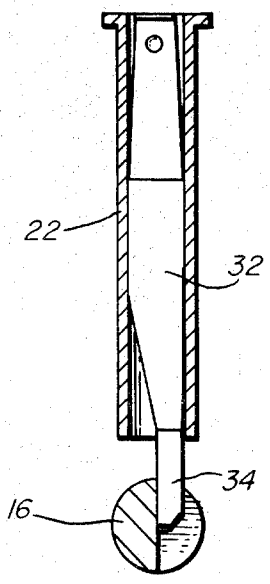


Fig_3

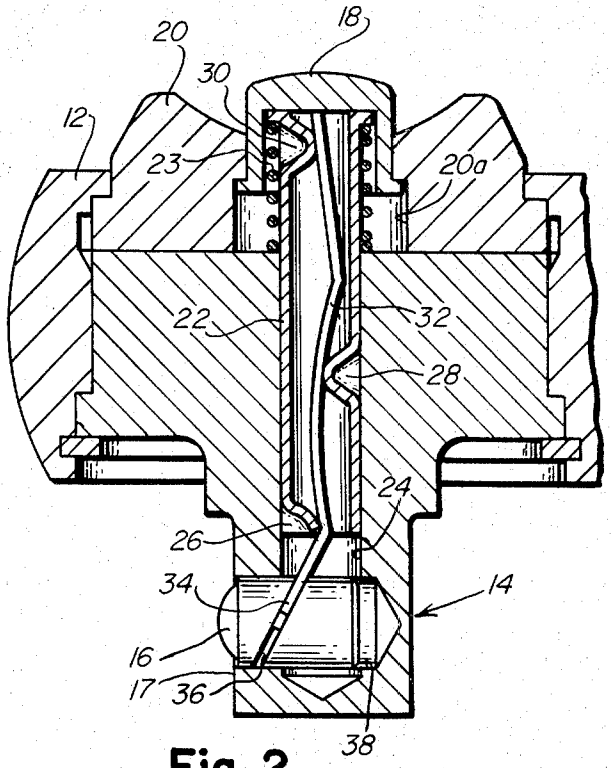


Fig_2

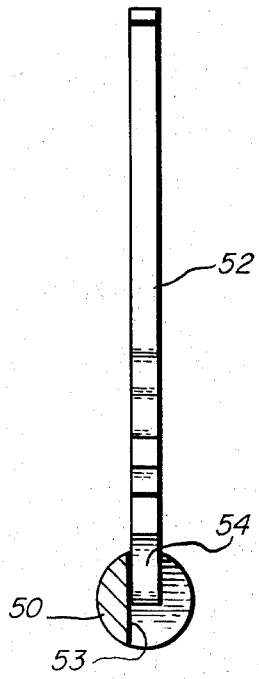


Fig_5

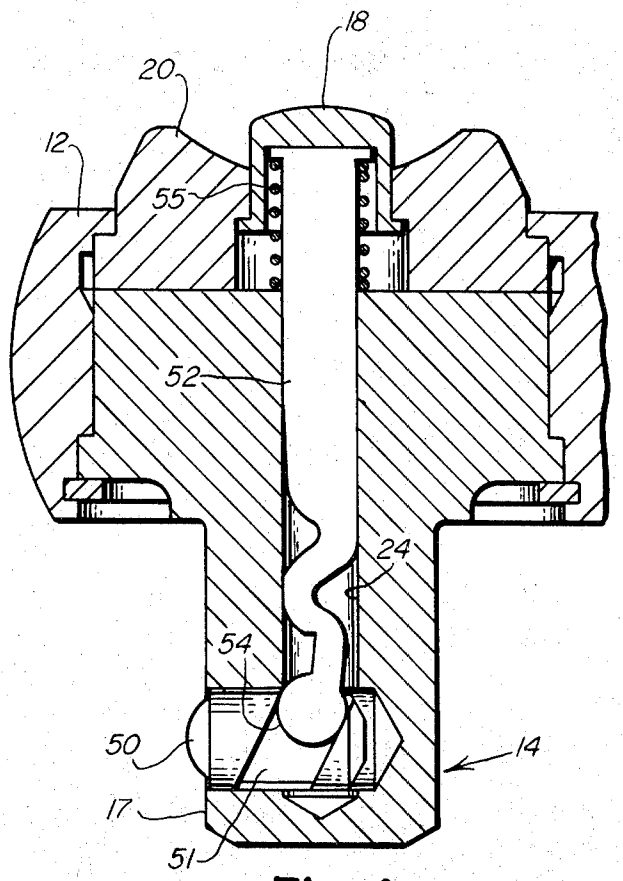


Fig_4

RESILIENT QUICK RELEASE FOR SOCKET WRENCH

BACKGROUND OF THE INVENTION

Socket wrenches are widely used where it is desired to drive a large number of sizes of theaded fastening devices. One problem associated therewith has been the removable sockets which have usually been retained by a ball detent assembly. One solution to this problem is described in an application filed Apr. 8, 1972, Ser. No. 132,289, having the same assignee as this application. That invention was a significant advance in the state of the art since it caused the detent assembly to be positively withdrawn rather than merely allowing forces imposed by a depending socket to urge the detent inwardly.

Many users of socket wrenches have been accustomed to manual removal of the socket and often instinctively continue to remove the sockets, at least occasionally, by manual means. In some earlier structures, this is detrimental to the detent, which most commonly is either a ball or an elongated cylindrical surface that may be crushed between the interior wall of the socket and a portion of the quick release mechanism.

SUMMARY OF THE INVENTION

It has now been found that the objects can be readily attained in a socket wrench assembly for use with an associated socket having a handle provided with a head portion and an elongated stud carried by the head in driving engagement. The stud has an extended portion extending from a surface of the head portion and having a wall cooperatively configured and dimensioned for engagement with the associated socket and also has a longitudinal passage through the extended portion as well as a transverse passageway in the extended portion communicating with the longitudinal passage and the wall. A detent member is slidably carried in the transverse passageway having an exterior end normally projecting out of the aperture of the passageway. An elongated push rod assembly slidably carried in the longitudinal passage is provided with resilient means having a first portion engaging a push member of the assembly and a second portion engaging the detent member. In one longitudinal position or socket detenting position, the second portion limits sliding movement of the detent member out of the aperture of the transverse passageway.

In its preferred aspect, the socket wrench assembly detent member is elongated and the resilient means engaging the detent is obliquely disposed with respect to the axis of the longitudinal passageway. The detent member may be provided with surfaces obliquely disposed with respect to the axis of the transverse passageway for engagement with the resilient means.

In one form, the resilient means comprises an elongated leaf spring having a plurality of bends between the ends thereof. In another form, the resilient means comprises an elongated spring having adjacent first and second sides. The first side is wider than the second side and is disposed in aligned relationship with the longitudinal axis of the elongated detent member. Most preferably, the second side edges have a plurality of curved regions. The second portion of the elongated spring has an enlarged end portion engaging the detent member which is of a generally planar circular form.

The inclined surfaces of the detent member engaging the elongated spring comprise the walls of a slot dimensioned for sliding or camming relationship with the generally circular form. The detent member is provided with a corresponding planar surface in sliding engagement with a planar side of the enlarged end portion of the elongated spring. The sliding engagement therebetween prevents angular movement of the elongated spring about the longitudinal axis thereof.

Accordingly, it is an object of the present invention to provide a novel socket wrench which is capable of rapidly and easily disengaging the detent mechanism from the socket used therewith and which limits the outward motion of the detent.

It is also an object of the invention to provide a quick release mechanism which allows manual removal of a socket without damage to the quick release mechanism.

Still another object is to provide a mechanism which will function without jamming and with minimum operational forces.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view to a reduced scale of a ratchet type socket wrench embodying the present invention, together with a sectional view of a socket;

FIG. 2 is a fragmentary simplified sectional view of the head portion in one embodiment of the invention;

FIG. 3 is a side elevational view of the spring utilized in the embodiment shown in FIG. 2 with the detent member and stud broken away which further illustrates the shape of the spring in that embodiment as viewed from the left side thereof;

FIG. 4 is a fragmentary simplified sectional view of the head portion of another embodiment of a quick release mechanism; and

FIG. 5 is a side elevational view of the spring utilized in the embodiment shown in FIG. 4 with the detent member and stud broken away which further indicates the particular shape of the spring.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now in detail to the attached drawing, there is illustrated in FIG. 1 a socket wrench assembly of the ratchet type having a handle **10**, a head **12** and a driving stud **14**. The stud **14** is preferably square and is provided with a detent member **16** projecting from one generally planar face **17**. The stud **14** is adapted to engage an aperture **4** of a socket **5**. A recess **6** in aperture **4** engages the detent member **16** for positive engagement therebetween. The position of the detent member **16** is controlled by a pushbuttom **18** projecting from the upper face of the head **12** in all embodiments. Also projecting from the upper face is a shift plate **20**. The form of the shift plate **20** is not part of this invention as it relates solely to the means for reversing the driving direction of the stud **14**.

One embodiment of the invention is shown in FIG. **2** in which the relationship between head **12**, driving stud **14**, pushbuttom **18** and shift plate **20** is more clearly shown. Pushbuttom **18** extends through a hole in shift plate **20** and has a circular radially extending flange which engages a counterbore **20a** of the shift plate **20**. The cooperative engagement therebetween allows the realtive movement of the pushbuttom **18** towards and away from the stud **14**. A tube **22** is slidingly carried

within a longitudinal passage **24** within head **12.** Usually the longitudinal passage **24** is aligned with the torque axis about which torque is applied to the socket **5.** The upper end of the tube **22** abuts the underside of the pushbutton **18.** The tube **22** is provided with indentations **26, 28** and **30** which cooperate with bends in a leaf spring **32** carried within the tube **22.** The bends and indentations **26, 28** and **30** stabilize the leaf spring **32** carried within the tube **22.** The lower end **34** of the spring **32** projects from the tube **22** and is slidingly received within an angularly disposed slot **36** in the detent member **16.** The detent member **16** is free to slide inwardly and outwardly in bore **38** of sutd **14** between socket releasing and socket detenting positions, limited only by the constraint imposed by spring **32.** Tube **22** is upwardly biased (as viewed) by coil spring **23** which also urges pushbutton **18** upwardly.

Spring **32** is heat treated to provide the required resiliency. As noted the projecting end **34** of spring **32** is slidingly received within a slot or open channel **36** in the side of and normally to bias the detent member **16** outwardly. As will be apparent by referring to FIG. **3,** the spring **32** is substantially a conventional leaf spring having several bends therein. The bends cooperate with the indentations in tube **22** to provide a stable mounting therebetween by preloading the spring **32** therebetween. Any flexure of the spring **32** will occur about such indentations. Spring **32** must be sufficiently rigid to properly constrain movement of detent member **16.** The spring **32** also must be sufficiently resilient to allow deflection of detent member **16** in the event the user of the ratchet should attempt to manually remove a socket **5** from the stud **14.** If the spring **32** does not have the required resiliency, the detent member **16** might be damaged if the socket **5** was manually removed without depressing pushbutton **18.**

Referring now to FIG. **4,** there is shown another embodiment having a head **12,** a driving stud **14,** a pushbutton **18** and a shift plate **20.** A detent member **50** is similar in overall shape to that provided in the embodiment shown in FIG. **2** and is accordingly most preferably elongated. A wider slot **51** having a longitudinally extending planar surface **53** dimensioned for sliding engagement with the generally planar side of the circular end **54** of a push rod spring **52.** The axially spaced sides **57** of the slot as well as surface **53** thereof, prevent angular movement of the spring **52** which would result in jamming of the mechanism. The generally planar circular end **54** is trapped between sides **57** of the slot as is evident in FIG. **4.** The spring **52** has two relatively wide parallel faces (one of which is in the plane of the drawing as shown in FIG. **4**), has edges which are curved at several regions and has a generally planar circular end **54** extending out of the longitudinal passage **24.** The serpentive-shaped spring **52** provides the necessary rigidity to constrain detent member **50** outwardly and the necessary flexibility to allow detent member **50** to be forced inwardly in the event the user of the ratchet wrench should attempt to manually draw a socket **5** from stud **14** without depressing pushbutton **18.** The curved regions effectively provide the spring action of a much larger flat spring. They are necessary since a corresponding flat spring would not fit into the available space within the longitudinal passage **24.** In the FIG. **4** embodiment, a coil spring **55** is provided between the upper end of the stud and a flange on the spring to urge the push rod spring **52** and pushbutton **18** upwardly and away from detent **50.**

As will be apparent by reference to FIGS. **2** and **4,** depressing pushbutton **18** in each embodiment forces, respectively, push rod springs **32** and **52** into an inclined slot in the detent member to cam it positively in both directions. In the embodiment shown in FIG. **2,** the slot **36** is relatively narrow to engage the relatively narrow leaf spring **32** of the push rod assembly. In the embodiment shown in FIG. **4,** the slot **51** is wider to engage slidingly the generally planar circular end **54** of spring **52.** The circularity of end **54** is desirable since this facilitates the sliding relationship between the circumference of end **54** and the sides of the slot **51.** In both embodiments, a relatively large spring force is provided to limit the outward movement of the detent member. The force required to urge or cam the detent member inward as a result of downward applied force is small in a properly dimensioned structure. The applied force is substantially aligned with the longitudinal axis of the push rod springs. In the embodiment shown in FIG. **2,** the tube **22** and leaf spring **32** are moved as an assembly; and the leaf spring is precompressed by the mounting provided by the tube **22.** Both in this embodiment and the embodiment shown in FIG. **4,** it is not necessary to overcome a spring force to urge a detent member inwardly. This is not generally true in earlier quick release mechanisms.

Although the concept of the present invention is applicable to any socket wrench, it will be seen that the most significant benefits are obtained from its use in ratchet type devices. This application is most desirable because such higher quality wrenches require a correspondingly superior performance.

As will be appreciated, the design of the quick release mechanism may vary somewhat from that illustrated herein, although the specific embodiments described are particularly preferred. It will be seen that the present invention provides a novel socket wrench with quick release features which permits facile disengagement of the detent mechanism from the socket used therewith and which limits outward motion of the detent member as well as positively retracting the detent member. In addition, the mechanism allows manual removal of a socket without damage to the detent mechanism as well as providing easy and jam-free operation.

We claim:

1. A socket wrench assembly for use with an associated socket comprising;

a a handle having a head portion;

b an elongated stud carried by said head in driving engagement, said stud having an extended portion for engagement with the associated socket and having a longitudinal passage through said extended portion and a transverse passage in said extended portion communicating with said longitudinal passage;

c a detent member slidably carried in said transverse passage having an exterior end normally projecting out of the aperture of said transverse passage;

d push rod means slidably carried in said longitudinal passage;

e resilient means having a first portion associated with said push rod means and a second portion engaging said detent member;

f said push rod means in one longitudinal position limiting sliding movement of said detent member out of said aperture.

2. A socket wrench assembly as set forth in claim **1** wherein said detent member is elongated.

3. A socket wrench assembly as set forth in claim **2** wherein said second portion of said resilient means engaging said detent member is obliquely disposed with respect to the axis of said longitudinal passage.

4. A socket wrench assembly as set forth in claim **3** wherein said detent member is provided with a surface obliquely disposed with respect to the axis of said transverse passage for engagement with said resilient means.

5. A socket wrench assembly as set forth in claim **4** wherein said resilient means comprises an elongated leaf spring having a plurality of bends between the ends thereof.

6. A socket wrench assembly as set forth in claim **4** wherein said resilient means comprises an elongated spring having parallel flat sides and parallel edges, said sides being wider than said edges and disposed in aligned relationship with the longitudinal axis of said elongated detent member.

7. A socket wrench assembly as set forth in claim **6** wherein said edges have a plurality of curved regions.

8. A socket wrench assembly as set forth in claim **7** wherein said elongated spring includes a generally circular member engaging said detent member, and said detent member includes a slot dimensioned for sliding relationship to said generally circular member.

9. A socket wrench assembly as set forth in claim **6** wherein said second portion of said elongated spring comprises a generally circular planar member, said detent member having a corresponding planar surface in sliding engagement with said generally circular planar member to prevent angular movement of said elongated spring about the longitudinal axis thereof.

10. A socket wrench having a handle and a drive stud,

a a first passageway in said drive stud extending along the torque axis,

b a second passageway in said drive stud transverse to said first passageway,

c a detent member movably mounted in said second passageway, and having a cam slot,

d a member movably mounted in said first passageway having a camming end disposed for movement within said cam slot,

e means biasing said member to a first position whereby said camming end serves to hold said detent member in an operative socket detenting position, and causes said detent member to be retracted to a socket releasing position when said member is moved to a second position, and

f said camming end of said member being formed to flex to permit movement of said detent member in a retracting direction when sockets are manually mounted or removed from said stud.

* * * * *

PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,777,596 Dated December 11, 1973

Inventor(s) William H. Smyers, Jr. and Ronald D. Russo

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

Column 1, line 10, "1972" should be --1971--.

Signed and sealed this 9th day of April 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

290