Feb. 28, 1928. 1,660,989

E. R. CARPENTER

WRENCH

Filed Jan. 27, 1927

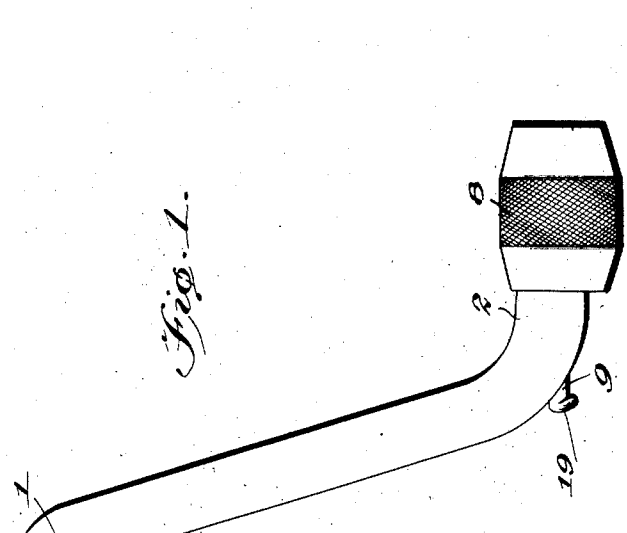

Fig. 1.

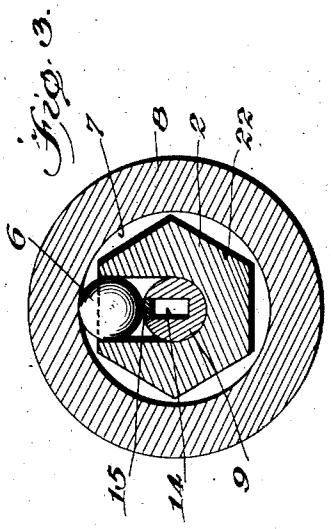

Fig. 3.

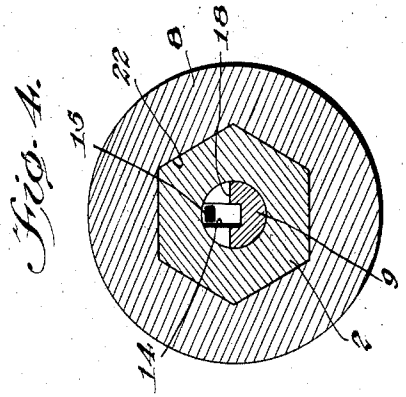

Fig. 4.

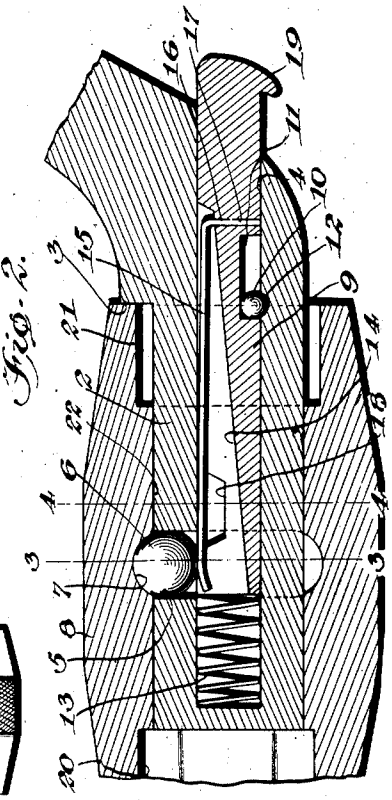

Fig. 2.

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UNITED STATES PATENT OFFICE.

EUGENE ROY CARPENTER, OF ANSONVILLE, NORTH CAROLINA.

WRENCH.

Application filed January 27, 1927. Serial No. 164,051.

My invention relates to improvements in wrenches of that type which comprises a handle member having socket members detachably and reversibly connected with the handle, and the invention consists in the combinations, constructions and arrangements herein described and claimed.

More specifically described the present invention contemplates an improvement over the socket wrench that is disclosed in Letters Patent of the United States No. 1,569,117, granted to me January 12, 1926, and an object of the present invention is to provide a locking device for holding reversible socket members firmly, although releasably, on the alined outturned ends of the arms of a substantially U-shaped handle that is used in the improved wrench.

A further object of the invention is the provision in a wrench of the character described of a locking means for holding the socket members against accidental displacement from the end portions of the handle of the wrench in such a manner that the locking means will be practically completely housed, and protected against accidental contact with an external object that might cause injury to the locking means or actuation of the locking means to release the socket members.

Other objects and advantages of the invention will be apparent from the following description, considered in conjunction with the accompanying drawings, in which

Fig. 1 is a side elevation of the improved wrench;

Fig. 2 is a fragmentary longitudinal section through locking means for holding the socket member in place on the end portion of the wrench handle;

Fig. 3 is a section substantially along line 3—3 of Fig. 2; and

Fig. 4 is a section substantially along line 4—4 of Fig. 2.

A wrench embodying the invention in the form now preferred by me comprises a handle having a substantially U-shaped body which is formed with alined outturned supporting end portions 2 at the extremities of the arms of the handle body. Each of the outturned end portions 2 is non-circular in cross sectional configuration from its outer end for the greater part of its length and is provided with an external shoulder 3 at the inner end of the non-circular portion thereof. The non-circular portion of each of the supporting end members of the wrench handle is straight for its entire length, and preferably is hexangular in cross sectional configuration. Each end portion 2 is provided with a bore 4 which extends through the associated bend portions of the handle at the juncture of that end portion 2 with an arm of the handle axially of the end portion 2 nearly to the outer end of the latter as clearly shown in Figure 2. This bore 4 communicates with a radial opening 5 that is formed through the end portion 2 at the inner side of the latter and which is located somewhat nearer to the outer extremity of the end portion 2 than to the shoulder 3 of that end portion 2. A ball latch member 6 is adapted to move radially in the opening 5 and has a diameter which is greater than the length of the opening 5 and less than the diameter of the opening 5 so that the ball latch member 6 will protrude from the opening 5 into a groove 7 in the inner periphery of a socket member 8 that is disposed on the end portion 2 when the ball latch member is supported in its outermost and latching position by a pin 9 in the bore 4 as shown in Figure 2. The pin 9 has limited sliding movement in the bore 4, which is determined by the engagement of a guiding and retaining pin 10 with the opposite ends of an elongated recess 11 that is provided in the pin 9. The guiding and retaining pin 10 is fitted into a hole drilled through the hexagonal part of the end portion 2. An expansion spring 13 is disposed between the inner end of the pin 9 and the end wall of the bore 4 and tends to maintain the pin 9 continuously in its outermost position in the bore 4 as shown in Figure 4. At this time, the inner end portion of the pin will support the ball latch member 6 in its outermost latching position in the opening 5 and the associated socket member 8 will be held in place on the end member 2 of the wrench handle. The pin 9 is provided with a longitudinally extending slot 14 in the side thereof that is next to the ball latch member 6. This slot 14 decreases the depth from the inner end of the pin 9 to the outer end of the slot 14 and the slot 14 extends in the pin 9 only a slight distance past cavity 11. The slot 14 has a width considerably less

than the diameter of the ball latch member 6 and is provided for the reception of the actuating arm 15 of a spring bar which also includes an arm 16 that extends substantially at right angles with the bar 15 and is secured in a transverse opening 17 in the pin 9 at the outer end of the slot 14. The actuating arm 15 of this spring bar extends past the opening 5 and therefore is in contact, at all times, adjacent to its extremity with the ball latch member 6. The pin 9 is provided at a slight distance from its inner end with a cavity 18 which is formed in the side of the pin 9 that is next to the ball latch member 6. The cavity 18 is sufficiently large to partially receive the ball member 6 when the cavity 18 is in register with the opening 5. The action of the spring 13 tends to maintain the pin 9 in its outermost position in the bore 4 and at such time the cavity 18 is located out of register with the opening 5 as shown in Figure 2. The cavity 18 intersects the slot 14 as shown and when it is desired to release the socket member 8 from the associated end portion 2 of the wrench handle, the pin 9 is forced axially inward against the action of the spring 13 until the engagement of the outer end of the cavity 11 with the guiding and retaining member 10 prevents further inward movement of the pin 9. The cavity 18 then will be disposed in register with the inner end of the opening 5 and the ball latch member 6 will move inward by force in the opening 5 out of the groove 7 so the socket member 8 will move partially into the cavity 18. This inward movement of the ball latch member 6 is effected against the action of the arm 15 of the spring member 15—16 which is not sufficiently strong to maintain the ball latch member 6 in its latching position but which will tend to prevent the ball latch member 6 from sticking or becoming frozen in place in the cavity 18. It is to be noticed at this point that the end walls of the cavity 18 are inclined oppositely so that the ball latch member 6 will be biased from its inner and non-latching position toward the position shown in Figure 2 when the latching pin 9 is returned from its inwardly pressed position to the position shown in Figure 2. It, therefore, will be apparent that clogging of the operating and latching parts of the device will be practically prevented so that uniformity of the operation of the latching mechanism for holding the socket member 8 on a supporting end portion of the wrench handle will be assured.

The pin may have the outer end thereof upset or enlarged laterally at 19 to adapt it for convenient manipulation by hand.

The socket member 8 is formed internally to produce the bore 22 which extends between the sockets 20 and 21 and which conforms in cross section configuration with the associated non-circular supporting end portion of the wrench handle, the aforesaid groove 7 is formed in the wall of the bore 22 intermediate the length of the latter and the socket member 8 is sufficiently longer than the associated non-circular end portion of the wrench handle to project beyond the extremity of the latter when the groove 7 is in position to partially receive the ball latch member 6, at which time the inner end portion of the wrench handle of the inner end of the socket member abuts the adjacent shoulder 3. At this time the outer end wall of the associated end portion of the wrench handle will be substantially flush with the bottom of the socket in the projecting end portion of the socket member 8.

It will be understood from the foregoing description that the constructions at the opposite ends of the handle member of the wrench are identical in essential respects. The sockets in the opposite ends of each socket member 8 preferably are of different sizes and the respective sockets of the two socket members 8 also will be of different sizes so that the improved wrench has sockets of two different sizes available for instant use when the socket members 8 are in place on the outturned end portions of the arms of the wrench handle, and so that two sockets of other different sizes can be quickly made available for use, merely by reversing the socket members 8 on their respective supporting end portions of the arms of the wrench handle. It also will be understood that a plurality of socket members 8 may be provided and used interchangeably on either or both of the outturned supporting end members of the wrench handle, such respective socket members of course having sockets of different sizes formed therein. The latching mechanism for releasably maintaining the socket members in place on the outturned end portions of the arms of the wrench will be completely housed and protected by portions of the associated socket members and the end portions of the wrench handle. Only the extreme outer end portions of the pins 9 of the holding means for the socket members are exposed and such exposed outer ends of the pins 9 are partially protected by the adjacent portions of the wrench handle. Also it will be noticed that the improved wrench does not include any laterally extending or projecting members for supporting parts of the holding means for the socket members. Therefore, opposite end portions of the wrench handle having the socket members thereon may be inserted and manipulated in places of relatively slight area.

Obviously, the invention is susceptible of embodiment in forms other than that which is illustrated in the accompanying drawings

and I therefore consider as my own all such modifications and adaptations as fairly fall within the scope of the appended claims.

I claim:—

1. In a socket wrench, a supporting member of non-circular configuration in cross-section, a socket member removably disposed on said supporting member, said socket member having an internal seat, said supporting member having a bore opening through the one end thereof and having a radial opening extending from said bore through the outer wall of the supporting member, the internal seat of said socket member being in register with said radial opening when said socket member is in place on said supporting member, a ball latch member movable in said radial opening to and from position to enter and engage with the seat in said socket member, and means slidable in said bore of the supporting member for releasably maintaining said ball latch member in engagement with the seat of said socket member.

2. In a socket wrench, a supporting member of non-circular configuration in cross-section, a socket member removably disposed in said supporting member, said socket member having an internal seat, said supporting member having a bore opening through the one end thereof and having a radial opening extending from said bore through the outer wall of the supporting member, the internal seat of said socket member being in register with said radial opening when said socket member is in place on said supporting member, a ball latch member movable in said radial opening to and from position to enter and engage with the seat in said socket member, a pin slidable in said bore of the supporting member to and from position to maintain said ball latch member in engagement with the seat of said socket member, and means for limiting the movement of said pin in said supporting member.

3. In a socket wrench, a supporting member of non-circular configuration in cross-section, a socket member removably disposed on said supporting member, said socket member having an internal seat, said supporting member having a bore opening through the one end thereof and having a radial opening extending from said bore through the outer wall of the supporting member, the internal seat of said socket member being in register with said radial opening when said socket member is in place on said supporting member, a ball latch movable in said radial opening to and from position to enter and engage with the seat in said socket member, a pin having limited sliding movement in the bore of said supporting member and projecting from the open end of said bore, said pin having a cavity in the side thereof that is next to said ball latch member, said cavity being spaced from the inner end of the pin and being adapted to receive a sufficient portion of the ball latch member to permit the latter to move out of the seat of said socket member when said cavity is in register with the radial opening of said supporting member and spring means within said supporting member acting on said pin to tend to maintain the cavity out of register with the radial opening of the supporting member.

4. In a socket wrench, a supporting member of non-circular configuration in cross-section, a socket member removably disposed on said supporting member, said socket member having an internal seat, said supporting member having a bore opening through the one end thereof and having a radial opening extending from said bore through the outer wall of the supporting member, the internal seat of said socket member being in register with said radial opening when said socket member is in place on said supporting member, a ball latch member movable in said radial opening to and from position to enter and engage with the seat in said socket member, a pin having limited sliding movement in the bore of said supporting member and projecting from the open end of said ball, said pin having a cavity in the side thereof that is next to said ball latch member, said cavity being spaced from the inner end of the pin and being adapted to receive a sufficient portion of the ball latch member to permit the latter to move out of the seat of said socket member when said cavity is in register with the radial opening of said supporting member, spring means within said supporting member acting on said pin to tend to maintain the cavity out of register with the radial opening of the supporting member, said pin having a longitudinal slot at the side thereof that is next to said ball latch member, said longitudinal slot intersecting said cavity, and a spring arm extending in said longitudinal slot and fixed at its outer end in said pin, the free end portion of said spring arm being in contact continuously with said ball latch member and said spring arm being ineffective to support said ball latch member when said cavity in the pin is in register with the radial opening of the supporting member.

5. In a wrench a handle having a non-circular supporting end portion, said end portion having an axial bore terminating short of the outer end of said supporting end portion, said supporting end portion having a radial opening spaced from the outer end of said bore, said latch handle having an external shoulder at the inner end of said non-circular supporting end portion of the handle, a socket member having sockets at its opposite ends and having a

bore extending between said sockets and conforming in cross sectional configuration with said non-circular end portion of the wrench handle, said socket member having an internal seat adapted to be located in register with said radial opening of the supporting member when either of the opposite ends of the socket member is in abutting relation to said external shoulder of the wrench handle, a ball member movable in said radial opening of the supporting member to and from position to protrude into the seat of the socket member, and spring pressed means in the bore of said handle member tending to maintain said ball latch member in engagement with the seat of the socket member.

6. A wrench handle having a non-circular supporting end portion, said end portion having an axial bore terminating short of the outer end of said supporting end portion, said supporting end portion having a radial opening spaced from the outer end of said bore, said wrench handle having an external shoulder at the inner end of said non-circular supporting end portion of the handle, a socket member having sockets at its opposite ends and having a bore extending between said sockets and conforming in cross sectional configuration with said non-circular end portion of the wrench handle, said socket member having an internal seat adapted to be located in register with said radial opening of the supporting member when either of the opposite ends of the socket member is in abutting relation to said external shoulder of the wrench handle, a ball member movable in said radial opening of the supporting member and from position to protrude into the seat of the socket member and spring pressed means in the bore of said handle member tending to maintain said ball latch member in engagement with the seat of the socket member, said spring pressed means including a pin slidable in the bore of the slide member, said pin having a cavity into which said ball member may project, said cavity having an inner wall adapted to bias said ball member outwardly in the radial opening when said pin is moved as required to position said cavity of the pin out of register with said radial opening of the supporting member.

7. In combination a tubular shank having a lateral opening in one side, a sleeve removably received on the shank, a pin slidable in the shank having a recess normally disposed to one side of the lateral opening, and a ball in the lateral opening and held into binding engagement with the sleeve by the pin and releasable to permit removal of the sleeve when the pin has been moved to a position where its recess will register with the lateral opening.

8. In combination a tubular shank having a lateral opening in one side, a sleeve removably received on the shank, a pin slidable in the shank having a recess normally disposed to one side of the lateral opening, and a ball in the lateral opening and held into binding engagement with the sleeve by the pin and releasable to permit removal of the sleeve when the pin has been moved to a position where its recess will register with the lateral opening, and means carried by the pin normally urging the ball into engagement with the sleeve.

9. In combination a tubular shank having a lateral opening in one side, a sleeve removably received on the shank, a pin slidable in the shank having a longitudinal slot opposed to the lateral opening and further provided with a recess normally disposed to one side of the lateral opening, a resilient arm carried by the pin and movable in the slot, and a ball in the lateral opening and normally held in binding engagement with the sleeve by the resilient arm, the pin being shiftable to a position to dispose its recess in registration with the lateral opening to permit the ball to move into the recess to permit removal of the sleeve upon manually shifting the latter in a longitudinal direction.

EUGENE ROY CARPENTER.