July 25, 1967 B. H. LYNN 3,332,304

REVERSIBLE SOCKET WRENCH HANDLE

Filed Aug. 10, 1965 2 Sheets-Sheet 1

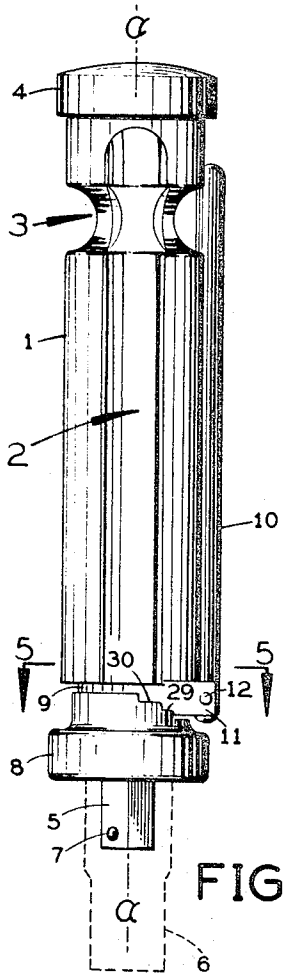

FIG. 1

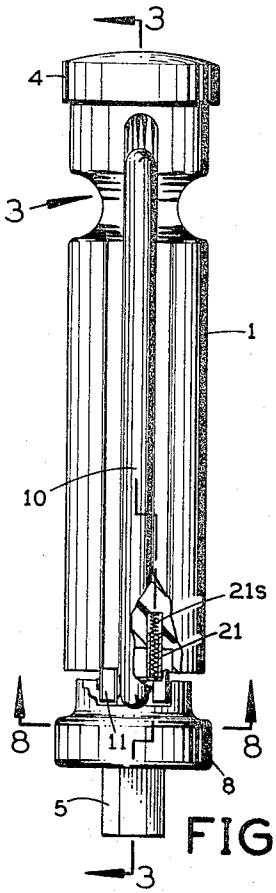

FIG. 2

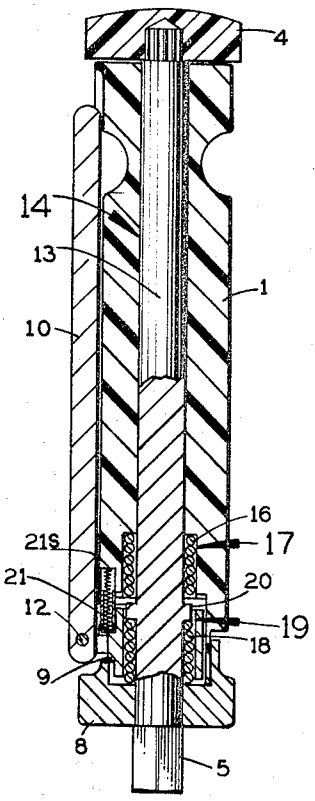

FIG. 3

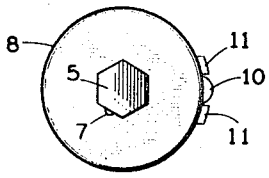

FIG. 4

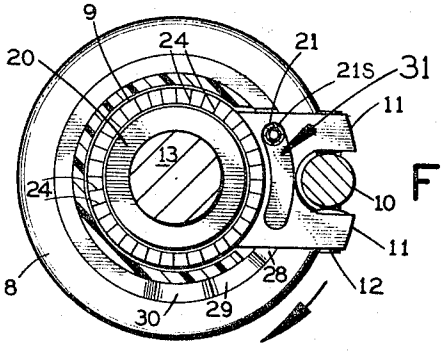

FIG. 5

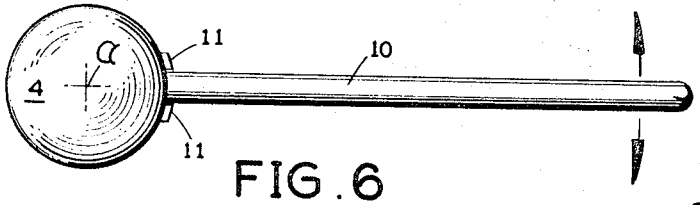

FIG. 6

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REVERSIBLE SOCKET WRENCH HANDLE

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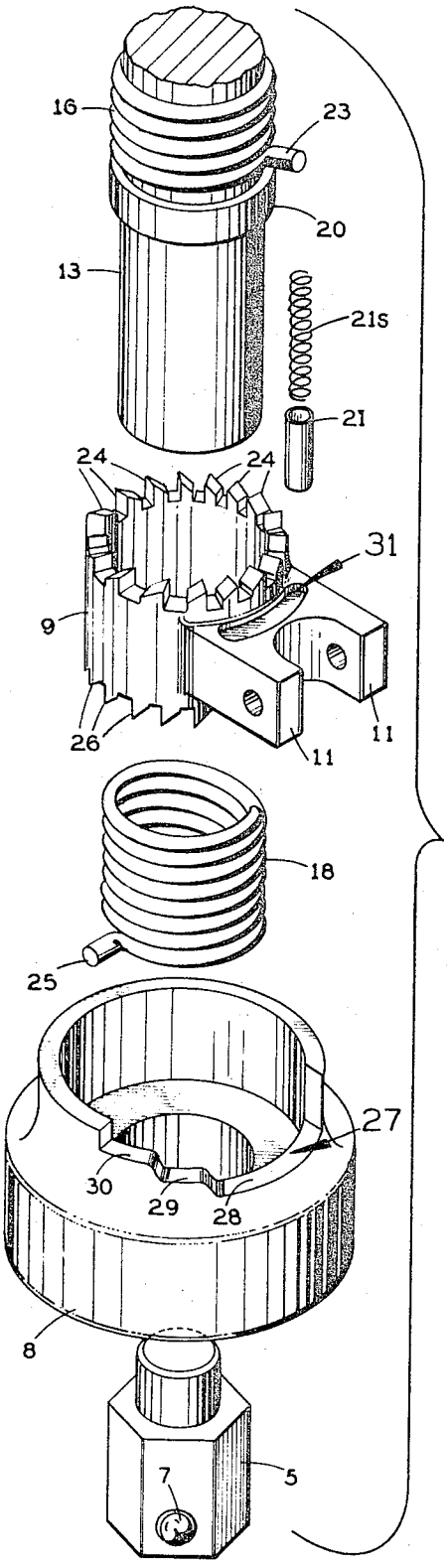

FIG. 7

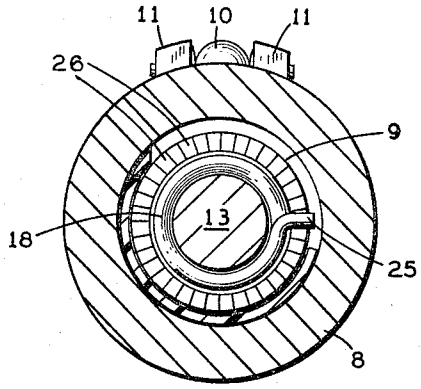

FIG. 8

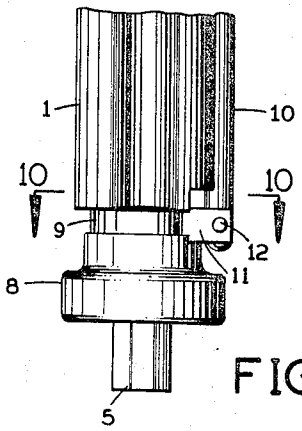

FIG. 9

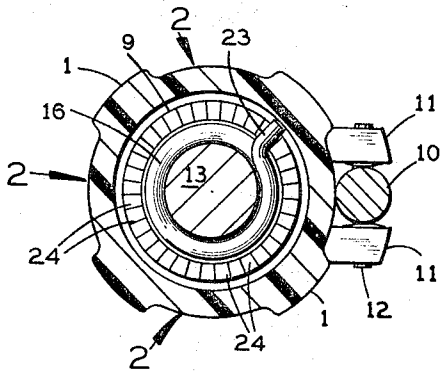

FIG. 10

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3,332,304

REVERSIBLE SOCKET WRENCH HANDLE

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3 Claims. (Cl. 81—58.1)

This invention relates in general to socket wrenches and more particularly to a reversible handle for normal use in coaxial position with the axis of the socket and including a flolding high torque lever.

Prior socket wrench handles of this general type with reversible pawl-wheel ratchet mechanism require a prerotation of a predetermined number of degrees of the handle to engage each successive tooth of conventional ratchet means, which means is not only costly and complicated but subject to failure because of the necessity of many coordinating parts. The inherent lost motion between handle and socket often prevents its use in close quarters and under restricted handle movement. Furthermore, the reversal feature of certain prior socket wrench handles was inaccessible while the wrench was engaged with a particular bolt head or nut.

The present invention overcomes the above objections and disadvantages by the provision of a coaxial wrench handle having a foldable high torque arm for setting and loosening bolts, nuts or cap screws requiring high torque by folding the high torque arm from an extended position to a folded position for the fast rotation of the socket.

A further object of the invention is the provision of a left and right clutch means where the rotary oscillation of the handle transmits uni-directional rotation to the driver and the socket attached thereto in either direction dependent upon the position of a selector member.

A further object of the invention is the provision of a pair of coil spring clutches with each adapted to segmentally uni-directionally rotate the driver in either direction without appreciable lost motion when the handle is oscillated about its principal axis through any predetermined angle.

These and other objects in one embodiment of the invention are described and shown in the appended specification and drawings, in which:

FIG. 1 is a side elevation of the socket wrench handle.

FIG. 2 is a side elevation of the handle shown in FIG. 1 turned 90 degrees about the axis thereof.

FIG. 3 is a cross sectional elevation taken through section line 3—3, FIG. 2.

FIG. 4 is a bottom plan view of the handle.

FIG. 5 is an enlarged cross sectional plan view taken through section line 5—5, FIG. 1.

FIG. 6 is a plan view of the handle shown in FIG. 1 with an element thereof in changed position.

FIG. 7 is an enlarged fragmentary exploded view of elements shown in FIG. 3.

FIG. 8 is an enlarged cross sectional plan view taken through section line 8—8, FIG. 2.

FIG. 9 is a fragmentary view of a portion of the wrench shown in FIG. 1, in changed position.

FIG. 10 is an enlarged cross sectional plan view taken through section line 10—10, FIG. 9.

Referring to FIG. 1 and in a preferred embodiment, the wrench handle 1 is molded from plastic material and generally cylindrical in shape having a principal axis *a*—*a* and includes four longitudinal flutes 2 and an outer peripheral groove 3 therein. The outer end of the handle terminates in a plastic cap 4 secured thereon. The lower end of the wrench terminates in a socket drive member 5 positioned coaxial with handle 1, on which a typical socket 6 is shown, in dotted lines, secured thereon by well known ball detent means 7, not shown in detail. A directional

control collar 8 is coaxially secured for limited angular movement about the axis of handle 1 and positioned between the lower end of the latter and the drive member 5. A clutch control 9 is positioned between the lower end of handle 1 and control collar 8. A torque lever 10 is pivoted in a clevis 11 integral with clutch control 9 by a pin 12 and is shown in its idle position in FIGS. 1, 2, and 3.

Referring to FIG. 3, a main shaft 13 is journalled for rotation in a coaxial bore 14 through handle 1 and is retained therein by fixed engagement of cap 4 on the upper end of the shaft and the shoulder of the drive member 5 which is secured to the lower end of the shaft 13 by well known means. The collar 8 is positioned for rotation on the shoulder of drive member 5, thus permitting the collar 8 to rotate about shaft 13 independent of the rotation of handle 1.

A left hand coil spring 16 is snugly retained around shaft 13 in a clearance counter bore 17 in the handle and a right hand spring 18 is snugly retained around shaft 13 in a counter bore 19 in clutch control 9. A collar 20 integral with shaft 13 is positioned between springs 17 and 19, as shown.

Referring to FIGS. 1, 2, and 3, a longitudinal recess in the lower end of handle 1 retains a hollow plunger 21 which retains a spring 21(*s*) which bears against clutch control 9 in pocket 31 and normally urges the latter in a direction toward collar 8.

Referring to FIG. 7, the lower end of left hand spring 16 terminates in a radial projection 23 with respect to the center of shaft 13, as shown, which projection is adapted to engage one of the upper teeth 24 on the clutch control 9 when registered therewith and the clutch control is moved upward on shaft 13, as will be hereinafter described. The right hand spring 18 terminates at its lower end in a radial projection 25 with reference to the shaft 13 when positioned directly beneath collar 20 within the bore through clutch control 9 for engagement with the lowermost teeth 26 when the control 9 is moved in a downward direction on shaft 13.

The FIGS. 8 and 10 illustrate the relative positions of lower and upper springs 16 and 18 with respect to their corresponding teeth 26 and 24, respectively, within the coaxial bores in clutch control 9 and bore 17 in handle 1. Clutch control 9 is provided with a segmental opening 27 having a pair of steps 28, 29 and 30 in the form of a crown cam, as shown, onto which the clevis 11 may selectively rest.

In operation and under the assumption that an appropriate socket is secured on drive member 5 and handle 1 is folded into the position shown and the collar is rotated to a position where the clutch clevis 11 is resting on step 28, better shown in FIG. 7, then the wrench is conditioned for manual rotation of bolt-head or nut in a clockwise direction by the normal grasping of the handle 1 and lever 10 in the hand.

It is now apparent that whichever tooth 26 of clutch member 29 is in engagement with projection 25 of spring 18 will grip the main shaft 13 and rotate the drive member 5 together with the handle 1.

It is also apparent that when reverse motion is applied to the handle, the projection 25 will move the spring counter-clockwise and thus free its engagement with shaft 10 through any counter-clockwise angle of rotation of handle 1.

When the collar 8 is rotated in a counter-clockwise direction with respect to handle 1, then clutch member 9 will be cammed upward from step 28 and step 29 onto step 30 by projection 11. This adjustment is made against the restraining action of spring 21(*s*) and plunger 21 which normally urges the clutch member in a downward direction with respect to handle 1. When clutch member 9 is

in its aforesaid upper position, spring projection **25** will be disengaged from any tooth **26** and projection **23** of spring **16** will be engaged by any one of the teeth **24** on clutch member **9**. Thus, counter-clockwise rotation of handle **1** will move projection **23** in the same direction and grip shaft **13** and the drive member **5** in a counter-clockwise direction through any angle corresponding with movement of the rotation of the handle. It is apparent that any oscillating driving motion in either direction may be applied to the driving member **5** depending upon the above described two positions of collar **8**. It is also apparent that when collar **8** is turned to a position whereby projection **11** is resting on the neutral step **29** that the handle and clutch are free to rotate about the shaft **13** or to permit the free roation of the drive member with respect to the handle.

It is also apparent that the handle **1** is securely engaged with torque lever **10** and rotates with the latter in its corresponding flute or groove **2**, as shown in FIG. 1.

When a high torque force is required by the device, the torque lever **10** is folded into a downward position, as shown in FIG. 6, which will permit the handle **1** to be free for rotation on shaft **13** and to be held by the hand while the remaining hand may apply high torque oscillatory angular forces to the lever **10** in either direction dependent upon the pre-selected position of collar **8**.

It is further apparent that the drive member may be engaged with tools other than socket wrenches, such as hex drivers and screw drivers of various sizes.

It is understood trat certain modifications in the construction, utilizing the features above described, are intended to come within the scope of the appended claims.

Having described my invention, I claim:

1. In a socket wrench handle of the character described a means forming an elongated handle symmetrical about a central axis with a coaxial bore therethrough and a coaxial counter bore in one end thereof,

a shaft journalled for rotation in said bore terminating in a drive member at one end thereof projecting from said counter bore for retaining each of a plurality of snap-on sockets or other coaxial tools,

a coil spring tensioned around said shaft and positioned within said counter bore with the lower end thereof projecting therefrom in a direction radial to said axis for rotating said shaft when said projection is moved in a clockwise direction and rotating about said shaft when moved in a counter-clockwise direction,

a circular flange means around said shaft adjacent the opposite end of said spring for preventing upward movement on said shaft,

a cylindrical clutch member having a coaxial bore therein positioned in said counter bore for oscillatory movement about said spring,

said member having a plurality of teeth projecting from the lower edge thereof for engaging said projection including an integral abutment projecting from one side thereof,

a crown cam means journalled on said shaft adjacent the upper end of said drive means for engaging said abutment and moving same from a neutral to a lower drive position when rotated whereby said clutch member will engage one of said teeth dependent upon the relative position of same and condition said wrench handle for moving said drive member in a clockwise direction when said handle is oscillated through any angle about said axis.

2. The construction recited in claim **1** including a recess in the side of said handle parallel said axis,

a torque lever pivotally secured at one end thereof to to said abutment and foldable from a position in said recess to a position normal said axis.

3. The construction recited in claim **1** including a spring and plunger means biased between said handle and said abutment for urging said clutch member into said neutral position.

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