Feb. 23, 1971 C. F. BATCHELDER 3,564,955

HIGH TORQUE WRENCH ASSEMBLY

Filed Feb. 5, 1969 2 Sheets-Sheet 1

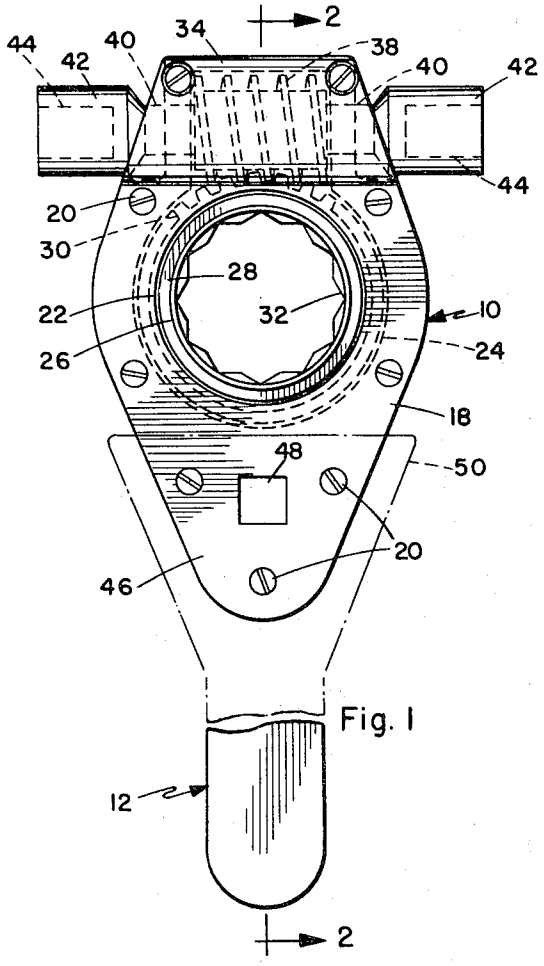


Fig. 1

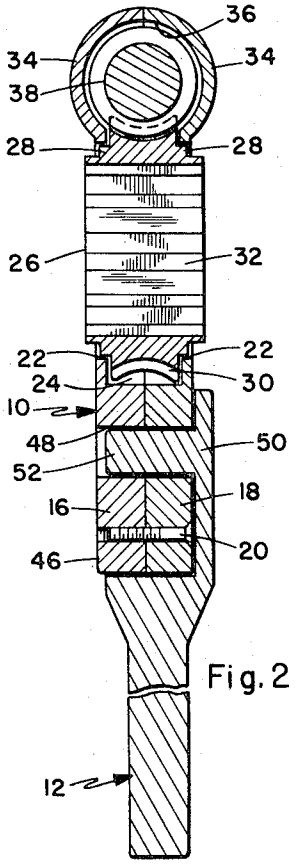


Fig. 2

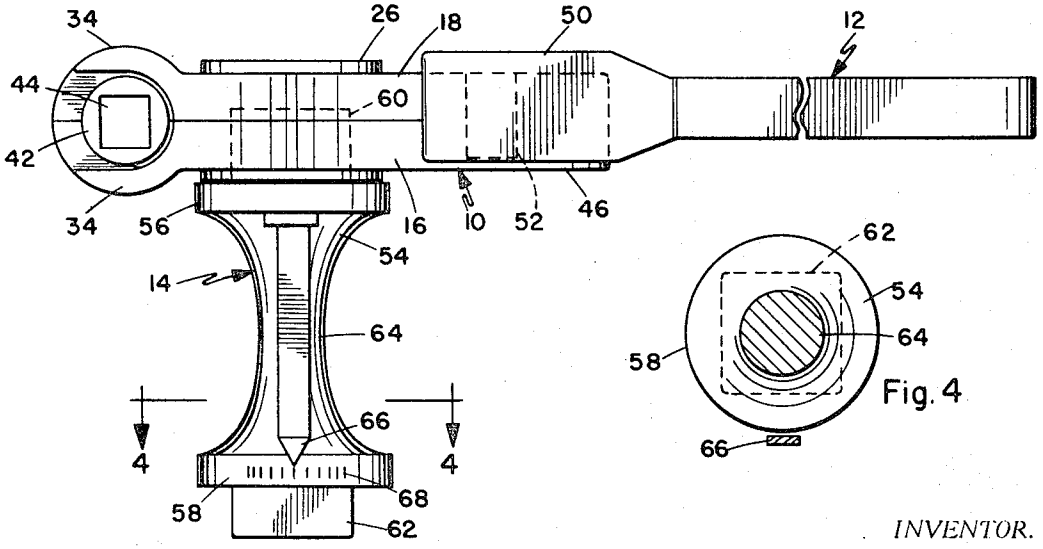


Fig. 3

Fig. 4

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HIGH TORQUE WRENCH ASSEMBLY

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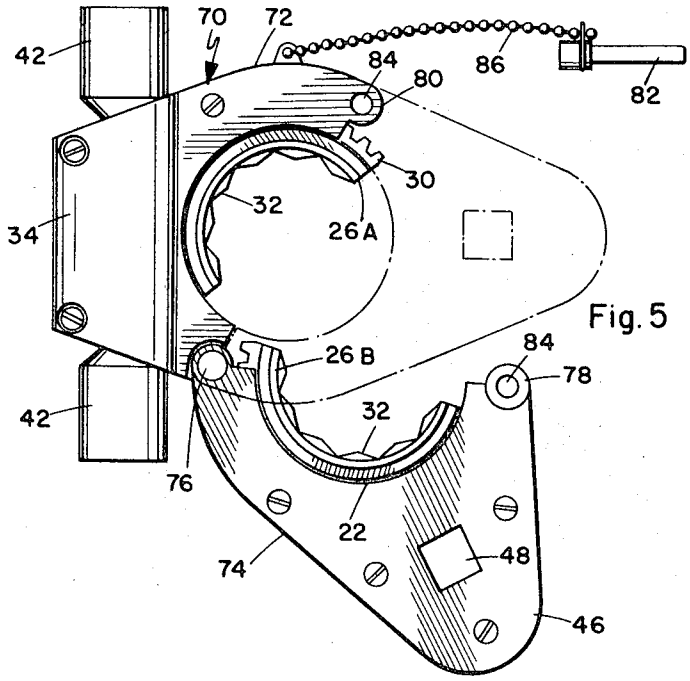


Fig. 5

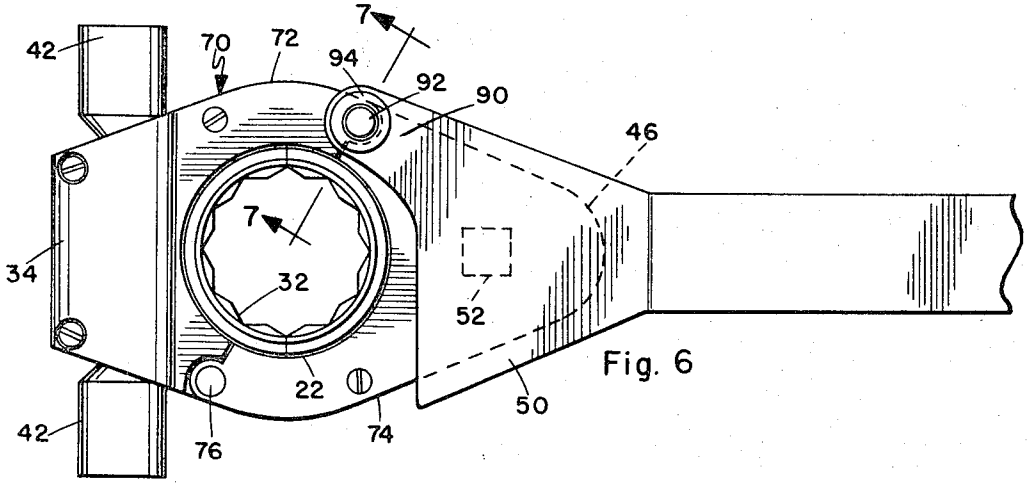


Fig. 6

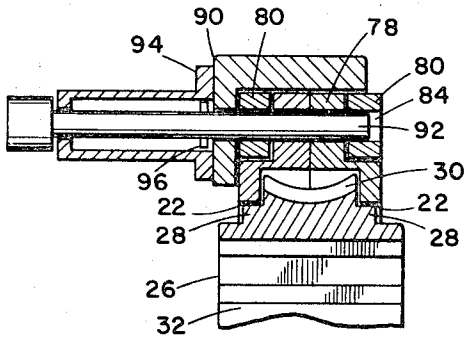


Fig. 7

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HIGH TORQUE WRENCH ASSEMBLY

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U.S. Cl. 81—57.29 8 Claims

ABSTRACT OF THE DISCLOSURE

The wrench assembly is for very high torque applications and uses a worm type mechanism adapted to be power driven. The body of the wrench has a socket to receive a locking bar or stabilizing bar to hold the wrench against rotation, and the wrench body may be unitary or a hinged opening type. A special extension driving element, which fits into the wrench, incorporates a special torsion type torque indicator particularly suited to the high torque range of the wrench.

BACKGROUND OF THE INVENTION

The present invention relates to tools and specifically to a high torque wrench assembly.

In the maintenance of heavy machinery, construction equipment and vehicles it is often necessary to apply a very high torque to tighten or loosen large nuts, bolts and similar elements. Hand wrenches for this purpose are heavy and require long handles for leverage. Pneumatic impact wrenches are also used, but accurate control of torque is difficult and the common types of torque indicators are not suitable for very high torque ranges. Geared wrenches are available with reduction drives of many types, but usually incorporate ratchets and other small mechanisms which limit the power that can be applied.

SUMMARY OF THE INVENTION

The wrench assembly described herein includes a rugged wrench unit with a simple worm type reduction, directly driving a collet which will hold a variety of sockets and other drive elements. The worm can be driven from either end in either direction and the wrench unit has a socket to receive a stabilizing bar, which holds the wrench unit against rotation. An extension driving element fits into the collet and incorporates a torsion type torque indicator to provide direct indication of the high torque being applied. For use on nut or collar elements having no open end over which a wrench can be placed, the wrench unit is hinged to open and the collet is split, a single fastening securing the unit in place.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the wrench unit and stabilizing bar, the bar being partially in broken line;

FIG. 2 is a sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is a side elevation view of the complete wrench assembly, with the torque indicator;

FIG. 4 is a sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a plan view of the hinged form of the wrench unit, in open and closed positions;

FIG. 6 is a plan view of the hinged wrench unit with a stabilizing bar attached; and

FIG. 7 is an enlarged sectional view taken on line 7—7 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The simple rugged structure of the wrench assembly makes it particularly suitable for very high torque applications, on the order of thousands of foot pounds, but the use is not necessarily limited to such a range.

The assembly includes three basic parts, a wrench unit 10, a stabilizing bar 12 and a torque indicator 14. In the form shown in FIGS. 1–3, the wrench unit 10 comprises a casing made in two halves 16 and 18, secured together by any suitable means such as the screws 20. If screws are used the casing half 16 is threaded, but otherwise the two halves are identical. Each casing half has a circular opening 22 with an internally undercut circumferential channel 24 to hold a collet 26, the collet having boss portions 28 which fit closely in openings 22, so that the collet is rotatable and held in alignment. Integral with collet 26 is a circumferential worm gear 30, which rides in channels 24. The center of collet 26 has a multi-sided bore 32, adaptable to square or hexagonal elements, the configuration being well known. A variety of inserts, adapters, socket elements and other accessories may be held in the collet, depending on the particular use.

At one end of the casing the two halves have barrel portions 34 enclosing a cylindrical chamber 36 in which is a worm 38 rotatably mounted in mesh with worm gear 30. Each end of worm 38 has a stub shaft 40 on which is an adapter 42 for connection to driving means. As illustrated, each adapter 42 has a square socket 44 to provide a secure connection for a fluid or electric motor, or a crank, the actual source of operating power not being critical. At the other end the casing has a tapered extended portion 46 with a square, or otherwise non-circular retaining socket 48 extending through both casing halves. In areas of limited access, or where the structure is convenient, a bar of suitable strength (not shown) may be passed through socket 48 and allowed to bear against adjacent structure, to prevent the wrench unit from rotating while being driven.

Where space permits the wrench unit is held by a laterally extending stabilizing bar 12, which has a recessed head 50 fitting closely over the extended end portion 46, the head having a plug 52 which seats in socket 48, as in FIG. 2. The stabilizing bar 12 is thus securely held in place and may be allowed to bear against convenient structure, or restrained in any suitable manner to hold the wrench unit against rotation. If necessary, a simple detent or locking means may be used to hold the stabilizing bar in place on the wrench unit.

Since the commonly used type of torque indicator is not suitable for very high torque, a special indicator 14 is incorporated into an extension driving element of the wrench. The torque indicator 14 comprises a post 54 having flanges 56 and 58 at opposite ends. At flanged end 56 is a non-circular plug 60 which is held in the bore 32 of collet 26, and at the other end is a plug 62 for attachment of suitable tools or driven elements. Post 54 is shown as tapering from both ends to a reduced diameter central portion 64 so that torque will cause the post to be twisted in the manner of a torsion bar. The specific configuration of the post will depend on the range of torque to be handled and the elasticity of the material used. To provide direct indication of torque, a pointer 66 is fixed to flange 56 and extends to flange 58, to be read against a suitable scale 68 on the latter flange.

For operation where access is limited, or for engaging nut or collar elements having no clear end over which the wrench can be placed, the modified wrench unit 70 shown in FIGS. 5–7 is used. Except for the casing being hinged, the wrench unit 70 is similar in structure to wrench unit 10 and pertinent portions are correspondingly numbered.

The casing is divided into a drive portion 72, containing the worm drive, and a gate portion 74 which in-

corporates the extended end **46**, with socket **48**. At one side the drive portion and gate portion are pivotally connected by a hinge pin **76** on an axis parallel to the collet axis so that the gate portion swings in the plane of the casing. Diametrically opposed to hinge pin **76**, across opening **22**, the gate portion **74** has a projecting boss **78** which fits closely between lugs **80** on the drive portion **72**, the connection being secured by a retaining pin **82** in a common bore **84** through the interfitting boss and lugs. For convenience the retaining pin **82** may be attached to the casing, as by a bead chain **86**.

The collet is diametrically split into two halves **26A** and **26B**, to separate with the casing portions. Due to the close fit of the collet in the casing, no special fastening means is needed to hold the collet halves together when the casing is closed, as in FIG. 6.

Stabilizing bar **12** may be used with the wrench unit **70**, or a modified stabilizing bar **88** shown in FIGS. 6 and 7 may be used. The stabilizing bar **88** is similar to bar **12** except for an arm **90** which extends along the side of the casing to the position of the retaining pin. For added convenience, a retaining pin **92** is mounted on arm **90** and is slidable in a hollow cap **94** fixed on the arm. A stop pin **96** fixed through retaining pin **92** and enclosed within the cap **94**, serves to hold the retaining pin on the stabilizing bar at all times, so that a separate pin is unnecessary.

The simple direct worm drive can be made very rugged and is fully enclosed for protection. While a ratchet or drive reversal means could be incorporated, the simple structure is preferred, since the direction of drive rotation can be reversed, or the drive can be changed from one adapter **42** to the other when necessary.

I claim:

1. A high torque wrench assembly, comprising:

a wrench unit having a casing;

a collet rotatably mounted in said casing and having an accessory receiving bore therein, said collet having a peripheral worm gear;

a worm mounted in said casing in driving mesh with said worm gear and having a drive connected adapter on at least one end thereof;

said casing having an open ended retaining socket therein, spaced from said collet, a laterally extending rotation preventing stabilizing bar being received in said socket.

2. The structure of claim **1** in which said elongated stabilizing bar has a head closely fitting over the portion of said casing containing said retaining socket, said head having a plug seating closely in said socket.

3. The structure of claim **1** and including an extension post having a plug at one end seating in said collet bore and an accessory attachment portion at the other end, said post comprising a torsion bar and having torque indicating means thereon.

4. The structure of calim **3**, wherein said torque indicating means comprises a pointer fixed to one end of said post and a torque scale on the other end of the post, against which said pointer is read.

5. The structure of claim **1**, wherein said casing has a movable portion separated substantially diametrically of the collet and hinged to swing about an axis parallel to the collet axis, and retaining means securing the casing portions together.

6. The structure of claim **5**, wherein said collet is split diametically to separate with the casing portions.

7. The structure of claim **5**, wherein said retaining means includes interfitting lug elements on the casing portions, with a common bore therethrough substantially parallel to the hinge axis of the movable portion, and a retaining pin removably secured in said common bore.

8. The structure of claim **7** in which said elongated stabilizing bar has a head closely fitting over at least part of said movable portion, said head having a plug seating closely in said socket, and said retaining pin being mounted on said stabilizing bar.

References Cited

UNITED STATES PATENTS

2,429,569	10/1947	Stewart	81—57.29
3,272,037	9/1966	Bruehl	81—57.29
865,544	10/1901	Weimar	81—57.29
2,787,180	4/1957	Fish	81—57.29
2,151,953	3/1939	Zimmerman	73—139

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