Aug. 20, 1957 C. A. CASADY ET AL 2,803,133

TORQUE WRENCH

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FIG. 1

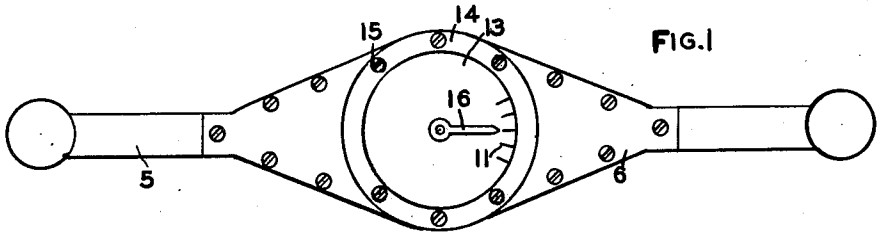


FIG. 2

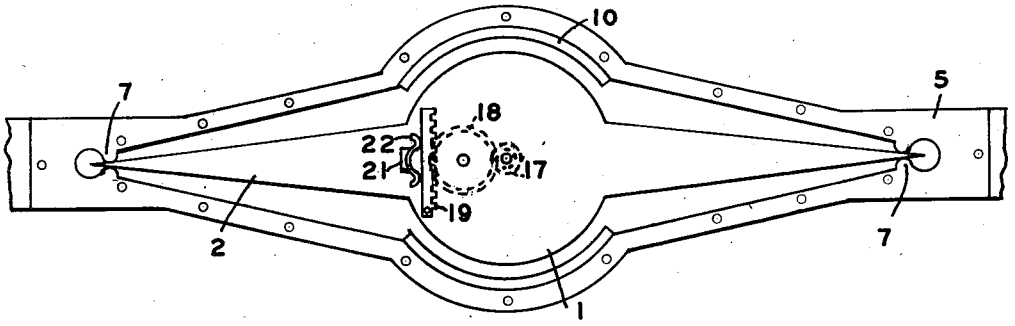
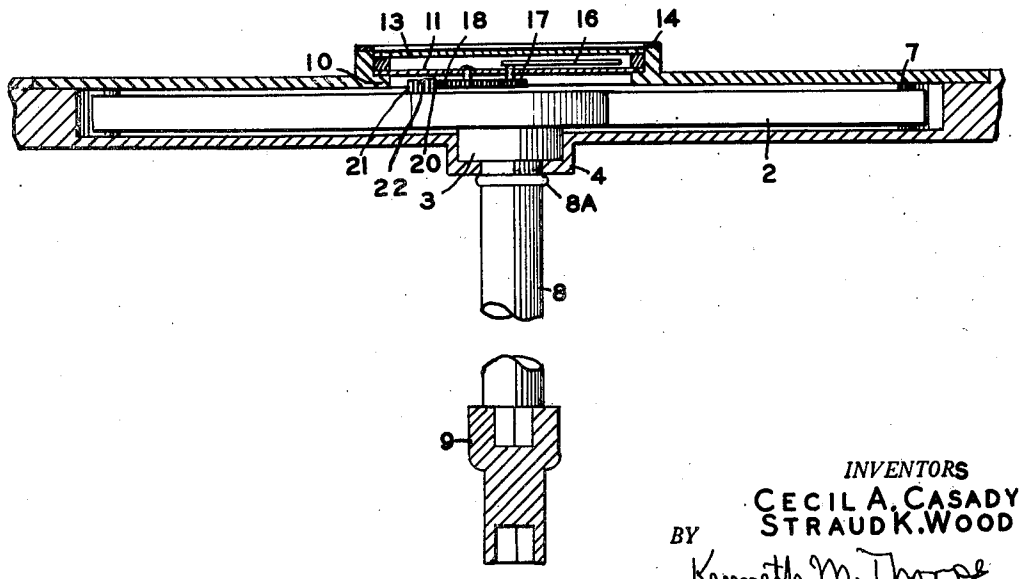


FIG. 3



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FIG. 4

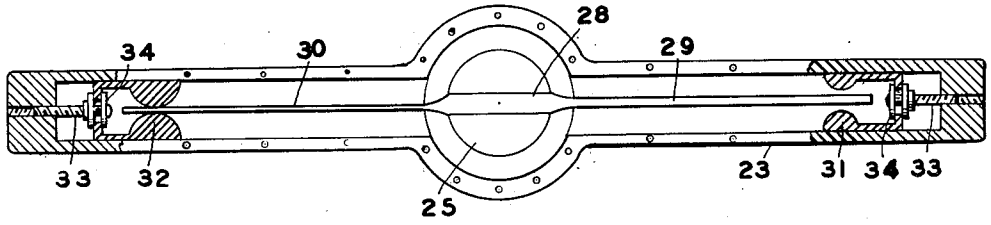


FIG. 5

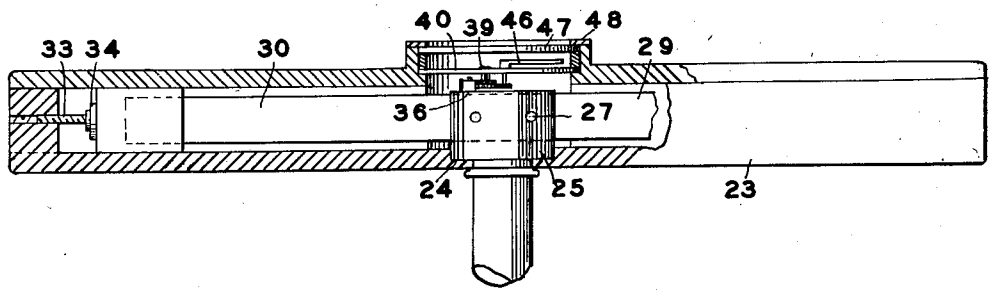
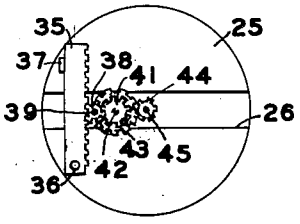


FIG. 6



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2,803,133

TORQUE WRENCH

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Application January 24, 1956, Serial No. 561,001

2 Claims. (Cl. 73—139)

This invention relates to torque wrenches whereby the force used to tighten or to loosen bolts, nuts, screws and the like is visually indicated in a convenient location for observation of the user of the tool. The use of a tool of this kind is becoming more and more important in the mechanical trades since more accurate machining and the increase in operating speeds and pressures, require more and more careful adjustment of parts.

It has also been found in a tool of this kind that the extent or range of the calibrated bar is rather limited, making it necessary, at the present time, to have a plurality of wrenches to cover a reasonable range of force. One of the chief objects of the present invention, therefore, is to provide in a single tool for a multiplicity of ranges so that an operator does not need to be constantly changing from tool to tool.

Another object of the invention is to provide means for calibrating the wrench by changing the relative location of certain abutments longitudinally of the torque bar.

With the general objects named in view and others as will hereinafter appear, the invention consists in certain novel and useful features of construction and organization of parts as hereinafter described and claimed; and in order that it may be fully understood, reference is to be had to the accompanying drawings, this application being a continuation in part of our application filed January 17, 1955, Serial No. 482,097, now abandoned, as follows:

Figure 1 is a face view of a torque wrench embodying the invention.

Figure 2 is an enlarged face view of the wrench with the cover plate and dial removed, certain gears carried by the dial being shown in dotted outline.

Figure 3 is a longitudinal section through the tool as shown in Figure 2.

Figure 4 is a top plan view of a wrench embodying the invention with the cover removed and illustrating a double torque bar.

Figure 5 is a fragmental section through one side of the tool as shown in Figure 4, with the cover in position.

Figure 6 is a top plan view of the torque shaft head to illustrate the gear train for operating the dial indicator.

In the said drawings, where like reference characters identify corresponding parts in all of the figures, 1 is the head of a torque shaft formed with a pair of oppositely projecting deflection torque bars 2. The underside of the head 1 has a circular boss 3 journaled in a socket 4 formed in a handle 5. The handle 5 is formed with an open side for convenience of assembly, said open side being normally closed by a cover plate 6.

The deflection torque bars 2 are preferably out of contact with any part of the handle except near their extreme ends where they contact rounded abutment surfaces 7 formed as an integral part of the cavity in the handle 5. The boss 3 is formed with a projecting torque shaft 8 of any desired length to impart rotation to a removable nut socket 9 or other tool. The assembly is

locked against dislocation by a split locking spring 8a or the like as shown.

With the construction as indicated, it will be apparent that if the shaft 8 is resisted by a nut or the like, the force applied to handle 5 will be imposed on the torque bars 2, and that they will yield in accordance with their bending resistance. To register or visually indicate the force being applied to rotate the shaft 8, the following mechanism is supplied so that the differential movement of the handle 5 and the shaft 8 can be directly read by the operator of the tool in foot-pounds or other measurement depending upon the calibration of the dial indicator.

The cavity in the handle 5 is formed with a shoulder 10 receiving a dial 11, the upper face of said dial having indicating markings calibrated in foot-pounds or other units of measure, the dial being held in place by a spacing ring 12 which receives a transparent cover glass 13. The dial indicator is held in place by a securing ring 14 receiving screws 15 engaging an upstanding shoulder on the cover 6.

Journaled in the center of the dial 11 is a shaft equipped at its upper end with a pointer 16 to register on the dial. The lower end of the shaft carries a spur gear 17 enmeshed with a large gear 18 journaled on a stub shaft projecting from the underside of the dial 11.

To impart movement to the gear train, the face of the body member 1 of the torque bar carries a pin 19 on which one end of a rack bar 20 is pivoted. The rack bar 20 is held enmeshed with the gear 18 by means of a spring 12 tensioned against a stop 21 projecting from the body 1, as shown. With the above arrangement it will be apparent that differential movement between the handle and wrench will be immediately registered on the dial. When the parts have been properly designed, this deflection will be a direct measure of the force being exerted to turn the screw or the like.

In the construction shown in Figures 4 through 6, the handle 23 is recessed at 24 to receive the circular head 25 formed at the upper end of the torque shaft to be applied to the work. The upper face of the head 25 is slotted at 26 and extending cross wise through the head is a pair of pins 27 which engage the heavy section 28 of a torque bar. The ends of the torque bar 28 are milled to form two deflecting or torque sections 29 and 30, the torque section 30 being of smaller cross sectional area, and designed to register forces of say, 5 to 25 lbs., while the heavier section 29 may register 25 to 100 lbs.

Mounted for sliding movement longitudinally of the torque bars 29 and 30, are rounded abutment members 31 and 32 respectively, so that the point of contact between the bars and the abutments can be varied. The abutments are oppositely facing in pairs on the ends of U-shaped members having a bolt opening at their mid-point to receive the ends of bolts 33 threaded in openings in the ends of the handles as illustrated. The bolts 33 are swivelled to the abutment members as at 34 so that as the bolts are moved in the handles the abutments will be correspondingly shifted.

In order to register force on the dial, the dial plate 40 carries a dial shaft 45 having a pointer 46 to travel over the face of the dial and on the opposite side of the dial plate the shaft carries a pinion 44. Projecting upwardly from the head 25 is a pin 36 on which a rack bar 35 rocks, said rack bar being urged by a spring 37 into mesh with a pinion 39 journaled on a shaft 38 projecting from the dial plate 40. Gears 39 and 44 turn in unison through a gear train comprising gears 41 and 43, respectively, said gears 39 and 44 being secured together on a common shaft 42 projecting from plate 40. With this construction it will be evident that when the bar 30 has been deflected to its maximum extent, continued torque movement will be picked up by the bar 29.

From the above description and drawings, it will be apparent that we have described and illustrated a construction embodying all of the features of advantage set forth as desirable, and while we have described and illustrated the preferred construction, we reserve the right to all changes within the spirit and scope of the appended claims.

We claim:

1. In a torque wrench, the combination with a housing, a torque shaft journaled in the housing and having means projecting therefrom to engage the work, a resilient torque bar carried by the shaft and projecting in opposite directions therefrom, said housing having cavities receiving the torque bars, abutments carried by the cavities and adjustable longitudinally of the torque bars, screw threaded devices carried by the housing for adjusting said abutments, a dial indicator carried by the housing, and a gear train connecting the torque shaft to the dial indicator.

2. In a torque wrench, the combination with a housing, a torque shaft journaled in the housing and having means

projecting therefrom to engage the work, a pair of resilient torque bars of high and low resistance respectively projecting in opposite directions from the torque shaft within the housing, abutments carried by the housing for contact with the torque bars, said abutments being longitudinally adjustable to vary their point of contact with the torque bars, the abutments for the high resistance torque bar being non-operative until the lower resistance torque bar has been fully deflected, a dial indicator carried by the housing, and a gear train connecting the dial indicator to the torque shaft.

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