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2,964,981

WRENCH HAVING AN EXTENSION HANDLE
ASSOCIATED WITH MEASURING INDICIA
Filed Feb. 27, 1959

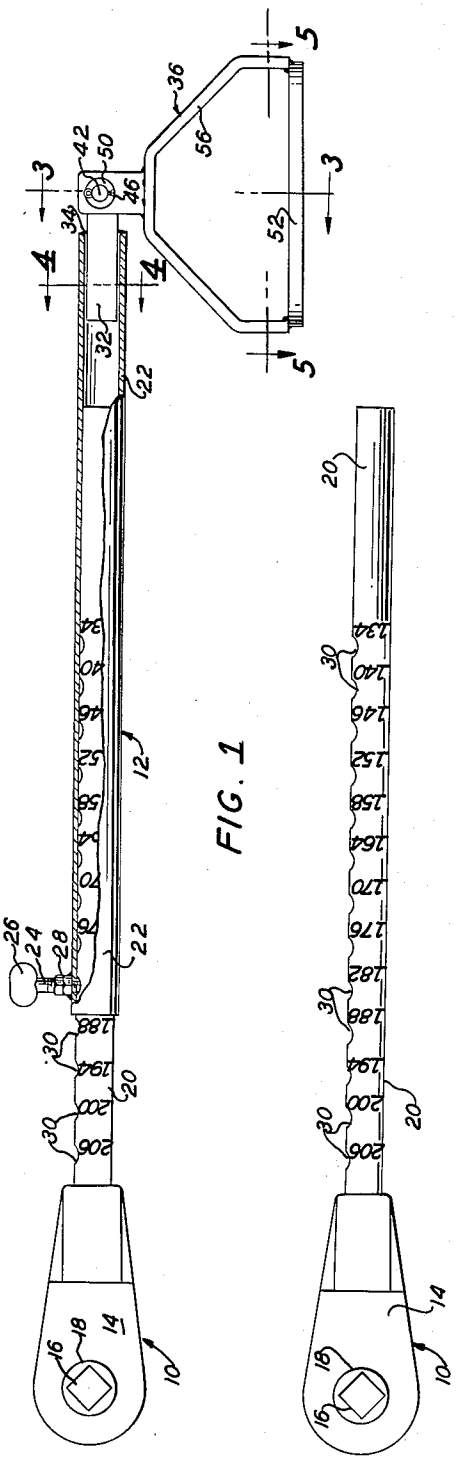

FIG. 1

FIG. 2

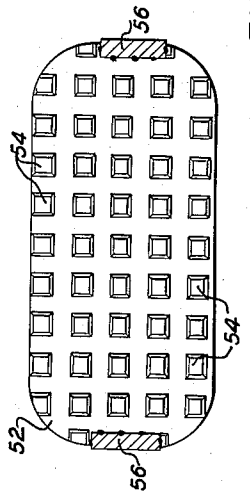

FIG. 5

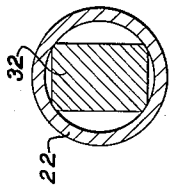

FIG. 4

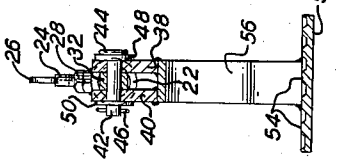

FIG. 3

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WRENCH HAVING AN EXTENSION HANDLE ASSOCIATED WITH MEASURING INDICIA

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4 Claims. (Cl. 81—177)

My invention relates generally to a new and improved wrench and more particularly to a torque wrench of relatively high torque capacity. My improved torque wrench is particularly adapted to be used in assembly operations for tightening threaded nuts on studs. For example, the wrench of my instant invention is useful in truck manufacturing operations for tightening large truck wheel lug nuts.

According to a principal feature of my invention, provision is made for limiting the torque which may be applied to a threaded nut so that a desired stress will be developed under all conditions.

The provision of an improved torque wrench of the type above mentioned being a principal object of my invention, it is another object of my invention to provide a torque wrench with a torque arm of variable length so that the torque developed by the wrench may be varied as desired for any given applied force. This avoids understressing as well as overstressing.

It is a further object of my invention to provide a new and improved torque wrench of the type above set forth which is characterized by its simplified construction and which may be readily adjusted by means of a simple manual operation to any desired torque capacity within a wide range of limits.

It is a further object of my invention to provide a heavy duty torque wrench for use in those applications requiring a developed torque in excess of 400 lbs.-ft. and which is substantially more durable than high capacity torque wrenches of known construction.

Other objects and advantages of my improved torque wrench will become apparent from the following description and from the accompanying drawings, wherein:

Figure 1 is a side elevation view, partly in section, of my improved torque wrench;

Figure 2 is a side elevation view of a portion of the wrench assembly shown in Figure 1;

Figure 3 is a side elevation view of my improved wrench assembly as viewed from the plane of section line 3—3 of Figure 1;

Figure 4 is a detailed cross sectional view taken along section line 4—4 of Figure 1; and

Figure 5 is a cross sectional view taken along section line 5—5 of Figure 1.

Referring first to Figure 1, the wrench of my instant invention comprises a headpiece **10** and a lever arm generally designated by numeral **12**. Headpiece **10** may be of conventional construction and it includes a body portion **14** and a socket retainer or adapter **16**, the latter preferably being of square cross section and extending outwardly from the body portion **14**. The adapter **16** is formed with a circular base **18** which is in turn received within a cooperating circular opening formed in body portion **14**. A suitable one-way ratchet or clutch mechanism is included within body portion **14** for establishing a one-way driving connection between the circular piece **18** of adapter **16** and body portion **14** so that torque may be applied to adapter **16** when a turning moment

is applied to body portion **14** in one direction. However, when a turning moment is applied in the opposite direction, the clutch mechanism will overrun adapter **16**.

The adapter **16** is capable of retaining sockets for gripping polygonally spaced nuts and bolt heads. This headpiece construction is conventional and well-known, and for this reason the specific construction of the internal one-way clutch mechanism for the headpiece will not be described at this time.

The lever arm **12** comprises two principal portions separately identified by numerals **20** and **22**, the former being fixed to the body portion **14** of headpiece **10**. Lever arm portion **22** is telescopically received over lever arm portion **20** and is hollow to permit relative sliding movement between the lever arm portions.

Lever arm portion **22** is formed with a tubular or circular cross section, and lever arm portion **20** is formed with a circular cross sectional shape, although I contemplate that other cross sectional forms can also be employed.

Figures 1 and 3 show a set screw **24** having a wing portion **26** to accommodate a manual adjustment of the same. Screw **24** is threadably received in a nut **28** which in turn is welded or otherwise fixed to the exterior of lever arm portion **22**. The lever arm portion **20** is recessed at regularly spaced intervals as shown at **30** and the end of screw **24** is adapted to be seated in the recesses **30** thereby locking lever arm portion **20** to lever arm portion **22**. By preference, the lever arm portion **22** is formed with a tapped opening which forms a continuation of the threaded opening of the nut **28**.

Lever arm portion **20** may carry thereon a plurality of indicia, one indicium corresponding to each recess **30**. One end of lever arm portion **22** selectively registers with the indicia as indicated.

A stirrup or treadle is pivotally secured at the end of lever arm portion **22**. An extension **32** is received within the opening at the end of lever arm portion **22** and it may be fixed therein by weld metal **34**. As best seen in Figure 5, extension **32** is of rectangular cross section with chamfered corners. The stirrup is generally designated by numeral **36** and it includes a bifurcated bracket having parallel arms **38** and **40** adapted to straddle extension **32**. Arms **38** and **40** and the extension **32** are formed with aligned openings for receiving a pivot pin **42**, said pin having a flat head **44**. The pin is formed with an opening through which a cotter pin **46** is received, and flat washers are situated adjacent the arms **38** and **40** as indicated at **48** and **50** respectively.

The stirrup **36** further includes a treadle plate **52** having sufficient width to accommodate the sole of the operator's shoe. If desired, the treadle plate **52** may be formed with cleats **54**.

Bracket arms **38** and **40** may be welded or otherwise secured to the upper portion of a diverging stirrup member **56** which in turn may be welded to opposed sides of treadle plate **52**.

In operation the socket carried by the headpiece **10** may be received over a lug nut and the operator may then apply torque to the lug nut by stepping on treadle plate **52**. The magnitude of the torque applied to the lug nut will then be equal to the weight of the operator multiplied by the effective length of the lever arm. The indicia on the lever arm portion **20** provide an indication of the magnitude of the torque which may be developed by the wrench and the wrench may be calibrated so that the left end of the lever arm portion **22** as viewed in the drawing may be set at an indicium corresponding to the weight of the operator. For example, if the operator weighs 188 pounds, the lever arm portions will be adjusted to the relative setting indicated in Figure 1. When the operator steps on the treadle plate **52**, the desired limiting torque

will be developed by the wrench. However, if the wrench is subsequently used by an operator weighing, for example 140 pounds, the relative setting between the lever arm portions 20 and 22 will be adjusted so that the left end of the lever arm portion 22 will be located at the 140 pound marking. It is thus apparent that the effective leverage of the wrench is thus increased to compensate for the lesser weight of the operator. In this way the desired torque will be developed in each case regardless of the weight of the operator.

It is thus seen that I have provided a very simplified, workable and durable torque wrench which may be adjusted as desired to produce any desired torque capacity, and the possibility of overstressing or understressing the workpiece is eliminated.

Having thus described a principal embodiment of my invention, what I claim and desire to secure by United States Letters Patent is:

1. In a torque wrench assembly for applying torque to a workpiece, a headpiece, a lever arm, said lever arm including a first portion connected to said headpiece and a second portion telescopically related with respect to said first portion and forming an extension thereof, and means for applying a force to the free end of said lever arm including a treadle carried by said lever arm, said treadle being adapted to accommodate the foot of an operator, one of said arm portions having indicia formed thereon at spaced intervals, the other arm portion selectively registering with said indicia whereby the desired torque transmitted by said assembly for a given force applied to said treadle may be readily obtained.

2. In a torque wrench assembly for applying torque to a workpiece, a headpiece, a lever arm, said lever arm including a first portion connected to said headpiece and a second portion telescopically related with respect to said first portion and forming an extension thereof, and means for applying a force to the free end of said lever arm including a treadle carried by said lever arm, said treadle being adapted to accommodate the foot of an operator, said treadle comprising a treadle plate and a bracket secured to said treadle plate, said bracket being pivotally connected to said lever arm, one of said arm portions having indicia formed thereon at spaced intervals, the other arm portion selectively registering with said indicia whereby the desired torque transmitted by said assembly for a given weight of the operator may be readily obtained.

3. In a torque wrench assembly for applying torque to a workpiece, a headpiece, a lever arm, said lever arm including a first portion connected to said headpiece and a second portion telescopically related with respect to said first portion and forming an extension thereof, means for releasably locking together said lever arm portions at any desired adjusted position including a locking screw carried by one lever arm portion, longitudinally spaced recesses formed in the other lever arm portion, said locking screw being adapted to engage said recesses to establish any desired degree of extension, and means for applying a force to the free end of said lever arm including a treadle carried by said lever arm, said treadle being adapted to accommodate the foot of an operator, one of said arm portions having indicia formed thereon at spaced intervals, one end of the other arm portion selectively registering with said indicia, said indicia being calibrated so that a desired limiting torque will be developed by the wrench assembly when said other arm portion is adjusted relative to said one arm portion to an indicium corresponding to the weight of the operator.

4. In a torque wrench assembly for applying torque to a workpiece, a headpiece, a lever arm, said lever arm including a first portion connected to said headpiece and a second portion telescopically related with respect to said first portion and forming an extension thereof, means for releasably locking together said lever arm portions at any desired adjusted position including a locking screw carried by one lever arm portion, indicia carried by the other lever arm portion at longitudinally spaced positions, and means for applying a force to the free end of said lever arm including a treadle carried by said lever arm, said treadle being adapted to accommodate the foot of an operator, said indicia being calibrated so that a desired limiting torque will be developed by the wrench when said one lever arm portion is adjusted relative to said other lever arm portion to an indicium corresponding to the weight of the operator.

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