April 4, 1961 W. BLESS 2,977,832

PREDETERMINED TORQUE RELEASE HAND TOOL

Filed April 30, 1959

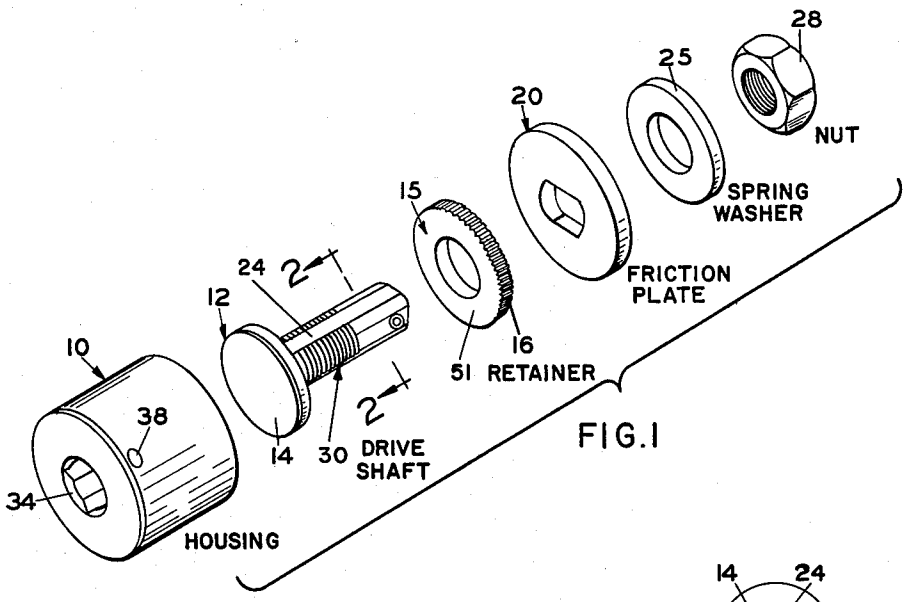

FIG. 1

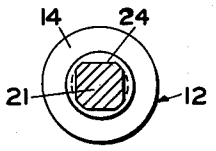

FIG. 2

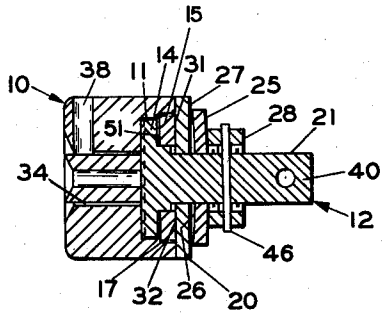

FIG. 3

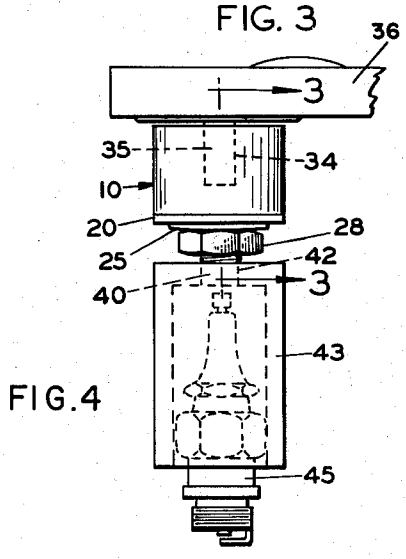

FIG. 4

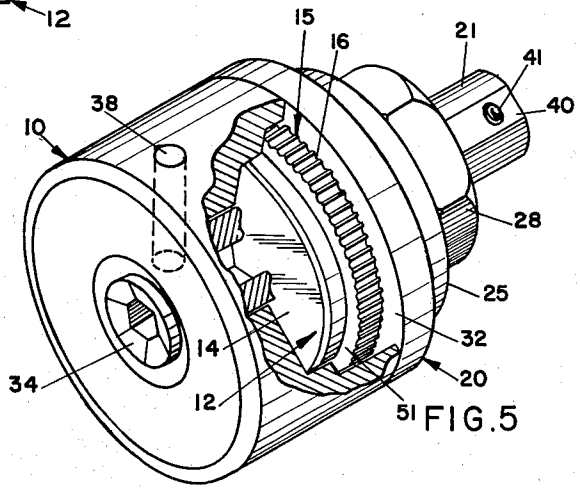

FIG. 5

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PREDETERMINED TORQUE RELEASE HAND TOOL

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1 Claim. (Cl. 81—52.4)

This invention relates to predetermined torque release wrench mechanisms of the type used to automatically draw up a threaded element to a predetermined degree of tightness.

In general, the torque wrench mechanism of the present invention includes a casing means provided with a handle having a drive shaft means rotatably journaled in said casing but restrained from rotation, relative to said casing, until a predetermined torque is applied to the handle.

The wrench mechanism of the present invention is of a simple design adapted to be set by the manufacturer at a predetermined fixed torque value for subsequent use by a mechanic in repeatedly doing the same kind of job where the same degree of tighness must be applied in accomplishing a particular job. Hence, the wrench mechanism is particularly useful in installing and tightening spark plugs in automotive and aircraft engines since a spark plug of a particular type should always be drawn up to a certain proper degree of tightness.

For example, 25 foot pounds of torque should be applied to 14 millimeter plugs for automotive use.

It is therefore an object of the present invention to provide a torque wrench mechanism of simple and inexpensive construction which can be preset by a manufacturer to operate at a predetermined fixed torque value required for a particular job application.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of embodiment of the invention is clearly shown.

In the drawings:

Figure 1 is an exploded view of a casing and drive shaft mechanism of a torque wrench construction according to the present invention;

Figure 2 is a sectional view taken through the drive shaft of the mechanism of Figure 1 with the section being taken along the line 2—2 of Figure 1;

Figure 3 is a side sectional view taken through the torque wrench mechanism of Figure 1 when the mechanism is in assembled relationship, the section being taken along the line 3—3 of Figure 4;

Figure 4 is a side elevational view of the mechanism of the preceding figures, which view illustrates a handle and socket member attached to the mechanism; and

Figure 5 is a broken perspective view illustrating the components of the clutch apparatus comprising a portion of the mechanism of the preceding figures.

Referring in detail to the drawings, the mechanism of the present invention includes a cup-shaped housing member indicated generally at 10 and provided with a recess 11. A drive shaft means indicated generally at 12 includes an annular flange portion 14 rotatably positioned in recess 11 by a retainer 15. The peripheral edge of retainer 15 is provided with serrations 16 which are gripped by serrations 17 formed in an outer portion of

the inner wall of recess 11. In assembling drive shaft 12 in cup-shaped housing member 10, retainer 15 can be forced into press fit engagement with the outer portion of the inner wall of recess 11 by any suitable press means.

After the drive shaft means is mounted in the housing member a friction plate 20 is assembled on a shank portion 21 of drive shaft means 12. Friction plate 20 is keyed to shank portion 21 for rotation therewith since a hole 22 through friction plate 20 is provided with flats 23 which engage corresponding flats 24 on shank means 21.

A dished spring washer 25 is next assembled on shank portion 21 with a concave inner surface 26 confronting the outer surface 27 of friction plate 20.

A nut 28 is next assembled on threads 30 and drawn snugly up against the outer surface of spring washer 25. This urges friction surface 50 on head portion 14 against friction surface 51 on retainer 15.

Retainer 15 includes an outer friction surface 31 that frictionally contacts inner friction surface 32 on friction plate 20 and it is at the engagement of these friction surfaces 31—32 and 50—51 that the slippage of the mechanism occurs. It will be understood that the tighter nut 28 is drawn up on shank 21 the greater will be the force by which friction surfaces 31—32 and 50—51 are urged together and the greater will be the torque value at which slippage occurs.

As is best seen in Figure 4, housing member 10 includes a flat-sided hole 34 for receiving the male portion 35 of a conventional ratchet handle 36. A hole 38 is drilled laterally into housing member 10 so as to intersect flat-sided hole 34 and thereby provide a dent for receiving the conventional spring pressed ball carried by the male portion 35 of ratchet handle 36.

The outer end of shank 21 is provided with a flat-sided end portion 40 and conventional spring pressed ball 41 for insertion into a female flat-sided hole 42 formed in socket 43. The socket member illustrated is for use with a spark plug indicated at 45.

The wrench is assembled by inserting an annular flange portion 14 of drive shaft means 12 into recess 11. Retainer 15 is then pressed into the outer end of recess 11 whereby the serrations on the retainer engage the serrations on the recess. Friction plate 20 and spring washer 25 are then assembled on the shaft and drawn up tightly by means of nut 28. The nut 28 is then progressively drawn up until the predetermined desired torque applied to handle 36 causes slippage between the friction surfaces 31—32 and 50—51. Nut 28 can then be secured to shaft 21 by drilling a hole through the nut and shaft and driving a pin 46 into the hole.

In operation, a socket 43 is mounted on end portion 40 of shank 21 with handle 36 in place on housing member 10. Socket 43 is then placed over a spark plug 45 and the handle manipulated to tighten the spark plug until slippage occurs.

While the form of embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claim which follows:

I claim:

A predetermined torque release hand tool comprising, in combination, a cup-shaped housing member; means for rotating said housing member; drive shaft means including a threaded shank extension provided with flats and an annular flange portion provided with an outwardly facing surface, said flange portion being journaled in said housing member; a retainer ring including an inwardly facing surface bearing against said outwardly facing surface of said annular flange portion and secured

to the end of said housing member opposite said actuating means, said retainer ring including an outwardly facing surface; a friction plate including a polygonal opening engaging said flats, an inwardly facing surface bearing against said outwardly facing surface on said retainer ring, and an outer face; spring means positioned on said shank extension and against said outer face of said friction plate; and a lock nut on said threaded shank portion whereby said surfaces are urged one against the other and the hand tool is caused to release at predetermined overload torque.

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