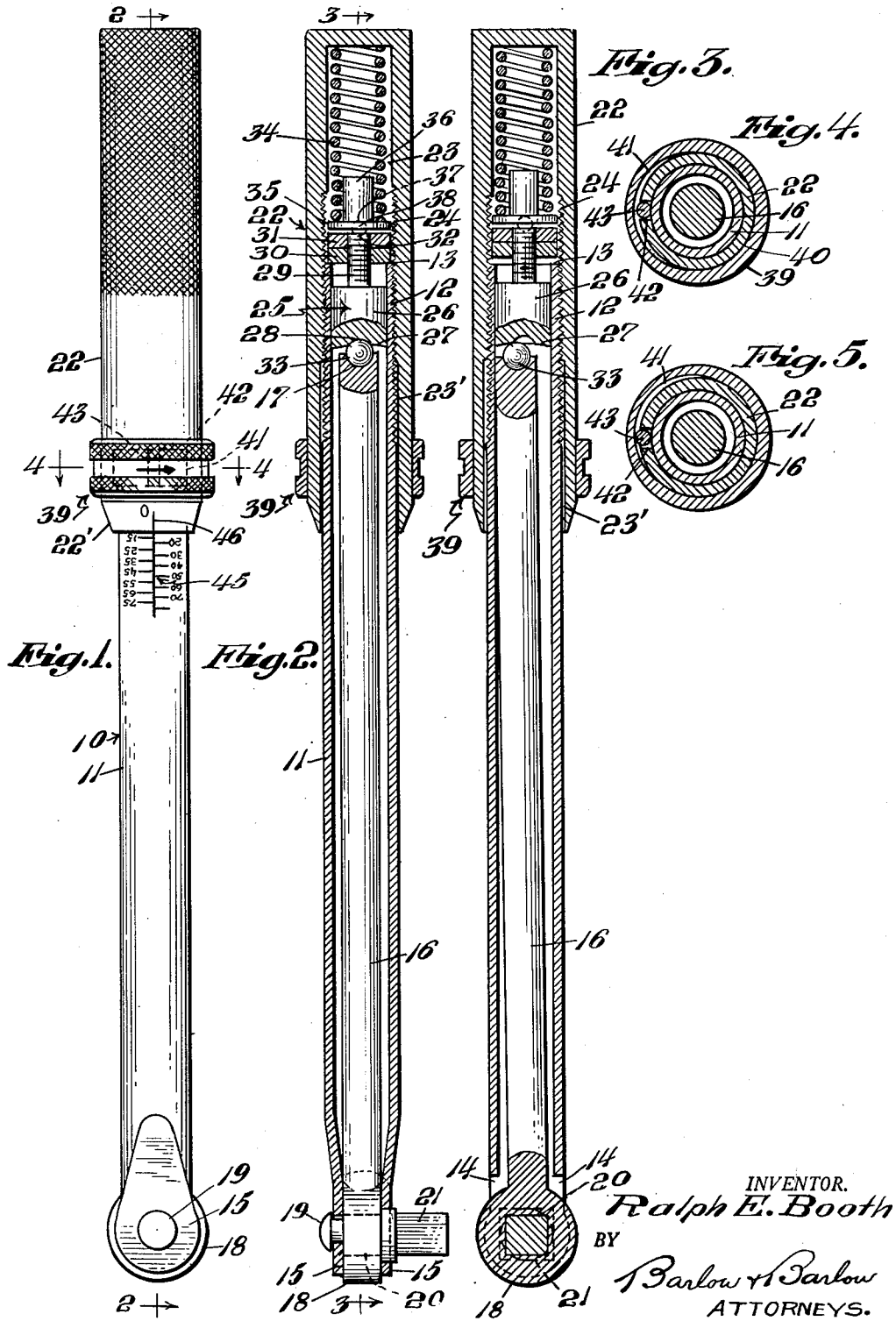


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TORQUE APPLYING TOOL WITH PREDETERMINED
TORQUE RELEASE MEANS
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TORQUE APPLYING TOOL WITH PREDETERMINED TORQUE RELEASE MEANS

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This invention relates to a torque applying tool, particularly a torque applying tool operable to produce an audible sound upon the application of a predetermined torque on the work.

An object of this invention is to improve generally on torque tools of this character.

A more specific object of the invention is to provide a torque tool operable to accurately preset the predetermined torque over the entire torque range of the tool.

Another object of the invention is to produce a torque tool so constructed as to eliminate the usual linkage frequently employed for producing an audible sound upon the application of the predetermined torque.

Another object of the invention is to provide a torque tool so constructed as to permit grasping the tool at most any location along its length to apply a predetermined torque on the work.

Another object of the invention is to provide for locking the spring adjustable tensioning means of the tool.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1 is an elevational view of a torque tool embodying my invention;

Figure 2 is a sectional view taken substantially along line 2—2 of Figure 1;

Figure 3 is a sectional view taken substantially along line 3—3 of Figure 2;

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

Figure 5 is a similar view and showing elements thereof in different relation.

Referring to the drawings, 10 designates the torque tool in its entirety. The torque tool has a tubular body 11 which has the end portion 12 thereof externally screw threaded inwardly from the extreme end 13 thereof. The other end portion of the body is flattened at opposite sides and oppositely slotted as at 14 providing spaced parallel wall portions 15. A round spring bar 16 having a semi-spherical opening or recess 17 in one end extremity thereof and a circular head 18 at the other end thereof extends within the body 11 with the head 18 positioned between the wall portions 15. The head 18 is pivotally mounted on the body 11 as by means of a pivot 19 having a rectangular shank 20 which is engaged with a similar shaped opening in the head 18. Thus, the head and pivot 19 may be rotated relative to the body 11. The pivot has a work engaging projection 21 which is rectangular in cross section to engage with a similar shaped opening in the work.

A handle 22 extends in continuation of the body 11 and has a bore 23 which is provided with screw threads as at 24 to engage with the screw threaded end portion 12. The bore 23 is counterbored to provide a clearance 23' with the body 11 forwardly of the threaded portion of the bore 23 and the threaded end portion of the body. The spring bar 16 is of a size relative to the bore of the body 11 to permit a limited lateral movement of the said bar 16 when swung about the axis of pivot 19 relative to the body 11. The bar 16 is yieldably coupled to the handle 22 for movement therewith and relatively thereto as by means of a resilient clutch arrangement designated generally 25. The clutch comprises a plunger 26 which is slidably received in the body 11 and has a concave end wall 27 in which there is

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formed centrally thereof a rounded recess 28. The plunger 26 has a screw threaded stem 29 at the other end thereof which receives an adjustable nut 30 and lock nut 31. The stem 29 is also provided in the end thereof with a rounded recess 32. A sphere or ball 33 is received in recess 17 which is of a diameter equal to the diameter of the ball 33. The ball 33 is also engaged by the wall of recess 28, which wall thereof conforms to the ball 33 and is of a diameter less than the diameter of the ball 33. Thus, a clearance is provided between the end of the bar 16 and the plunger 26. The end 13 of the body 11 forms a stop against which the adjusting nut 30 is engaged for a purpose to hereinafter appear.

A compression spring 34 is arranged in the bore 23 to apply a controlled pressure on the plunger 26. One end of the spring 34 abuts against the bottom of the bore 23; the other end thereof abuts against a rotatable member or disk 35 having a spring guide stem 36 which is surrounded by the spring 34. A semi-spherical recess 37 is provided centrally in the face of the disk in which is received a ball 38 which also engages in the recess 32. Thus, the pressure of spring 34 is applied to the plunger 26 to hold the nut 30 against the stop 13. In providing the abutment stop 13, it will be apparent that the thrust of the spring will be against the stop 13 and the frictional contact between the ball 33 and the walls of the recesses 17, 28 may be nicely controlled by the adjustment provided by the nuts 30, 31.

The pressure of the spring 34 is adjustable by turning the handle 22 relative to the body 11 which because of the screw thread will be moved axially of the said body. When the handle 22 is turned in a direction to be advanced axially on the body, the spring will be compressed to increase the tension thereof. When the handle is turned in the other direction to withdraw the handle axially from the body 11, the spring 34 will expand and decrease the tension of the same. In order to maintain the pressure setting of the spring, a lock sleeve or ring 39 is provided (see Figures 4 and 5). The ring 39 has a bore 40 in which a cam recess 41 is formed. The end portions of the recess 41 are tapered as shown to merge with the adjacent wall portion of the bore 40. The handle 22 has an elongated slot 42 therethrough (see also Figure 1) in which is received a roller 43 having a diameter greater than the thickness of the wall of the sleeve but less than the combined thickness of the said wall and greatest depth of the cam recess 41. The roller 43 may be engaged or jammed into locking relation between the opposite wall portion of the body 11 and the camming wall of recess 41. Upon turning the ring 39 in a direction to free the roller 43 from the camming wall of recess 41, the handle 22 will be free to turn relative to the body 11 to adjust the tension of spring 34 as above described.

It will be apparent from the hereinabove description that a force applied on the handle 22 may be transmitted through the projection 21 on to the work; the work as by way of example may be a nut to be tightened and engaged by a wrench socket in which the projection 21 may be engaged to turn the socket. The handle 22 may be grasped and swung in an arc in either direction depending upon the required direction of turning of the said nut. The force or pressure applied on the handle is transmitted through the plunger 26, bar 16 and projection 21. When resistance of the work to the torque applied increases to a degree to overcome the frictional engagement between the ball 33 and walls of recess 17, 28, the bar 16 and ball 33 will be moved laterally a distance sufficient to raise the nut 30 from the stop 13 to place the plunger 26 under direct pressure of spring 34. Further swinging movement of the handle in the same direction and upon an increase in resistance to the torque applied sufficient to overcome the pressure of the spring 34, the ball 33 will be moved completely out of recess 28 and the bar 16 will move into engagement with the body 11 with a hammer-like blow and produce an audible sound and indicate thereby the application of the predetermined torque on the work. Upon release of the force applied on the handle 22, the concave wall 27 of the plunger 26 will

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guide the ball 33 into recess 28 to reset the coupling 25 in initial position.

It will be apparent that the spring pressure on the coupling 25 is in effect applied on the plunger 26 only during the period at which the resistance of the torque applied increases to a degree to overcome the frictional contact between the ball 33 and the recesses 17, 28. Since there is a tendency for the bar 16 to flex under strain, producing a change in axial distance between the pivotal axis of the bar 16 and the coupling 25, a greater accuracy in preset spring pressure may be made over the entire range of torque application in the provision of the stop means 13 than were the pressure applied directly on the plunger 26.

During the resetting action of the plunger 26, the ball 38 bearing in the shallow recess 32 and because of a slight axial misalignment between the disk 35 and plunger 26, there will be a tendency of the ball 38 to rotate under pressure which will cause a slight axial turning of the said plunger 26 and prevent grooving of the wall 27 of the plunger by the ball 33.

The invention contemplates the provision of an indicator scale 45 on the body 11 which in co-operation with datum points 46 on the handle 22 will indicate the pre-setting of the torque to be applied on the work. The scale 45 extends axially of the body and is calibrated in torque units. The end portion of the handle 22 is tapered as at 22' and is divided circumferentially in a plurality of equally spaced divisions as for example five divisions, and these divisions (only one being illustrated) are indicated by lines designated 0 to 4 and are the datum points 46. The distance between the lines on scale 45 is indicated in pound units and equal to the distance the handle is advanced on the body for each complete revolution or partial rotation thereof. As for example, in Figure 1 the present pressure is ten pounds torque; turning the handle 22 for the next division line thereon in register with the scale would indicate a fifth of the distance between the ten pound line and the fifteen pound line and indicate an eleven pound torque.

I claim:

1. A torque tool comprising a body having a work engaging member pivotally mounted thereon at one end thereof, a handle secured to said body at the other end thereof for movement therewith, a spring bar rigidly connected to said member and extending therefrom axially of said body and having limited lateral movement with respect thereto, resilient means for holding said bar against said lateral movement including a slidable plunger at the end of said bar in axial alignment therewith, a ball positioned between said bar and said plunger, and a compression spring acting between said handle and said plunger urging said ball into engagement with said bar, and means for limiting the pressure of said spring on said plunger prior to the yielding of said spring under stress.

2. A torque tool as set forth in claim 1 wherein said handle is hollow and adjustably screw threaded on said body, and means for locking said handle in the adjusted position.

3. A torque tool comprising a tubular body having a work-engaging member pivotally mounted thereon at one end thereof, a hollow handle screw threaded to said body at the other end thereof, a spring bar rigidly connected to the work-engaging member and extending within the body, said bar having limited lateral movement with respect to said body, resilient means for holding said

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bar against said lateral movement including a resilient coupling engaged by said bar, a compression spring for applying a pressure on said coupling and means for limiting the pressure of said spring on to said coupling prior to the yielding of said coupling under stress.

4. A torque tool as set forth in claim 3 wherein means are interposed between the plunger and said compression spring operable to rotate said plunger at the resetting thereof in the bar holding position.

5. A torque tool comprising a body having a work-engaging member pivotally mounted thereon at one end thereof, a handle secured to said body at the other end thereof for movement therewith, a spring bar connected to said member for movement therewith and extending therefrom axially of said body and having limited lateral movement with respect thereto, resilient means for holding said bar against said lateral movement including a slidable plunger at one end of said bar in axial alignment therewith, said plunger having a threaded shank, a ball positioned between said bar and said plunger, an adjustable abutment on said shank, a compression spring acting between said handle and said plunger urging said ball into engagement with said bar, and a shoulder on said body engaged by said abutment for limiting the pressure of said spring on said plunger prior to the yielding of said spring under stress.

6. A torque tool comprising a tubular body having a work-engaging member pivotally mounted thereon at one end thereof, a handle secured to said body at the other end thereof for movement therewith, a spring bar rigidly connected to said member and extending therefrom axially through said body and having limited lateral movement with respect thereto, resilient means for holding said bar against said lateral movement including a slidable plunger at the end of said bar in axial alignment therewith, a ball positioned between said bar and said plunger, and a compression spring acting between said handle and said plunger urging said ball into engagement with said bar.

7. A torque tool comprising a tubular body having a work-engaging member pivotally mounted thereon at one end thereof, a handle screw threaded on said body at the other end thereof for movement therewith and relative thereto, a spring bar rigidly connected to said member and extending therefrom axially through said body and having limited lateral movement with respect thereto, resilient means for holding said bar against said lateral movement including a slidable plunger at the end of said bar in axial alignment therewith, a ball positioned between said bar and said plunger, and a compression spring acting between said handle and said plunger urging said ball into engagement with said bar.

8. A torque tool as set forth in claim 7 wherein means on said body and said handle indicate the pressure of said spring acting on said plunger.

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