

Jan. 31, 1956

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2,732,746

TORQUE LIMITING SCREWDRIVER

Filed Aug. 2, 1954

FIG. 2.

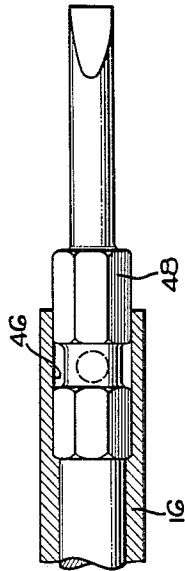
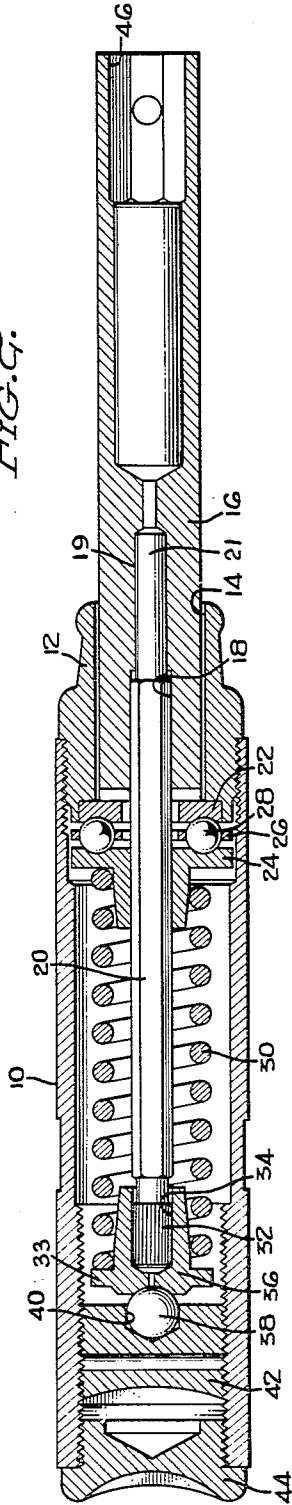


FIG. 3.

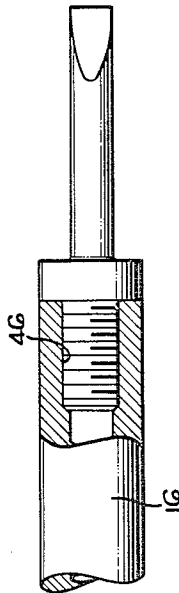


FIG. 4.

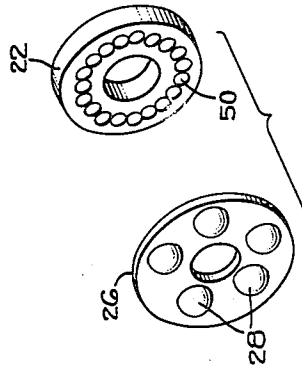


FIG. 5.

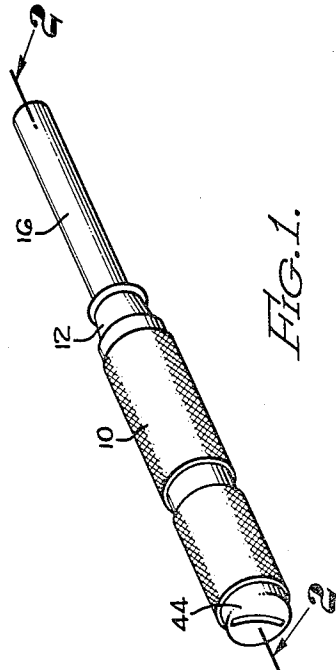


FIG. 1.

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## TORQUE LIMITING SCREWDRIVER

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Application August 2, 1954, Serial No. 447,114

4 Claims. (Cl. 81—52.4)

This invention relates to an improved torque limiting tool.

It is an object of this invention to provide a tool such as a screwdriver wherein the blade will turn with respect to the handle when a preselected torque is applied.

It is a further object of this invention to provide means whereby the torque, which when applied causes the blade to turn with respect to the handle, may be readily varied.

It is a further object of this invention to provide novel means for determining the slipping torque which can be varied to change the torque range of the tool.

Other objects and advantages will be readily apparent from the following description.

In the drawings:

Figure 1 is a perspective view of the handle and tool receiving member.

Figure 2 is a section taken along line 2—2 of Figure 1.

Figure 3 is a fragmentary view of a screw-driver blade mounted.

Figure 4 is a view similar to Figure 3, of a modified form of blade mounting.

Figure 5 is a perspective view of the ball retainer and one of the dimple plates.

The device has a hollow handle or barrel 10, which is threaded internally at both extremities. Screwed into the lower extremity of the barrel is a cap 12, which has a central bore 14 receiving tool holding member 16. The tool receiving member 16 has a bore 18 which receives the hexagonal portion of spindle 20, and has a smaller aligned bore 19 receiving the cylindrical projection 21. The spindle 20 is press fitted into the member 16 and projects into barrel 10.

Mounted in cap 12 is a first dimple plate 22, which in this embodiment is press-fitted into a suitable recess in the cap. Slidably mounted upon spindle 20 is a second dimple plate 24 which has a hexagonal bore preventing rotation relative to spindle 20. Between the dimple plates 22 and 24 a retainer plate 26 is provided carrying a plurality of equal size balls 28 which fit into suitable dimples or recess in the dimple plates.

The spindle 20 extends centrally through a spring 30 which receives the frusto-conical upper extremity of member 24 and bears against said member. At the upper extremity spindle 20 has a knurled tip 32 which is press fitted into recess 34 of spring retaining member 36, which has a frusto-conical hub fitting into spring 30 and a flange 33 against which the spring bears.

The spring retaining member 36 is centrally recessed to receive ball 38 which is peened into a recess 40 of adjusting screw 42 which is screwed into the upper end of the barrel 10. A cap 44 may be provided to screw into barrel 10 to cover the adjusting screw 42.

The tool holding member 16 may be provided with a hexagonal bore 46 to receive the hexagonal base 48 of a tool, in this instance a screwdriver, as in Figure 3, or may be threaded as in Figure 4 to receive a threaded tool.

It is readily apparent that tightening of adjusting screw 42 compresses spring 30 requiring greater torque before

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tool holder 16 will turn with respect to handle 10. The amount of torque is controlled by the upper race 24 and lower race 22.

The retainer plate 26 in this embodiment carries five balls 28. The members 22 and 24 are each provided with 20 recesses which receive the balls.

To permit the tool holder 16 to rotate with respect to handle 10 the torque applied to the tool holder 16 must be sufficient to cause the balls 28 to climb out of the recesses 50 and thereby overcome the force of the spring 30. This causes member 24 to slide axially along spindle 20 a distance equal to the depth of recesses 50 so that the balls 28 may move from one of the recesses 50 into an adjacent recess 50.

By replacing one or both members 22 and 24 with other members having deeper or shallower recesses, the torque may be varied. Thus the range of torque which may be applied to the instrument is set by the adjusting screw 42 and the limits of the range set by the depth of the recesses in the members 22 and 24.

While what hereinbefore has been described is the preferred embodiment of this invention, it is readily apparent that alterations and modifications can be resorted to without departing from the scope of this invention and such alterations and modifications are intended to be included within the scope of the appended claims.

I claim:

1. A torque limiting tool comprising in combination: a barrel, a coaxial tool holding member having a projecting element extending into said barrel, means providing a flange shoulder on the projecting end of said element, torque transmitting means encircling said element including axially spaced dimple plates each having a plurality of indentations, balls interposed between said dimple plates and extending into said indentations, means securing one of the dimple plates relative to said barrel, means mounting the other dimple plate for axial sliding movement relative to said projecting element but preventing relative rotary movement therebetween, resilient means interposed between said flange shoulder and the latter said dimple plate, and adjustable thrust receiving means limiting axial movement of said flange shoulder under force of said resilient means.

2. A torque limiting tool comprising in combination: a barrel, a coaxial tool holding member having a non-circular projecting element extending into said barrel, means providing a flange shoulder on the projecting end of said element, torque transmitting means encircling said element including axially spaced dimple plates each having a circular series of indentations, balls interposed between said dimple plates and extending into said indentations, means securing one of the dimple plates relative to said barrel, the other dimple plate having a non-circular bore receiving said projecting element for axial sliding movement relative thereto but preventing relative rotary movement therebetween, a compression spring interposed between said flange shoulder and the latter said dimple plate, and adjustable thrust receiving means limiting axial movement of said flange shoulder under force of said spring.

3. A torque limiting tool comprising in combination: a barrel, a coaxial tool holding member having a projecting element extending into said barrel, means providing a flange shoulder on the projecting end of said element, torque transmitting means encircling said element including axially spaced dimple plates each having a circular series of indentations, balls interposed between said dimple plates and extending into said indentations, means securing one of the dimple plates relative to said barrel, means mounting the other dimple plate for axial sliding movement relative to said projecting element but preventing relative rotary movement therebetween, a compression spring interposed between said flange shoulder and the

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latter said dimple plate, a thrust receiving ball element limiting axial movement of said flange shoulder under force of said spring, and an adjusting screw threadedly mounted with respect to said barrel and engaged by said ball element.

4. A torque limiting tool comprising in combination: a barrel, a coaxial tool holding member having a projecting non-circular shaft extending into said barrel, means providing a flange shoulder on the projecting end of said shaft, torque transmitting means encircling said shaft including axially spaced dimple plates each having a circular series of indentations, balls interposed between said dimple plates and extending into said indentations, means securing one of the dimple plates relative to said barrel,

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means mounting the other dimple plate for axial sliding movement relative to said non-circular shaft but preventing relative rotary movement therebetween, a compression spring interposed between said flange shoulder and the latter said dimple plate, and adjustable thrust receiving means within the barrel limiting axial movement of said flange shoulder under force of said spring.

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