

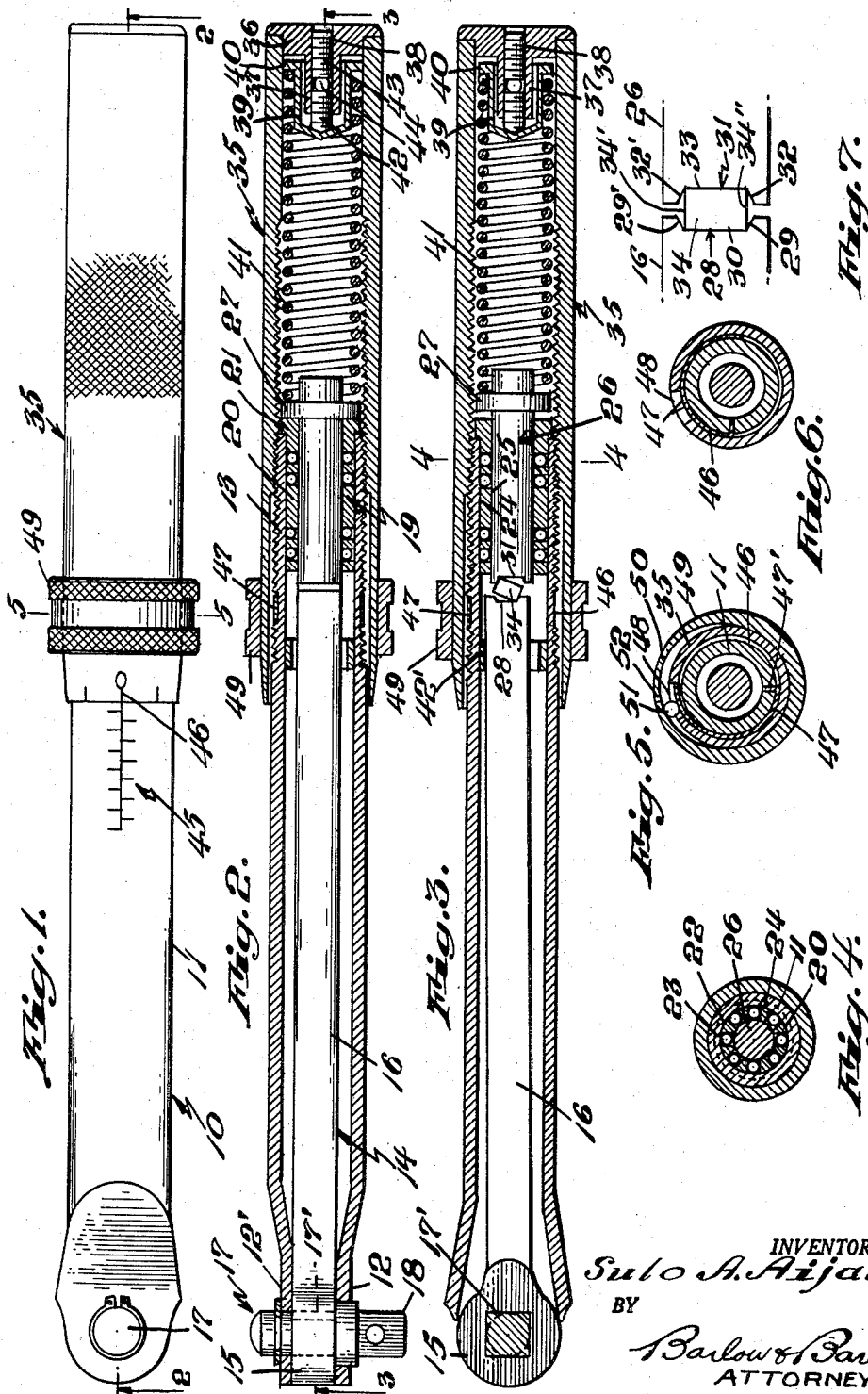
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PREDETERMINED TORQUE RELEASE HAND TOOL

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PREDETERMINED TORQUE RELEASE HAND TOOL

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1 Claim. (Cl. 81—52.4)

This invention relates to improvements in a torque applying tool, particularly a torque tool as disclosed and described in Patent No. 2,704,472 to Ralph E. Booth.

The torque tool illustrated in the above said patent has a spring bar through which a torque is transmitted to the work. The spring bar has a limited lateral movement with respect to the body of the tool and is resiliently coupled to the means through which torque is applied on the spring bar. The resilient coupling includes a slidable spring pressed plunger which is connected to the spring bar by means of a free ball which normally seats in concave recesses formed in the ends of said plunger and spring bar which are adjacent and in line with each other, the ball being held in position by the spring bias on said plunger. When a torque is applied on the spring bar sufficient to overcome the spring pressure on said plunger, the spring will yield and allow the spring bar to move laterally and carry the said ball out of the recess of the plunger. Upon the torque force being removed, the spring bar will return to normal and return the ball to seat in the said recess of the plunger. In the use of this tool, the ball is moved many times in and out of seated position which causes wear on the ball and recess at an undesirable rate. Further, it appears that the pressure of the plunger on the ball when out of seated position is such as to tend to cant the plunger against the wall in which it slides which prevents a smooth sliding of the plunger, and it often happens that the plunger fails to return to its normal position with the result that the ball is not returned to its seat which affects the accuracy of the tool.

An object of the present invention is to improve on the above tool.

Another object of the invention is to provide a tool of the above character wherein the resilient coupling will be so arranged as to minimize the wear thereon.

Another object of the invention is to provide a tool of the above character wherein the spring bar will be allowed but a small distance of lateral movement.

Another object of the invention is to provide a tool of the above character wherein the free member connecting the plunger to the spring bar will be limited to a rocking movement.

Another object of the invention is to provide a tool of the above character wherein the free member connecting the plunger to the spring bar will always return to its initial seated position when torque is released.

Another object of the invention is to provide a tool of the above character wherein the plunger will be mounted in a manner to allow free sliding movement thereof at any pressure applied thereon.

Another object of the invention is to provide a torque applying tool wherein provision will be made for calibrating the spring pressure on the plunger at the place of use and in which said initial calibration will be carried at any of a plurality of spring adjustments.

With these and other objects in view, the invention consists of certain novel features of construction as will be

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more fully described and particularly pointed out in the appended claim.

In the accompanying drawings:

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

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

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

Figure 4 is a sectional view taken along line 4—4 of Figure 3;

Figure 5 is a sectional view taken along line 5—5 of Figure 1;

Figure 6 is a similar view with the lock sleeve omitted and the parts shown in different relation; and

Figure 7 is a fragmental elevational view of the adjacent ends of the spring bar and the plunger with a member connecting them.

In the drawings, 10 designates a torque applying tool having a tubular body 11 which has a flattened and slotted end portion providing spaced parallel walls 12, 12'. The other end of the body is externally screw threaded as at 13. A spring bar 14 has a circular head 15 which is of a thickness substantially the distance between walls 12, 12' and is positioned between these walls and a shank 16 which extends within said body 11. The bar 14 is pivotally secured in position by a pivot 17 which has a mid portion 17' of rectangular cross section and which extends through a similar shaped opening in the head 15. Thus the head 15 and the pivot 17 are secured to each other to be turned in unison; while at either side of this rectangular section, the pin is cylindrical and rotatably mounted in the walls 12, 12'. The pivot has a work engaging projection 18 which is rectangular in cross section.

An anti-friction bearing 19, which in the present embodiment is in the form of a sleeve 20, is inserted in the other end of the body and has a flange 21 which engages the end extremity of the body. A plurality of circular rows of openings 22 (see Figure 4) extends through the walls of the sleeve, and ball bearings 23 are positioned in the said openings. These are of a diameter slightly larger than the wall thickness of the sleeve and will engage the walls of the bore 24 of the body 11 and project slightly within the bore 25 of the sleeve 20. A plunger 26 extends through the bore 25 and slidably engages the said balls 23 and is provided with a flange or shoulder 27 which normally engages the outer edge of the sleeve.

The shank 16 normally extends axially in line with the plunger 26 in juxtaposition therewith. The adjacent end of the shank has a groove or recess 28 therein (see Figure 7) which extends diametrically across the said end and is provided with opposite side walls 29, 29' which extend on an outward taper from the bottom wall 30 of the recess. The adjacent end of the plunger 26 is likewise provided with a similar recess 31 with walls 32, 32' which extend on an outward taper from the bottom wall 33. The walls 30 and 33 are substantially parallel to each other. A short bar or block 34 which is rectangular in cross section is positioned between the shank 16 and the plunger 26 for engagement with the said walls 30 and 33. The block 34 lies flat against the said bottom walls 30, 33 of the recesses and is of a width no greater than the width of said bottom walls and is maintained engaged with said bottom walls by means of a spring bias placed on the plunger as will now be described.

A tubular handle 35 is screw threaded on the body 11 and is closed at its outer end by a bonnet 36 which has an inwardly extending boss 37 and a screw threaded central opening 38 therethrough. A thimble 39 having a flange 40 surrounds the boss 37 in spaced relation there-

to. A compression spring 41 is arranged within the bore of the handle 35 and has one end thereof abutting flange 27 of plunger 26 and the other end thereof bearing against the flange 40 so as to apply a spring pressure on the plunger 26 in a direction tending to seat the flange 27 against the sleeve 20. The initial tension of spring 41 is made by means of a set screw 42 which projects from the boss 37 into engagement with the thimble 39, and the adjustment is locked by means of a second set screw 43 which is turned against a steel ball 44 positioned between said screws. Turning the handle relative to the body 11 will increase or decrease the tension of the spring on the plunger 20 depending upon the direction of rotation of said handle.

It will be seen that in the normal relation between the shank 16 and plunger 26 the block 34 will rest flat against the substantially parallel bottom walls of the recesses and resiliently hold the spring bar and plunger connected together to move in unison upon turning of the handle in one or the other direction. It will also be seen that when resistance of the work to be turned (which may be the tightening of a nut) is greater than the frictional contact of the block 34 with the bottom walls of the recesses, the resistance of the shank 16 will cause a relative lateral movement between body 11 and shank 16. During this relative lateral movement, as for example when the tool is moved in a clockwise direction as seen in Figure 7, the wall 34' of block 34 will be engaged by the wall 32' of recess 33 and the opposite wall 34'' will be engaged by the wall 29 of recess 28 as seen in Figure 3. Since the block cannot be moved along the bottom walls of said recesses, the block 34 will be caused to tilt or rock about opposite diagonal corners (Figure 3) and move plunger 26 outwardly against the bias of spring 41. Upon yielding of the resilient coupling a relative lateral movement takes place between the body 11 and the shank 16 to provide an audible signal upon the shank striking some object placed in the path of movement thereof.

It is desirable that a limited lateral movement of the shank 16 be had relative to the body so as to limit the amount of rocking of block 34 as above mentioned. To this end, a collar 42' is mounted within the bore of body 11 to surround the shank 16 at a location substantially inwardly of the movable end portion of said shank 16. Thus, only a slight relative lateral movement of shank 16 will be necessary to strike the collar and produce the signal. Upon the release of the torque force applied to the handle 35, the spring pressure on the block 34 acting thereon through the plunger 26 will rock the block 34 in the other direction to return the shank 16 to normal position.

It will be seen that the relatively small rocking movement permitted the block 34 upon yielding of spring 41 will tend to reduce wear on the block and walls of the recesses to a marked degree; and further, the block 34 will always return to its initial position in its recesses 28, 31 with the result that accuracy is maintained over a long period of use. Providing an anti-friction bearing for the plunger assures the return of the plunger to proper position which also aids in maintaining accuracy of the tool.

The tool is adjustable as to the torque applied to the work and is calibrated in torque units indicated by a scale 45 on the body 11 and the datum lines 46 on the handle which may be moved into register therewith to indicate the torque applied to the work. Turning the handle to advance the same along the body 11 will increase the pressure of the spring 41. Turning the handle to withdraw the same from the body will decrease the pressure of the spring 41. The tool is calibrated at the place of manufacture; but should it happen that the tool be off calibration for one reason or another, the tension of spring 41 may be readjusted by means of screw 42 and this adjustment will carry through for all settings of handle 35.

It is desirable that the handle 35 be detachably secured on the body 11. To this end, an annular groove 46 is made in the body 11 to receive a flat semi-circular spring 47 (see Figure 5) having one end attached to the body 11 as at 47' and the other end free to project from the groove. The handle 35 has an opening 48 therethrough, one edge of which is adapted to be engaged by the free end of spring 47. The handle 35 is telescoped over the body 11; and when turned in a direction to advance the same along the body 11, the spring is engaged in a direction to maintain the same beneath the outer edges of the groove 46 and the opening 48 may be advanced to a position beyond the said spring. Upon turning the handle 35 in the other direction, it will bring the opening 48 into register with the spring which, upon such registry, will spring outwardly in position to engage the edge of opening 48 and block further movement of the handle in the direction to withdraw the same from the body.

A locking ring 49 (see Figure 5) is provided for locking the handle at any torque setting thereof. This ring 49 has a cam groove 50 in the walls of the bore thereof into which projects a roller 51 which is positioned in opening 48 and held thereby against movement relative to the body. The cam groove 50 tapers as shown to merge with a wall portion of the bore of the ring. The roller 51 is of a size to be jammed between the cam groove 50 and the body 11 so as to lock the handle in adjusted position. Should the handle 35 be locked at a position in line with spring 47, the roller will jam between the spring 47 and wall of cam groove 50. To permit removal of the handle, an opening 52 in the lock ring 49 is provided through which a pin may be inserted to press upon the spring 47 when the locking ring is in released position to push the spring inwardly out of engagement with the edge of said opening 48 when in registry therewith.

I claim:

A torque tool comprising a hollow body having a work engaging member at one end thereof pivotally mounted therein, a sleeve extending within said body at the other end portion thereof and having a shoulder therein engaged against the inner end of said body, said sleeve carrying a plurality of spaced ball bearings of a size to engage the inner surface of the walls of said body and to project into the bore of said sleeve, a spring pressed plunger slidable in said sleeve, said plunger having a flange normally engaged against said shoulder by the spring bias on said plunger, a bar rigidly connected to said member and extending therefrom toward said plunger into juxtaposition therewith, said bar having limited relative lateral movement with respect to said plunger, the ends of said plunger and said bar adjacent each other having a recess therein extending in opposite directions to each other and having opposite parallel walls, a rectangular block positioned within said recesses and having opposite parallel sides engaged against said parallel walls, the side walls of each of said recesses being tapered outwardly, whereby upon lateral movement of said bar, said walls will engage opposite sides of said block to rock the same about opposite diagonal corners thereof so as to move said plunger against the said spring bias thereon upon a predetermined torque being applied on said bar.

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