

Oct. 4, 1966

R. G. WOODS
TORQUE WRENCH

3,276,296

Filed Sept. 28, 1964

2 Sheets-Sheet 1

FIG. 1

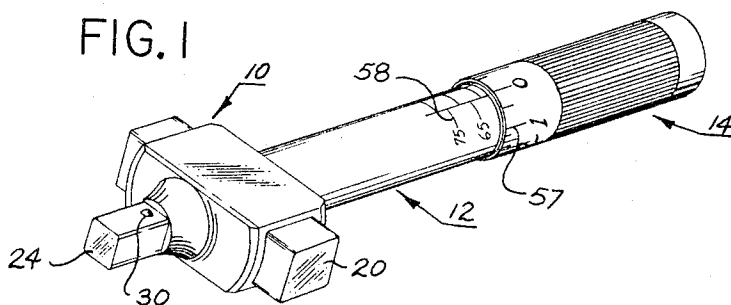


FIG. 2

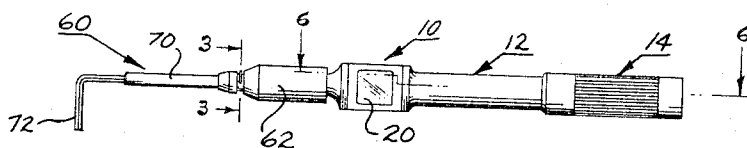


FIG. 3

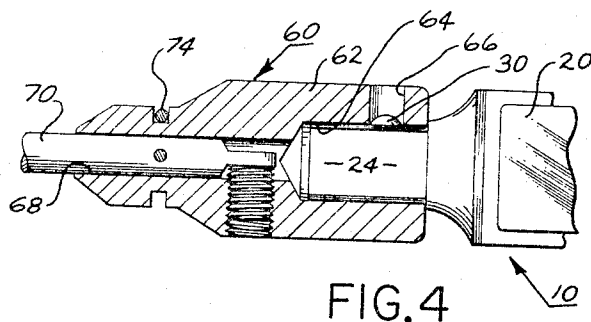
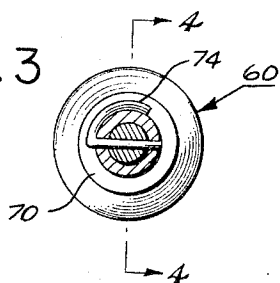


FIG. 4

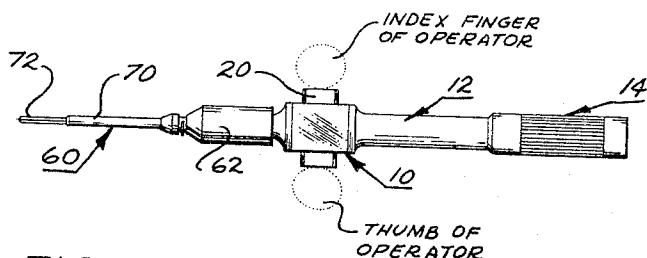


FIG. 5

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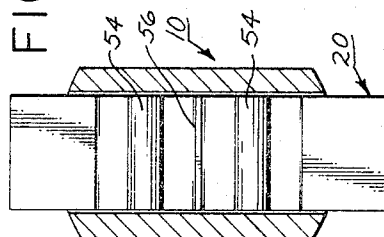
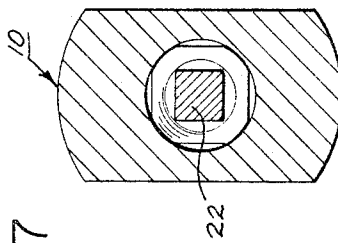
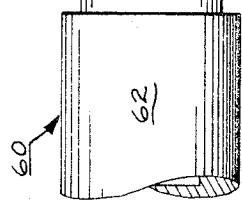
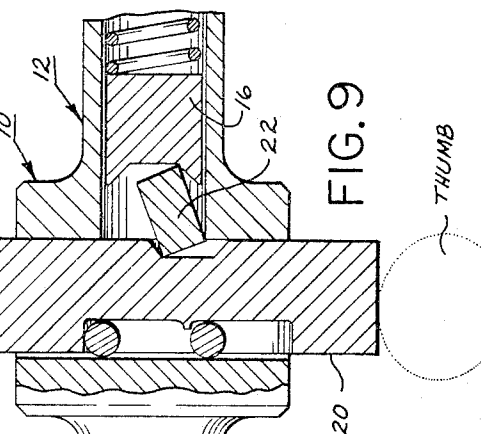
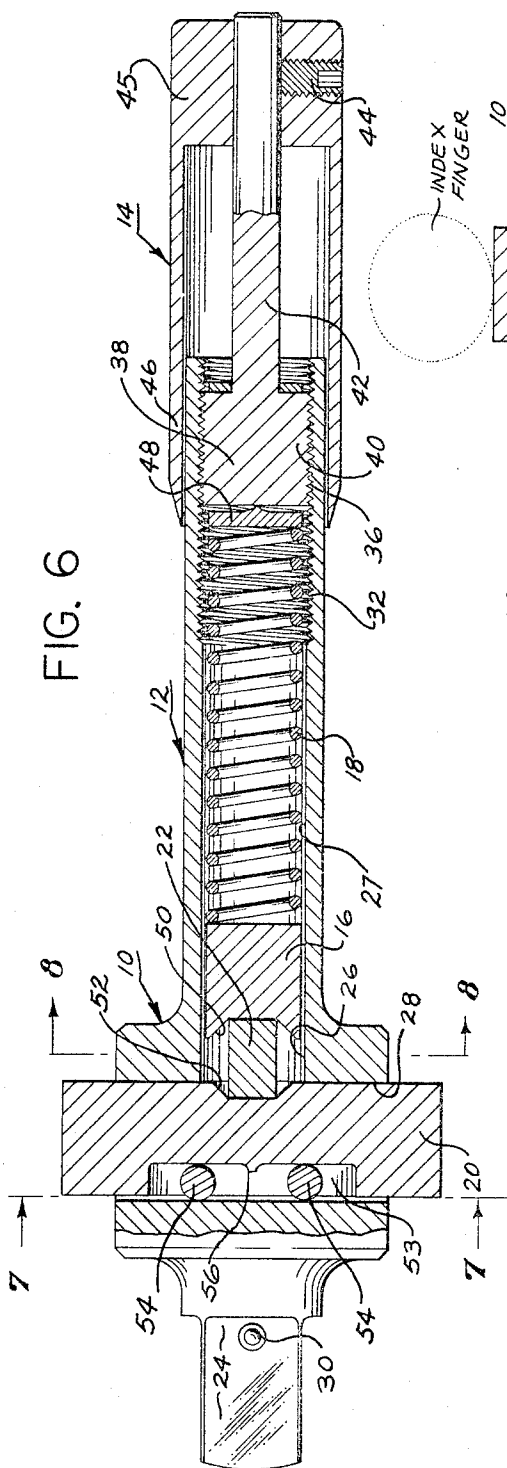
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TORQUE WRENCH

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2 Sheets-Sheet 2



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TORQUE WRENCH
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8 Claims. (Cl. 81-52.4)

The present invention relates generally to wrenches and more particularly to a new and novel torque wrench.

Torque-limiting wrenches have found wide applications in many industries. Generally, these torque-limiting wrenches include a load-engaging member and a spring which resists the movement of the load-engaging member until the desired limited amount of torque is applied to the load thereby. The application of such limited amount of torque to the load through the load-engaging member causes an element of the wrench to undergo movement from its original position against the force of the spring thereby providing an indication that the desired limited amount of torque has been applied to the load. It is a major object of the present invention to provide a torque wrench which is particularly adapted for use with smaller mechanical components such as are found in the electronics industry.

Another object is to provide a torque wrench of the aforescribed nature which is extremely accurate, even though the forces involved are small in comparison to the forces handled by conventional torque wrenches.

A further object is to provide a torque wrench of the aforescribed nature that is simple of design and rugged of construction whereby it may afford a long and useful service life and that is extremely light in weight and compact in size.

The accuracy of many conventional torque wrenches is dependent upon the point of contact of the user's hand relative to the handle thereof, such point of contact determining the length of the lever arm between the load-engaging member and the torque-applying point. The wrench of the present invention eliminates any potential inaccuracy of this nature since torque-producing force can only be applied by the user at only one point.

These and other objects and advantages of the present invention will become apparent from the following detailed description when taken in conjunction with the appended drawings wherein:

FIGURE 1 is a perspective view of a preferred form of torque wrench embodying the present invention;

FIGURE 2 is a side elevational view in reduced scale showing the wrench of FIGURE 1, together with a work-engaging attachment;

FIGURE 3 is a vertical sectional view taken in enlarged scale along line 3-3 of FIGURE 2;

FIGURE 4 is a vertical sectional view taken on line 4-4 of FIGURE 3;

FIGURE 5 is a top plan view of said wrench and work-engaging attachment;

FIGURE 6 is a vertical sectional view taken in enlarged scale along line 6-6 of FIGURE 2;

FIGURE 7 is a vertical sectional view taken on line 7-7 of FIGURE 6;

FIGURE 8 is a vertical sectional view taken on line 8-8 of FIGURE 6; and

FIGURE 9 is a fragmentary horizontal sectional view similar to FIGURE 6 showing the mode of operation of said wrench.

Referring to the drawings, a preferred form of torque wrench embodying the present invention broadly comprises a head, generally designated 10, a tubular body, generally designated 12, extending away from the rear of the head, a tubular handhold, generally designated 14, on the rear portion of the tubular body, a plunger 16 longitudinally slidably disposed within the front portion

of the body 12, a spring 18 that constantly biases the plunger 16 forwardly, a push rod 20 transversely slidably carried within the head 10, and a pivot 22 interposed between the rear of the push rod 20 and the front of the plunger 16. The front portion of the head 10 is formed with a load-engaging member 24. Torque is applied to the load-engaging member 24 by moving the body 12 in either a clockwise or a counter-clockwise direction from its position of FIGURES 1 and 6.

More particularly, the head 10 is integrally formed on the front of the body 12. The interior of the head 10 includes a longitudinal or axial passage 26 which forms a forward continuation of the passage 27 of the tubular body 12, as indicated particularly in FIGURE 6.

The head 10 is also formed with a transverse, horizontally extending passage 28 that intersects the front end of the axial passage 26. The load-engaging member 24 is integral with the forward portion of the head 10 and takes the form of a rectangular boss of square cross-section provided with a spring-pressed detent 30. The rear portion of the interior of the body 12 is formed with internal threads 32. The threads 32 are engaged with complementary external threads 36 formed on an axially extending handhold support 38. The handhold support 38

includes a cylindrical boss 40 whereon are formed the external threads 36 and a rearwardly extending post 42. The rear portion of the post 42 is keyed to the handhold 14 by means of a set screw 44 carried by the rear wall 45 of the handhold. The handhold 14 includes a forwardly extending barrel 46 that overlies the rear portion of the body 12, the front end of the handhold being open.

The plunger 16 is axially slidably disposed within the front portion of the body passage 27. The spring 18 is of spiral configuration and is maintained in compression between the rear end of the plunger 16 and a dish-like spacer 48 that abuts the front portion of the handhold boss 40. The front portion of the plunger 16 is formed with a rearwardly extending depression 50.

The push rod 20 is of generally rectangular configuration with its longitudinal axis normal to that of the body 12. The push rod 20 is formed at its rear-center portion with a forwardly extending depression 52 complementary to plunger depression 50. The front portion of the push rod 20 is formed with an elongated aperture 53 wherein are disposed a pair of like rollers 54. The mid-portion of the push rod aperture 53 is formed with a forwardly extending rib 56 that maintains rollers 54 separated. The pivot 22 is of generally rectangular configuration and is normally arranged with its front and rear ends positioned within recesses 50 and 52, as shown in FIGURE 6. When so arranged, the pivot 22 restrains transverse horizontal movement of the push rod 20 relative to the head 10.

It will be apparent that rotation of handhold 14 upon body 12 will vary the forwardly directed force exerted by the spring 18 on the rear of the plunger 16. In order to provide a visual indication of such spring force the handhold barrel 46 is marked with scaler markings 57 adapted to be utilized in conjunction with complementary scaler markings 58 formed on the body 12, as shown in FIGURE 1. These markings 57 and 58 may constitute vernier graduations reading in inch-ounces.

Referring now to FIGURES 2, 3 and 4, the load engaging boss 24 of the aforescribed wrench is adapted to removably receive various work-engaging attachments. A typical work-engaging attachment is generally designated 60 in FIGURE 2. The work-engaging attachment 60 includes a generally cylindrical adapter 62 formed with a socket 64 of square cross-section which is removably slidably received by the boss 24. A small transversely extending bore 66 receives the spring-pressed detent 30 when the adapter 62 is slipped onto the boss

24. Forwardly of the socket 64 the adapter 62 is formed with an axial passage 68 wherein is positioned the rear portion of a drive 70. The downwardly extending front end 72 of the drive 70 is disposable within a complementary socket formed on a member (not shown) that is to be rotated with a predetermined amount of torque. The drive 70 is removably secured to adapter 62 by a suitable spring element 74.

In operation of the aforescribed torque wrench, a suitable work-engaging attachment such as that designated 60 in FIGURE 2 is applied to the load-engaging boss 24 formed at the front of the head 10. Next the handhold 14 is rotated upon the rear portion of the body 12 until the desired reading is obtained on the markings 57 and 58. The drive 70 of work-engaging attachment 60 is then engaged with the work to be rotated. The operator then places the opposite sides of the push rod 20 between his index finger and thumb, as indicated in FIGURE 5. Next, assuming the work is to be rotated clockwise relative to FIGURES 5, 6 and 9, the operator urges the entire assembly in such direction by means of the push rod 20. During such movement the push rod 20 will be restrained from transverse movement in the direction of wrench movement by the spring 18 acting through plunger 16 and pivot 22. When, however, the torque being applied by the wrench through attachment 60 reaches the selected predetermined magnitude the push rod 20 will "break" in the direction of wrench movement, as shown in FIGURE 9, the pivot 22 pivoting within depressions 50 and 52 as the plunger 16 compresses spring 18. It should be noted that the provision of rollers 54 minimizes the friction developed between push rod 20 and head 10 thereby affording great accuracy. It should also be noted that the aforescribed wrench may be utilized to apply torque in a counter-clockwise direction.

Various modifications and changes may be made with respect to the aforescribed preferred embodiment without departing from the spirit of the present invention or the scope of the following claims.

I claim:

1. A torque wrench for applying a predetermined magnitude of torque to a load, comprising:
 - a body having a head at its front portion, said head being formed with a load-engaging member;
 - a push rod transversely slidably carried by said head, said push rod being employed to rotate said body and thereby apply torque to said load;
 - a plunger axially slidably carried by said body rearwardly of said head;
 - resilient means interposed between said body and said plunger for constantly urging the latter forwardly relative to said body;
 - and a pivot element interposed between the rear of said push rod and the front of said plunger, said pivot normally restraining transverse movement of said push rod relative to said head as said body is caused to rotate until a predetermined magnitude of torque is applied to said load, with said push rod then undergoing transverse movement relative to said head.

2. A torque wrench as set forth in claim 1 wherein the rear of said push rod and the front of said plunger are formed with complementary depressions wherein are disposed the front and rear ends, respectively, of said pivot element.

3. A torque wrench as set forth in claim 1 wherein said resilient means is a spring, with said body having means for adjusting the effective force of said spring.

4. A torque wrench as set forth in claim 1 wherein roller means are interposed between said push rod and said head.

5. A torque wrench for applying a predetermined magnitude of torque to a load, comprising:

- an elongated body formed with an axial passage;
- a head on the front portion of said body, said head being formed with an axial passage connected with the axial passage of said body and with a transverse passage intersecting the axial passage of said head;
- a push rod transversely slidably carried by the transverse passage of said head, said push rod being employed to rotate said body and thereby apply torque to said head;
- a load-engaging member on said head;
- a plunger axially slidably carried within the axial passage of said body rearwardly of said head;
- resilient means interposed between the rear portion of said body and said plunger for constantly urging the latter forwardly relative to said body, said resilient means being disposed within the axial passage of said body;
- and a pivot element interposed between the rear of said push rod and the front of said plunger, said pivot normally restraining transverse movement of said push rod relative to said head as said body is caused to rotate until a predetermined magnitude of torque is applied to said load, with said push rod then undergoing transverse movement relative to said head.

6. A torque wrench as set forth in claim 5 wherein said resilient means is a spring and the rear portion of said body is provided with handhold means which is movable relative to said body to adjust the effective force of said spring.

7. A torque wrench as set forth in claim 5 wherein roller means are interposed between said push rod and said head.

8. A torque wrench as set forth in claim 5 wherein the rear of said push rod and the front of said plunger are formed with complementary depressions wherein are disposed the front and rear ends, respectively, of said pivot element.

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