

[54] **NON-SLIPPING POLYGONAL WRENCH**

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[22] Filed: **June 28, 1971**

[21] Appl. No.: **157,327**

[52] U.S. Cl. **81/71, 81/125.1**

[51] Int. Cl. **B25b 13/48**

[58] Field of Search 81/71, 72, 125, 57.38, 81/125.1, 177; 145/50 A, 50 D, 50 E; 287/58 CT, 53 R, 53 H, 53 SS, 103 R, 126

[56] **References Cited**

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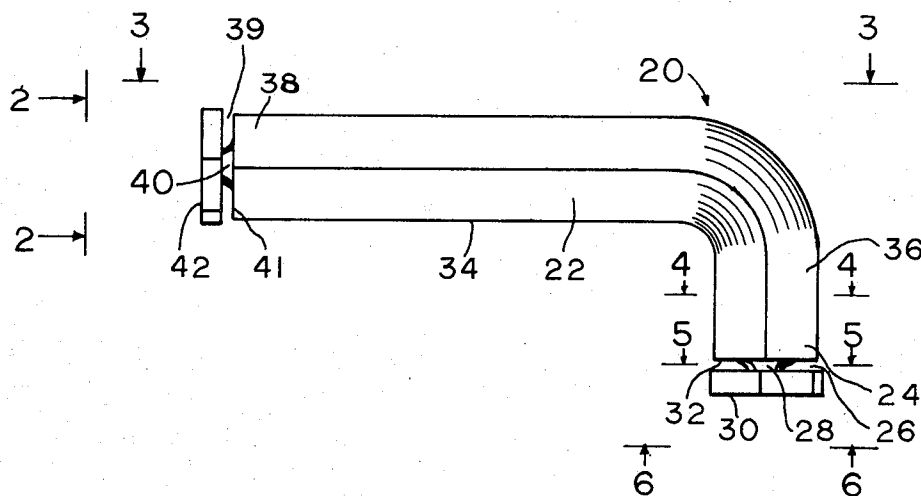
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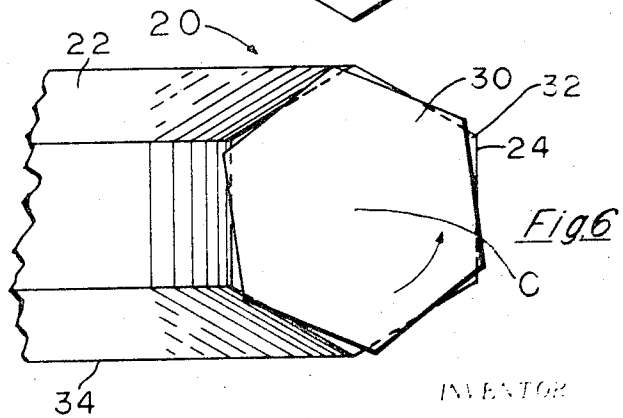
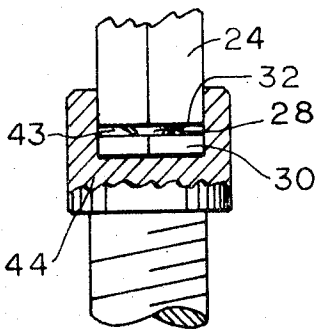
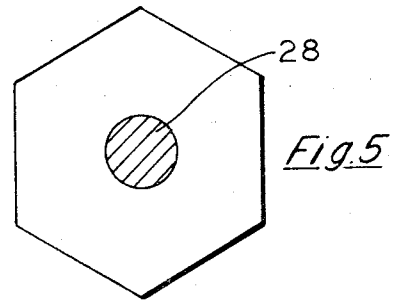
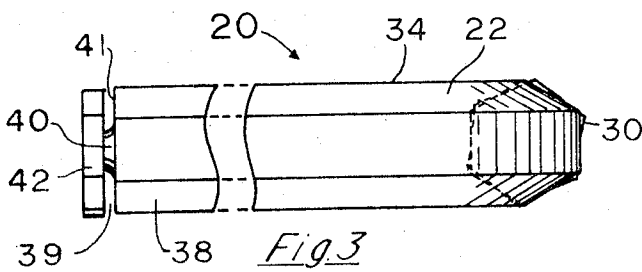
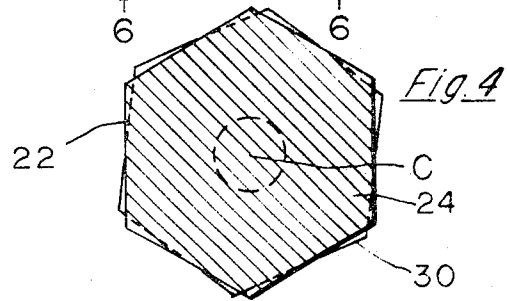
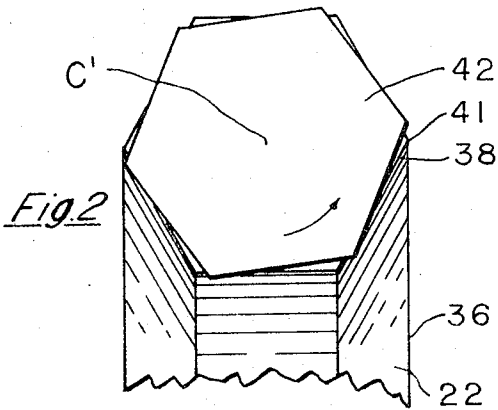
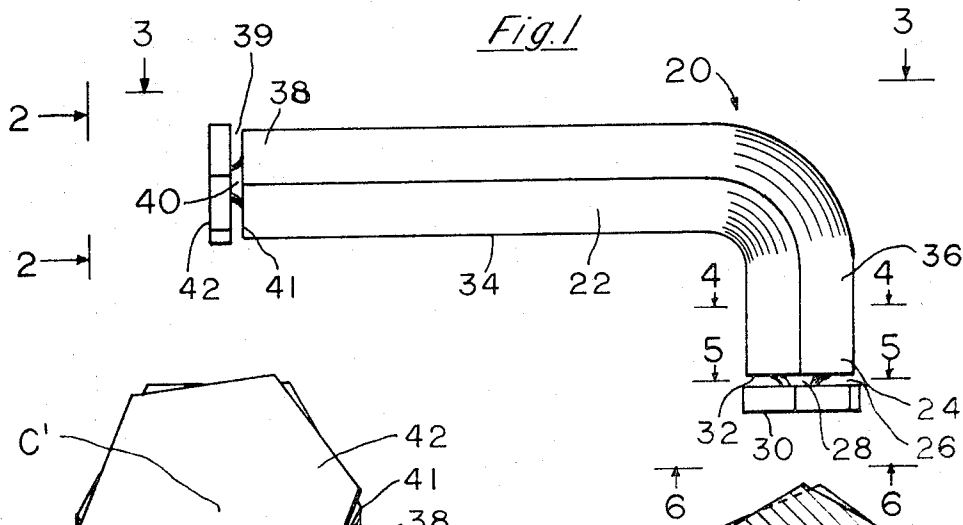
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[57] **ABSTRACT**

A wrench having a plurality of sides is formed with a head at one end for insertion into a socket of a screw or bolt having a corresponding number of sides. A horizontally springy neck of the wrench is integral with a head and with a tip spaced axially from the head. The tip is offset circumferentially from the head approximately 5° to 10°. A similar head, springy neck and offset tip may be provided at the other end of the wrench. The wrench may be straight or L-shaped and have any number of sides greater than two.

10 Claims, 11 Drawing Figures





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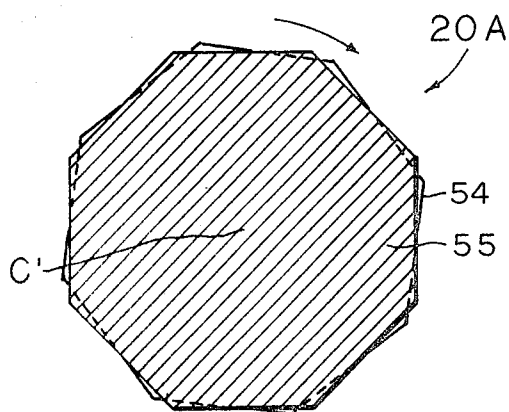


Fig. 11

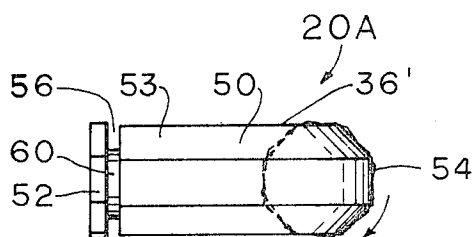


Fig. 9

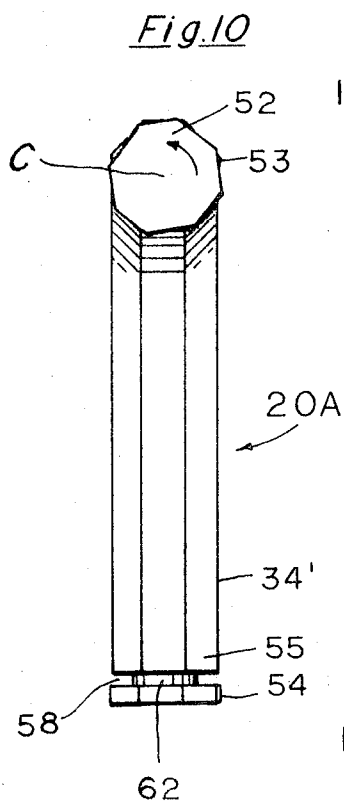


Fig. 10

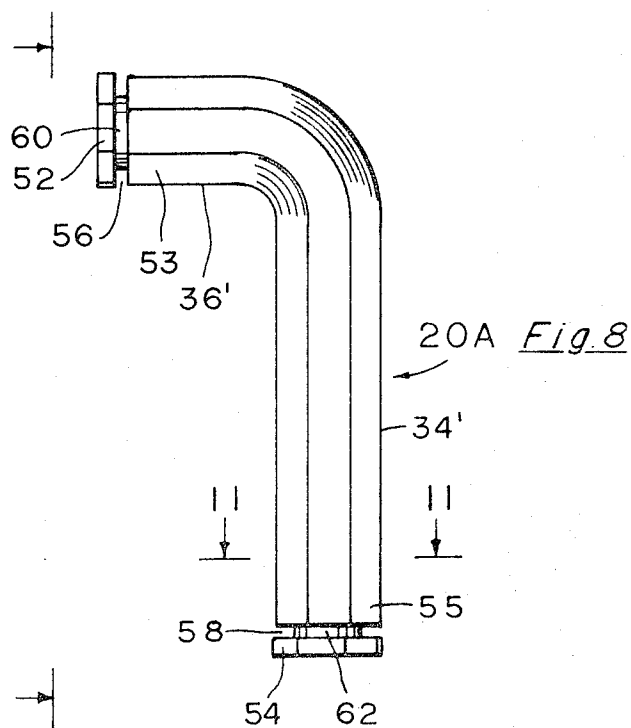


Fig. 8

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NON-SLIPPING POLYGONAL WRENCH

This invention concerns wrenches of the type having a plurality of sides and used with bolts or set screws having sockets with a corresponding number of sides as the wrench thereby capable of receiving the ends of the wrench.

A difficulty encountered with wrenches of the conventional and well known Allen type which have a hexagonal sided head, is the tendency of the wrench to slip out of the socket head of a bolt or screw when the threads of the bolt or screw are not engaged in a work piece and a force such as gravity is acting on the bolt or screw. Analysis of this situation reveals that the cause is lack of any effective gripping force between the smooth side walls of the socket and the smooth side walls of the wrench head. Proposals heretofore made for increasing the mutual grip between socket and wrench have not proven successful or universally applicable. For example, one expedient has been to employ an adapter which grips the outside of the bolt head. This construction is not adaptable to use with headless set screws having polygonal sided sockets, nor is it usable with bolts where inadequate space is available around the bolt heads for the adapters. Other expedients proposed involve forming the wrench heads with teeth, which is undesirable since mutilation of the socket walls occur.

The present invention solves the problem by providing gripping means for the wrench head whereby the head will remain engaged with a set screw or bolt while the screw or bolt is being inserted into a threaded hole. Thus the wrench can be used to hold the screw or bolt while it is being brought to the threaded hole, and can be further used to start turning the screw or bolt in the threaded hole and finally can also serve to tighten the screw.

The gripping means prevents accidental slippage of the wrench head out of its socket. After the screw or bolt is set in place the wrench is simply pulled loose out of the socket in which it is engaged. In reverse operation while disengaging the set screw or bolt from a threaded hole, the wrench is again held in non-slip engagement with the socket, and after the screw or bolt is fully disengaged from the threaded hole in which it was set, the wrench holds the screw or bolt until it is pulled off the wrench.

According to the invention, the head of a wrench is provided with a circumferential groove defining a neck which is torsionally springy. The neck terminates in a tip which has a position turned annularly slightly from the head of the wrench. When the wrench head is inserted into a socket of a screw or bolt the tip is turned while the neck is twisted circumferentially. This provides a friction grip between the tip of the wrench and socket and between the head of the wrench and socket directed in opposite directions due to the torsional spring force exerted by the twisted neck. It is of course necessary to manufacture the wrench or at least the wrench head of spring steel to accomplish the purposes of the invention. The invention is adapted for use with polygonal wrenches of any number of sides from three to 12 or more.

It is therefore a principal object of the invention to provide a wrench with a head adapted to exert a friction grip with a socket under torsional spring tension.

It is a further object to provide a polygonal wrench head with a tip jointed to the head by an integral springy neck, the tip being offset circumferentially slightly from the polygonal head.

These and other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which:

FIG. 1 is a side view of a wrench embodying the invention;

FIG. 2 is an enlarged fragmentary end view of the wrench taken along line 2—2 of FIG. 1;

FIG. 3 is a plan view of the wrench with a part broken away, and taken along line 3—3 of FIG. 1;

FIG. 4 is an enlarged cross sectional view taken along lines 4—4 of FIG. 1;

FIG. 5 is an enlarged cross sectional view taken along lines 5—5 of FIG. 1;

FIG. 6 is an enlarged fragmentary bottom plan view taken along line 6—6 of FIG. 1;

FIG. 7 is a fragmentary side view partially in cross-section of the head and tip of a wrench engaged in the socket of a bolt head;

FIG. 8 is a side view of another polygonal wrench embodying the invention;

FIG. 9 is an end view of the wrench of FIG. 8;

FIG. 10 is another side view of the wrench, taken 90° from the view of FIG. 8 along lines 10—10 of FIG. 8; and

FIG. 11 is an enlarged cross sectional view taken along line 11—11 of FIG. 8.

Referring, now to the drawings wherein like reference characters designate like or corresponding parts throughout, there is illustrated in FIGS. 1—7, a wrench generally designated as reference numeral 20 which is L-shaped in side view and is formed with flat, polygonal sides 22. A head 24 of the wrench is formed with a circumferential groove 26 defining a tapered round neck 28 integral with a polygonal tip 30. The tip 30 is turned angularly on the center C of the head and given a permanent set which is counterclockwise with respect to the head 24, as best shown in FIG. 6. The plane of the tip 30 is parallel to the end surface 32 of the head 24 as clearly illustrated in FIG. 1. The wrench has a longer portion 34 which serves as a handle. It is possible to use the wrench as a double headed one, with a shorter portion 36 serving as a handle. A head 38 will then be provided with a circumferential groove 39 defining a springy neck 40 between an end surface 41 of the head 38 and a polygonal tip 42. The tip 42 will also be given a permanent set by being turned angularly counterclockwise around axis C' with respect to the head 38 as best shown in FIG. 2. The angle of set of each of the tips 30 and 42 will preferably range from 5° to 10° with respect to the heads 24 and 38 respectively.

In operation of the wrench, either of the head 24 or 38 may be inserted into a polygonal socket 43 of a screw or a bolt head 44. As shown in FIG. 7, first the tip 30 is inserted into the socket 43, the head 24 is inserted and then the wrench is twisted from 5° to 10° to align the sides of the head 24 with the sides of the tip 30 and the sides of the socket 43. Finally the head 24 is pushed axially into the socket 43. While the wrench is being twisted the bolt is held stationary. This imparts a circumferential torsional twist to the neck 28. The bolt can then be manually released and will be held

frictionally gripped by the wrench head and the twisted tip 30. The wrench tip 30 and the head 24 will be biased in opposite directions due to the torsional spring tension in twisted neck 28. The bolt can then be inserted into a threaded hole supported by the wrench with wrench portion 34 used as a handle. During driving of the bolt, the wrench head will remain in an anti-slip engagement along with the tip 30 in the socket 43.

In removing a bolt or screw from a screw hole, the wrench tip will first be inserted in the socket 43. Then the wrench will be turned 5° to 10° and finally the wrench head will be inserted into the socket of the bolt or screw. Again the wrench and socket will be in anti-slip engagement during loosening and removal of the bolt or screw. After the bolt or screw is fully loosened it will remain engaged with the wrench head until forcefully removed. This is a highly advantageous feature when the bolt or screw is being removed from a tight, narrow spaced position. Both ends of the wrench operate in the manner described above.

Instead of a hexagonal wrench as shown in FIGS. 1-7, the wrench may have any desired number of sides, such as three, four, five, eight, 12, etc. FIGS. 8-10 show a polygonal wrench 20A having eight sides 50. Octagonal tips 52, 54 at opposite ends of a short and long portion 36', 34' respectively of the L-shaped wrench are twisted circumferentially with respect to adjacent parallel heads 53, 55. Circumferential grooves 56, 58 define springy necks 60, 62 with the tips 52 and 54 offset about 5° to 10° circumferentially with respect to the heads 53, 55 respectively. The tips are turned counterclockwise on axes C and C' with respect to the heads as clearly shown in FIGS. 10 and 11. In both the wrenches 20 and 20A it is of course possible to fabricate the wrenches with a clockwise twist to the wrench tips with respect to the wrench heads. This may be desirable when the wrenches are specifically intended for use with bolts and screws having left hand threads. The wrenches may be made of spring steel or any other material having springy properties, for the necks 28, 40, 60, 62. The heads and tips may be of tool steel hardness for long wearing, durable, reliable operation.

The invention is adapted to wrenches of various sizes with individual wrenches made with heads of different sizes each provided with a twisted tip and torsion spring neck. The invention may also be used with straight polygonal wrenches rather than L-shaped ones as shown in the drawings, by similarly omitting the shorter arms of the wrenches.

Although the invention has been illustrated and described as being used with a conventional allen screw or polygonal sided figure, the invention may be used with any socket screw as long as the wrench has sides

or a configuration corresponding to that of the socket of a screw.

It should be understood that the foregoing relates to only a preferred embodiment of the invention, and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The invention claimed is:

1. A wrench comprising:
a body having a head means at one end,
a torsionally springy neck means integrally formed with said head means and extending axially from a free end of said head means,
a tip axially integral with said neck means, said tip having an external form corresponding to that of said head means with said tip circumferentially offset therefrom by a permanent angular twist around the central axis of said head means.
2. A wrench as defined in claim 1 wherein said body, and said tip have a polygonal sided shape.
3. A wrench as defined in claim 1 further comprising another head means at the other end of said body
another torsionally springy neck means integrally formed with said other head means and extending from a free end of said other head means;
another tip axially integral with said other neck means, said tip having an external form corresponding to that of said head means with said tip circumferentially offset therefrom by a permanent angular twist around the central axis of said other head means.
4. A wrench as defined in claim 3, wherein said body is L-shaped in side view.
5. A wrench as defined in claim 1, wherein said head means, and said tip have a number of straight sides ranging from three to twelve.
6. A wrench as defined in claim 3 wherein said head means and said tip have a number of sides ranging from three to twelve.
7. A wrench as defined in claim 1, wherein said tip is twisted from 5° to 10° with respect to said head means.
8. A wrench as defined in claim 3, wherein each tip is twisted from 5° to 10° with respect to the respective head means.
9. A wrench as defined in claim 1 wherein said neck means is defined by a circumferential groove between said head means and said tip.
10. A wrench as defined in claim 1 wherein said tip is twisted counterclockwise from 5° to 10° with respect to said head means as viewed endwise.

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