April 15, 1958 W. C. FINN 2,830,479

GEAR OPERATED WRENCH

Filed Feb. 11, 1957

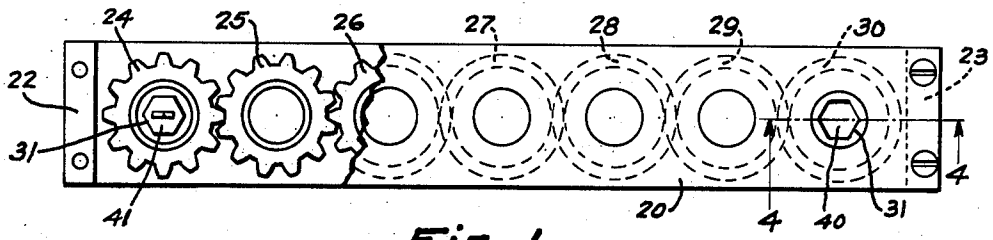


Fig. 1.

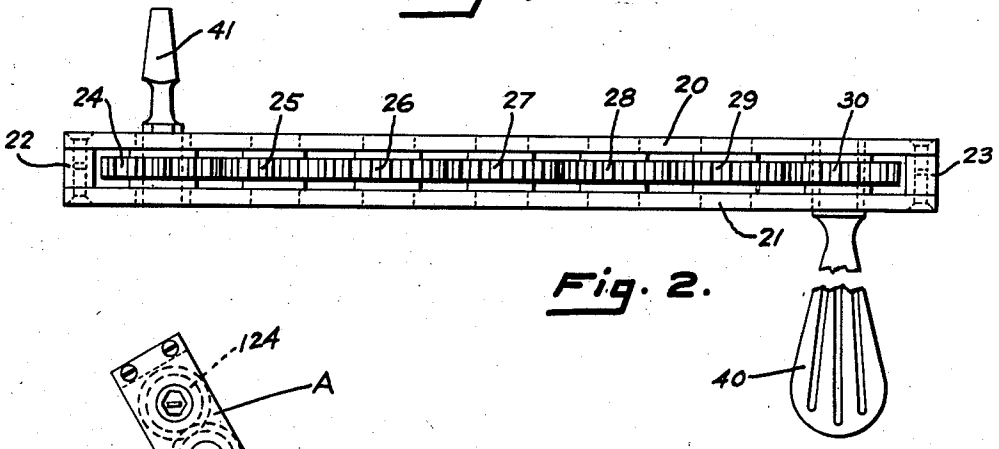


Fig. 2.

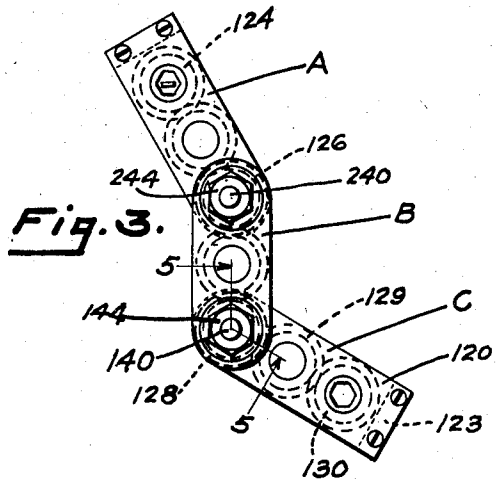


Fig. 3.

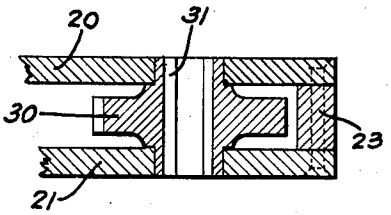


Fig. 4.

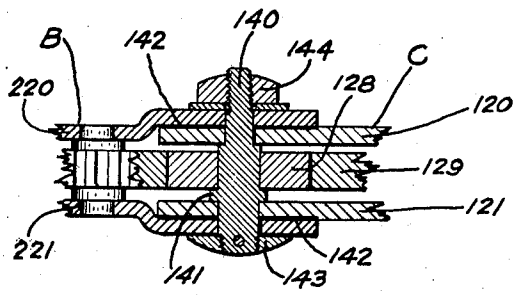


Fig. 5.

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United States Patent Office 2,830,479 Patented Apr. 15, 1958

2,830,479

GEAR OPERATED WRENCH

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Application February 11, 1957, Serial No. 639,553

4 Claims. (Cl. 81—57)

This invention relates to an improved gear operated screw driver or wrench.

It is among the objects of the present invention to provide a gear operated screw driver or wrench capable of engaging and turning a screw or nut in a restricted area in which an ordinary screw driver or wrench could not be used for their intended purposes.

A further object of the present invention is to provide such a tool which is capable of being adjusted so as to be insertable into cramped or restricted areas, avoid interfering parts and engage and be held in operative engagement with screws or nuts located in such areas and not capable of being engaged or operated by the ordinary screw driver or wrench.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings which illustrate a preferred form of the invention.

In the drawings:

Fig. 1 is a front view of the tool with a portion broken away to show interior elements.

Fig. 2 is a side view of the device shown in Fig. 1.

Fig. 3 is a front view, at reduced scale, showing a form of tool capable of being adjusted to meet extraordinary requirements in the operation of screws or nuts.

Fig. 4 is a fragmentary sectional view taken along the line 4—4 in Fig. 1.

Fig. 5 is a fragmentary sectional view taken along the line 5—5 in Fig. 3.

In commercial production, the design of the article being produced often requires screws, bolts and nuts to be applied in areas difficult to reach with an ordinary screw driver or wrench. This is particularly true when the article has been in use in the field and requires servicing. For instance, in an automobile or airplane, where space is at a premium and applied parts are numerous, progressive application of such parts during assembling of the machine results in the location of screws, bolts and nuts very difficult to reach with an ordinary screw driver or wrench, especially when the machine requires servicing. Restricted space and interfering parts necessitate the use of specially designed tools to reach, engage and operate the unhandily located screw or nut.

The device of the present invention is such a specially designed tool. It is so constructed that it can be inserted into a restricted space and its torsion tool, screw driver or wrench, placed into operative engagement with the screw or nut to be turned and so held while the tool is being operated handily outside the restricted space.

As shown in Figs. 1 and 2, the wrench or torsion tool consists of a rigid frame comprising two spaced, parallel front and back plates 20 and 21. These plates are held in spaced relation by end members 22 and 23 secured to said plates in any suitable manner.

Within this frame there is provided a train of cooperating gears 24, 25, 26, 27, 28, 29 and 30, rotatably carried by the frame plates 20 and 21. All of these gears are

alike with the exception of gears 24 and 30 later referred to as "end gears." These end gears each have an axial through passage 31 as shown in Fig. 4. all of the gears have hub portions extending coaxially from each side of the gear, said hub portions each extending into a respective opening in the plates. Thus all gears are rotatably supported between said plates 20 and 21. The hubs of the intermediate gears 25, 26, 27, 28 and 29 are solid, however, the hubs of the end gears as well as the gear itself has a through passage 31 which is adapted to receive and removably hold the shank portions of either a driving or driven tool member 40 or 41 respectively. Fig. 2 shows the driving member as a handle and the driven member as a screw driver. The through passages are shown hexagon shaped so that the similarly shaped shanks of the tool members 40 and 41, when inserted into said passages, will be operatively connected to the end gears 24 or 30 respectively. Either of these end gears may receive either the driving or the driven tool member at either side of the respective gear so that said tool members may extend from one or the other side of the frame as desired.

For purposes of illustration, the tool member 41 is shown as a screw driver. It may be a socket wrench to turn nuts, a plug wrench to turn Allen screws or a driver to turn Phillips screws. All of these tool members must have a shank portion shaped similarly to the through passage 31.

From the aforegoing description and reference to Figs. 1 and 2, of the drawings it may be seen that the frame of the torsion tool may easily be inserted into a comparatively narrow and confined space and the tool portion 41 be brought into and firmly held in operative engagement with the screw or nut to be turned, even though said screw or nut could not be reached by an ordinary screw driver or wrench.

When this torsion tool is inserted into the narrow or confined place, the operating handle is conviently outside this space and may be easily turned to actuate the tool member through rotation of the train of gears. The rigid frame provides for the constant maintaining of the tool member in operating engagement with the screw or nut to be turned.

In some assemblies obstructions in the confined space occupied by screws or nuts to be turned may not permit the insertion of the straight frame torsion tool shown in Figs. 1 and 2. A torsion tool constructed in accordance with Figs. 3 and 5 of the drawings would readily meet the requirements of this situation. Here the tool, instead of having a straight rigid frame, consists of two or more frame sections hinged together so as to be and be arranged in disalined or zig-zag fashion as shown in Fig. 3.

In Fig. 3, the frame is shown as having three sections A, B and C, each consisting of front and back plates between which a train of gears, similar to the train of gears shown in Figs. 1 and 2, are rotatably supported. The one frame section C, shown in Figs. 3 and 5, consists of front plate 120 and back plate 121 held in spaced relation at one end by the member 123 to which said plates are rigidly secured in any suitable manner. Three gears 128, 129 and 130 of a train of gears are rotatably carried in the frame section C between its plates 120 and 121. Gears 129 and 130 are identical with gears 29 and 30 of the torsion tool shown in Figs. 1 and 2. Gear 128, however, differs in that it is rotatably carried by a pivot pin 140 extending through openings in the plates 120 and 121 adjacent their corresponding inner ends.

Pivot pin 140 has an annular flange 141 providing two oppositely disposed annular shoulders, one forming an end thrust seat for the gear 128 rotatably supported by said pivot pin, the other shoulder providing an abutment for the frame plate 121 through which said pin extends.

Another annular shoulder formed by a reduced diameter portion of the pivot pin 140 provides an abutment for the other frame plate 120 of section C. These abutments hold said plates in the same spaced relation as the member 123.

The middle section B of the torsion tool shown in Fig. 3 consists of two spaced, parallel plates 220 and 221, the respective ends of which are flared outwardly to rest flatly upon the corresponding plates 120 and 121 of the frame section C at one end and frame section A at the other end. Fig. 5 shows the adjacent flared ends of plates 220 and 221 of section B flatly engaging the respective plates 120 and 121. Pivot pin 140 extends through openings in said flared ends of plates 220 and 221. The engaging surfaces of plates 120 and 220 and 121 and 221 have serrations 142 radially of the openings in said plates through which the pivot pin extends. An abutment head 143 is attached to the pivot pin 140 in any suitable manner so as to be engageable with plate 221. A locking nut and washer 144 are provided on the pivot pin so as to be engageable with plate 220. The locking nut 144 is operative to exert pressure upon plate 220 and through head 143 upon plate 221 so that plates 120 and 220 and plates 121 and 221 are, by the aid of their serrated engaging surfaces, immovably locked together in selected relative position. When the locking nut is operated to release its pressure, the frame sections B and C may be rotated on the pivot pin to alter their relative positions.

Section A of the torsion tool shown in Fig. 3, has its one end pivotally attached to the middle section B in the same manner as section C is attached to said middle section. Suffice to say that pivot pin 240, which rotatably carries gear 126, has a locking nut 244 which, when loosened, will permit section A to be adjustably moved relatively to section B. Tightening of nut 244 locks the sections A and B securely together to prevent relative movement therebetween.

The end gears 124 and 130 of the train of gears rotatably carried in the frame sections A, B and C, are each provided with a through passage for receiving and removably holding tool members 40 and 41 the same as the identical gears 24 and 30 of the tool shown in Figs. 1 and 2. It will of course be seen that the torsion tool of Fig. 3, may consist of any number of sections so constructed as to provide rigidity.

From the aforegoing description it will be apparent that the present invention provides a torsion tool which may be inserted into places so restricted as to prevent the use of ordinary screw drivers or wrenches. The torsion tool of the present invention is so constructed that the tool portion 40 thereof, screw driver or wrench, may be placed and held in operating engagement with and then operated to turn a screw or nut located in a confined area into which no ordinary screw driver or wrench may be inserted much less used.

What is claimed is as follows:

1. A torsion tool consisting of a rigid frame; a train of cooperating gears rotatably carried by said frame; a driving and a driven tool member; and a through passage, having at least one flat side, coaxially provided in the respective gear at each end of said train of gears, each through passage being operative to receive and removably secure to said gear either the driving or the driven tool member so that said member extends from either one or the other side of the frame.

2. A torsion tool consisting of a rigid frame in which a train of cooperating power transmitting elements are rotatably supported, the respective end elements only, in said train of elements having means for receiving and detachably holding a tool member coaxially extending from either side thereof, said tool members being a driving means for rotating the train of power transmitting elements and a driven tool operative to provide a torsion force upon any device operatively engaged thereby.

3. A torsion tool having a frame consisting of a plurality of sections, adjacent ends of which are pivotally secured, one to the other, rendering said sections relatively adjustable; means operative to lock engaging frame sections against relatively pivotal movement; a train of cooperating gears rotatably carried by said frame sections, a gear of said train being mounted on said frame coaxially of each pivotal connection between adjacent frame sections; and tool receiving and holding means provided in each end gear of said train of gears.

4. A torsion tool having a frame consisting of a plurality of sections, each one hingedly attached to the adjacent section to provide for selective adjustment of said sections, one relatively to the other; pivot means hingedly securing the ends of adjacent frame sections, one to the other; releasable locking means on the pivot means operative rigidly to secure the one frame section to the other in relatively adjusted position; a train of operatively engaging gears rotatably carried in said frame sections, each pivot means rotatably supporting one gear of said train; and means in each gear at the extreme ends of said train of gears, providing a receptacle for receiving and detachably holding tool members, one of which is an operating means for the train of gears, the other an operated tool to provide a torsion force.

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