

Aug. 14, 1945.

A. E. CARLBERG
EXTENSIBLE HAND TOOL

2,382,291

Filed April 8, 1943

2 Sheets-Sheet 1

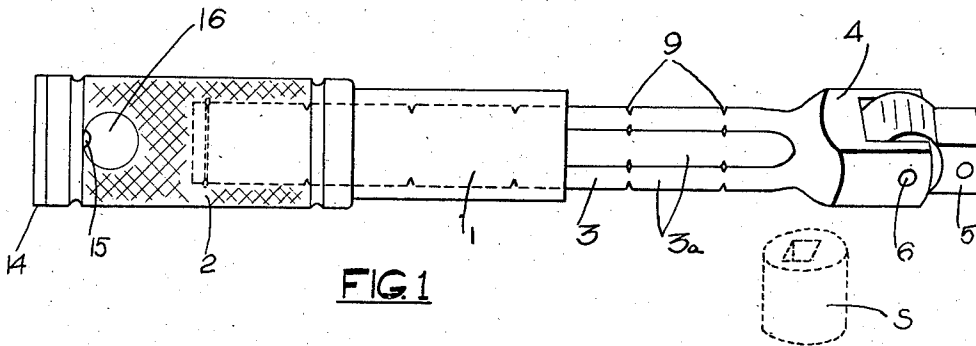


FIG 1

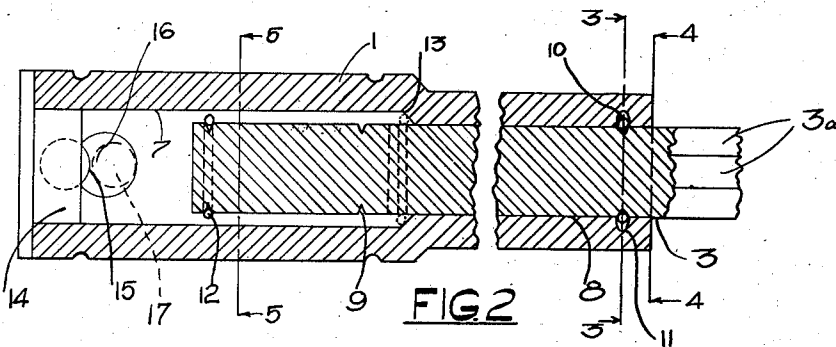


FIG 2

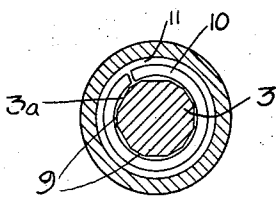


FIG 3

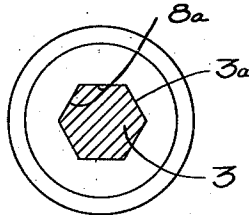


FIG 4

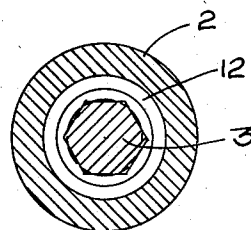


FIG 5

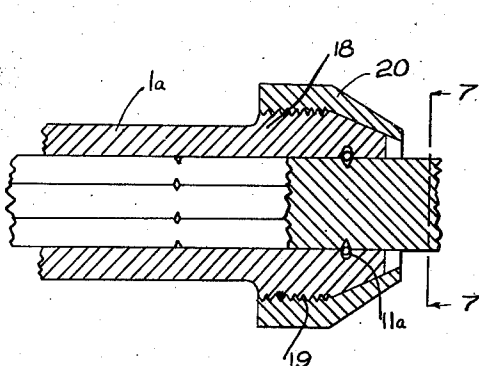


FIG 6

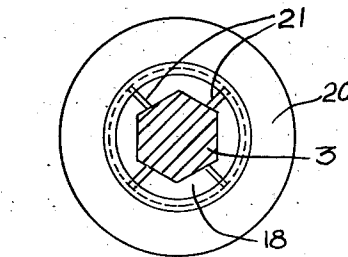


FIG 7

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2 Sheets-Sheet 2

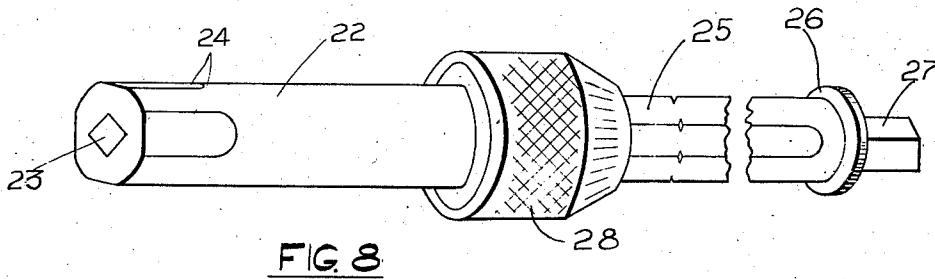


FIG. 8

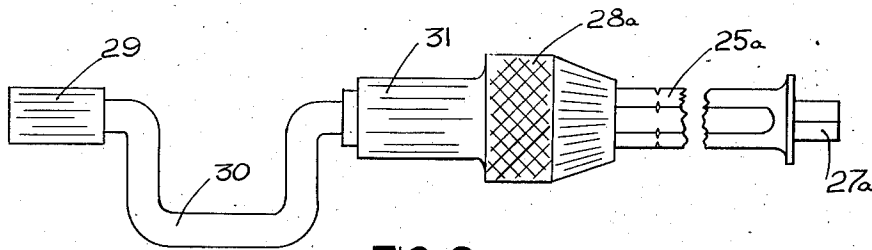


FIG. 9

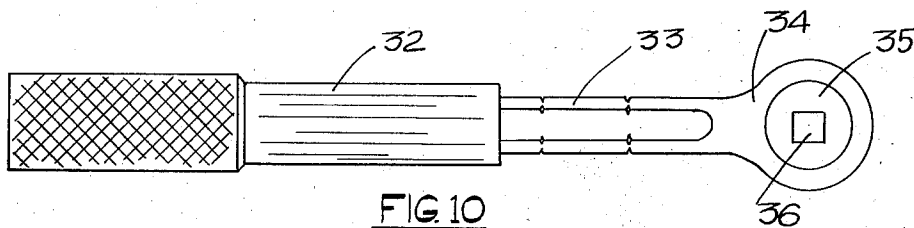


FIG. 10

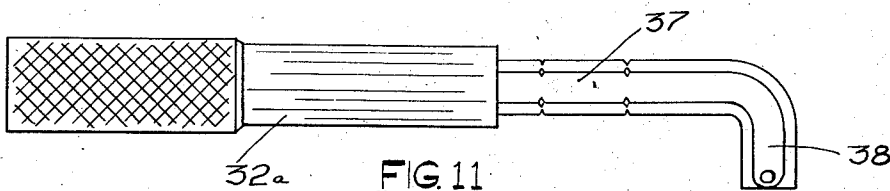


FIG. 11

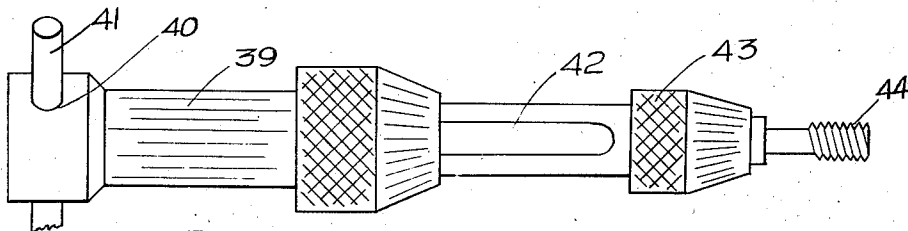


FIG. 12

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2,382,291

EXTENSIBLE HAND TOOL

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Application April 8, 1943, Serial No. 482,275

3 Claims. (Cl. 287—58)

The present invention relates to hand tools such as wrenches and the like, and has for its object to provide a tool of this character that may be easily operated and applied to parts that are located in relatively inaccessible places. The tool embodying my invention is constructed so that it may be readily adjusted to operate under different conditions, particularly as regards the length of the tool. Furthermore, the tool is so constructed that it can be operated with any given adjustment so as to apply a turning force to the work operated upon, either by turning the tool about its own axis, or using it as a lever.

The above and other advantageous features of the invention will hereinafter more fully appear from the following description, considered in connection with the accompanying drawings, in which:

Fig. 1 is a view in side elevation of a tool embodying the invention.

Fig. 2 is a longitudinal sectional view through the handle portion of the tool of Fig. 1, on an enlarged scale.

Figs. 3, 4 and 5 are transverse sectional views along the lines 3—3, 4—4 and 5—5 of Fig. 2.

Fig. 6 is a fragmentary sectional view showing a modification of the tool adjusting means.

Fig. 7 is a transverse sectional view along the line 7—7 of Fig. 6.

Fig. 8 shows a tool embodying the invention adapted for use as an extension bar.

Fig. 9 shows a tool embodying the invention adapted for use as a brace.

Fig. 10 shows a tool embodying the invention adapted for use as a ratcheting wrench.

Fig. 11 shows a tool embodying the invention functioning as an offset wrench.

Fig. 12 shows a tool embodying the invention employed as a tap.

Referring first to Figs. 1 and 2, the tool consists of a handle portion 1 providing a suitable grip 2, the handle portion 1 being hollow to receive a shank 3 longitudinally adjustable within the handle, as will hereinafter appear. The free end of the shank 3 terminates in a head 4 providing spaced arms between which a driver 5 is mounted on a pivot 6. The driver 5 is squared at its end so as to be readily received in a co-operating socket S, indicated in dotted lines as being of the type commonly employed in socket wrench sets.

As will later appear, the shank 3 may be provided with other types of drivers or work performing members adapted to meet different conditions. However, the principle of the tool remains the same, irrespective of what type driver may be employed, namely the provision of means whereby the shank 3 may be readily extended with respect to the handle portion 1, and where-

by the driver 5 may be operated either by turning the tool on its axis, or using it as a lever.

Referring now to Figs. 2 to 5 inclusive, it will be seen that the handle portion 1 provides a smooth internal bore 7, the diameter of which is such as to freely receive the shank 3 which is angular in cross section. While the shank is shown as being hexagonal in form, it may be square, or have such other straight-sided form, as may be desired. The shank 3 is adapted to fit tightly into a second bore 8 of the handle portion 1 which, as shown in Fig. 4, is broached after boring so as to provide angularly disposed faces 8a coinciding with the faces 3a of the shank. Thus while a sliding fit is provided between the shank 3 and the handle portion 1, the engaged faces 3a and 8a prevent turning of the shank within the handle.

In order that the shank 3 may be held in a number of different positions within the handle to vary the over-all length of the tool, the shank 3 provides a number of series of notches 9 cut across the corners between its faces 3a. These notches 9 are arranged at regular intervals, and as best shown in Fig. 3, any one of the series of notches 9 is adapted to be engaged by a frictional holding member 10 provided inside the handle. As shown, the holding member 10 is in the form of a split ring freely seated within a groove 11 near the outer end of the bore 8. The ring 10 is of such diameter that it will be slightly expanded within the groove 11 when riding on the un-notched portions of the shank 3. However, when movement of the shank 3 brings the rings 10 in register with a series of notches 9, the ring 10 will contract upon the shank and so exert a strong compressive force on the shank to hold it positively in position, as indicated in Fig. 3. However, the ring 10 will always exert a considerable pressure on the shank 3 between notches which will serve to frictionally hold the shank so that it will never slide freely between notches.

In order to prevent the shank from being entirely pulled out of its handle, the series of notches 9 at the inner end of the shank receive a ring 12 which normally bears on the surface of the larger bore 7. Obviously, when the shank 3 is fully extended as indicated in dotted lines in Fig. 2, the ring 12 will engage a shoulder 13 between the bores 7 and 8 to prevent withdrawal of the shank. In assembling the tool, the shank, without the ring 12, is pushed entirely through the open end of the bore 7 to permit the ring 12 to be placed in position, after which it is impossible to accidentally separate the shank from the handle.

It is to be noted that the shoulder 13 is located substantially midway between the ends of the handle 1, so that even with the shank 3 fully extended, a considerable portion of the shank will be disposed within the handle. The displacement

between the shoulder 13 and the shank receiving end of the handle 1 insures that the angular faces 3a and 8a will always be engaged sufficiently to insure that the shank is solidly held against turning with respect to the handle.

As best shown in Fig. 2, the open end of the bore 7 is closed by a plug 14, which may be drive-fitted or threaded into the handle. The plug 14 provides a spring-pressed friction ball 15, which extends beyond the plug sufficiently so that a portion thereof lies within the edges of aligned transverse openings 16 extending through the wall of the handle grip 2. These openings 16 are adapted to receive the cross bar 17 shown in dotted lines, with the pressure of the ball 15 holding the bar 17 frictionally in position. Thus the tool may be used as a T-handle wrench when the driver 5 is applied to the work, with turning of the handle about its axis imparting a turning movement to the driver. Or, as previously pointed out, the tool may be used as a lever of varying length when the driver 5 is turned on its pivot pin 6 so as to be offset from the longitudinal axis of the tool.

Referring now to Figs. 6 and 7, there is shown a modification in the means for holding the shank 3 in any adjusted position. In this arrangement, the end of the handle portion 1a provides an enlargement 18 of tapered form providing screw threads 19 for receiving an internally threaded sleeve 20. One end of the sleeve 20 is tapered to correspond to the tapered end surface of the portion 18, which is slotted as indicated at 21 in Fig. 7, so that screwing on of the sleeve 20 will tend to contract the portion which surrounds the friction ring 11a, to such an extent as to very tightly compress the ring 11a upon the shank, thereby holding the shank firmly in any adjusted position. Otherwise the construction of the tool is the same as described above with reference to Figs. 1 and 2.

As previously pointed out, the invention may also be applied in connection with other types of tools having the same general purpose as the tool of Fig. 1, namely to move some relatively inaccessible part either by turning the tool itself, or using the tool as a lever. In Fig. 8, the invention is shown as incorporated in an extension bar, wherein the end of the handle 22 provides an angular socket 23 adapted, for example, to receive the driver 5 at the end of the tool of Fig. 1. The handle 22 is also flattened at 24 to receive a wrench, if desired. The shank 25 terminates in a head 26 providing a driver 27 formed integrally with the shank, and a tapered sleeve 28 is adapted to lock the shank 25 in different positions, as described above with reference to Fig. 6.

In Fig. 9 the invention is shown as being applied to a wrench of the brace type, wherein the handle 29 provides a crank portion 30, to the end of which is attached a tubular portion 31 for receiving an extensible shank 25a similar to the shank 25 of Fig. 8, said shank 25a providing a driver 27a.

In Fig. 10 the handle portion 32 is shown as being constructed in substantially the same manner as in Fig. 1, with the shank 33 terminating in a head 34 carrying a ratcheting device 35, which provides a squared opening 36 for receiving the squared end of the member to be turned. In this embodiment, the tool is used entirely as a lever, the length of which can be readily changed to suit the clearances available at the work, or the amount of force that is to be applied. In Fig. 11 the handle portion 32a is similar to the handle portion 32, and receives an ex-

tensible shank 37 providing at its end an offset driver 38 adapted to be received in a wrench socket of usual form.

In Fig. 12 the handle portion 39 provides a transverse opening 40 for receiving a bar 41 for using the tool as a T-handle, with a shank 42 provided at its end with a chuck 43 for receiving a thread-tap 44. Adjustment of the shank 42 within the handle 39 permits the tap 44 to be used for the threading of holes in different locations.

From the foregoing, it is apparent that by the present invention there is provided an extensible tool adapted for a wide variety of uses, with the tool being rotatable about its own axis to turn work at different distances from the user, or being adapted to turn the work by the application of different leverages. A mechanic equipped with such a tool is able to perform a large variety of operations that heretofore would have required several handles, or separate wrenches.

I claim,

1. An extensible hand tool comprising in combination a hollow handle providing a split portion at one end, a shank longitudinally movable within the handle and providing a work engaging portion at one end beyond said handle, a contractile member within the split portion of said handle for exerting a frictional restraining force on said shank and means for contracting the split portion of said handle on the shank to also contract said member and positively lock the shank against turning within the handle and to hold it in different positions with relation to the handle.

2. An extensible hand tool comprising in combination a hollow handle open at one end and providing an internal groove located adjacent to said open end and an internal shoulder spaced from said open end, a shank providing a work engaging member at one end, with the other end of said shank slidably received within said handle and extending beyond said shoulder, a contractile member seated in said handle groove and bearing on the outside of said shank for frictionally holding said shank in different extended positions with relation to said handle, and an abutment positionable on the inner end of said shank, after its insertion in said handle, to prevent complete withdrawal of the shank from the handle upon engaging said shoulder inside the handle.

3. An extensible hand tool comprising in combination a hollow handle open at one end and providing an internal groove located adjacent to said open end and an internal shoulder spaced from said open end, a shank providing a work engaging member at one end, with the other end of said shank slidably received within said handle and extending beyond said shoulder, a contractile member seated in said handle groove and bearing on the outside of said shank for frictionally holding said shank in different extended positions with relation to said handle, and an abutment positionable on the inner end of said shank, after its insertion in said handle, to prevent complete withdrawal of the shank from the handle upon engaging said shoulder inside the handle, said handle further providing internal flat surfaces, and with said shank providing external flat surfaces in engagement with the flat surfaces of said handle, to prevent relative turning movement between the shank and handle in any of said shank's extended positions.

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