

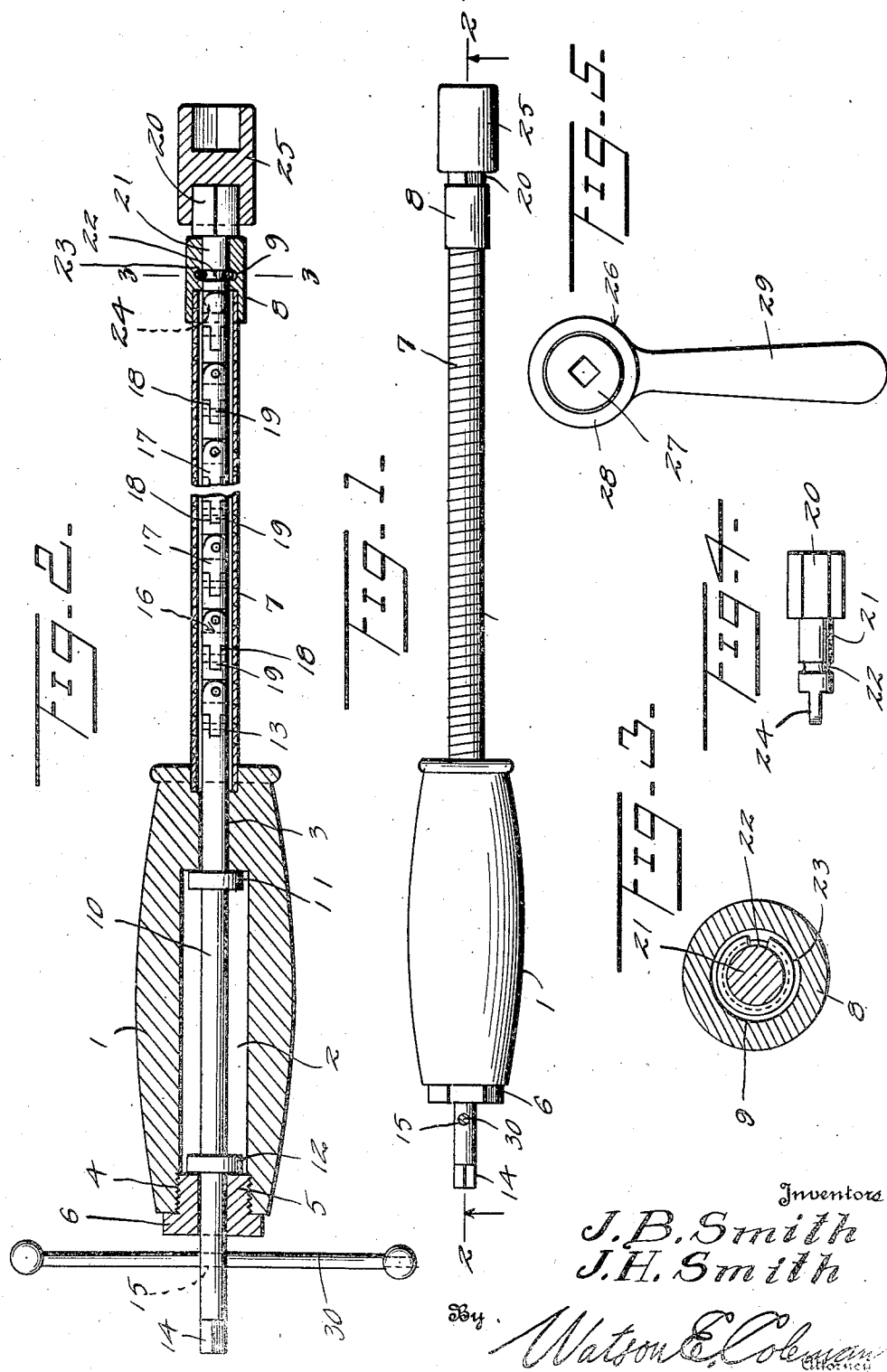
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WRENCH

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WRENCH

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This invention relates to improvements in wrenches and pertains particularly to a flexible wrench.

The primary object of the present invention is to provide a wrench which may be employed in locations difficult of access so that the turning of a nut or stud-bolt may be readily effected, the wrench being of an elongated flexible character whereby it may be readily rotated although bent or curved.

Another object of the invention is to provide a wrench having an elongated flexible portion adapted to be readily rotated while in a bent or curved condition and of a novel construction whereby it may be readily and economically assembled.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawing but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawing:—

Figure 1 is a view in side elevation of the wrench embodying the present invention, showing a socket head applied thereto.

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

Figure 3 is a view in transverse section taken on the line 3—3 of Figure 2;

Figure 4 is a view in side elevation of an element of the wrench structure;

Figure 5 is a view of one type of handle provided for the operation of the wrench.

Referring now more particularly to the drawing wherein like numerals of reference indicate corresponding parts throughout the several views, the numeral 1 indicates a handle member which as shown, is in the form of an elongated tubular body having the major portion of the passage therethrough of enlarged diameter to form the chamber 2 and a short portion thereof of reduced diameter to form the guide 3.

The end of the chamber 2 where it opens through the end of the handle, is interiorly threaded as indicated at 4 and has normally secured therein the threaded nut sleeve 5, a portion of which is of polygonal outline, as indicated at 6, to facilitate the engagement of a wrench therewith.

Secured in the outer end of the reduced portion 3 of the handle passage, is one end of a flexible tube 7, the other end of which is secured in any suitable manner in a sleeve 8, the interior wall of which has formed therein the circular channel 9.

Extending through the handle 1 is a shaft 10 which has the two collars 11 and 12 secured in spaced relation thereon, which collars position within the chamber 2, one engaging the end wall of the chamber where the same opens into the passage 3, while the other is engaged by the inner end of the sleeve bolt 5. That end of the shaft 10 adjacent the collar 11 or at the forward end of the handle 1, extends into the flexible tube 7 and is transversely slotted, as indicated at 13, while the other end of the shaft extends a substantial distance beyond the nut 5 and is provided with the polygonal shaped terminal portion 14 and a transverse passage 15 adjacent thereto. Within the flexible tube 7 is a flexible shaft which is indicated as a whole by the numeral 16 and which is made up of a plurality of units 17 each of which has one end slotted and its other end provided with a longitudinally extending tongue.

The slot of each of the elements 17 is indicated by the numeral 18, while the tongue of each element is indicated by the numeral 19. As shown the elements 17 are assembled by positioning the tongue of one in the slot of another. It will be seen, of course, that the element 17 nearest the slotted end of the shaft 10 will have its tongue positioned in the slot 13 of the shaft, while the element at the opposite end of the flexible shaft will have its slotted end disposed to receive the tongue end 24 of the head 20.

The terminal sleeve 8 carries a head 20 which is of polygonal cross sectional design as shown, and integral with this head is a stem 21 which has an annular groove 22

formed therein and this stem when inserted into the head 8 has the groove 22 thereof brought into a register with the groove 9 in the wall of the passage in the sleeve and connection is effected between the sleeve and the stem by means of a split ring 23. The inner end of the stem 21 is formed to provide a tongue 24 which engages in the slot of the adjacent element 17. It will thus be seen that the head element 20 is connected with the shaft 10 by a flexible union which facilitates the turning of the head when the shaft is turned even though the tube 7 may be bent or curved.

Upon the head 20 there is shown a socket element 25 which is detachably connected therewith as shown, and it will, of course, be readily apparent that this may be replaced by elements of different sizes or by a wrench of the character wherein a polygonal extension is provided for engagement in a socket in a bolt or nut.

The outer end of the shaft 10 is squared as indicated at 14 so that a wrench of a suitable character may be readily connected therewith, such for example, as the wrench which is shown in Figure 5 and is indicated generally by the numeral 26. This wrench is of the type having a rotatable central portion 27 which is designed to rotate in the surrounding portion 28 and with which it has ratchet connection. It will, of course, be apparent that in the place of this wrench 26 there may be employed a wrench having the same type of head but without the handle 29 which is here shown, or an ordinary jaw wrench may be coupled with the end 14 of the shaft.

The passage 15 through the shaft 10 is provided for the reception of a bar or rod such as is indicated by the numeral 30, by which means a suitable leverage may be obtained for turning the shaft and the nut with which the unit 25 is engaged.

It will also be readily apparent that in addition to mounting a socket wrench upon the head 20 other tools such as screw-drivers, drill chucks or the like may be readily connected therewith.

Having thus described the invention, what is claimed is:—

1. A tool of the character described comprising a flexible tubular housing, a handle connected at one end with said housing and having a passage therethrough, a portion of said passage being of relatively large diameter and opening through the end of the handle remote from the housing, a rigid shaft extending through said handle and having a pair of collars thereabout located in the enlarged portion thereof, a sleeve but removably engaged in the handle at the outer end thereof and engaging one of said collars, the end of said shaft adjacent said sleeve nut being formed to facilitate the attachment of

an operating implement therewith, a flexible shaft extending through said housing and having one end connected with the rigid shaft, a sleeve connected with the housing at its other end, and a head member having a reduced stem portion rotatably mounted in said sleeve and coupled with the adjacent end of the flexible shaft.

2. A tool of the character described, comprising a tubular flexible housing, a flexible shaft disposed in said housing to rotate therein, a tubular handle member having one end of the housing secured thereto against rotation with the shaft, a rigid shaft rotatably mounted in said handle and extending from one end thereof into said housing and having connection at the said end with the flexible shaft, the other end of said rigid shaft extending from the other end of the handle and being adapted to facilitate the attachment of an actuating member therewith, means carried by the rigid shaft for limiting its longitudinal movement in the handle, means carried by the handle in said last end and engaging the last mentioned means for facilitating the removal of the rigid shaft from the handle, a sleeve mounted upon the other end of the housing and secured thereto, a split ring disposed in a recess formed in the inner wall of said sleeve, and a head having a cylindrical portion rotatably mounted in said sleeve and having a groove in the wall of the cylindrical portion in which said split ring is engaged, said cylindrical portion of the head having connection with the adjacent end of the flexible shaft to be turned thereby.

In testimony whereof we hereunto affix our signatures.

JOS. B. SMITH.

JAMES HATHAWAY SMITH.