June 30, 1964 B. W. FRIZZELL 3,138,983

FLEXIBLE WRENCH

Filed Jan. 17, 1963

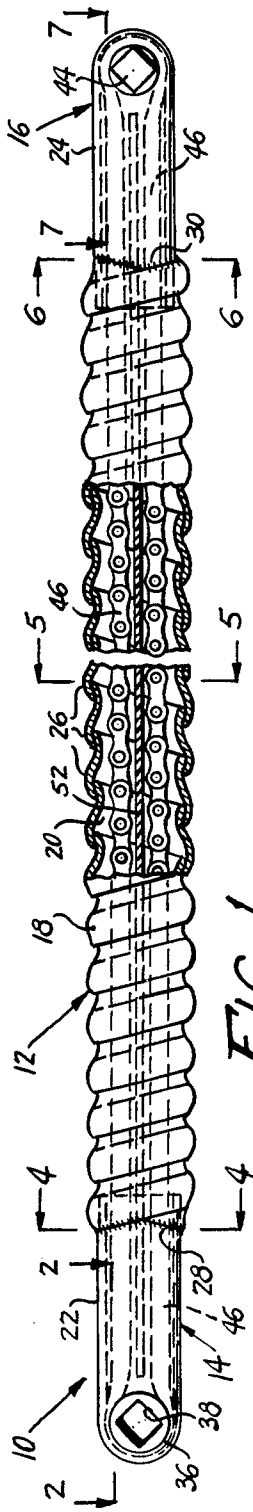

FIG. 1

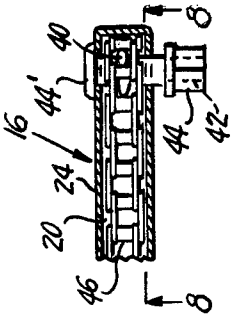

FIG. 7

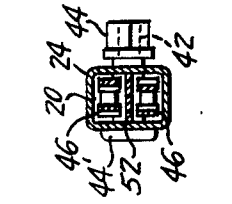

FIG. 6

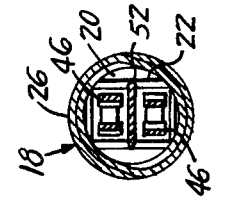

FIG. 5

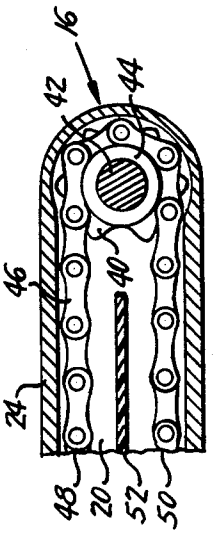

FIG. 8

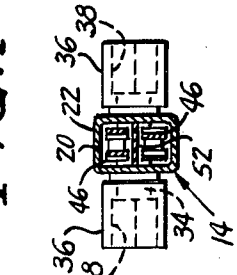

FIG. 4

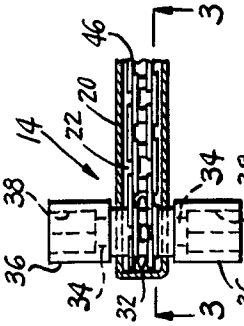

FIG. 2

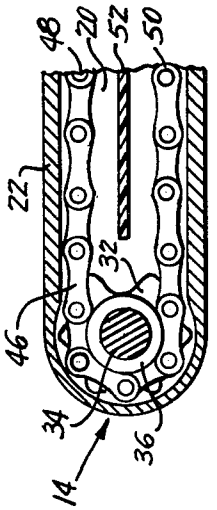

FIG. 3

INVENTOR.
BERT W. FRIZZELL
BY
Kimmel & Crowell
ATTORNEYS.

United States Patent Office 3,138,983 Patented June 30, 1964

3,138,983
FLEXIBLE WRENCH

Bert W. Frizzell, 5150 46th St., Sacramento 20, Calif.

Filed Jan. 17, 1963, Ser. No. 252,130
4 Claims. (Cl. 81—57)

This invention relates to a flexible wrench and relates more particularly to a wrench which may have a ratchet-type handle secured thereto for easy operation in normally inaccessible places.

An object of this invention is the provision of a flexible wrench which is inexpensive to manufacture, sturdy in construction and easy to use.

Another object of this invention is the provision of a wrench having driven means at one end of an elongated member and driving means at the other end with a flexible coupling therebetween.

A further object of this invention is the provision of a flexible wrench having at least one female socket member secured to a sprocket element at one end and at least one male socket member secured to a sprocket element at the other end and a continuous chain means operatively connecting both sprocket elements.

A still further object of the instant invention is to provide a device of the type described wherein a pair of female socket members are connected to one end thereof having openings disposed outwardly of the wrench so that the wrench may be used in relatively inaccessible areas regardless of the arrangement of the same.

A further object of the instant invention is to provide a flexible wrench having a continuous chain means interconnecting sprocket elements at its two ends and a divider strip which is relatively thin and bendable separating the chain means so that it will not bind even when the wrench is twisted or bent.

Another object of this invention is to provide a wrench having male and female socket members at its extremities interconnected by a continuous chain means, at least a substantial portion of the wrench being formed by a hollow cable comprised of a continuous interlocking helical cable member to provide flexibility thereto.

Other and further objects reside in the combination of elements, arrangement of parts and features of construction.

Still other objects will in part be obvious and in part be pointed out as the description of the invention proceeds and as shown on the accompanying drawing wherein:

FIGURE 1 is a stop plan view of a flexible wrench in accordance with the instant invention, partly in section and with parts being broken away for illustrative convenience;

FIGURE 2 is a fragmentary cross sectional view taken on line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged fragmentary cross sectional view taken on line 3—3 of FIGURE 2;

FIGURE 4 is a transverse cross sectional view taken on line 4—4 of FIGURE 1;

FIGURE 5 is a transverse cross sectional view taken on line 5—5 of FIGURE 1;

FIGURE 6 is a transverse cross sectional view taken on line 6—6 of FIGURE 1;

FIGURE 7 is a fragmentary cross sectional view taken on line 7—7 of FIGURE 1; and

FIGURE 8 is an enlarged cross sectional view taken on line 8—8 of FIGURE 7.

Like reference characters refer to like parts throughout the several views of the drawing.

Referring now to the drawing, the flexible wrench of the instant invention is shown generally by reference numeral 10 and is comprised of an elongated member 12 having a female socket end portion 14, a male socket end portion 16 and a central flexible portion 18. The female and male

socket end portions 14 and 16 respectively are formed of casing members 22 and 24 which are secured in any conventional manner to a continuous interlocking helical cable member 26 which forms the central flexible portion 18. The helical member 26 may be in the form of the well known B–X cable. Each of the elements may be formed of any conventional material such as plastic or the like but metal is preferred and if this material is used the elements are advantageously secured together as by welding shown at 28 and 30. The female socket end portion 14, the male socket end portion 16 and the central flexible portion 18 each have a hollow interior 20 for a purpose to be further described hereinafter.

At the female socket end portion 14 a sprocket element 32 is rotatably supported by a pin 34 which may be held in place by the casing 22. A pair of female socket members 36 having openings 38 therein are secured to the sprocket element 32 for rotation therewith and the openings 38 are disposed outwardly of the sprocket element 32 for a purpose to be further described in more detail hereinafter.

At the male socket end portion 16 a sprocket element 40 is rotatably supported on a pin 42 which may be preferably secured to the casing 24. An enlarged head 44' on the pin 42 engages one side of the casing 24 and a male socket member 44 is disposed over the other end of the pin 42 and secured to the sprocket element 40 for rotation therewith.

A continuous link chain means 46 operatively engages the sprocket elements 32 and 40 and forms an upper pass 48 and a lower pass 50. The passes 48 and 50 are separated by a thin divider strip 52 of any flexible bendable material, such as plastic or the like, to prevent the passes 48 and 50 from rubbing against each other and binding particularly when the wrench 10 is twisted or bent.

A handle means (not shown) having a conventional ratchet mechanism and a connecting means is engageable with either the male socket member 44 or one of the female socket members 36 to operate the device of the instant invention. It will be apparent that either of the female socket members 36 may be secured over the head of a bolt or the like (not shown) and by rotating the male socket member 44, the chain means 46 will drive the female socket members 36 to loosen or tighten the bolt as may be desired. By providing two female socket members 36 the wrench 10 of the instant invention may be easily applied for use regardless of the particular position in which the bolts are mounted. Likewise, the male socket member 44 may be secured in a female socket in a bolt (not shown) and driven via the chain means 46 and one of the female socket members 36. The flexibility afforded by the portion 18 allows the wrench to be twisted or bent in use to reach relatively inaccessible areas while the divider strip 52 avoids binding between the upper and lower passes 48 and 50, respectively, of the chain means 46.

It will be understood that while two female socket members and one male socket member have been shown, that this may be reversed and two male socket members may be provided with a single female socket if the type of bolts to be used have a female socket or the like in their head engageable by the male socket member. It is also possible to slip conventional sockets over the male socket member 44 to convert it to a female socket member and similar conversion sockets may vary the shape of the hole in the female socket members 36 or the shape of the male socket member 44 from the square shapes shown to any conventional polygonal shape desired.

While the male and female socket end portions 14 and 16 respectively have been shown as completely enclosed by casings 22 and 24, it will be understood that

either or both end portions may be left uncovered, but this will increase the possibility of foreign matter being caught in the chain means **46** and binding or otherwise stopping the normal operation of the device.

It will now be seen that there is herein provided a flexible wrench which satisfies all of the objects of the instant invention and others including many advantages of great practical utility and commercial importance.

Since many embodiments may be made of the instant inventive concept, and since many modifications may be made of the embodiments herein shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative and not in a limiting sense.

I claim:

1. A flexible wrench comprising an elongated member having two ends and a hollow interior and being flexible over a substantial portion of its length, a sprocket element rotatably mounted at each end of said elongated member, a continuous chain means passing through said hollow interior of said elongated member and over each of said sprocket elements to operatively interconnect the same, said continuous chain means forming an upper pass and a lower pass, at least one female socket means connected to one of said sprocket elements for rotation therewith and having an opening disposed outwardly of said one sprocket element, and at least one male socket means connected to the other of said sprocket elements for rotation therewith, said male socket means having a male socket member extending outwardly from said other sprocket element, a thin divider strip of bendable material extending through a major portion of said hollow interior of said elongated member between said upper and lower passes of said continuous chain means to prevent said passes from rubbing against each other.

2. A flexible wrench comprising an elongated member having two ends and a hollow interior and being flexible over a substantial portion of its length, a sprocket element rotatably mounted at each end of said elongated member, a continuous chain means passing through said hollow interior of said elongated member and over each of said sprocket elements to operatively interconnect the same, said continuous chain means forming an upper pass and a lower pass, at least one female socket means connected to one of said sprocket elements for rotation

therewith and having an opening disposed outwardly of said one sprocket element, and at least one male socket means connected to the other of said sprocket elements for rotation therewith, said male socket means having a male socket member extending outwardly from said other sprocket element, said flexible portion of said elongated member being formed of a continuous interlocking helical cable member.

3. A flexible wrench comprising an elongated member having two ends and a hollow interior and being flexible over a substantial portion of its length, sprocket means rotatably mounted at each end of said elongated member, a continuous chain means passing through said hollow interior of said elongated member and over each of said sprocket means to operatively interconnect the same, said continuous chain means forming an upper pass and a lower pass, at least one socket means connected to each of said sprocket means for rotation therewith, a thin divider strip of bendable material extending through a major portion of said hollow interior of said elongated member between upper and lower passes of said continuous chain means to prevent said passes from rubbing against each other.

4. A flexible wrench comprising an elongated member having two ends and a hollow interior and being flexible over a substantial portion of its length, a sprocket means rotatably mounted at each end of said elongated member, a continuous chain means passing through said hollow interior of said elongated member and over each of said sprocket means to operatively interconnect the same, said continuous chain means forming an upper pass and a lower pass, at least one socket means connected to each of said sprocket means for rotation therewith, said flexible portion of said elongated member being formed of a continuous interlocking helical cable member.

References Cited in the file of this patent

UNITED STATES PATENTS

1,353,417	Pendleton	Sept. 21, 1920
1,454,789	Rentchler	May 8, 1923
1,536,157	Slack	May 5, 1925
2,678,577	Tackett	May 18, 1954