

March 16, 1937.

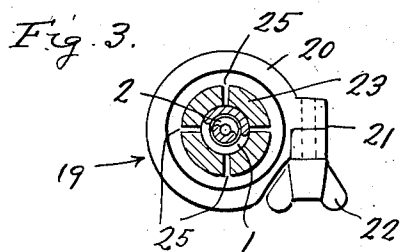
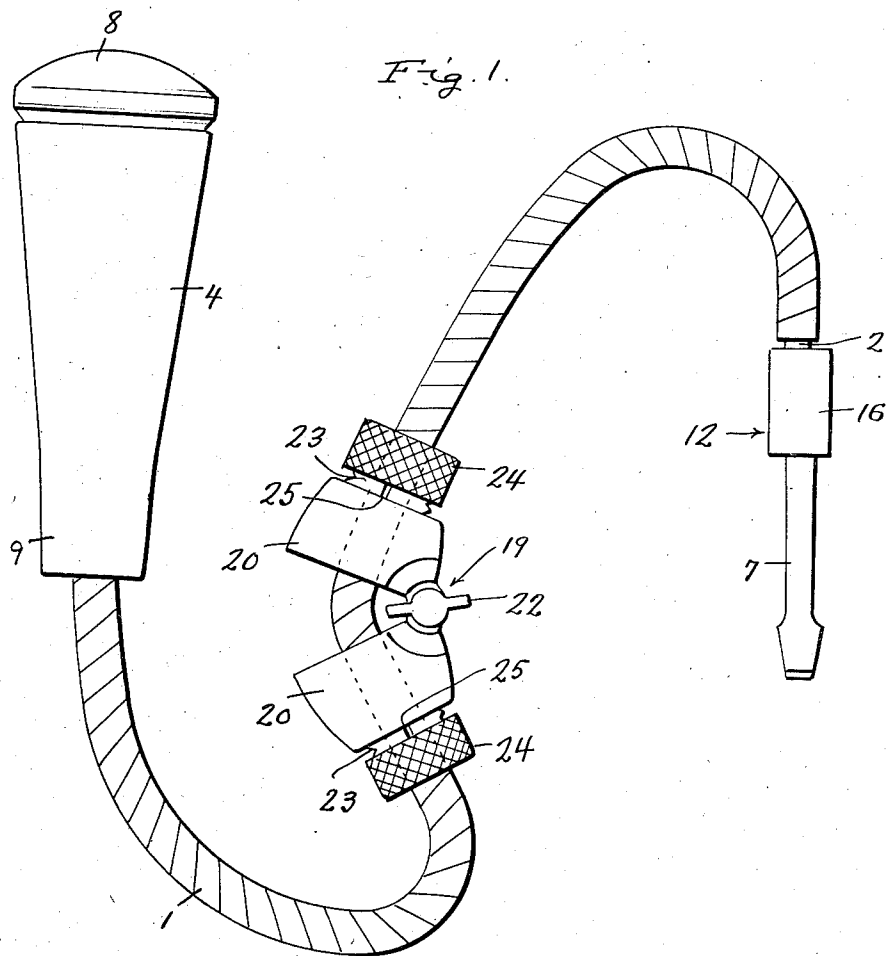
M. B. O'NEIL

2,073,903

FLEXIBLE TOOL

Filed April 14, 1936

2 Sheets-Sheet 1



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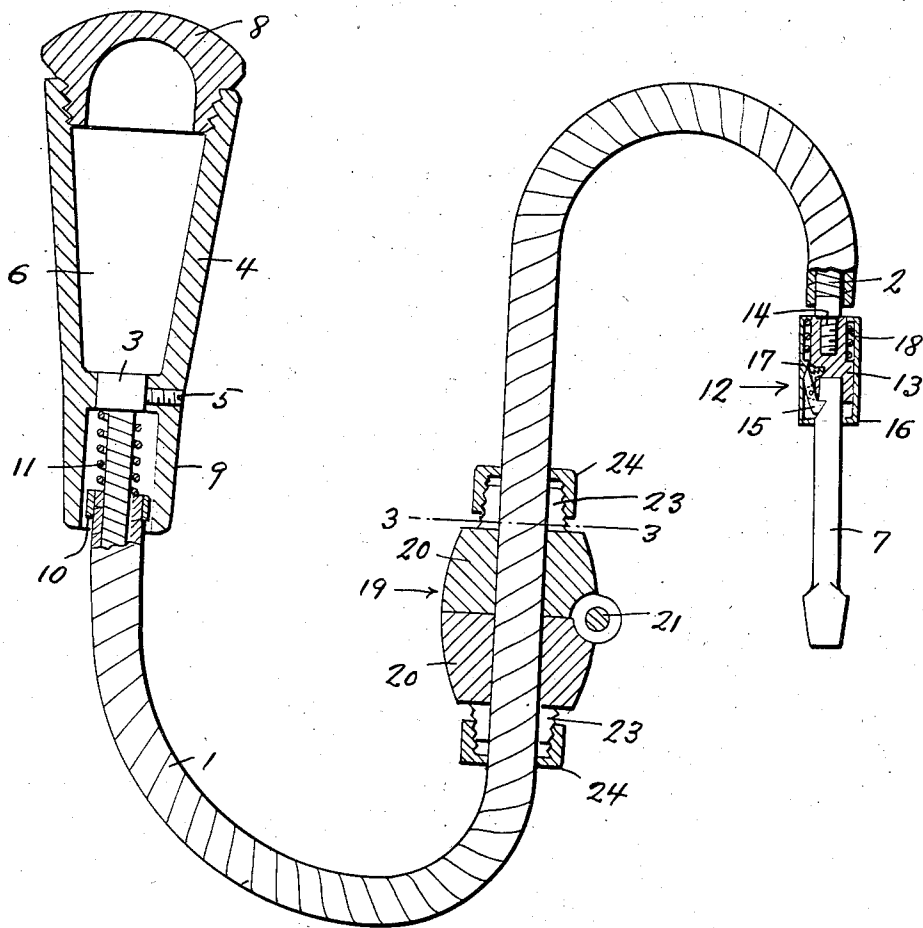


Fig. 2.

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UNITED STATES PATENT OFFICE

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FLEXIBLE TOOL

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Application April 14, 1936, Serial No. 74,355

3 Claims. (Cl. 145-61)

The present invention relates to new and useful improvements in flexible tools and has for its primary object to provide, in a manner as hereinafter set forth, novel actuating means through the medium of which screw drivers, files, saws, etc., may be conveniently used in what are ordinarily inaccessible places.

Another important object of the invention is to provide, in a manner as hereinafter set forth, flexible means for reciprocating as well as rotating screw drivers, files, saws, etc.

Still another very important object of the invention is to provide a tool of the character described comprising a novel construction of adjustable handle through the medium of which the flexible drive or actuating means may be bent to and maintained at any desired angle within a given range.

Other objects of the invention are to provide a flexible tool of the character set forth which will be comparatively simple in construction, strong, durable, highly efficient and reliable in use, compact, light in weight and which may be manufactured at low cost.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in connection with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views and wherein:—

Figure 1 is a view in side elevation of a flexible tool constructed in accordance with the present invention.

Figure 2 is a view showing the invention partially in side elevation and partially in vertical section.

Figure 3 is a cross-sectional view taken substantially on the line 3—3 of Figure 2.

Referring now to the drawings in detail, it will be seen that the embodiment of the invention which has been illustrated comprises a flexible housing 1 which may be of any suitable length. Extending rotatably and slidably through the flexible housing 1 is a flexible driveshaft 2. At one end, the flexible drive shaft 2 terminates in a head 3 on which an operating handle 4 is secured through the medium of a set screw 5. The handle 4 is hollow to provide a chamber 6 for the reception of a screw driver 7 and other tools such as files, saws, etc. A removable closure 8 is provided for the chamber 6.

The operating handle 4 includes a sleeve 9 which extends slidably over a collar 10 which is

fixed on the adjacent end of the flexible housing 1. Encircling the flexible drive shaft 2 between the head 3 and the adjacent end of the flexible housing 1 is a coil spring 11 which yieldingly urges the operating handle 4 outwardly.

Mounted on the other end of the flexible drive shaft 2 is a chuck which is designated generally by the reference numeral 12. The embodiment of the chuck which has been shown includes a socket member 13 which is threadedly mounted on a shank 14 on the flexible drive shaft 2. The socket member 13 is for the reception of the removable screw driver 7 or other tools. The screw driver 7 or other tool being used is removably secured in the socket member 13 through the medium of a spring actuated latch 15 which is pivotally mounted on said socket member 13. Slidably mounted on the socket member 13 is a casing 16 having a cam 17 therein for actuating the latch 15 to disengaged position. The socket member 13 includes a reduced inner end portion which accommodates a coil spring 18 which yieldingly urges the casing 16 in a direction to move the cam 17 away from the latch 15.

The reference numeral 19 designates generally a handle which is mounted for sliding adjustment on the flexible housing 1. The handle 19 comprises a pair of half sections 20 which are adapted to be swung to the desired position relative to each other, as seen in Figure 1 of the drawing, on a hinge 21. A wing nut 22 is provided for securing the sections 20 of the handle 19 in adjusted position. On the ends of the handle 19 are reduced, tapered shanks 23 on which nuts or the like 24 are threadedly mounted. The shanks 23 are divided into bendable segments by longitudinal slits 25 (see Figure 3).

It is thought that the manner of using the tool will be readily apparent from a consideration of the foregoing. The blade of the screw driver 7 is aligned with the slot in the screw head and then engaged therein by pushing inwardly on the operating handle 4 against the tension of the coil spring 11. Then, by rotating the handle 4 the screw driver 7 will be actuated to drive the screw into the work or to remove said screw. Of course, the handle 19 is held in one hand by the operator who uses his other hand on the handle 4. If desired, a file, saw or other tool may be mounted in the chuck 12 and reciprocated by moving the handle 4 toward and away from the housing 1. Of course, the coil spring 11 moves the handle 4 with the flexible drive shaft 2 in one direction. The handle 19 may be convenient-

ly moved to any desired position on the flexible housing 1 by simply loosening the nuts or the like 24. The handle 19 is secured in adjusted position by tightening the nuts 24 in a manner to contract the segmental tapered shanks 23 for causing said shanks to frictionally grip said housing 1. By "breaking" the handle 19, as shown in Figure 1 of the drawings, and tightening the wing nut 22, the flexible housing 1 may be bent to any desired angle within a given range and maintained as long as desired, whereby the housing may be held in a fixed angularly adjusted position when using the tool under conditions where a freely flexible housing would be impracticable. It is believed that the many advantages of a flexible tool constructed in accordance with the present invention will be readily understood and although a preferred embodiment of the device is as illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which will fall within the scope of the invention as claimed.

What is claimed is:—

1. A flexible tool of the class described comprising a flexible housing, a flexible drive shaft operatively mounted in said housing, means for actuating the drive shaft, means for connecting a tool to said drive shaft, and a handle mounted for sliding adjustment on the flexible housing, said handle encircling the housing and including split, tapered shanks on its ends and nuts thread-

edly mounted on said shanks for contracting said shanks for frictionally gripping the housing.

2. A tool operating means of the class described comprising a flexible housing, a flexible drive shaft operable in said housing, means for actuating the drive shaft, means for mounting a tool on said drive shaft, and a substantially tubular handle mounted for sliding adjustment on the housing, said handle including a pair of half sections, hingedly connected for swinging movement relative to each other for flexing the housing, means for securing the half sections in adjusted position, and means for frictionally clamping the handle to the housing.

3. A tool operating means of the class described comprising a flexible housing, a flexible drive shaft operable in said housing, means for actuating the drive shaft, means for mounting a tool on said drive shaft, and a substantially tubular handle mounted for sliding adjustment on the housing, said handle including a pair of half sections hingedly connected for swinging movement relative to each other for flexing the housing, means for securing the half sections in adjusted position, means for frictionally clamping the handle to the housing, the last named means including longitudinally split, tapered shanks on the outer ends of the half sections, and nuts threadedly mounted on said shanks for contracting said shanks on the housing.

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