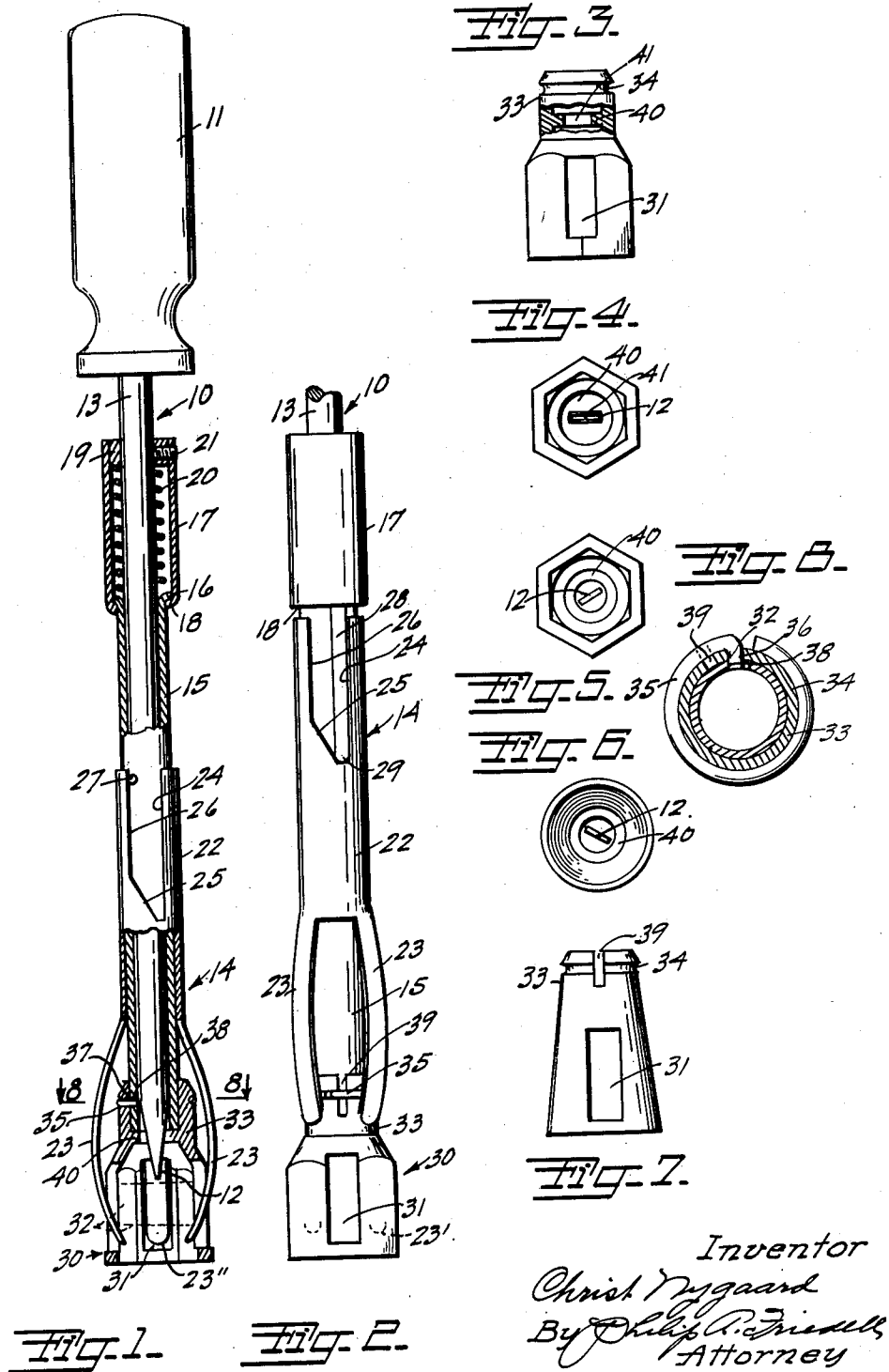


Sept. 4, 1951

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COMBINATION SCREW DRIVER AND WRENCH WITH SCREW
HEAD AND NUT GRIPPING MEANS
Filed June 20, 1950

2,566,673



UNITED STATES PATENT OFFICE

2,566,673

COMBINATION SCREW DRIVER AND
WRENCH WITH SCREW HEAD AND
NUT GRIPPING MEANS

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Application June 20, 1950, Serial No. 169,079

4 Claims. (Cl. 145—52)

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This invention relates to improvements in means for inserting and removing screws, bolts and nuts, and is equally applicable for either of such operations merely by selecting and applying a socket suited to the specific operation and the element to be inserted or removed. The invention is equally adapted for operation on wood screws, metal screws with round, square, hexagonal or other forms of heads and nuts of various shapes, and will simultaneously hold a screw with a washer next to the head.

The invention is particularly adapted to the insertion or removal and retrieving of screws from confined spaces, and includes a replaceable socket which can be replaced by another socket for use either as a screw driver or as a wrench, there being included in sockets for non-slotted screw heads, locking means for locking the screw driver to the socket, while for slotted screw heads, the socket only centers the head while the screw driver bit engaged in the screw driver slot in the head, and the gripping means will grip screw heads, nuts and washers within a considerable range of diameters, therefore a quite universal screw operating tool is provided.

The screwhead gripping means automatically rotates the gripping means to a non-engaging position when the gripping sleeve is retracted and cannot be moved to engaging position until the sleeve is first moved to a forward position.

The objects and advantages of the invention are as follows:

First, to provide a tool for operation on threaded elements for insertion, application or removal, and which will grip and hold the element during the operation.

Second, to provide a tool as outlined with gripping means which is automatically moved out of registry with a normal engaging position when retracted.

Third, to provide a tool as outlined with replaceable sockets for operation on the heads and nuts of screws irrespective of their form.

Fourth, to provide a tool as outlined which is adaptable for use as a screw driver or as a wrench, for adaptation to either, slotted, or non-circular heads so that any type of screw, bolt or nut can be applied or removed, and in which the gripping means will function as retrieving means for confined areas.

Fifth, to provide a tool as outlined which is of the utmost simplicity in construction and arrangement, economical to manufacture, and easy and convenient to operate.

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In describing the invention reference will be had to the accompanying drawing, in which:

Fig. 1 is a front elevation of the invention shown mostly in section, and showing the gripping means in screw head gripping position.

Fig. 2 is a fragmentary front elevation showing the gripping means in retracted and out-of-registry position, and with the gripping means control modified.

Fig. 3 is a front elevation, and Fig. 4 is a bottom plan view of a replaceable socket for use with a hex head screw in which case the tool operates as a wrench.

Fig. 5 is a modification of Figs. 3 and 4 as used with slotted hex head screws, with the tool to function as a screw driver.

Fig. 6 is a bottom view of a socket for use with wood screws and the like.

Fig. 7 is a front elevation of Fig. 6.

Fig. 8 is an enlarged section through any type of socket and is taken on a line 8—8 of Fig. 1.

The invention includes a conventional screw driver 10 having operating means such as a handle 11, and a bit 12, the shank 13 being sufficiently long to accept the gripping unit 14.

This gripping unit consists of a main sleeve 15 terminating at its upper end in an annular flange 16 and being slidable on the shank 13. A spring barrel 17 is inwardly flanged at its lower end as indicated at 18 and which flange engages the underside of the flange 16 on the main sleeve. A collar 19 is inserted in the upper end of this barrel with interposed compression spring 20, and this upper end of the barrel with its collar 19 is fixed to the shank 13 as by a set screw 21 after adjusting for tension of the spring 20. Thus the main sleeve can slide upward in the barrel against the urge of the spring, permitting advance of the screw driver relative to the main sleeve.

Slidable on this main sleeve is the gripping member consisting of a sleeve 22 which is slidable on the main sleeve and terminates at its lower end in a plurality of spring fingers 23, and having a slot formed inwardly from the upper end with one side 24 straight to the lower end while the other side has a cam surface 25 at its lower end and continuing into a straight wall 26 parallel with the one side 24. The cooperative means for the cam surface and slot is shown in Fig. 1 as a bead 27 fixed or formed on the outer surface of the main sleeve, while a modification is shown in Fig. 2 in which a finger 28 projects from the lower end of the spring barrel and engages in the slot, the lower end 29 cooperating with the cam surface 25 when the sleeve 22 is retracted.

Releasably securable on the lower end of the main sleeve is a socket 30 which has openings 31 through which the spring fingers 23 engage the screw head or nut 32; this socket being formed to fit over the specific head or nut to be operated upon, and having a hub 33 provided with an annular groove 34 in which a spring wire retainer 35 is seated, with one end of the wire bent in as indicated at 36 and passing through a hole 37 formed through the hub and engaging in a hole 38 formed through the main sleeve, thus locking the socket to the sleeve.

A recess 39 is formed from the end of the hub for insertion of a small rod under the spring lock adjacent to the bent down portion so that it can be pried out of the hole in the main sleeve easily for removal of the socket.

For use with wood screws the type of socket shown in Figs. 6 and 7 is used, this socket being tapered as shown so as to accept heads of various diameters, and it can also be used with non-circular head screws when provided with a screw driver slot.

For use as a wrench, the socket is made to the size and cross-sectional shape of the nut or screw head as illustrated in Figs. 3 and 4. This wrench type of socket has a wall 40 intermediate its length in which a slot is centrally formed as indicated at 41 through which the screw driver bit 12 projects to turn the socket by the screw driver.

With the proper socket applied and locked in position, and with the spring fingers in the position shown in Fig. 2, the socket is placed over the head of the screw or nut, or the head of the screw or nut 32 is inserted in the socket, and the sleeve 22 is then moved straight down to the position indicated at 23'. The sleeve 22 is then rotated until the opposite wall 23 of the slot engages the bead 27 or finger 28, moving the spring fingers around to spring into the engaging slots 30 as indicated at 23'', engaging under the head of the screw, or under the nut or washer as the case may be. At this time the bit 12 may not engage in the screw driver slot but with pressure on the handle 11 it is forced down against the action of the spring 20 and is limited as to relative axial movement by the space between the flange 18 and the spring when fully compressed, having movement just enough to permit operation on the screw to the very end of the socket for complete seating of the screw. Under such conditions the main sleeve and socket do not rotate with the screw driver.

When used as a wrench, the bit engages in the slot 41 and turns the socket and both sleeves with the screw driver, the gripping action being the same as with wood or slotted screws.

I claim:

1. A screw driver having a shank and a bit;

a main sleeve slidable on said shank and spring urging means cooperative between said shank and said main sleeve for urging retraction of the shank in said main sleeve and including engaging means cooperative between the shank and the sleeve for limiting retraction; a second sleeve slidable on said main sleeve and having a slot formed from the upper end with a cam surface formed at the lower end of the slot, and engaging means cooperative with said cam surface for causing relative rotation of said sleeves when said second sleeve is retracted, and spring fingers formed at the other end of said second sleeve and being moved to a neutral position through said relative rotation.

2. A structure as defined in claim 1; a socket having slots formed in the sides thereof for passage of the ends of said fingers and releasably attachable to the lower end of said main sleeve.

3. A structure as defined in claim 2; said socket having a cross wall intermediate its length and provided with an axial screw driver slot for engaging with the bit end of the screw driver for rotation of the socket by the screw driver, whereby the screw driver is converted into a wrench.

4. A convertible tool comprising a screw driver having a shank and a bit; a main sleeve slidable on said shank; a spring barrel fixed at its upper end to said shank and having an intumed flange to engage an annular flange formed on the upper end of said main sleeve, and a spring in said spring barrel cooperating between the upper end of the spring barrel and said annular flange for retraction of the shank in said main sleeve; a gripping sleeve slidable on said main sleeve and terminating at its lower end in spring fingers and having a slot formed downwardly from its upper end with the lower end having an angular cam surface, and means on said main sleeve cooperative with the walls of said slot and with said cam surface for rotating said gripping sleeve when the gripping sleeve is axially retracted and for limiting rotation to a predetermined degree, and a socket mounted on the lower end of said main sleeve and including means for releasably securing the socket against relative rotation.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,558,267	McGuckin	Oct. 20, 1925
2,108,344	Miller	Feb. 15, 1938
2,399,138	Nygaard	Apr. 23, 1946