

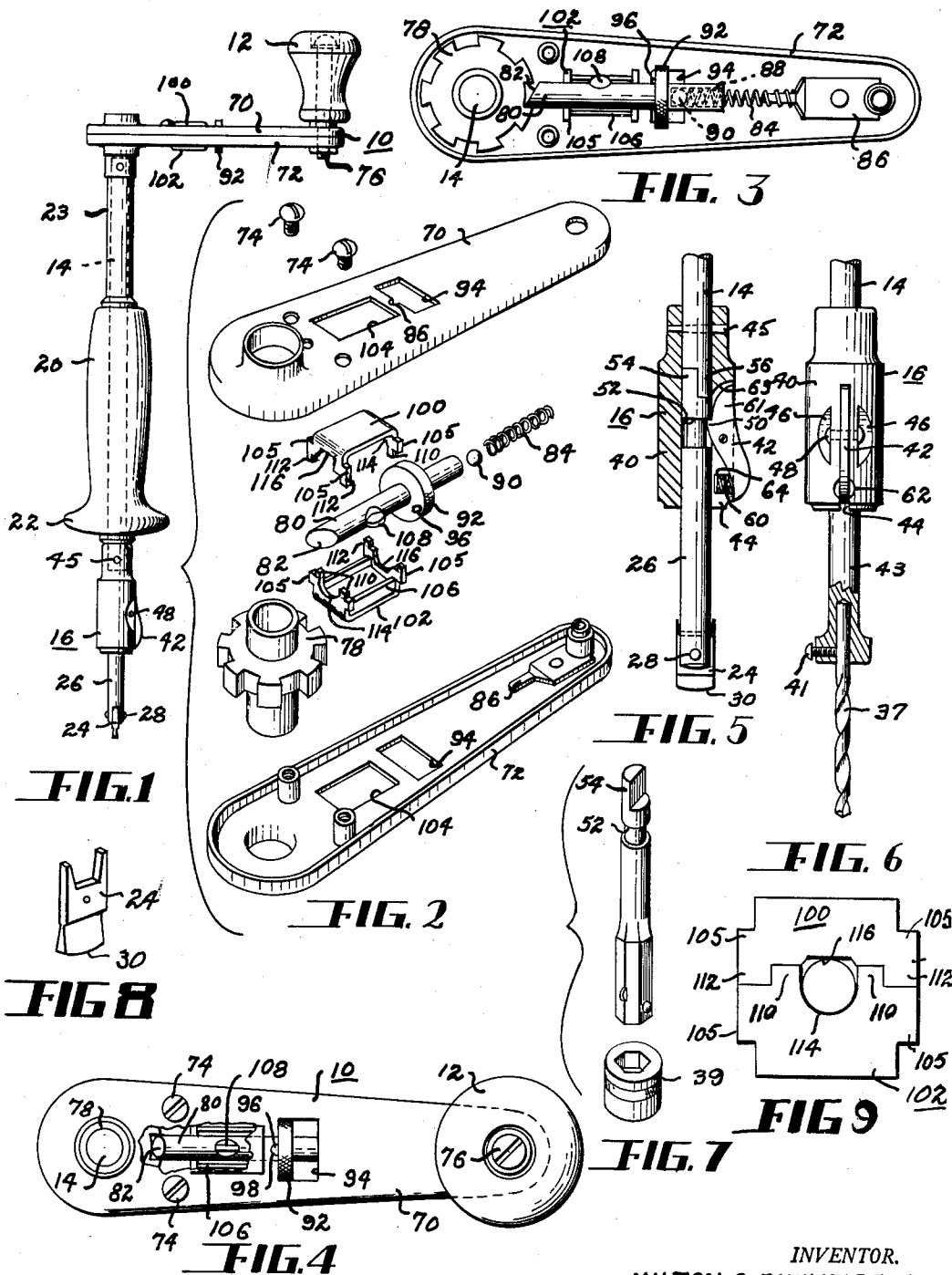
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CHUCK AND RATCHET MECHANISM

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CHUCK AND RATCHET MECHANISM

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1 Claim. (Cl. 81—63.2)

This invention relates to a tool for operating various types of devices such as screw drivers, drills, socket wrenches, and the like.

A large number of ratchet mechanisms have been devised from time to time for use in operating screw drivers and the like, but these have either involved a large number of delicate parts or have otherwise been unsatisfactory. The problems of providing a satisfactory ratchet type of operator for a screw driver is very difficult because of the tendency of the ordinary screw driver to slip out of the slot in the screw and because of the need for applying a strong downward pressure while rotating the screw driver. It is an object of this invention to provide an improved combination screw driver and screw driver holder or operator which makes it easy to hold the screw driver in place in the eye of the screw during the screw driving operation.

It is another object of this invention to provide an inexpensive, yet durable, tool which may be used for a large number of different uses and which operates in an improved manner. More particularly, it is an object of this invention to provide an improved type of ratchet drive which includes a simplified means for selectively adjusting the ratchet for rotating a tool in either direction of rotation or for rotating the tool in both directions.

Another object of this invention is to provide an improved pawl and pawl mounting arrangement.

Another object of this invention is to provide an improved relationship between a ratchet type of crank and the tool to be operated thereby.

Still another object of this invention is to provide an improved form of chuck for use in supporting the tools.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

In the drawings:

Figure 1 is a side elevational view;

Figure 2 is an exploded perspective view showing the construction and arrangement of the ratchet mechanism;

Figure 3 is a plan view of the ratchet mechanism with the cover removed;

Figure 4 is a plan view with parts broken away to show the ratchet in its neutral position;

Figure 5 is a fragmentary sectional view showing the chuck and its relationship to a tool mounted in the chuck;

Figure 6 is a side elevational view, with parts broken away, showing a drill unit mounted in the chuck;

Figure 7 is a perspective view of an adapter for use in mounting a socket wrench in the chuck shown in Figure 5 and 6.

Figure 8 is a perspective view of the lower end-piece of the screw driver; and

Figure 9 is a fragmentary elevational view showing the pawl supporting means.

Referring now to the drawings wherein I have shown a preferred embodiment of my invention, reference numeral 10 generally designates a ratchet lever having a

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handle 12 rotatably mounted adjacent the one end thereof for use in imparting rotation to the main shank 14 through a ratchet drive in a manner to be explained more fully hereinafter. A chuck or socket 16 is secured to the lower end of the shank 14 and is adapted to interchangeably receive a variety of types and sizes of tool members, such as screw drivers, drills, socket wrenches, Allan wrenches, and the like.

A specially designed pressure handle 20 is rotatably supported adjacent the lower end of the shank 14 in such a manner that the operator of the tool may guide the tool and simultaneously apply downward pressure by means of one hand while applying rotation to the handle 12 by means of the other hand. By virtue of this construction, there is little need for applying any downward pressure on the handle 12. Downward pressure on the handle 12 tends to throw the tool out of alignment with the work. The lower portion of the pressure handle is provided with a relatively wide flange 22 which makes it possible to exert a downward pressure without danger of one's hand slipping. The upper end of the handle does not have such a flange and is purposely so designed that irrespective of how large one's hand is, one can get a firm grip on the pressure handle. A sleeve 23, which is disposed between the handle 20 and the ratchet lever 10, holds the pressure handle against the upper end of the chuck as shown. It should be noted that the handle 20 is placed next to the chuck, whereby it is possible to accurately guide the tool held by the chuck.

Generally speaking, no amount of downward pressure will keep a poorly designed screw driver from slipping out of place. The most common forms of screw drivers have a straight shank with a fixed handle arranged directly in alignment with the shank, so as to enable the user to align the screw engaging portion with the eye of the screw. Even with these conventional screw drivers, it is difficult to keep the axis of the screw driver properly lined up with the axis of the screw. In the screw driver construction shown in the drawings, the screw engaging portion 24 is pivotally mounted on a holder 26 by means of a pin 28 arranged as shown. A slight amount of clearance is provided between the upper end of the screw engaging portion 24 and the holder 26, so as to permit limited oscillation of the portion 24 relative to the holder 26. Furthermore, the lower end of the screw engaging portion 24 is slightly curved as shown at 30. By virtue of this curved arrangement, a slight misalignment of the screw driver relative to the axis of the screw does not have as much tendency to disengage the screw driver from the slot in the screw.

As indicated in the drawings, the lower end of the screw driver has been ground, so as to form a somewhat wedge-shaped screw engaging member which further tends to prevent the screw driver from slipping out of the slot in the screw head. By virtue of this latter construction, operation of the screw driver tends to pull the screw driver downwardly in the slot rather than upwardly as in the conventional screw driver designs. Thus, a screw driver of the type disclosed herein is especially well suited for use in a crank type of screw driver wherein the tendency for misalignment between the shank of the screw driver and the axis of the screw is somewhat greater than with ordinary straight screw drivers.

The device shown herein is also ideally suited for use with other types of tools, such as the drill 37 of Figure 6 and the Allan wrench 39 of Figure 7. Each of the tools is supported by means of a suitable holder similar in shape at its upper end to the tool 26 shown in Figures 1 and 5. In the case of drills, these may be conventional drills held in place by a set screw 41 in a drill holder such as the holder 43 of Figure 6.

In order to facilitate the interchange of the tool elements supported in the chuck, the chuck consists of a main body member 40 which is keyed to the shank 14 by a key 45, so as to rotate in unison with the shank 14 at all times. A latching dog, or trigger 42 is pivotally supported within the slot 44 provided in the body member 40. As shown in the drawings, the body member 40 is cut away as indicated at 46, so as to provide a suitable mounting flange for the pin 48 on which the trigger 42 is pivotally supported. The trigger 42 is provided with a sear 50 which is adapted to engage the shoulder 52 formed on each of the tools to be used in the chuck. The shoulder 52 is formed by cutting a circumferentially extending groove in the shank of each of the tools, as shown. The upper end of each tool is provided with a semicircular lug or projection 54 which is complementary to a similar semicircular lug or projection 56 formed integrally with the lower end of the main shank 14.

The trigger 42 is at all times biased into latching position by the spring 60, and in order to remove a tool from the chuck, it is necessary to press on the projecting end of the trigger so as to disengage the sear from the shoulder 52. In order to support the spring 60 within the body member 40, a hole 62 is drilled into the body member 40, as best shown in Figure 6. The diameter of the hole 62 is slightly greater than the width of the slot 44, so that a washer 64 placed in the bottom of the hole 62 serves to support the inner end of the spring. By virtue of this arrangement, the pivot pin 48 not only holds the trigger 42 in assembled relationship but also serves to hold the spring 60 and the washer 64 in assembled relationship. The projecting end 61 on the trigger 42 strikes against the end surface 63 of the slot 44 and limits the inward movement of the sear portion 50 of the trigger.

Referring now to the ratchet mechanism which is used for transmitting power from the handle 12 to the shank 14, reference numerals 70 and 72 designate the upper and lower housing members respectively of the ratchet assembly. Each of these housing members consists of an inexpensive sheet metal stamping which may be held in assembled relationship by any suitable means, such as the screws 74 and the bolt 76 which supports the handle 12. The upper end of the shank 14 has secured thereto a ratchet member 78 which is disposed between the housing members 70 and 72, as shown. A single ratchet engaging pawl 80 is slidably mounted between the housing members 70 and 72 and is adapted to have its inner end arranged to engage the teeth on the ratchet member 78. The inner end of the pawl 80 has its one side bevelled, as indicated at 82, so that in a first setting of the pawl, it will be shoved out of engagement with the ratchet teeth as the pawl is rotated in the one direction but will positively engage the ratchet teeth if rotated in the opposite direction. By rotating the pawl through 180° into a second position, one automatically changes the direction in which the pawl is effective to operate. Unlike ordinary pawls, the pawl 80 can be set in a neutral position which is midway between the first and second positions just mentioned and in this neutral position it will transmit power to the teeth of the ratchet in both directions of rotation of the pawl. This is made possible by the fact that the bevelled portion 82 faces up rather than towards the teeth of the ratchet when the pawl is in the neutral position. In this neutral position the straight sides of the pawl engage the teeth, as shown in Figure 4 of the drawings.

The pawl 80 is biased into engagement with the ratchet member by means of a spring 84 which has its one end abutting against the fixed spring support 86 riveted or otherwise secured to the housing member 72, as shown. The outer or free end of the pawl is provided with a recess 88 for receiving the one end of the spring 84. In order to facilitate free relative rotation between the spring and the pawl, a ball bearing element 90 has been provided, as shown, at the inner end of the recess 88.

In order to set the pawl so as to operate the ratchet

in the desired direction, the pawl 80 is provided with a finger engaging wheel or knurled disc 92 which is adapted to project through the slot 94 in the housing member 70. A lug 96 is formed on the disc and is adapted to cooperate with the housing member 70, so as to hold the pawl in any one of the three desired positions. The one wall of the slot 94 is provided with a notch 98 for holding the pawl in the neutral position. The lug 96 rests against the inner side of the housing in the other two positions of the pawl.

The pawl 80 is rotatably supported between a pair of complementary floating bearing elements 100 and 102, as shown. These bearing elements are formed from sheet metal stampings which are held in place against sidewise or endwise movement within the slots 104 formed in the housing members 70 and 72. Projections 105 formed on the elements 100 and 102 limit the outward movement of the bearing elements in the slots 104.

As best illustrated in Figures 2 and 9, the arms of the bearing elements 100 and 102 are provided with interlocking projections 110 and 112 which serve to hold the bearing elements in proper alignment with one another. It will be observed that one arm of each of the stampings is provided with a substantially U-shaped bearing slot 114 and that the complementary arm is provided with a flat bearing surface 116. By virtue of this construction, it is obvious that a limited amount of misalignment between the opposed bearing elements will not cause the pawl to bind. Thus, slight variations in the dimensions of the parts will not cause the pawl to bind.

In order to limit the rotation of the pawl 80, the one bearing element 102 has secured thereto (such as by spot welding) a U-shaped stamping element 106 which has its upper edges arranged to limit the rotational movement of the dog 108 which is struck up from the pawl 80, as shown.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

In an operator for tools comprising a shank, a chuck supported by the shank, a handle including two complementary hollow half sections each having upstanding marginal flanged edges defining a chamber within the handle, a ratchet wheel secured to the shank and rotatably journaled in one end of the handle, the chuck being adapted for interchangeable engagement with tools, the shank being attached to the ratchet wheel at the center portion thereof and concentric therewith, the ratchet wheel being provided with straight sided teeth, a pawl for engaging said teeth slidably and rotatably supported within the hollow handle and normal to the longitudinal axis of the shank, a plurality of floating bearing elements carried by the handle and supporting the pawl, a spring biasing said pawl into engagement with the ratchet wheel, one end of the pawl being provided with a circular recess formed therein, a ball bearing partially disposed within the circular recess and engaged by one end of the spring, the other end of the spring engaging one of the hollow half sections, the pawl having one side thereof bevelled to slidably engage the teeth, the pawl also having a straight side, and a knurled knob attached to the pawl for adjusting the pawl.

References Cited in the file of this patent

UNITED STATES PATENTS

12,198	Everett	Jan. 9, 1855
67,014	Ayres	July 23, 1867
207,964	Hart	Sept. 10, 1878

(Other references on following page)

UNITED STATES PATENTS

219,425	Abrams	Sept. 9, 1879	1,395,888
223,484	Crockford	Jan. 13, 1880	1,422,121
270,394	Crecilius	Jan. 9, 1883	1,425,270
406,935	Murphy	July 16, 1889	1,680,515
417,564	Kent	Dec. 17, 1889	1,814,140
438,860	Pratt	Oct. 21, 1890	1,903,514
456,300	Dawson	July 21, 1891	1,997,422
658,618	Chellis	Sept. 25, 1900	2,205,664
717,543	Charles et al.	Jan. 6, 1903	2,257,675
748,527	Peterson	Dec. 29, 1903	2,277,961
1,078,059	Mossberg	Nov. 11, 1913	2,317,319
1,138,277	Carll	May 4, 1915	2,505,889
1,230,173	Kremer	June 19, 1917	2,512,755

Ayotte	Nov. 1, 1921
Miller	July 11, 1922
Morgan	Aug. 8, 1922
Gormley	Aug. 14, 1928
Flintermann	July 14, 1931
Merriman	Apr. 11, 1933
Lorenzer et al.	Apr. 9, 1935
Mayer	June 25, 1940
Eastus	Sept. 30, 1941
Detmers	Mar. 31, 1942
West	Apr. 20, 1943
Foreman	May 2, 1950
Vosper	June 27, 1950