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G. F. KRIEGER

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RATCHET SCREW DRIVER

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RATCHET SCREW DRIVER

George F. Krieger, Wisconsin Rapids, Wis.

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1 Claim. (Cl. 145—76)

This invention relates to screwdrivers of the ratchet type.

An object of this invention is to provide an improved screwdriver which is simple in construction and which is so constructed that different types of bits or sockets may be mounted on the shank thereof.

Another object of this invention is to provide an improved screwdriver with an improved ratchet mechanism including a pair of opposed clutch elements fixed relative to the handle and a movable clutch element which is selectively engageable with a fixed clutch element for rotating the shank and bit in one direction.

A further object of this invention is to provide in a screwdriver of the ratchet type an improved handle which is formed with a plurality of finger recesses so as to prevent slipping of the handle in the hand.

A further object of this invention is to provide a screwdriver having a manually shiftable clutch which is normally biased to a neutral or declutching position and is adapted to be held in operative position by a thumb or finger.

A further object of this invention is to provide in a screwdriver a lever which is mounted on the shank of the screwdriver and which is shiftable to a right angular operative position so that additional pressure may be applied to the bit in order to initially loosen a tight screw or to apply extra pressure to an inserted screw.

To the foregoing objects and others which may hereinafter appear, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and illustrated in the accompanying drawing, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawing:

Figure 1 is a longitudinal section partly broken away and in detail of a ratchet screwdriver constructed according to an embodiment of this invention,

Figure 2 is a fragmentary longitudinal section taken on the line 2—2 of Figure 1,

Figure 3 is a sectional view taken on the line 3—3 of Figure 1,

Figure 4 is a sectional view taken on the line 4—4 of Figure 1,

Figure 5 is a sectional view taken on the line 5—5 of Figure 1,

Figure 6 is a longitudinal sectional view of the modified form of tool used with this device, and

Figure 7 is a longitudinal section partly broken away of another form of tool for use with the shank of the device.

Referring to the drawing the numeral 10 designates generally a polygonal screwdriver shank of desired length which at its rear or inner end is formed with a polygonal part 11.

A handle 12 formed with a centrally disposed bore 14 is rotatably mounted on the shaft or shank member 11, and the handle 12 is formed of substantially frusto-conical configuration and is provided in the outer surface thereof with a plurality of elongated substantially elliptical recesses 15 which form a plurality of radially arranged ribs 16. The recesses 15 provide finger engaging recesses, and the ribs 16 provide a means whereby the handle 12 may be firmly grasped in the hand and held against rotation. The rear end of the handle 12 is formed in substantially semi-spherical configuration as at 17 and a substantially semi-spherical cap 18 rotatably engages the head or rear end 17.

The cap 18 is secured to the rear or inner end of the shaft or shank member 11 by welding 19 or the like so that the cap 18 will rotate with the shank or shaft 11. Preferably the semi-spherical head or body 17 is substantially smaller in diameter than the diameter of the handle 12 at the rear or large end thereof, thereby forming a shoulder 20 against which the forward or open side of the cap 18 is adapted to abut. The outer surface of the cap 18 is substantially flush with the outer surface of the handle 12 at the rear thereof.

A cylindrical sleeve 21 is disposed forwardly of the handle 12 and positioned loosely about the shank 10 adjacent the rear end of the shank. The sleeve 21 at its rear end is formed with a flared or frusto-conical ferrule 22 which is mounted on a reduced frusto-conical forward end portion 23 formed on the forward end of the handle 12, and the outer surface of the ferrule 22 is substantially flush with the outer surface of the forward portion of the handle 12 as shown in Figure 1. The ferrule 22 is adapted to be fixedly secured relative to the handle 12 by means of a fastening device 24 which extends through the ferrule 22 and into the reduced forward end 23 of the handle 12.

A forward clutch element 25 is disposed within the forward end portion of the sleeve 21 and is provided with a cylindrical bore 26 within which the shank 10 rotatably engages. The clutch element 25 is fixedly secured within the sleeve 21 by means of a fastening device 27. The clutch

element 25 is formed with rearwardly directed teeth 28 so that a shiftable clutching element to be hereinafter described may engage the teeth 28 for rotating the shank 10 with the handle 12 in one direction.

A second or rear clutch element 29 is secured by a fastening device 30 within the rear end portion of the sleeve 21, and is formed at its forward end with clutch teeth 31 which are disposed in a direction opposite from the teeth 28. A manually shiftable clutching or coupling member 32 is slidably mounted on the shank 10, but is non-rotatable relative to the shank 10. The shiftable clutch element 22 at its forward end is formed with teeth 33 for selective engagement with the teeth 28 of the forward clutch element 25, and the rear end of the shiftable clutch element 32 is formed with teeth 34 for selective engagement with the teeth 31 of the rear clutch element 29.

The clutch element 32 is formed between the ends thereof with a peripheral annular groove 35 within which a clutch shifting pin 36 is adapted to loosely engage. The sleeve 21 is formed with a longitudinally extending slot or opening 37 within which the clutch shifting pin 36 slidably engages, and the pin 36 also extends through a cap or transversely arcuate plate 38 which is fixed by fastening devices 39 to the outer side of the sleeve 21. The plate 38 is formed with a longitudinal slot or opening 39 through which the pin 36 slidably engages, and a nut or head member 40 is threaded onto the outer end portion of the pin 36 and slidably engages the outer side of the cap or plate 38. Preferably the pin 36 is formed intermediate the ends thereof with an annular rib 41 which slidably engages the inner side of the cap or plate 38, so that the pin 36 is thereby held against endwise movement.

The shiftable clutch element 32 is normally maintained in a neutral or inoperative position between the clutch elements 25 and 29 by means of a pair of springs 42 and 43 which are mounted within the housing 44. The housing 44 is formed with marginal flanges 45 which may be secured by fastening devices 46 to the sleeve 21 opposite from the cap or plate 38 as shown in Figure 3. An arcuate block 47 is loosely disposed within the groove 35 of the clutch element 32, and has secured thereto an outwardly extending pin 48 having a head 49 on the outer end thereof. The pin 48 slidably engages in an elongated slot 50 which is formed in the sleeve 21, and the head 49 of the pin 48 is disposed between the confronting ends of the two springs 42 and 43.

The shank 10 at its forward end has removably mounted thereon a polygonal sleeve 51 which is frictionally held against endwise movement on the shank 10 by means of an elongated slot 52 which is formed in the sleeve 51. The sleeve 51 is of inwardly tapering construction so that the inner portion 53 of the sleeve 51 will frictionally engage the shank 10 and thus hold the sleeve 51 against endwise movement.

A screwdriver bit 54 is disposed within the forward end portion of the sleeve 51 and may be tightly secured therein by spot welding 55 or other suitable fastening means.

In Figure 6 there is shown a modified form of tool which may be coupled or associated with the shank 10 and which includes a polygonal sleeve 56 having a recess portion 57 for providing for the frictional holding of the sleeve 56 on the forward end of the shank 10. A nut socket member 58 is secured as by welding or other suit-

able fastening means on the forward portion of the sleeve 56, and the forward end of the socket member 58 projects forwardly beyond the forward end of the sleeve 56 so that the head 59 of a cap screw 60 may removably engage in the socket 58.

In Figure 7 there is also shown a further tool which may be removably mounted on the shank 10 and which includes an elongated polygonal sleeve 61 having a recess 62 for providing for the frictional holding of the sleeve 61 on the shank 10. The sleeve 61 has secured within the outer end portion thereof a star-shaped screwdriver bit 63 which in the present instance is formed with a tapering inner end 64 tightly engaging within the forward end of the sleeve 61. The sleeve 61 at a point intermediate the ends thereof is provided with an interiorly disposed plug or abutment 65 which may be welded or otherwise tightly secured in the sleeve 61 in order to limit the telescoping of the sleeve 61 on the forward end of the shank 10.

In order to provide a means whereby a tight screw may be readily loosened or a screw or bolt may be additionally tightened, I have provided a handle 66 which is pivotally mounted on the shaft or pin 67. The handle 66 is mounted between a pair of ears 68 which are carried by a polygonal sleeve 69 engaging about the shank 10. The sleeve 69 is formed with a recess 70 so as to provide for the frictional holding of the sleeve 69 against endwise movement on the shank 10. When the handle 66 is in inoperative position, it will be disposed as shown in full lines in Figure 1. When the handle is in an operative position, it is manually swung to the dotted line position shown in Figure 1.

In the use and operation of this screwdriver the handle 12 is grasped in one hand, and if it is desired to remove a screw or loosen a bolt or nut, the clutch element 32 is shifted forwardly by pressing the button or operator 40 with a finger or thumb, and shifting the button 40 with the clutch element 32, so that the teeth 33 of the clutch element 32 will engage the teeth 28 of the forward clutch element 25. The movable clutch element 32 is manually held in its forward engaging position while the handle 12 with the shank 10 is rotated in a counter-clockwise direction. The desired screwdriver bit, nut socket or other tool is mounted on the forward end of the shank 10 and will rotate as a unit with the shank. When the button 40 is released, the two springs 42 and 43 will automatically shift the clutch element 32 to a neutral or disengaged position, in which position the handle 12 is freely rotatable relative to the shank 10. In the event during the tightening of the screw, nut, or the like, it is desired to place additional pressure or strain on the article, the handle 66 may be shifted to an extended or substantially right angular position with respect to the shank 10 as shown in dotted lines in Figure 1. In this position the handle 66 may be grasped by the other hand of the user and the shank 10 turned to the desired extent.

Where it is desired to tighten a screw, nut or the like, the clutch element 32 is shifted rearwardly into engagement with the clutch element 29 and held in this rear position. In the event the screw, nut, or the like is unduly tight the handle 66 may be swung to an operative position, and the additional pressure afforded by the extended handle 66 will permit the ready tighten-

ing of the article, after which the handle 66 may be returned to its inoperative position.

What I claim is:

A ratchet screwdriver comprising an elongated shank polygonal in transverse section, a handle 5 rotatable on said shank and formed with a parti-spherical rear end, a parti-spherical cap fixed to the rear end of said shank and rotatably engaging the rear end of said handle, a sleeve fixed to said handle and loosely engaging about a portion of said shank, a pair of spaced apart toothed 10 clutch elements fixed within said sleeve and formed with cylindrical bores through which said shank rotatably engages, a shiftable clutch element between said pair of clutch elements and 15

slidable on said shank, said shiftable element having a peripheral groove, a clutch shifter engaging in the groove of said shiftable clutch element, means slidably mounting said shifter relative to said sleeve, a housing fixed to said sleeve opposite from said shifter, a pair of aligned springs in said housing, a slide member loosely engaging in said groove, a shank fixed to said slide member and extending outwardly into said housing, and a ball-shaped head fixed to the outer end of said shank and interposed between said springs for normally maintaining said shiftable clutch element in disengaged position.

GEORGE F. KRIEGER.