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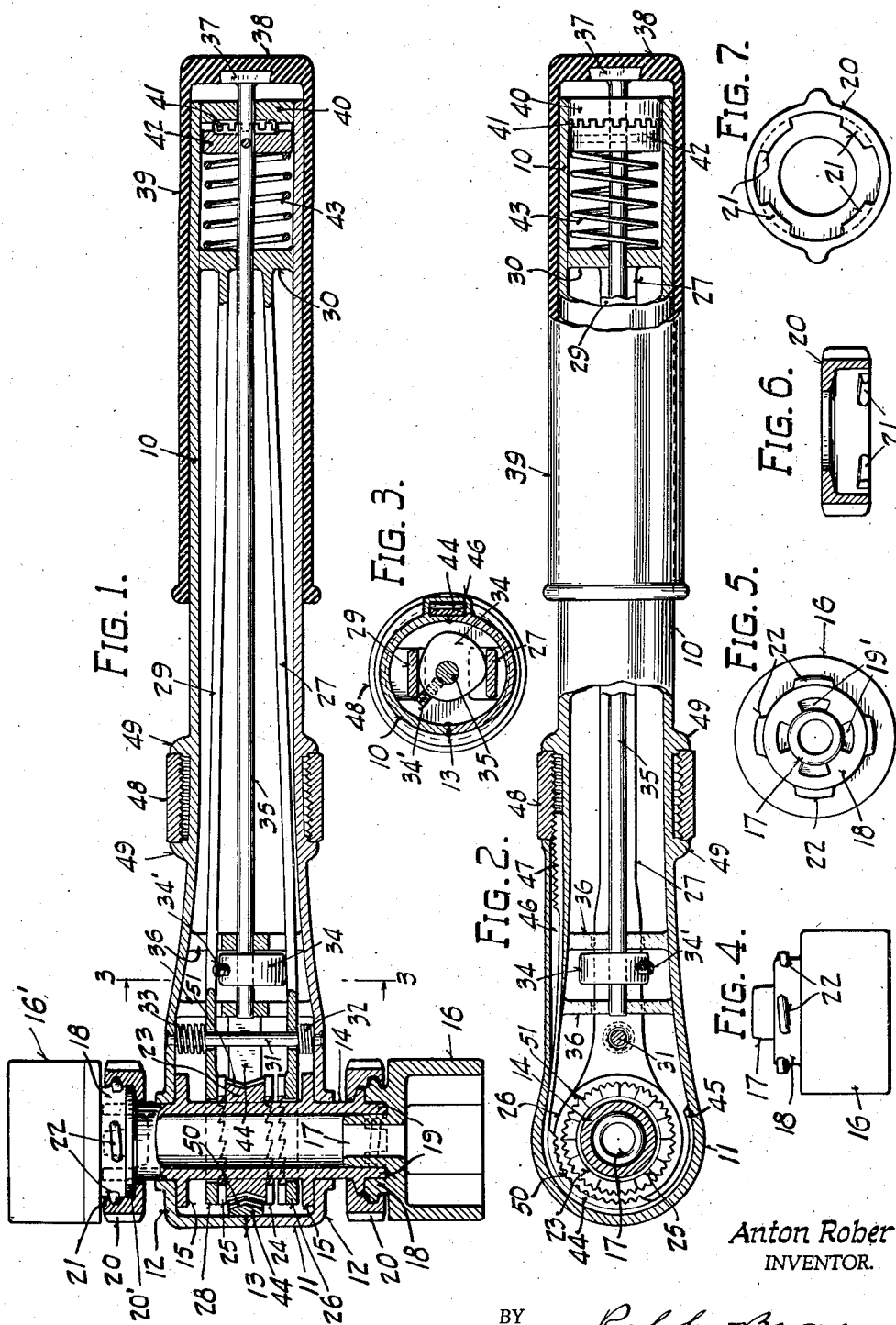
A. ROBER

2,393,413

TOOL

Filed July 10, 1943

2 Sheets-Sheet 1



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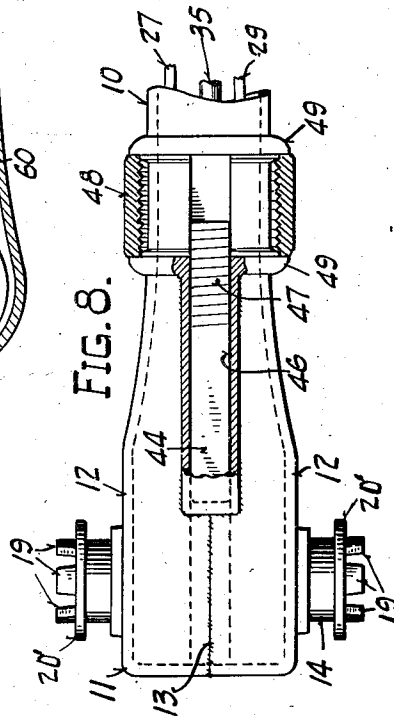
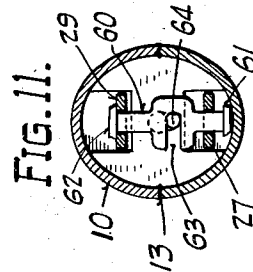
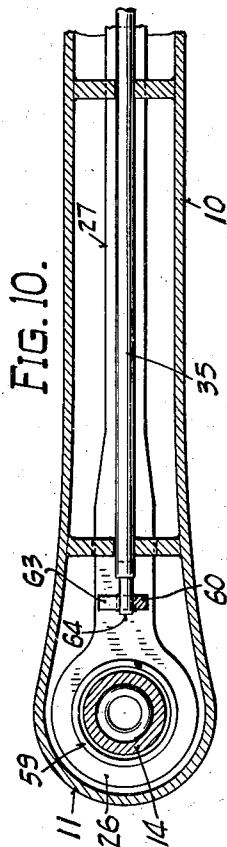
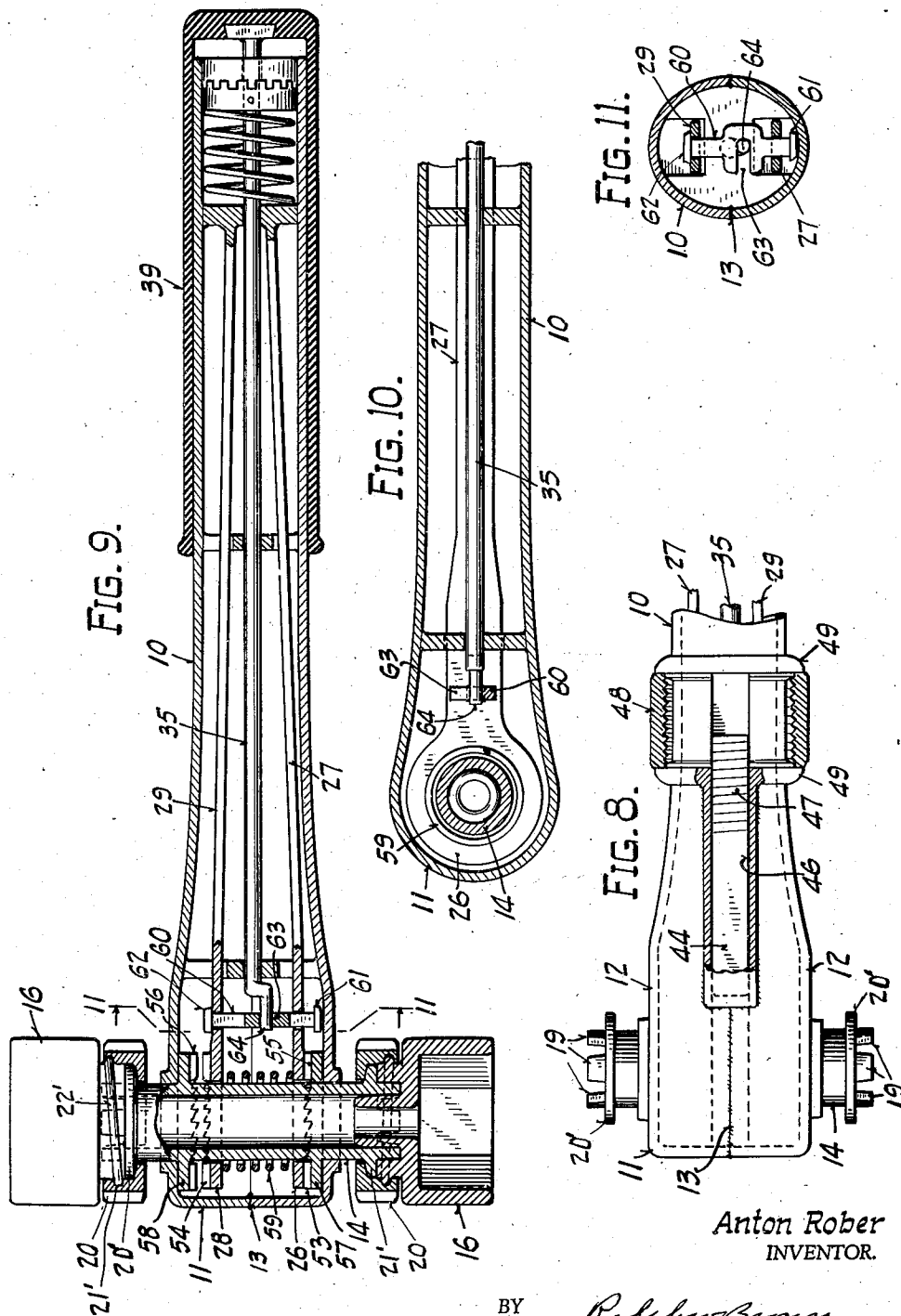
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TOOL

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,393,413

TOOL

Anton Rober, Milwaukee, Wis.

Application July 10, 1943, Serial No. 494,134

2 Claims. (Cl. 81-58)

This invention relates to tools.

One object of the present invention is to provide a convertible tool in which any of several types of tool elements may be readily and releasably attached to the handle.

Another object is to provide a tool so equipped as to provide a ratchet action in either of two directions selectively.

Another object is to provide a tool having means adjustable to effect a ratchet action in either of two directions selectively or to lock the tool for movement as a unit with the handle.

Other more specific objects and advantages will appear, expressed or implied, from the following description of an illustrative embodiment of the present invention.

In the accompanying drawings:

Figure 1 is a longitudinal sectional view of a convertible tool constructed in accordance with the present invention.

Fig. 2 is a longitudinal sectional view taken at right angles to that of Fig. 1.

Fig. 3 is a transverse sectional view taken along the line 3-3 of Fig. 1.

Fig. 4 is a side elevation of a detached tool element.

Fig. 5 is an end elevation of the tool holder.

Figs. 6 and 7 are a transverse section and face view, respectively, of a locking collar shown in Fig. 1.

Fig. 8 is a fragmentary view of the tool handle, partly in section and partly in elevation.

Fig. 9 is a longitudinal sectional view of a modified form of tool embodying the present invention.

Fig. 10 is a fragmentary longitudinal sectional view taken at right angles to that of Fig. 9.

Fig. 11 is a transverse sectional view taken along the line 11-11 of Fig. 9.

The tool shown in Figs. 1 to 8 includes a hollow handle 10 terminating at one end in a rounded head 11 having substantially flat sides 12. For purposes of assembly the handle 10 is preferably longitudinally split, as at 13, and welded into a solid structure.

The head 11 provides support for a tubular shaft 14 journaled therein and projecting through the opposite sides 12 thereof, the shaft being longitudinally fixed by appropriate bearing collars 15 fixed thereon. The projecting ends of the shaft 14 are fashioned to detachably receive any of several types of tools, such for instance as, the socket wrench shown at 16, or the hammer head shown at 16' of either metal, rubber, or other appropriate material.

In this instance each tool is removably attached to an end of the shaft 14 and for that purpose is provided with a shank 17 adapted to fit into the open end of the shaft 14, the shank 17 projecting from the face of a cylindrical boss 18 formed on the base of the tool. Teeth 19 projecting from each end of the shaft 14 are arranged to engage in sockets 19' formed in the boss 18 to lock each tool 16 against rotation with respect to the shaft. Each shaft end also carries a hollow collar 20 rotatable thereon and seated against a circular stop flange 20' fixed on the shaft. The collar 20 is provided with a series of peripherally spaced inclined cam lugs 21 formed on its interior and adapted to interlock beneath a similar series of inclined cam lugs 22 formed on the exterior of the boss 18 of the tool to lock the tool onto the shaft end. In applying the tool to the shaft the lugs 22 on the tool are passed between the lugs 21 on the collar, after which the collar is rotated to position the lugs 22 beneath the lugs 21 and to lock the tool in place by a camlike wedging action between the two sets of lugs.

Provision is made for controlling rotation of the shaft 14 within the head 11. In this instance the shaft 14 is provided midway of its ends with a drum 23 fixed thereto. Each side face of the drum is provided with a circular series of ratchet teeth 24 or 25, the teeth of one series being set in a direction opposite to those of the other series. The teeth of one series 24 are disposed to coact with mating teeth on a ratchet ring 26 carried by an extended arm 27, and the teeth of the other series 25 are disposed to coact with mating teeth on a second ratchet ring 28 carried by an extended arm 29. Arms 27 and 29 extend lengthwise of the handle 10 and are fixed at their remote ends to a supporting disk 30 fixed transversely of and within the handle.

A transverse rod 31 fixed within the head 11 extends through appropriate apertures in the arms 27 and 29 adjacent the ratchet rings 26 and 28 to provide additional support and guidance for the latter. Both ratchet rings are yieldably urged toward the mating teeth on the drum 23 by separate coil springs 32 and 33 carried by the rod 31 and interposed between one of the arms 27 or 29 and the wall of the handle.

The ratchet rings 26 and 28 are withdrawable from the drum 23 by appropriate means, such as a cam 34 fixed to a shaft 35 and rotatable with the latter in a manner to force one or the other of the arms 27 and 29 outwardly against the thrust of its spring 32 or 33. In this instance the

shaft 35 is journaled in spaced spiders 36 disposed within the handle 10 at opposite sides of the cam 34. The shaft 35 extends lengthwise of the handle, through the disk 30 in which it is journaled, and at its outer end is provided with a head 37 solidly embedded in the end 38 of a tubular hand grip 39 which is rotatable on the outer end of the handle. The grip 39 is preferably formed of hard rubber or other good insulating material to avoid transmission of electric shock to the hand of the user.

A suitable clutch within the handle prevents accidental rotation of the grip 39 and of the shaft 35 and cam 34. The clutch shown comprises a disk 40, fixed in the outer end of the handle 10, having jaw teeth 41 which normally mesh with mating teeth formed upon a disk 42, fixed to the shaft 35. In this instance a spring 43, interposed between the disk 30 and the clutch disk 42, yieldably retains the clutch teeth in interlocking engagement, so that neither the shaft 35 nor grip 39 can be rotated. However, by forcing the grip 39 inwardly along the handle 10 against the thrust of the spring 43, the clutch disk 42 may be disengaged from the disk 40 and the grip 39 and shaft 35 rotated to thereby rotate the cam 34.

It will of course be understood that, by rotating the grip 39, shaft 35 and cam 34, one or the other of the arms 27 or 29 may be forced outwardly against its spring 32 or 33 in a manner to withdraw its ratchet ring 26 or 28 from engagement with the ratchet teeth on the drum 23. In that position the other ratchet ring 26 or 28 under the pressure of its spring 33 or 32 coacts with the drum 23 to effect intermittent rotation of the drum 23, shaft 14 and tool 16 in one direction when the handle 10 is swung back and forth about the axis of the shaft 14. Similarly when the cam 34 is rotated into such position as to force the other ratchet ring 26 or 28 out of coacting engagement with the drum, the first mentioned ratchet ring 26 or 28 coacts with the drum to intermittently rotate the drum, shaft and tool in the opposite direction. An appropriate stop in the form of a pin 34' is provided on the cam 34 in position to coact with one or the other of the arms 29 or 27 to limit rotation of the cam as an aid to the operator in adjusting the latter.

Provision is also made for locking the drum 23 to the handle so that the tool 16 responds to all movements of the handle. For this purpose a steel band 44 is disposed about the drum 23, one end 45 being anchored within the head 11, and the other end extending through a channel 46 formed externally of the handle 10 and having a threaded portion 47 engaged with an internally threaded collar 48. The collar 48 is rotatable on the handle 10 and axially confined between appropriate stop rings 49 fixed to the handle. The band 44 is provided with teeth 50 adapted to interengage peripheral teeth 51 on the drum 23 when the band is tensioned about the drum.

The band 44 normally assumes a position spaced from the drum 23, as indicated in Fig. 2, in which position the drum is free to turn within the head 11 under the control of one or the other ratchet rings 26 or 28, but by rotating the collar 48 the band 44 may be tensioned about the drum 23 to lock the same against rotation.

The device shown in Figs. 9, 10 and 11 is substantially identical with that hereinabove de-

scribed except for the means employed for controlling the direction of ratchet action, this means being designed to hold the shaft 14 against rotation within the handle head 11 when desired and thereby eliminating the brake mechanism above described. In the latter form of device each ratchet ring 26 and 28 is equipped on its outer face with a circular series of ratchet teeth 53 or 54 adapted to coact with corresponding teeth 55 or 56 formed on collars 57 or 58 fixed to the shaft 14. In this instance a spring 59 interposed between the rings 26 and 28 yieldably urges both outwardly or in such directions as to engage the teeth 53 or 54 of each with the teeth 55 or 56 respectively.

The positions of the rings 26 and 28 are controlled in this instance by a transverse bar 60 that extends loosely through the arms 29 and 27 and which is equipped with appropriate stops in the form of heads 61 and 62 at its opposite ends. This bar 60 is equipped with a transverse slot 63 adapted to receive an actuating crank 64 provided on the end of the control shaft 35.

The arrangement is such that with the crank 64 in the lower extreme position shown, the upper ratchet ring 28 is withdrawn from coacting engagement with the collar 58, while the other ratchet ring 26 is yieldably pressed by the spring 59 into ratcheting engagement with the collar 57, with the result the oscillating of the handle will effect a ratchet action of the shaft 14 in one direction. By rotating the shaft 35 so as to position the crank 64 in its upper extreme position, the ring 26 will be withdrawn from coacting relation with the collar 57 and the other ring 28 will coact with collar 58 to effect a ratchet action in the opposite direction.

In an intermediate position of the crank 64 both rings 26 and 28 are forced by the spring 59 into coacting engagement with the collars 57 and 58, respectively, and the shaft 14 is held against rotation in either direction by that engagement.

In the device shown in Figures 9, 10, and 11 each tool element is releasably attached to the shaft 14 by a rotary collar 20 substantially identical with the collar employed in the device first above described, except that instead of the lugs 21, the collar is provided with an internal groove 21' adapted to receive a screw thread 22' on the tool element.

Various changes may be made in either embodiment of the invention hereinabove specifically described without departing from or sacrificing the advantages of the invention as defined in the appended claims.

I claim:

1. In a tool the combination of a handle having a head at one end thereof, a transverse tool-carrying shaft journaled in said head, a hand grip enclosing the opposite end of said handle and rotatably seated thereon, a spring urged clutch in said handle normally holding said hand grip against rotation relative to said handle, said clutch being releasable by lengthwise movement of said hand grip relative to said handle, ratchet mechanism in said head for effecting step-by-step rotation of said shaft in one direction in response to swinging movement of said handle about the axis of said shaft, separate ratchet mechanism in said head for effecting step-by-step rotation of said shaft in an opposite direction in response to swinging movement of said handle about the axis of said shaft, and means

responsive to rotation of said hand grip on said handle for rendering said ratchet mechanisms selectively effective or ineffective.

2. In a tool, the combination of a handle having a head at one end thereof, a transverse tool-carrying shaft journaled in said head, a hand grip enclosing the opposite end of said handle and rotatably seated thereon, a spring urged clutch in said handle normally holding said hand grip against rotation relative to said handle, said clutch being releasable by lengthwise movement of said hand grip relative to said handle, ratchet mechanism in said head for effecting step-by-step rotation of said shaft in one direction in

5 response to swinging movement of said handle about the axis of said shaft, separate ratchet mechanism in said head for effecting step-by-step rotation of said shaft in an opposite direction in response to swinging movement of said handle about the axis of said shaft, means responsive to rotation of said hand grip on said handle for rendering said ratchet mechanisms selectively effective or ineffective, and means 10 operable independently of said hand grip for releasably holding said shaft against rotation relative to said head.

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