The present invention relates to a reversible ratchet tool as a screwdriver and the like.

The principal object of this invention is to provide a novel and improved reversible ratchet tool construction employing few parts which are easy to assemble, affording great economy in manufacture, simplicity in structure and operating efficiently in carrying out the purposes for which it is designed.

Other objects and advantages relating to the novel and improved construction of the parts, their assembly and functional relationships will become apparent as this disclosure proceeds.

In the accompanying drawings forming part of this specification, similar characters of reference indicate corresponding parts in all the views.

Fig. 1 is a longitudinal view of a screwdriver embodying the teachings of this invention.

Fig. 2 is an end view thereof.

Fig. 3 is a section taken at lines 3—3 in Fig. 2, or at lines 3—3' in Fig. 4.

Fig. 4 is a section taken at lines 4—4 in Fig. 1, showing the ratchet mechanism in its condition where the tool shank is locked against axial rotation with respect to the handle. The gear fixedly carried on the tool shank, is engaged by both of the included pawls against rotation in either direction. A stressed spring member acts to maintain such engagement. A pawl shifter or actuator member as it is called, is here in "neutral" position.

Fig. 5 is a view similar to Fig. 4, showing the actuator shifted to a position where it has moved and is holding one of the pawls out of engagement from the gear, thus permitting rotation of the tool shank in only one direction with relation to the handle.

Fig. 6 is a perspective view of the pawls.

Fig. 7 is a perspective view of the spring member.

Fig. 8 is a top view of the actuator member in Fig. 3.

The structure of said member is here shown to include a pair of spaced ribs therealong to form a channel for the bight of the spring.

Fig. 9 is a section taken at lines 9—9 in Fig. 8.

The Figs. 3 through 9 are drawn to a larger scale than the Figs. 1 and 2.

In the drawings, the numeral 15 designates generally a hollow casing in which the ratchet mechanism is housed. The casing includes an attached cap 16, having a central hole through which the shank 17 of the tool extends.

A handle 18 is in any suitable manner attached to the casing. In the screwdriver embodiment illustrated, the handle is in axial alignment with the tool shank; being mounted on a stud 18' extending integral from the casing.

Said tool shank 17 is rotatably positioned through a central hole in the cap 16, and its end interior the casing, sits rotatably in the socket 19 which is a bore in the stud 12. A gear 20 is fixedly carried on the tool shank within the casing. The numerals 21 and 22 are the pawls which are vanes extending at each side of the axis of their end pintles. Both pawls are identical in structure and each has a struck-up lip as 23 for engagement respectively by the ends of the arms of a U-shaped blade spring 24 so that said spring acts to turn the pawls to be in engagement with said gear 20. The letters "A" and "B" indicate socket positions in opposite walls of the casing 15, which serve as bearings for the pintles of the pawls. The axes of rotation of the tool shank 17 and of the pawls 21 and 22, are parallel. The pawl pintles are indicated at 25.

The cavity 14 of the casing 15 is cylindrical at least in sufficient part thereof to permit the ring segment 26 of the actuator or pawl shifter, 27, to ride its required scope of movement within the casing in concentric contact relation therewith. The gear 20 is concentric with said ring segment 26 and spaced therefrom. Midway between its ends, said ring segment is provided with a finger-piece or button 28 which extends through and is movable along an elongated peripheral slot 29 in the wall of the casing. This slot is in such position that when both pawls 21, 22 are in engagement with the gear as in Fig. 4, the mentioned finger-piece of the actuator is midway between the ends of said slot. The length of said slot 28 is such that when the finger-piece is at one end of same, one of the pawls has been turned by one end of the actuator to be out of engagement from the gear 20, and when said finger-piece 28 is at the other end of said slot 29, the other pawl has been turned by the other end of the actuator to be out of engagement with said gear. The pawls, when engaging the gear, lie of course in the respective paths of the ends of the actuator 27.

When any of the pawls are shifted out of engagement from the gear, the stressed spring 24 is further stressed by pawl movement and serves to hold the moved pawl pressed against the actuator whereby the latter is held from slipping from its manually set position. This is shown in Fig. 5.

The ring segment 26 of the pawl shifter 27 has a pair of spaced, parallel, inward ribs 31 therealong to hold the bight 24 of the U-shaped spring 24 against shifting out of place with respect to the pawls 21, 22 though said spring and ring segment are in slidable relation. Said ribs really form a channel or race for the said bight to lie in. The ring segment 26 is made of a strip of such width that it has but minute play along the longitudinal axis of the tool. It is evident that spring 24 also serves to maintain the ring segment in contact with the inner wall of the casing 12. The ends of said ring segment may be sloped as at 26' and 26" respectively, in converging relation towards the body of said segment 26 to afford cam surface contact and cam action on the vanes of the pawls 21, 22, respectively.

The tool will now be considered in use. In Fig. 4, where the condition is that the finger-piece 28 is in central position in slot 29, both pawls 21 and 22 engage the gear 20, thus locking the tool shank 17 against movement with respect to the handle 18. The tool is now as an ordinary screw driver in that the shank is secured to and moved with the handle.

Now upon shifting the finger-piece 28 in clockwise direction from its position in Fig. 4 to that shown in Fig. 5, the segment's end 26' has contacted the vane of the pawl 21 and has caused said pawl to turn out of engagement from the gear 20 and has come to rest beyond said pawl, thus holding the pawl 21 in such shifted position. The tool shank 17 is here free to turn clockwise, but is locked by pawl 22 against counter-clockwise movement.

When the finger-piece 28 is shifted in counter-clockwise direction from its position in either Figs. 3 or 4 to the other end of the slot 29, the ring segment's end 26" will have contacted the vane of the pawl 22 and will have caused same to turn out of engagement from
the gear 20 and will have come to rest beyond said pawl 22 thus holding this pawl in such moved position. The pawl 21 thus becoming free, will be returned into engagement with said gear 20 by action of the spring 24. The tool shank 17 is now free for counter-clockwise movement, but is locked against clockwise movement.

It is to be noted that the spring 24 applies its force on each pawl, on the vane portion of the latter which is to one side of the pawl pin hole so as to cause engagement of said pawl with the gear 20, and that the force applied on each pawl by movement of the finger-piece 28, is onto the vane portion which is to the other side of said axis so as to shift the pawl out of engagement with said gear. The spring 24 lies between the gear 20 and the actuator 26.

This invention is capable of numerous forms and various applications without departing from the essential features herein disclosed. It is therefore intended and desired that the embodiment shown herein be deemed illustrative and not restrictive and that the patent shall cover all patentable novelty herein set forth; reference being had to the following claims rather than to the specific description herein to indicate the scope of this invention.

I claim:
1. In a ratchet tool, a casing having a substantially cylindrical chamber, an axially rotatably mounted tool shank extending through a wall of the casing and positioned axially of said chamber, a gear fixedly carried on the shank within the casing, a ring segment concentrically positioned within said chamber and in contact with the casing; said casing having a slot along the ring segment; said ring segment being provided with a finger-piece at its mid-region, extending through said slot, two paws swingably mounted in the chamber and positioned to engage said gear and maintain same against rotation when engaged by both said paws; said gear being capable of rotation in one direction when engaged by one of the paws only, and in the other direction when engaged by the other of said paws only; each pawl comprising a vane on an axis of rotation so that part of the vane is to one side of its axis of rotation and the remainder of said vane is to the other side of said axis; each of said vanes being provided with a lip struck up therefrom at that side of the axis of the vane which is nearest the gear; the axes of rotation of the tool shank and both paws, being parallel; said ring segment being formed with a channel thereinlong in its concave surface and a stressed U-shaped blade spring positioned between said ring segment and the gear, with its free ends contacting said paws and engaged between the body of a vane and the lip on said vane respectively; said spring acting to yieldingly urge and hold the paws in engagement with the gear; the bight of said spring being within the channel in the ring segment, in slidable relation therewith and acting to press the ring segment against the wall of said chamber; said channel serving as a track for said spring and to hold said spring against movement of the paws; the ends of the said spring, bearing on those vane portions which are to the side of the respective pawl axes nearest the gear; the ends of the ring segment being at the other vane portions whereby upon movement of the finger-piece away from the mid-region of the slot, one of the paws is shifted by the ring segment out of engagement from the gear, and upon movement of the finger-piece to the other end of the slot, the moved pawl is released to re-engage the gear and the other pawl is shifted by the ring segment out of engagement with the gear; the spring acting to hold the ring segment in contact with the wall of the casing.

2. The ratchet tool as defined in claim 1, wherein the ring segment is of strip material and the channel is formed by a pair of ribs pressed in said strip.

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