This invention relates to a reversible ratchet device for wrenches, of the type including a pair of teeth engaging pawls.

Wrench mechanisms of this type have been provided heretofore, but have of necessity been limited to relatively large sizes due to having a large number of parts and requiring substantial space for connectingly mounting the pawls.

One object of the present invention is to provide an improved ratchet mechanism which makes possible the provision of a ratchet wrench of lightweight construction capable of withstanding relatively heavy loads as compared with prior art wrenches of similar sizes.

Another object of the invention is to provide a ratchet wrench of the character described which is of relatively simple construction, having a minimum number of parts, and which may be economically manufactured by use of automatic machinery.

Another object of the invention is to provide a ratchet wrench mechanism of the character described, which is relatively easy to assemble in production, and similarly easy to take apart and reassemble for cleaning or repairing purposes.

Another object of the invention is to provide a ratchet wrench of the character described, in which the reversing mechanism is positive in action and not subject to accidental reversal as by jarring in use.

These and other objects of the invention will be manifest from the following brief description and the accompanying drawings.

Of the accompanying drawings:

Figure 1 is a top plan view of a ratchet wrench embodying the features of the invention.

Figure 2 is a fragmentary cross-section, on an enlarged scale through the head portion of the wrench and taken substantially on the line 2—2 of Figure 1.

Figure 3 is a horizontal cross-section, on the same scale, taken substantially on the line 3—3 of Figure 2.

Figure 4 is a similar horizontal cross-section, but taken on the line 4—4 of Figure 2.

Figure 5 is a transverse cross-section on the same scale, taken substantially on the line 5—5 of Figure 3.

Figure 6 is an explosiv view of the essential parts of the ratchet wrench mechanism shown in Figures 1 to 5.

Referring to the drawing generally, there is illustrated the ratchet wrench 10, embodying the features of the invention for turning various sized wrench sockets of known type, one such wrench socket being indicated at 11 in chain-dotted lines in Figure 2. The wrench includes a head portion 12, having an opening 13 therethrough between opposite flat sides 14 and 15 thereof, and having an integral handle 16 extending from the same at right angles to the axis of the opening. A reversible ratchet mechanism 17, on which the socket 11 is relatively non-rotatably attachable, is mounted in said opening 13 to be turned with the head in reverse directions of operation of the same for turning the socket in a manner to be described later.
the plate 22 through which the stem is rotatably received. Neck portion 47 has rotatable bearing engagement with the smaller semi-circular portion of opening 41, and the enlargement 41a thereof facilitates the assembly of the stem 38, shank 18, plate 22 and the associated parts thereof in the interlocked-releasable state best illustrated in Figures 2, 3 and 4, wherein the stem 38 is rotatably retained against axial movement with respect to the shank, by the plate 22 complementarily engaging within the groove defined by the reduced neck portion. Said stop shoulders 48 and 49 are each located on radii extending from the center of the stem, at angles to each other slightly greater than 180 degrees, so that in either said stop position of pin 46 against said shoulders the ball, while having urged the respective pawl into meshing engagement with the teeth 28, will be stopped against an inclined inner flat face 31a of the pawl, as best shown in Figure 3, said incline face thereby serving as a yielding releasable stop means for preventing accidental reverse rotation of the stem. The stem, however, is so reversibly operable against the yielding pressure of the ball 44 by forcibly turning the knob 43.

In use of the improved ratchet wrench as for turning a nut on a bolt (not shown), a standard wrench socket 11 of requisite size is releasably fitted onto the squared extension 50 of the shank 18, against the action of the spring-pressed detent ball 51 on the extension. In preparation for tightening the nut, the indexing knob 43 is set to engage the pin 46 with either shoulder 49, in which condition the pawl 31 is urged into meshing engagement with the teeth 28 on head 12, against the yielding pressure of the spring-pressed ball 44 as best shown in Figures 2, 3, 4 and 5, the pawl 31 being yieldingly retained in this relative position as described above, and pawl 32 being held in engagement with the teeth 28 by the spring- lock 42. The nut may then be tightened by alternately turning the wrench head by means of handle 10 in opposite directions, the clockwise rotation thereby engaged with engagement of pawl 31 with the teeth 28 being effective to turn the shank 18, socket 11 and the nut (not shown) in that order.

Conversely, the tool is set for loosening a nut by turning the knob 43 in a counter-clockwise direction relatively of the shank 18 as viewed in Figures 1, 3 and 4, against the action of the spring-pressed ball 44, until the pin 46 engages stop shoulder 48 and the ball 44 engages the inner face 32a of pawl 32 in an inclined position of the same, as described above, in which pawl 32 is yieldingly held in meshing engagement with the teeth 28. In this engaged position of pawl 32, the pawl 31 is maintained out of engagement with teeth 28 by the link 42. Operation of the tool is otherwise the same as before except that the pawl 32 drives the shank 18 in counter-clockwise direction.

It will be seen particularly from Figure 6 that the improved wrench includes relatively few parts, which for the most part may be economically produced by use of automatic machinery. The wrench, moreover, may be quickly assembled or taken apart for production, repair, or other purposes. The accurate link 42 among other things makes possible provision of a compact tool which is relatively powerful as compared with similar tools of the same weight and size.

Modifications of the invention may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. A reversible ratchet device of the character described comprising a head having an opening therein, a member relatively rotatably mounted on said head to be rotatable about an axis and having a part received in said opening, said opening having circumferentially spaced teeth on the inner periphery thereof, separate laterally oppositely disposed paws pivotally mounted on said part for driving engagement with said spaced teeth in opposite directions of relative rotation of the member in said head, a link pivotally connected at opposite ends thereof to the respective said paws to extend unobstructedly between the same and to be freely movable laterally, whereby through said link said paws are swingable in unison in either direction laterally, an element mounted in said member to be rotatable about said axis, and indexing means operating upon relative rotation of the element in either of opposite directions with respect to said rotatable member and including a portion carried by said element engageable with a corresponding said pawl to urge the same outwardly into driving engagement with said teeth while said connecting link correspondingly urges the other pawl inwardly out of driving engagement with the teeth.

2. A reversible ratchet device of the character described comprising a head having an opening therein, a member relatively rotatably mounted on said head to be rotatable about an axis and having a part received in said opening, said opening having circumferentially spaced teeth on the inner periphery thereof separate laterally oppositely disposed paws pivotally mounted on said part for driving engagement with said spaced teeth in opposite directions of relative rotation of the member in said head, a link pivotally connected at opposite ends thereof to the respective said paws to extend unobstructedly between the same and to be freely movable laterally, whereby said paws are swingable in unison in either direction, an element mounted in said member to be rotatable about said axis, and indexing means operating upon relative rotation of the element in either of opposite directions with respect to said rotatable member and including a spring- pressed detent engageable with a corresponding said pawl to urge the same outwardly into driving engagement with said teeth while said connecting link urges the other pawl inwardly out of driving engagement with the teeth, said head having annular seats on opposite sides thereof, said member including separable parts having annular parts relatively rotatably seating in said seats, and means being provided for securing said separable portions together.

3. A reversible ratchet device of the character described comprising a head having an opening therein, and peripheral seat portions at opposite sides of said head, a member including a shank received within said opening and having an annular retaining shoulder rotatably emplaced upon said shank, an element secured to said shank and rotatably engaging said retaining said seat for retaining the member against axial movement on the head, said opening having circumferentially spaced teeth on the periphery thereof, said shank having thereon spaced axially inwardly extending portions defining a central space within said opening and communicating with said toothed periphery at substantially diametrically opposed portions thereof, separate oppositely disposed paws pivotally mounted on said shank to extend within said central space at lateral extensions of the axis of rotation of said member for selective driving engagement with said spaced teeth in opposite directions of rotation of said shank relatively of said head, a link pivotally connected at opposite ends to the respective said paws to extend unobstructedly between the same and to be freely movable laterally, whereby the paws are movable in unison therewith in either direction, a stem rotatably mounted in said member to extend into said central space between said paws, said stem having an outward protrusion thereon manually operable to turn the same with respect to said member, and spring-pressed detent means on said stem engageable with one or other of said paws upon manual rotation of the stem relatively of said member.
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for urging said one pawl outwardly into driving engagement with said teeth while said link urges the other pawl inwardly out of engagement with the teeth.

4. A ratchet device as set forth in claim 3, said element being a plate, means being provided for releasably securing said plate to said inwardly extending shank portions, said plate having a recess through which said stem is received, said recess being at least partially enlarged to define arcuately spaced stop shoulders, said stem having a projection therefrom engageable with said shoulders in stop positions in their respective tooth-engaging positions of said pawls.

5. A ratchet device as set forth in claim 3, said link being of relatively stiff elongated material arched around said stem within said central space in an area thereof between the stem and adjacent said inwardly extending portion.

6. A ratchet device as set forth in claim 3, said element being a plate, means being provided for releasably securing said plate to said inwardly extending shank portions, said plate having a recess through which said stem is received, said recess being at least partially enlarged to define arcuately spaced stop shoulders, said stem having a projection therefrom engageable with one or other of said shoulders in opposite stop positions corresponding to the respective opposite tooth-engaging positions of said pawls, said detent means being a spring-pressed ball projecting from said stem, the pivotal points of said pawls being at opposite sides of said stem, one of said inwardly extending portions of the shank having an arcuate track yieldingly retaining said ball inwardly retracted in said stem in all positions of rotation between said stop opposite positions of said stem.

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