

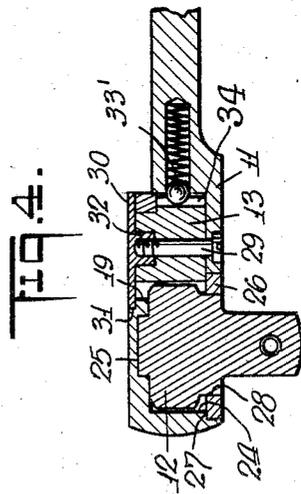
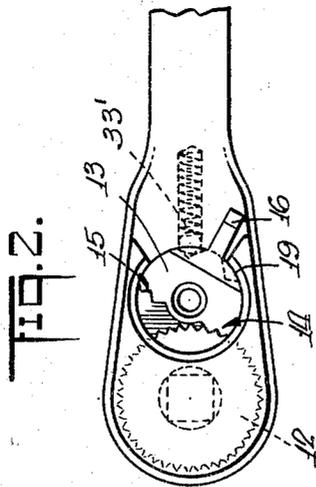
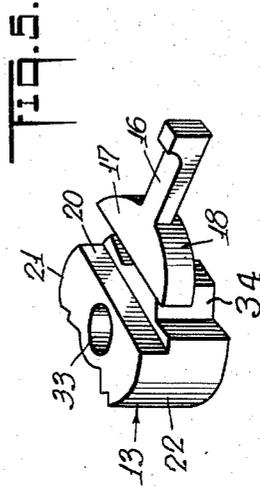
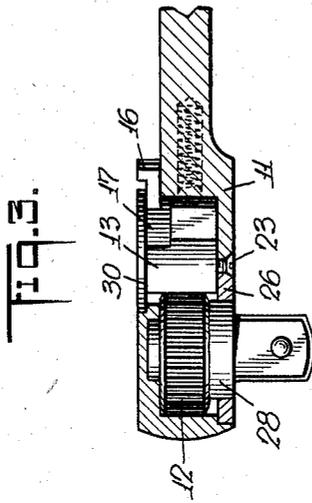
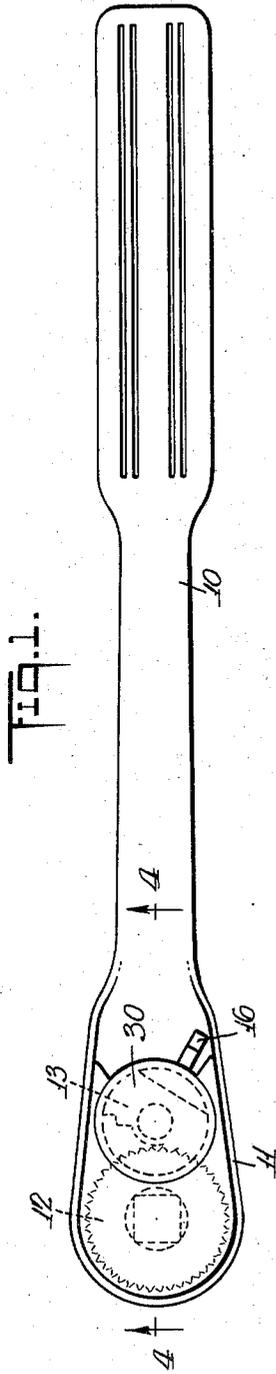
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RATCHET MECHANISM

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RATCHET MECHANISM

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My invention relates to ratcheting devices and in particular to a reversible or two-way-engaging ratchet wrench.

It is an object of my invention to provide an improved ratchet-wrench construction.

It is another object to provide an improved ratchet mechanism the parts of which lend themselves to simple and inexpensive fabrication.

It is a more specific object to provide an improved shift means for a pivot pawl in a ratcheting device of the character indicated.

Other objects and various further features of the invention will be pointed out or will occur to those skilled in the art from a reading of the following specification in conjunction with the accompanying drawings. In said drawings:

Fig. 1 is a plan view of a ratchet wrench incorporating features of the invention;

Fig. 2 is a fragmentary view similar to Fig. 1, but with a covering element removed;

Fig. 3 is a fragmentary elevational view of the head of the ratchet of Fig. 1 with parts of the casing broken away to illustrate the cooperating relationship of parts;

Fig. 4 is a fragmentary vertical sectional view taken substantially in the plane 4-4 of Fig. 1; and

Fig. 5 is an enlarged exploded perspective view illustrating the cooperation between two elements of the ratchet of Fig. 1.

Broadly speaking, an important part of my invention contemplates an improved mechanism for pivotally shifting the pawl in a reversible ratcheting device in which the pawl is supported within a chamber including a surface cylindrical about the pivotal axis of the pawl. The pawl-shifting means includes an arcuate surface slidingly engageable within the cylindrical surface and it also has a part engageable with the pawl. In the specific form to be described, the pawl has a chordlike flat or abutment surface for cooperative engagement with a correspondingly flat and substantially coextensive surface on the shift means.

Referring to the drawings, my invention is shown in application to a reversible ratchet wrench having a shank or handle portion 10 and a head 11. Pivotally supported within the head 11 is a ratchet member 12 and a reversible pawl 13 having duplicate sets of ratchet-engaging teeth 14-15. One of the members 12-13 is a driving member and the other is a driven member, and in the form shown the ratchet wheel 12 is driven by the pawl 13. The direction of drive may be selected by selectably positioning one or the other of sets of teeth 14-15 in engagement

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with the ratchet wheel 12, as by rocking the pawl 13 about its pivotal axis. The parts which have thus far been described are well known and form no part of my invention.

According to the invention, I provide novel means for selectably positioning the pivotal pawl 13 for reversing the direction of the ratcheting operation. This means contemplates an additional member which may include a shift lever 16. Integrally formed with the shift lever 16 is an enlarged or head portion 17, characterized on one side by a generally arcuate surface 18 which may slidingly abut a correspondingly arcuate surface or bore 19. It will be understood that, although this sliding abutment is circumferentially continuous for the full arcuate extent of the head of lever 16, there may be some unsupported upper areas of the arcuate surface 18 immediately adjacent the juncture of lever 16 with head 17; however, the unsupported areas may not impair the effectiveness of full arcuate support of the lever head 17, as will be clear. The other side of the shift head 17 is formed for engagement with a portion of the shiftable pawl 13. In the form shown, this cooperative engagement between the pawl 13 and the shift mechanism comprises a generally chordwise extending surface 20 on the pawl 13 and a substantially coextensive similar surface on the shift head 17. It will be clear that, when the pawl 13 is pivotally held within the head 11 and when the shift head 17 is inserted between the flat 20 and the cylindrical bore 19, there is formed a sufficiently positive engagement between the shift lever 16 and the pawl 13, so that a rotary displacement of the shift lever 16 will result in a rocking of both the pawl 13 and the lever 16 about the pivotal axis of the pawl 13, whereby ratcheting action may be reversed as desired.

In accordance with the invention, I provide novel means for readily assembling and holding together the parts which have been described. In the form shown, the pawl 13 is formed with generally opposed arcuate outer surfaces 21-22 which during a reversing shift may slide freely over the cylindrical wall of a bore within the head 11. As shown this bore coincides with the bore 19 which receives a part of the shift head 17. The ratchet wheel 12 is likewise received within counterbore 24 in the head 11, and one end thereof may be journalled as at 25 within a bore in the head 11. The bores 24 and 19 may be said to be intersecting and to enter the head 11 from opposite sides of the head 11. The other end of the ratchet wheel 12 may be freely pivot-

ally supported as by an annular cover plate 26, which may be seated within a further counter-bore 27 in the head 11 and slidably engageable with a shoulder 28 on the ratchet wheel 12. Heads of countersunk screws 23 set in the head 11 may overlap cut-away portions of the cover plate 26 to secure the latter flush with the head, for a clean appearance.

Pivotal support for the pawl 13 may be provided by pin means such as a screw 29, passing through a part of the head 11 through the pawl 13 and threadedly engageable with a pawl cover plate 30, which in turn may be flush-mounted in the head 11 as by seating in a counterbore 31. The cover plate 30 preferably includes a shank portion 32 which may slidably fit within a bore 33 in the pawl 13.

In use, the direction of ratcheting may be maintained as selected, by the action of a spring-detent mechanism 33' upon one side or the other of a radially extending camming projection 34 formed in the pawl 13. During ratcheting, the pawl rocks about its pivot, with the arcuate surfaces 21—22 sliding freely past adjacent areas of the bore 19. However, under load there is a direct transmission of thrust from the ratchet-engaging teeth, across the pawl, and to the head 11 by a firm abutment of say the arcuate surface 21 with the adjacent area of the bore 19, as will be clear.

It will be appreciated that I have described an improved ratchet-wrench construction in which the cooperating parts lend themselves to simple and inexpensive fabrication. In particular, the means for shifting the pivot pawl to reverse or modify the ratcheting function represents a novel improvement over the art.

My improved pawl and shifter construction utilizes parts that are relatively easy to construct, and, while they are so combined into the wrench or handle head 11 as to present a completely flush surface with no snagging projections, these parts may be readily disassembled, as for cleaning. It will be understood that machining of the pawl member 13 may be of the simplest, said member 13 being formed from bar stock with a minimum of waste, with the various teeth 14—15 and shoulders and other recesses being milled; the shift-lever unit 17 may be a simple die casting. Not even the upturned end of the shift-lever handle 16 need project above the flush top of the wrench head, and a mere loosening of the simple bolt 29 will suffice for disassembly of the pawl and pawl-shift mechanism, as for cleaning. It will be noted that the novel pawl construction, whereby pawl journals or bearings are completely closed to the outside, may materially improve the resistance of the mechanism to grit and grime, thus reducing the need for frequent cleaning.

While I have described the invention for the preferred form shown, it will be understood that modifications may be made within the scope of the invention as defined in the claims which follow.

I claim:

1. In a ratchet device of the character indicated, a head, a pawl member pivotally supported in a cylindrical bore in said head, a ratchet member pivotally supported in said head, said pawl member being variously engageable with said ratchet member for various angular positions of said pawl member with respect to said ratchet member, shifting means engageable with said pawl for shifting the same from a first to a

second of said angular positions, said shifting means including a shift member having an arcuate surface to fit said bore and a portion axially slidably engageable with a part of said pawl off the pivotal axis of said pawl, and removable cover means supporting one end of said pawl member and serving to retain said pawl member and said shift member in non-sliding engagement with each other.

2. In a ratcheting device of the character indicated, a head, a pawl member pivotally supported within a cylindrical bore in said head and having substantially diametrically opposite shoulder portions in adjacency to said bore, and a shift member having a generally arcuate surface slidably to fit said bore and including chordwise projecting portions engageable with said opposed shoulder portions of said pawl member.

3. In a ratcheting device of the character indicated, a head, a pawl member pivotally supported in a cylindrical bore in said head, a ratchet member pivotally supported in said head and engageable with said pawl member, one of said members being a driving element and the other of said members being a driven element, said pawl member including generally arcuate surfaces in adjacency to substantially diametrically opposed portions of said bore, a substantially chordwise extending shoulder on said pawl member between said arcuate surfaces, and a shift member having an arcuate surface slidably to fit said bore and including a projecting portion engageable with said shoulder, said head including a cover portion over a part of said shift member for retaining said shift member in engagement with said pawl member.

4. In a ratcheting device of the character indicated, a head, a pawl member pivotally supported in a cylindrical bore in said head, said pawl member including duplicate ratchet-engaging means symmetrically disposed about a plane of symmetry passing through the pivotal axis of said pawl member, a generally chordwise extending shoulder symmetrically cut with respect to said plane of symmetry, and a shift member including means engaging said shoulder and slidably fitting said bore, said head including cover means covering both ends of said pawl member and a part of said shift member, with a part of said shift member projecting out from under said cover means for finger engagement.

5. In a ratcheting device of the character indicated, a head, a pawl member pivotally supported in a cylindrical bore in said head, said pawl member including duplicate ratchet engaging means oppositely disposed about a plane of symmetry including the pivotal axis of said pawl member, a substantially flat abutment surface on said pawl member, said flat surface describing a chord with respect to said pivotal axis, and a shift lever including an arcuate surface slidably engageable with said bore and a flat surface substantially coextensive with said chord, said head including cover means flush therewith and extending over said pawl member and over a part of said shift member, with another part of said shift member projecting out from under said cover means for finger engagement.

6. In a ratcheting device of the character indicated, a head, a pawl member pivotally supported in a cylindrical bore in said head, said pawl member having duplicate sets of ratchet-engaging means for selectable use in a two-way engaging device, spring-detent means cooper-

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ating between said pawl and said head for retaining said pawl member in a selected position for one of said two-way engagements, a chord-like abutment surface on said pawl member, and a shift lever including an arcuate surface slidably engageable with said bore and a flat surface engageable with said abutment surface, said head including cover means flush with said head and extending over said pawl member and over a part of said shift member.

7. In a ratchet wrench, a head, a cylindrical ratchet bore extending into said head from one side, a cylindrical pawl bore extending into said head from the opposite side, said two bores intersecting each other, a ratchet member in said ratchet bore and having a wrench-attaching part extending to the outside of said head, a retaining washer extending over said wrench-engaging portion and secured to said head for holding said ratchet member in place, a pawl in said pawl bore, a disc for closing the outer end of said pawl bore, means extending into said head and disc and passing through said pawl for holding said disc in place and confining said pawl in its bore, and shift means for said pawl engageable at the outside of said head, said shift means projecting out from under said disc, where- by the finger-engageable part of said shift means

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may not project above the otherwise smooth and flush surface of said head.

8. In a ratcheting device of the character indicated, a ratchet head having a bore, a shift-
5 able pawl with an arcuate surface to fit said bore, covering means carried by said head for covering both ends of said pawl and for providing central bearing support therefor, the cover means on one end of said pawl being removable for
10 axially sliding removal of said pawl, said head at one side thereof having an arcuate open portion between the main body of said head and said cover means, and shift means engaged with said pawl and projecting out from under said
15 cover means through said opening.

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