Dec. 6, 1955 A. P. STONE 2,725,772

SINGLE PIVOTED PAWL REVERSIBLE RATCHET WRENCH

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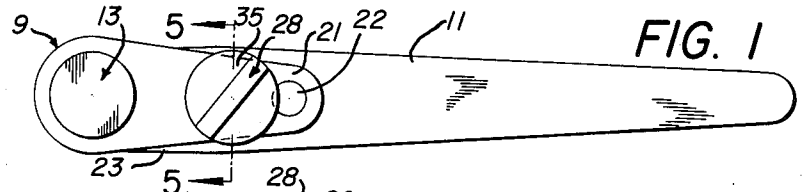


FIG. 1

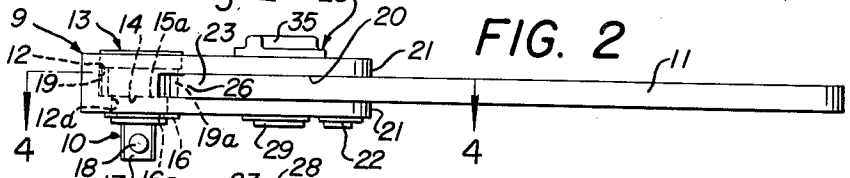


FIG. 2

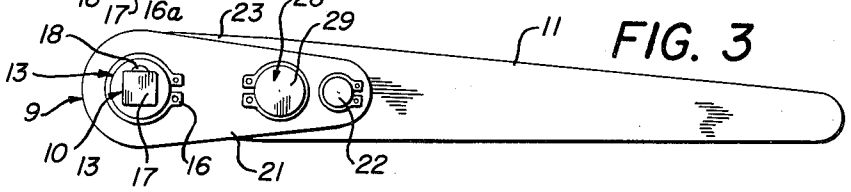


FIG. 3

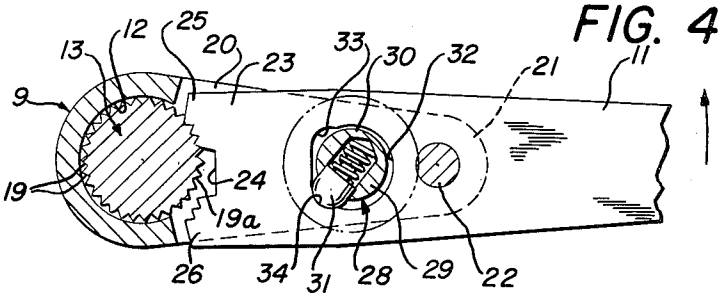


FIG. 4

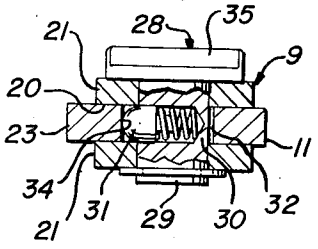


FIG. 5

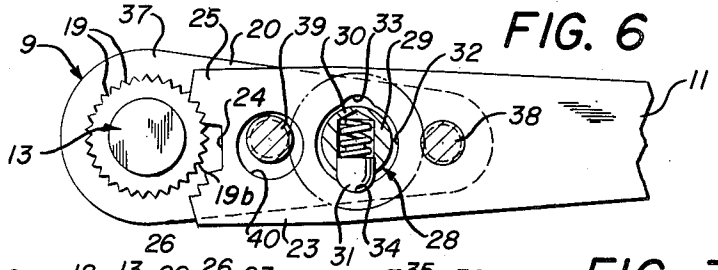


FIG. 6

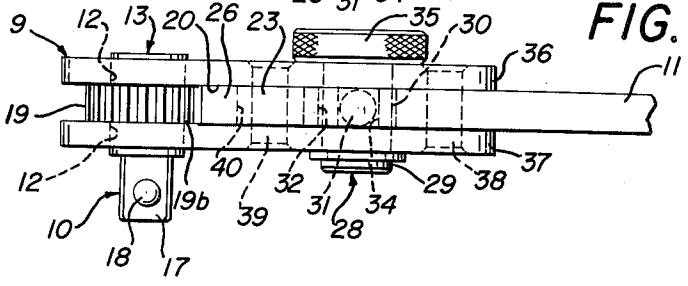


FIG. 7

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SINGLE PIVOTED PAWL REVERSIBLE RATCHET WRENCH

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5 Claims. (Cl. 81—63)

This invention relates to a reversible ratchet wrench.

One object of the invention is to provide a simple reversible ratchet wrench, having a minimum of parts, and yet which is relatively strong and durable.

Another object of the invention is to provide a ratchet wrench wherein the ratchet mechanism is positive in action, that is, having no friction rollers to slip or cause accidental reversing, and in which there are no delicate pawls or similar small parts likely to break or get out of order.

Another object of the invention is to provide a ratchet wrench wherein only a very slight relative movement of interengageable tooth parts is required to engage or disengage the same for changing the direction of operation of the wrench.

Still another object of the invention is to provide a ratchet wrench of the character described wherein the parts mainly may be made by means of automatic machining methods, no drop forgings or cold drawn sections being necessary.

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 side or edge view of the wrench shown in Figure 1.

Figure 3 is a bottom view of the same.

Figure 4 is an enlarged longitudinal cross-section of the wrench, partly broken away, and taken substantially on the line 4—4 of Figure 2.

Figure 5 is an enlarged transverse cross-section, taken substantially on the line 5—5 of Figure 1.

Figure 6 is a view similar to Figure 4, illustrating a modified form of ratchet wrench.

Figure 7 is a front edge view, partly broken away, of the wrench shown in Figure 6.

Referring particularly to Figures 1 to 5 of the drawings, there is illustrated a reversing type ratchet wrench embodying the features of the invention, including a head **9** having means **10** incorporated therein for turning a wrench socket or other work-turning tool (not shown), and an elongated handle **11** pivoted to said head.

As best shown in Figures 4 and 5, the head **9** has a cylindrical bore **12** extending to substantial depth from a flat top side thereof, said bore having an axis normal to a general horizontal plane of the head. A shank **13** is rotatably received in the bore **12** and has an inwardly presented shoulder **14** in seating relation against a seat **15***a* defined by a reduced opening **12***a* in the head, through which the shank is extended. The shank is retained in said seating relation by a wire spring retaining ring **16** yieldingly clamped in a groove **16***a* in the shank at the underside of the head **9**. For turning a wrench socket of known type, a squared extension **17** of the shank, at the underside of the wrench, is provided with a spring-pressed ball detent **18**.

A length **19** of the shank within the bore **12** is cut, knurled or otherwise provided with a plurality of circumferentially spaced V-shaped teeth, a substantial peripheral portion **19***a* of which may be exposed longitudinally inwardly within a space **20** in said general horizontal plane of the head **9**, as defined by spaced flat bifurcations **21**, **21** which are integral with said head. The handle **11** is pivoted on a pin **22** suitably connected between the bifurcations, to have an integral extension **23** of the handle received within the space **20** and extending longitudinally outwardly toward the shank **13**. The outer end of this handle extension is centrally recessed at **24** to define laterally oppositely disposed toothed projections or shoulders **25** and **26** which, by relatively slight pivotal movement of handle **11** on the pin **22**, are selectively complementally engageable with the aforementioned exposed toothed portion **19***a* of the shank, the points of such complemental engagement being at one side or other of the longitudinal centerline of the wrench head and relatively close thereto, as best seen in Figure 4.

For releasably and resiliently holding the handle extension in either of said tooth engaging positions, indexing means **28** may be provided at a point intermediate shank **13** and pivot pin **22**. Said indexing means may comprise a stem **29** suitably rotatably mounted between the bifurcations **21** of the wrench head, the portion **30** of the stem within space **20** having a rounded end of a spring-pressed detent **31** protruding from the same against an inside cam surface **32** defined by an opening in the handle extension through which opening the indexing stem **29** is freely received. The handle extension is held in each tooth-engaging position by yielding engagement of detent **31** in one of two recessed portions **33** and **34** in the cam surface **32**, as shown in Figures 4 and 5, wherein the detent is adapted yieldingly to retain the toothed shoulder **25** in positive multiple toothed engagement with toothed shank portion **19**, for counterclockwise rotation of the shank and work turned thereby, upon corresponding movement of the handle **11** as indicated by an arrow in Figure 4. On the other hand, while the shank is held fixed by the work, the handle **11** and wrench head **9** may be moved in unison in the opposite or forward direction because the yielding detent **31** will allow the toothed shoulder to click over the toothed portion of the shank. A knob **35** on stem **22** is manually engageable to reverse the action of the wrench by rotating stem **29** to position the detent **31** in cam recess **33**, thereby to urge shoulder portion **26** into toothed engagement with the shank **13** at the other side of the wrench centerline.

In operation or use of the wrench shown in Figures 1 to 5, as for loosening a nut on a bolt assembly, a requisite wrench socket (not shown) attached to the squared portion **13***a* of wrench shank **13**, is engaged with the work in known manner, the knob **35** of indexing means **28** being turned yieldingly to engage detent **31** in stop position in cam recess **34** (see Figures 4 and 5). Thus, the spring pressure on detent **31** will pivot the handle **9** and extension **23**, on pin **22** relatively of wrench head **9**, in counterclockwise direction thereby to engage the toothed shoulder **25** of the handle extension with the toothed portion **19***a* of shank **19**. By continued manual movement of handle **9** the work may be turned in counterclockwise direction, in which case it will be noted that said toothed engagement will be positive because the area of complemental engagement of the toothed parts is substantially close to the centerline of the tool, or in other words, a centerline between shank **13** and pivot pin **22**. As previously stated, however, the spring-pressed detent **31** will permit reverse operation of handle **11** and head **9** while the shank is held by the work, by reason of the toothed shoulder portion **25** being free to click past the teeth

on the shank. By alternately operating the handle **11** in opposite directions, therefore, the toothed parts will be alternately engaged and disengaged for the purpose of turning the work in counterclockwise direction only. In a similar manner the wrench may be reversely operated, as for tightening a nut (not shown), upon turning the indexing knob **35** to position detent **31** in cam recess **33**, to engage the toothed shoulder **26** with the toothed portion **19***a* of the shank at the opposite side of the centerline of the tool.

In Figures 6 and 7 there is illustrated a modified form of ratchet wrench which is substantially like the wrench shown in Figures 1 to 5, except that the head **9** and a bifurcated extension thereof are formed of two flat plates **36** and **37** fixed in spaced apart relation by means of longitudinally spaced spacers **38** and **39** on opposite sides of the indexing means **28**, longitudinally of the wrench. Like parts, therefore, are given like numerals unless otherwise noted. Spacer **38** serves as the pivot **22** for handle **11**, and handle extension **23** is provided with an opening **40** therethrough receiving the spacer **39** in a manner which permits requisite free swinging movement of the handle and extension for the purposes previously described. The shank **13** is formed to have toothed portion **19***b* thereof rotatably received between the spaced plates **37**, as best shown in Figure 7.

In both forms of the invention the ratcheting principle is the same. In each instance, for example, the pivotal connection **22** between the handle **11** and the head **9** is a substantial distance away from the axis of rotation of the shank **13**, whereby the opposite or reversed tooth-engaging positions of the handle extension **23** with shank **13** may be accomplished with a minimum of movement of the handle **11**, namely a total of three or four degrees. Also, the indexing mechanism **28** is substantially closer to the pivotal connection **22** than to the shank **13**, so as to gain optimum pressure of the detent **31** yieldingly holding the handle extension **23** in given positive tooth-engaging relation.

The improved ratchet wrench, in either form thereof, is adapted to be economically manufactured in large scale production, and in a very wide range of sizes.

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

What is claimed is:

1. A reversible ratchet wrench, comprising a head, a work-turning shank rotatably mounted in said head and having an outwardly presented work-turning part, said head having an integral bifurcated part, a portion of said shank within the head having peripherally spaced teeth, the bifurcations of said part defining a space therebetween in a plane substantially at right angles to the axis of said shank and open to a substantial area of the toothed portion of said shank, a handle pivotally connected on said bifurcated part and having an inward extension in said space, said extension having spaced toothed portions selectively engageable with the teeth on said shank by pivotal movement of said handle and extension on said bifurcated part, said handle extension having an opening therethrough defining a cam surface having spaced recessed portions, a member rotatably mounted on said bifurcated part and having a portion loosely received in said opening, said member portion having a spring-pressed detent yieldingly engaging in one or other of said cam recessed portions for holding said handle and extension in either of said tooth-engaging positions, and manually operable turning means on said member for operating the same to holding positions thereof.

2. A reversible ratchet wrench, comprising a head, a work-turning shank rotatably mounted in said head and having an outwardly presented work-turning part, said head having an integral bifurcated part, a portion of said shank within the head having peripherally spaced

teeth, the bifurcations of said part defining a space therebetween in a plane substantially at right angles to the axis of said shank and open to a substantial area of the toothed portion of said shank, a handle pivotally connected on said bifurcated part and having an inward extension in said space, said extension having spaced toothed portions selectively engageable with the teeth on said shank by pivotal movement of said handle and extension on said bifurcated part, and releasable holding means for holding said handle and extension in either of said tooth engaging positions, said head and said bifurcations thereof including superposed plates having spaced pins fixedly holding the same in spaced apart relation, one said pin constituting the pivotal connection for said handle on said bifurcated part, said handle extension having an opening therethrough freely receiving the other said pin to permit said pivotal movement of the handle.

3. A reversible ratchet wrench, comprising a head, a work-turning shank rotatably mounted in said head and having an outwardly presented work-turning part, said head having an integral bifurcated part, a portion of said shank within the head having peripherally spaced teeth, the bifurcations of said part defining a space therebetween in a plane substantially at right angles to the axis of said shank and open to a substantial area of the toothed portion of said shank, a handle pivotally connected on said bifurcated part and having an inward extension in said space, said extension having spaced toothed portions selectively engageable with the teeth on said shank by pivotal movement of said handle and extension on said bifurcated part, and releasable holding means for holding said handle and extension in either of said tooth engaging positions, said holding means including a spring-pressed detent allowing only unidirectional rotation of said shank relatively of said head, said member and associated holding parts thereof being located intermediate said shank and the pivotal connection of said handle, said head and said bifurcations thereof including superposed plates having spaced pins fixedly holding the same in spaced apart relation, one said pin constituting the pivotal connection for said handle on said bifurcated part, said handle extension having an opening therethrough freely receiving the other said pin to permit said pivotal movement of the handle.

4. A reversible ratchet wrench, comprising a head, a work-turning shank rotatably mounted in said head and having an outwardly presented work-turning part, said head having an integral bifurcated part, a portion of said shank within the head having peripherally spaced teeth, the bifurcations of said part defining a space therebetween in a plane substantially at right angles to the axis of said shank and open to a substantial area of the toothed portion of said shank, a handle pivotally connected on said bifurcated part and having an integral inward extension in said space, said extension having spaced toothed portions selectively engageable in opposite directions with the teeth on said shank by pivotal movement of said handle and extension on said bifurcated part, and releasable holding means including a member shiftably mounted on said head and yieldingly interengageable portions being provided on the member and the handle extension for selective interengagement in oppositely biased positions of the handle extension, thereby yieldingly to bias said extension with one or other of said spaced toothed portions thereof engaging the teeth of said shank to prevent rotation of said shank in one corresponding direction and yieldingly to permit rotation of the shank in the opposite direction.

5. A reversible ratchet wrench, comprising a head, a work-turning shank rotatably mounted in said head and having an outwardly presented work-turning part, said head having an integral bifurcated part, a portion of said shank within the head having peripherally spaced teeth, the bifurcations of said part defining a space therebe-

tween in a plane substantially at right angles to the axis of said shank and open to a substantial area of the toothed portion of said shank, a handle pivotally connected on said bifurcated part and having an inward extension in said space, said extension having spaced toothed portions selectively engageable with the teeth on said shank by pivotal movement of said handle and extension on said bifurcated part, and releasable holding means including a member pivotally mounted on said head intermediate said pivotal connection of the handle and said shank and yieldingly interengageable portions being provided on the member and the handle extension for selective interengagement in oppositely biased positions of the handle extension, thereby yieldingly to bias said extension with one or other of said spaced toothed portions thereof engaging the teeth of said shank to prevent rotation of

said shank in one corresponding direction and yieldingly to permit rotation of the shank in the opposite direction.

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