May 8, 1956 T. O. RUEB 2,744,432

REVERSIBLE RATCHET WRENCH

Filed July 27, 1954

Fig. 1

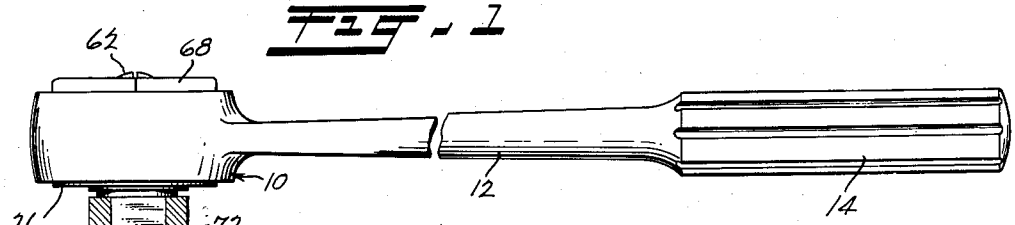


Fig. 2

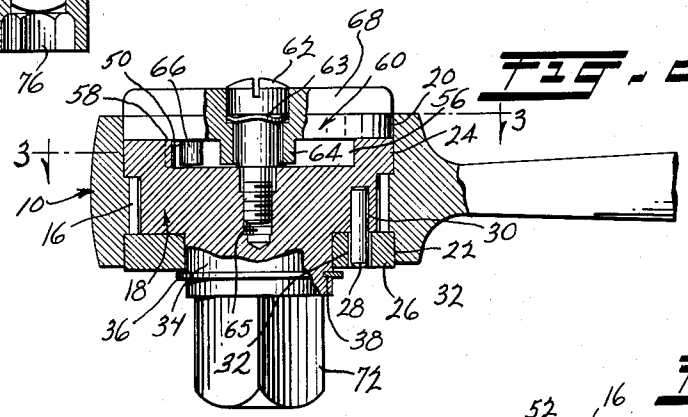


Fig. 3

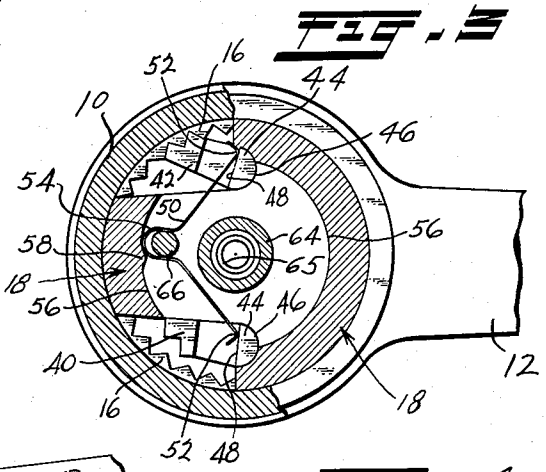


Fig. 5

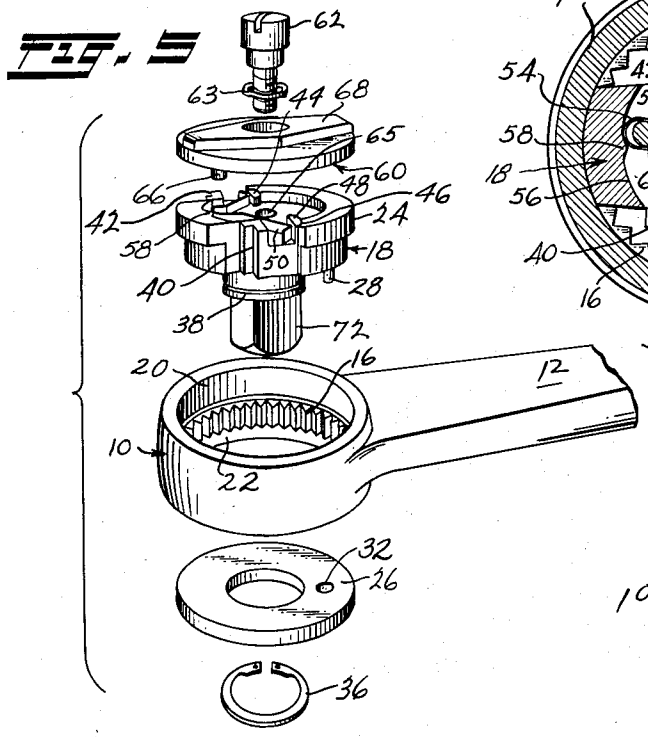
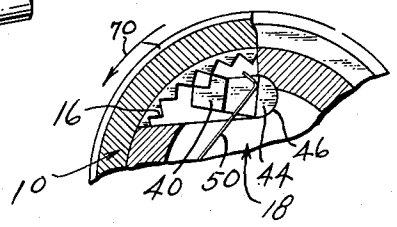


Fig. 4



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REVERSIBLE RATCHET WRENCH

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4 Claims. (Cl. 81—62)

This invention relates to a ratchet wrench or ratcheting device of reversible character having an improved and simplified pawl mechanism therein of sturdy construction, relatively simple shifting means being provided for reversing the pawl action.

One object of the invention is to provide a ratcheting device so constructed that it will stand up under hard usage and may be used for a relatively long period of time without undue wear.

Another object is to provide a ratcheting device including a barrel-like driving member and a head-like driven member therein, with ratcheting mechanism interposed between the two and a simple ratchet shifting means being provided in the form of a leaf spring engageable with opposite pawls. The device is adjustable for rotation in either direction by a selector disk at one end of the barrel, means being provided at the other end of the barrel for engaging the work, such as a wrench socket or the like for nuts and bolt heads, etc.

Still another object is to provide a construction wherein the head is amply supported for rotation in both ends of the barrel by means of a flange on one end of the head, and a bearing washer at the other end thereof which is pinned with respect to the head so as to rotate therewith and thereby provides a bearing surface in the barrel at the periphery of the bearing washer.

A further object is to provide a simple pawl arrangement wherein the pawls are provided with rounded ends forming rocker-type pivots that are received in notches of the head, which notches form rocker seats therefor and thus provide a rugged support for the pawls without the necessity of providing pivot pins and the like as in usual ratchet and pawl constructions.

Still a further object is to provide pawl shifting faces on the pawls with which the ends of a leaf spring may be engaged in such manner that the engagement is outside the pivotal center of one pawl and inside the pivotal center of the other, and may be shifted in the opposite direction to effect reversal of the ratcheting action, a selector disk being provided for this purpose designed to be given partial rotative movement relative to the head and preferably in the direction that it is desired to rotate the work.

An additional object is to provide an over-center snap mechanism for the spring, so that it will be thereby retained in either of its adjusted positions once it is adjusted thereto, accidental change in the adjustment being thereby minimized.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts which constitute my ratchet wrench, whereby the objects above contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in detail on the accompanying drawing, wherein:

Fig. 1 is a side elevation of a ratchet wrench embodying my present invention, a wrench socket being shown in section in association therewith.

Fig. 2 is an enlarged vertical sectional view through the barrel end of the wrench with portions thereof left in side elevation.

Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 2 showing the wrench adjusted for counterclockwise rotation.

Fig. 4 is a fragmentary view of a portion of Fig. 3 showing the upper pawl during the ratcheting operation; and

Fig. 5 is an exploded perspective view of the parts of the wrench to illustrate details and the assembly of the parts.

On the accompanying drawing I have used the reference numeral 10 to indicate a driving member in the form of a barrel or cylinder. A lever arm 12 extends therefrom and terminates in a handle 14 for convenience in manually rotating the driving barrel 10. The barrel 10 is provided with inwardly projecting ratchet teeth 16 centrally located between the upper and lower ends of the barrel.

A driven member in the form of a head 18 is rotatably mounted in the barrel 10 and has a flanged portion 24 rotatably engaged with a counter-bore 20 at the upper end of the teeth 16 (see Fig. 2) which counter bore serves as a journal or bearing therefor. A bearing washer 26 is mounted on a reduced shank 34 of the head 18 and rotates in another counter bore 22 in the lower end of the barrel below the ratchet teeth. To insure rotation of the bearing washer 26 with the head 18 I provide a pin 28 which has a press fit into a socket 30 in the head and a loose fit in a perforation 32 of the washer 26. Thereby the counter bore 22 serves as a second bearing for the head 18, both 20 and 22 being of relatively large diameter to minimize wear in the operation of the tool. The operating life of the tool is thereby considerably extended. To retain the bearing washer 26 in position, I provide a spring retainer or C washer 36 located in a groove 38 in the shank 34.

For operative interposition between the head 18 and the ratchet teeth 16 of the barrel 10 I provide a counter-clockwise pawl 40 and a clockwise pawl 42. The pawls 40 and 42 have rounded ends 44 which serve as rockers or pivots. These rounded ends are seated in rocker or pivot seats 46 which are notches in the head 18 and located at opposite sides thereof (upper and lower sides as shown in Fig. 3).

Each pawl is provided with a spring shoulder or pawl shifting face 48 with which faces the ends of a generally V-shaped leaf spring 50 engage. These ends are hooked as indicated at 52 for smoothness of action and the spring is so diminsioned that when it is shifted clockwise relative to the head 18 as shown in Fig. 3, the upper spring end 52 will engage the pawl shifting face 48 of the pawl 42 outwardly of its pivot center while the lower spring end 52 will engage the pawl shifting face 48 of the pawl 40 inward of its pivot center.

It will be noted that the spring 50 has a central hump 54 which is above a projection 58 that I provide extending from the internal diameter of a counter bore 56 in the flange 24, which counter bore provides a socket for reception of the spring 50. The projection 58 serves to provide over-center snap action so as to retain the spring 50 either in the position shown in Fig. 3 or in an opposite position rotated counter-clockwise relative thereto with the hump 54 on the lower side of the projection 58.

A plate-like reversing member or selector disk 60 is provided for reversing the pawl action. It is retained in position by a shouldered screw 62 and a tension washer 63, the screw having a threaded portion entering a tapped center hole 65 in the head 18. The disk 60 has a hub 64 surrounding the screw 62 and a pin 66 forms a projection which extends from the lower surface of the disk

and terminates within the hump **54** of the spring **50** as shown in Figs. 2 and 3. On its outer surface the disk **60** is provided with an actuating wing or finger piece **63** whereby the disk may give partial rotative movement for selecting the direction of rotation of the head **18** within the barrel **10**.

The head **18** is provided with a wrench socket shank **72** for engagement with work to be turned or with some intermediate element, such as a socket member **74**. Obviously, interchangeable socket members **74** will adapt the one ratcheting device disclosed to a plurality of different sized nuts or bolt heads, etc., the sockets **76** of the various members **74** being of different size.

Practical operation

In the operation of my ratcheting device, assuming the parts to be in the position shown in Fig. 3, the disk **60** has been rotated clockwise for effecting rotation of the head **18** also clockwise (intermittently) as the lever arm **12** is oscillated. It will be noted that the counter-clockwise pawl **40** is held inoperative because the lower hooked end **52** of the spring **50** is inward of the pivotal axis thereof where it engages the pawl shifing face **48**, thereby swinging the pawl **40** clockwise to its limit of motion, whereas the upper hooked end of the spring is outward of the pivot axis of the clockwise pawl **42** to bias it into engagement with the ratchet teeth **16**. Accordingly, as the barrel **10** is rotated counter-clockwise, as indicated by the arrow **70** in Fig. 4, the ratchet teeth **16** will ratchet past the pawl **42**. Upon subsequent clockwise rotation of the barrel the teeth will engage those of the pawl **42** for rotating the head **18** clockwise.

When it is desirable to reverse the ratcheting action it is merely necessary to rotate the selector disk **60** counter-clockwise, whereupon the clockwise pawl **42** will be held inoperative and the counter-clockwise pawl **40** will be held operative. During this selecting action the projection or pin **66** of the selector disk moves the hump **54** of the spring **50** counter-clockwise past the over-center snap projection **58**, whereupon the spring **50** will be held in the counter-clockwise position until the selector disk is again adjusted to the opposite position.

From the foregoing specification it will be obvious that I have provided a ratcheting device wherein there is relatively simple pawl mechanism involving but few parts and eliminating such parts as pivot pins for the pawls. A single spring of special shape coacts with shifting faces of the pawls and is readily operated by an oscillatable selector disk. The parts are all susceptible of ready fabrication on automatic machines, and the pawls themselves may be formed of extruded metal, lengths of which are cut to provide the individual pawls and a notch cut in one end of each pawl to provide the pawl-shifting face **48**.

The various parts can be economically machined and the resultant assembly is very rugged in construction and has long-wearing qualities, both as to the rotation of the head within the barrel and as to the pivoting surfaces of the pawls in relation to the rocker seats of the head, resulting from ample bearing surfaces and other obvious design characteristics as above pointed out. While some changes may be made in the construction and arrangement of the parts of my ratchet wrench without departing from the real spirit and purpose of my invention, it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may reasonably be included within their scope.

I claim as my invention:

1. A ratchet wrench including an annular member having a cylindrical bore provided with ratchet teeth, a turning head rotatably mounted in said bore and having a socket therein, opposite rocker seats adjacent the periphery thereof, pawls for coaction with said teeth and having rounded ends seated in said rocker seats, said pawls being provided with pawl shifting shoulders which extend diametrically across said rounded ends, a leaf spring having its ends resting on said shoulders and its central portion located in said socket, a selector disc covering said socket and designed to be given partial rotative movement relative to said head, said selector disc having a projection engaging said central portion of said spring to shift one of said ends inwardly and the other end thereof outwardly relative to said shoulders for rendering one of said pawls ineffective and the other effective respectively, or vice versa upon opposite partial rotative movement of said selector disc, said socket having a radially inward projection past which a portion of said spring snaps to retain said spring in either of said positions and a shank on said head for rotating a wrench socket or the like.

2. In a wrench, the combination with a handle, of a cylinder provided with an annular series of teeth therein, and spaced from the ends thereof, a head for engagement with wrench sockets or the like and having a flange surrounding the same which is rotatably mounted in said cylinder at one end of said teeth, pawls mounted in said head and having outwardly disposed engaging portions for engagement with said teeth whereby said head may be turned in opposite directions, a spring mounted in said head and cooperable with said pawls to render one operable and the other inoperable, or vice versa, a bearing washer rotatable with said head at the other end of said teeth and closing one end of said cylinder, a selector disk adjacent said flange of said head and closing the other end of said cylinder, a projection from said disk engageable with said spring to shift it in one direction or the other to hold one pawl or the other in ratcheting position and the other inoperable, and means to retain said bearing washer in position on said head with said flange adjacent one end of said teeth and said bearing washer adjacent the other end thereof.

3. In a ratchet device of the character set forth, the combination of a driving member comprising a cylinder having inwardly extending teeth, a driven member comprising a head rotatably mounted in said cylinder, means for holding said head in said cylinder, a pair of pawls carried by said head for coaction with said teeth of said cylinder, said pawls being pivoted in said head and each having a face extending across its pivot axis and having portions thereof located on opposite sides of said pivotal axis, a spring engageable with said faces and adjustable to two different positions, one in which it engages the portion of the face of one pawl inward of its pivotal axis and the other outwardly thereof, and vice versa, a disk designed to be given partial rotative movement relative to and mounted in said cylinder adjacent said pawls and having an off-center projection engageable with said spring to shift the same when the disk is partially rotated in one direction or the other relative to said head, means for holding said disk in engagement with said head, a wing on said disk for partially rotating the same and thereby selecting the direction of rotation of the work rotated by said ratchet device, and over-center means to retain said spring in its respective operating positions of adjustment.

4. In a manually operable ratchet tool, the combination of a barrel having interior ratchet teeth centrally located to provide cylindrical portions on opposite sides of the teeth for bearing surfaces, a driven head member rotatably mounted in said barrel with a portion thereof journalled in one of said cylindrical portions and having work engaging means, said head member having oppositely arranged rocker notches in its periphery, rockably mounted pawls in said rocker notches and having flat shoulders passing substantially through their rocker axes, a V-shaped spring having its ends engaging said shoulders and being so dimensioned as to engage one of the shoulders inside of the rocker axis of its pawl and the other outside the rocker axis of the other pawl when the spring is in one position or vice versa when in the other position, a selector disk designed for partial rotative movement, mounted in one of said cylindrical portions and

having an off-center projection engageable with the apex of said spring for shifting it from one position to the other, and a bearing washer in the other of said cylindrical portions having said head member bearing therein and its periphery bearing in the other of said cylindrical portions.

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