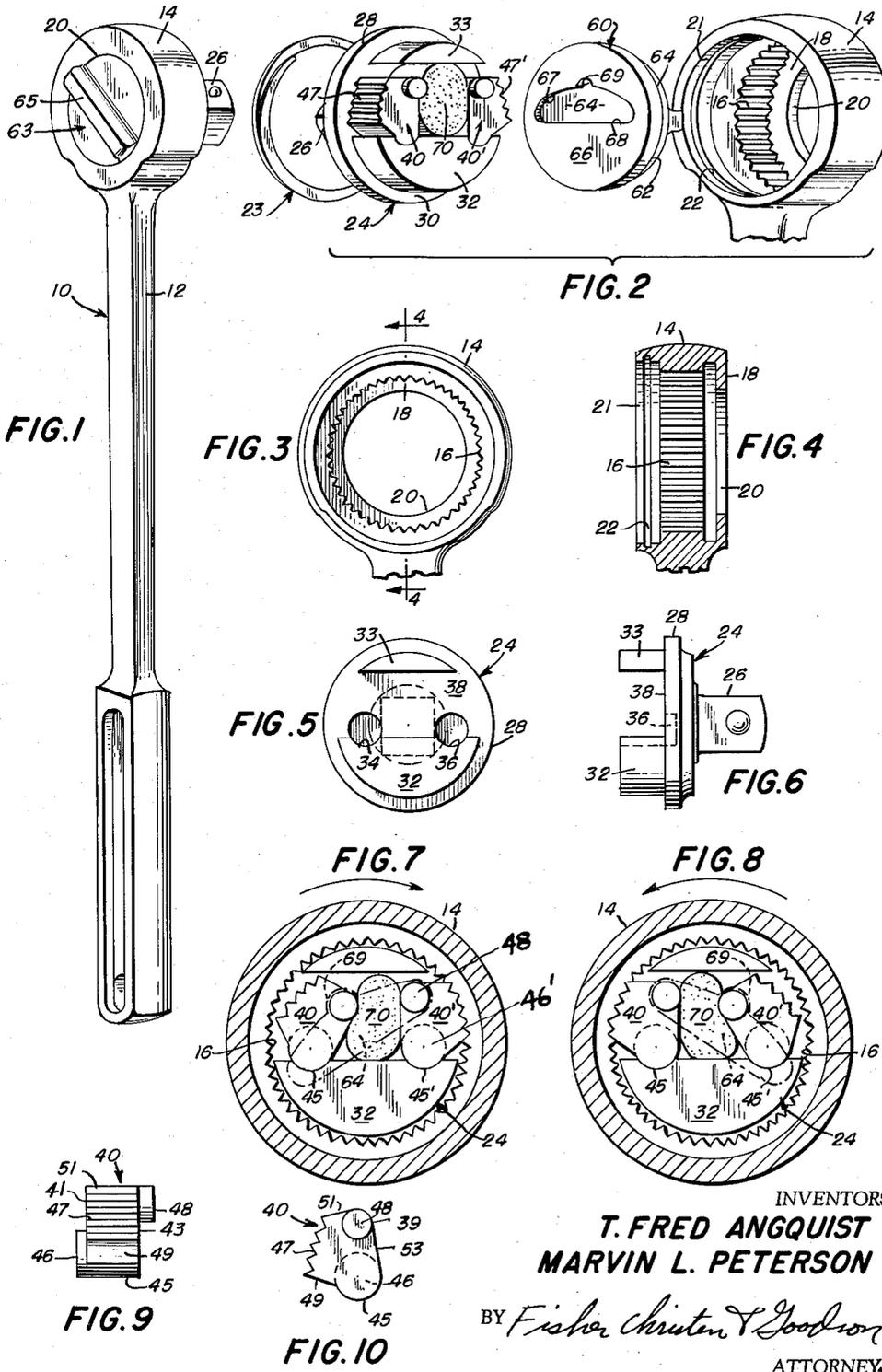


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RATCHET WRENCH

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## RATCHET WRENCH

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This invention relates to ratchet wrenches, and particularly to round-headed ratchet wrenches having a minimum number of moving parts, with a maximum in strength and ease of operation.

One objective of this invention is in the provision of pawls which have a plurality of teeth mating with the teeth of the ratchet ring. This objective is accomplished while maintaining a simple and sturdy construction for engaging and disengaging the mating teeth from each other.

One other objective of this invention is in the provision of a ratchet wrench which will not become accidentally reversed in use because the greater the load on the handle, the more firmly the mating members will engage.

In many prior art devices, when the control disc is rotated clockwise, the wrench is capable of turning a work-piece in the clockwise direction. The wrench of this invention reverses this, and provides that when the control disc is rotated clockwise, the wrench will turn the work piece in the counter clockwise direction. This latter arrangement greatly decreases accidental disengagements. This invention provides for this feature without the necessity of intermediate moving members.

A further objective of this invention is in the provision of a ratchet wrench which can have its direction of operation changed without the necessity of holding the work-engaging member.

Another important objective of this invention is in the provision of a ratchet having only five movable members and which can be readily disassembled, repaired, and reassembled.

A still further important objective of this invention is in the provision of a single, small, cylindrical, resilient, plastic member which provides the necessary bias for both pawls as well as retaining the control member in a selected position.

Other objects and advantages will be apparent from the following description, wherein reference is made to the accompanying drawings illustrating a preferred embodiment of our invention.

In the drawings:

Fig. 1 is a perspective view of the wrench of this invention;

Fig. 2 is an exploded perspective view of the principal elements of the wrench;

Fig. 3 is a plan view of the ratchet head;

Fig. 4 is a cross-sectional view along the line 4-4 of Fig. 3;

Fig. 5 is a plan view of the driven work-engaging member;

Fig. 6 is a side view of the member;

Figs. 7 and 8 show the elements in various working positions;

Fig. 9 is a side view of a pawl; and

Fig. 10 is a plan view of said pawl.

Referring now to the drawings, the reference character 10 designates the wrench of this invention. The wrench 10 comprises, generally, the handle 12 and the cylindrical

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head or housing 14. Along the central inner periphery of the head, and integral therewith, are ratchet teeth 16. As best seen in Fig. 4, annular flange 18 defines an opening 20 at what may be termed the top of the housing, and at what may be termed the bottom end of the housing, is the circular opening 21. Annular groove 22 along the interior of the housing and near opening 21, houses a retaining spring ring 23 which retains the other elements of the wrench within the housing.

A driven work-engaging member 24 consists principally of a plate 28 having a diameter slightly less than the diameter of the opening 21 of the housing 14. Extending from one surface of the plate is a conventional work-engaging end 26, and formed on the other surface 30 of the plate, opposite the work-engaging end, are the raised chord sections 32 and 33 which refine a flat 38 therebetween. A pair of sockets 34 and 36 are drilled in member 24 so that they will be partly in the raised section 32, but mostly in the flat 38 of the surface 30; this is seen best in Fig. 5.

A block-like pawl 40 is of a substantial thickness and is bounded by the substantially flat and parallel surfaces 41 and 43. These surfaces are bounded by an irregular periphery designated as 39. One end of the edge 39 of the pawl is rounded at 45. The rounded end extends beyond the surface 41 to form a stub shaft 46. The rounded end and shaft together form a bearing adapted to cooperate with socket 34. Another portion of the edge 39 forms a plurality of pawl teeth 47. A flat shoulder portion 49 extends between the teeth and the bearing. The periphery 39 is completed by section 51 and the section 53 which are joined at substantially right angles to each other. Extending from surface 43 of the pawl, where sections 51 and 53 meet, is a control boss 48.

The pawl 40' is the mirror image of the pawl 40 and for that reason its parts are labeled the same as 40 with the addition of primes.

A disc 60 for controlling the position of the pawls has a shoulder 62 along its outer circumference defining a raised circular portion 63 substantially equal in diameter to the inside circumference of opening 20 and is adapted to fit therein. Extending beyond the opening, the control disc has on this circular portion a finger ridge 65 for rotating the disc when desired. On the interior or bottom surface 66, the disc has a recess 64 adapted to receive the bosses 48 and 48' of the pawls.

The recess 64 is arc-shaped in configuration and is defined by curved portion 67 and the substantially flat portion 68. Midway along the curved portion 67 is an indentation stop 69.

Disposed between pawls 40 and 40' is a generally cylindrical member 70. The member 70 is preferably made of foam neoprene or any readily deformable and resilient material.

The wrench is assembled by inserting all of the elements through the bottom opening 21. As seen best in Fig. 2, the control disc 60 is first inserted so that the finger ridge 65 extends through the top of the housing and shoulder 62 is adjacent opening 20. The stub shafts 46 and 46' of pawls 40 and 40' are placed in the sockets 34 and 36 respectively of the driven member 24 and the resilient piece 70 is placed therebetween. By pressing inwardly on the teeth 47 and 47' slightly with the thumb and forefinger, the driven member 24 is inserted so that the bosses 48 and 48' are received by recess 64, and the pawl teeth engaged with ratchet teeth 16. The retaining ring 23 is then inserted into annular groove 22 where it is adapted to hold all the elements in the housing.

The operation of the wrench is seen in Figs. 7 and 8. The movement of the recess 64 (shown in dotted lines) follows the movement of the finger ridge 65. When the

recess is turned approximately a quarter-turn to the left the boss 48 moves along arcuate cam surface 67 to the indentation stop 69, and as a consequence causes the rear edge 53 of the pawl 40 to exert a force on pawl 40' through the resilient member 70. This force causes the pawl teeth 47' to pivot in engagement with the ratchet teeth 16. With the recess in this position, the handle 12, when rotated in the direction of the arrow in Fig. 7, will cause the work-engaging member to follow. When the control boss 48 reaches, and is engaged by the indentation 69, the control boss 48' prevents further rotation of the control disc 60. When the handle is turned in a direction opposite that of the arrow in Fig. 7, the pawl will easily disengage because only the readily compressible member 70 is then holding it in the engaged position. Pawl 40, of course, will remain cammed out of engagement.

When the recess is turned approximately a quarter-turn to the right as shown in Fig. 8 the exact opposite effect and operation is accomplished.

In point of fact, the pressure exerted through the handle actually keeps the proper pawl in engagement during the operation of the wrench. The resilient member 70 acts primarily as a positioning agent.

The finger ridge 65 may move the recess 64 from the position of Fig. 7 to that of Fig. 8 or vice versa without the necessity of holding the work-engaging member. This can be done because the proper pawl is immediately cammed into position when the recess is rotated. As seen by the arrows in Figs. 7 and 8, when the recess (and ridge) is turned to counter clockwise, the wrench is capable of turning a work-piece in the clockwise direction, and when the recess is turned clockwise, the wrench is capable of turning a work-piece in a counter clockwise direction.

In a general manner, while there has been disclosed in the above description, what is deemed to be the most practical and efficient embodiment of the invention, it should be well understood that the invention is not limited to such embodiment, as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

We claim:

1. A ratchet wrench comprising, in combination, a handle having a cylindrical head at one end thereof, ratchet teeth along the inner surface of said cylindrical head, a work-engaging member adapted to fit within said cylindrical head and having a plurality of sockets therein, a plurality of pawls adapted to pivot in said sockets and having engaging teeth at one end, a recess-engaging boss on each of said pawls, resilient means between said pawls, a disc having a shaped recess therein adapted to receive said recess-engaging bosses, whereby when said disc is rotated in one direction one of said pawls engages said ratchet teeth and the other is held out of engagement.

2. A ratchet wrench comprising, in combination, a handle having a cylindrical head at one end thereof, ratchet teeth along the inner surface of said cylindrical head, a work-engaging member adapted to fit within said cylindrical head and having a plurality of sockets therein, a plurality of pawls adapted to pivot in said sockets and having engaging teeth at one end, a boss on each of said pawls, resilient means between said pawls, means engaging said bosses to pivot one of said pawls into engagement with said teeth while pivoting the other of said teeth out of engagement with said teeth.

3. The ratchet wrench described in claim 2 wherein said last mentioned means is a control disc having a recess therein.

4. A ratchet wrench comprising, in combination, a handle having a cylindrical head at one end thereof, ratchet teeth along the inner surface of said cylindrical

head, a work-engaging member adapted to fit within said cylindrical head and having a plurality of sockets therein, a plurality of pawls adapted to pivot in said sockets and having engaging teeth at one end, a recess-engaging boss on each of said pawls, resilient means between said pawls, a disc having means adapted to receive said recess-engaging bosses, said means causing said pawls to rotate in a first direction when said means are rotated in a second direction opposite to said first direction.

5. In a ratchet device, a cylindrical head, ratchet teeth along the inner periphery of said head, a work-engaging member having two sockets therein, two teeth engaging pawls adapted to pivot in said sockets and a boss extending from each of said pawls, resilient means between said pawls, a control disc having means on one surface to engage said bosses, whereby when said disc is rotated in one direction, one of said pawls is urged into engagement with said teeth and the other of said pawls out of engagement with said teeth, each of said pawls rotating in the same direction.

6. In a ratchet wrench, a cylindrical head having teeth along its inner periphery, a work-engaging member, pawls pivotally mounted on said member, a resilient member mounted between said pawls, means to simultaneously move one of said pawls into engagement with said teeth, and the other of said pawls out of engagement with said teeth and means causing said engaging pawl to remain engaged with said teeth when said cylindrical head is moved in one direction, and said resilient member permitting said engaged pawl to disengage when said cylindrical head is turned in the opposite direction.

7. In a ratchet device, a housing head, ratchet teeth along the inner periphery of said head, a work-engaging member having two sockets therein, two teeth-engaging pawls adapted to pivot in said sockets, control bosses extending from each of said pawls, a control disc having an arcuate recess on one side thereof and adapted to receive said control bosses, indentation means in said control disc, whereby when said control disc is rotated in one direction, one of said pawls is urged into engagement with said teeth, and the other of said pawls out of engagement with said teeth and locked by its boss entering into said indentation means, each of said pawls moving in the same direction.

8. A ratchet wrench comprising in combination, a housing, a handle extending therefrom, said housing having teeth along the inner surface thereof, a work-engaging member having a portion thereof extending within said housing and having two sockets in said portion, a pair of teeth-engaging pawls each comprised of two flat surfaces and an irregular peripheral surface, a stub shaft extending from one of said flat surfaces and received in one of said sockets, and a control boss extending from the other flat surface, and a plurality of teeth extending from said peripheral surface; a control means having a recess to receive said control bosses, whereby when said control means is rotated in one direction, one of said pawls is cammed out of engagement with said teeth and the other of said pawls urged into engagement with said teeth, and each of said pawls moves independently of the other.

9. A ratchet wrench comprising in combination, a housing having a handle extending therefrom, ratchet teeth along the inner periphery of said housing, a work-engaging member adapted to rotate in said housing, a pair of pawls pivotally mounted on said work-engaging member, a cylindrical plastic resilient means mounted between said pawls, a two-position control disc having an arcuate recess for selectively determining which of said pawls will be in engagement with said ratchet teeth, a boss on each of said pawls and extending into said recess, said recess having an indentation midway along its length to receive a pawl boss and lock one pawl out of engagement while permitting the control boss of the other pawl

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to follow the arcuate recess until the teeth of said other  
pawl become engaged with said ratchet teeth.

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