July 26, 1932. N. F. McNAUGHT ET AL 1,868,839

RATCHET LEVER

Filed July 3, 1930

Fig. 1

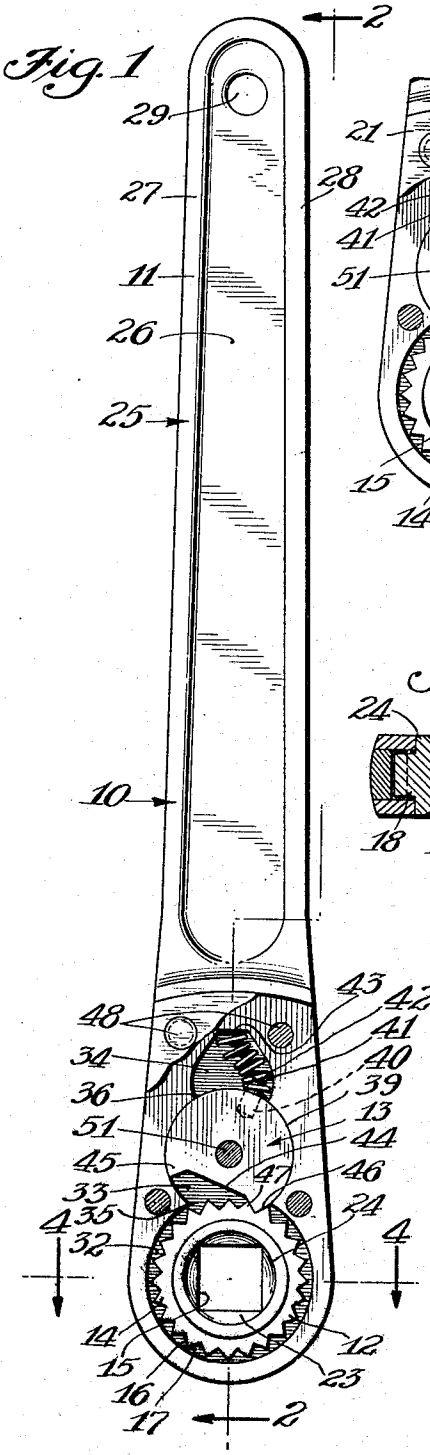


Fig. 3

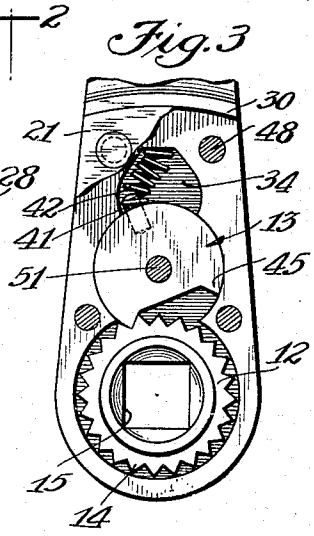


Fig. 2

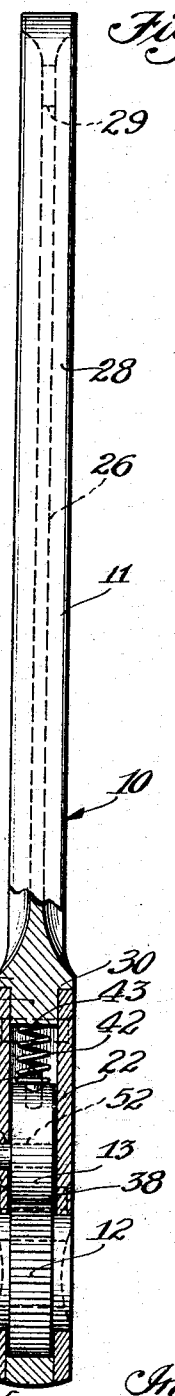
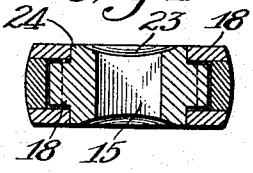


Fig. 4



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UNITED STATES PATENT OFFICE

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RATCHET LEVER

Application filed July 3, 1930. Serial No. 465,634.

The present invention relates to ratchet levers, and is particularly concerned with ratchet levers adapted to be used as wrenches.

One of the objects of the present invention is the provision of an improved ratchet lever of particularly simple and economical construction, which is capable of manufacture in large volume at a low cost.

Another object is the provision of an improved ratchet lever having an improved form of supporting body capable of being constructed of ordinary stock materials with a minimum of machining operations, and having an improved form of pawl which may be constructed of high grade materials, with a minimum expenditure of time and labor.

Another object is the provision of an improved ratchet lever which is sturdy, simple, economical, has a minimum of moving parts, and which is capable of withstanding a greater amount of hard usage and abuse than the devices of the prior art.

Another object of the invention is the provision of an improved ratchet lever, all parts of which may be made of the best materials such as tool steel, with a minimum amount of machine operations, thereby providing a ratchet lever of high quality at a cost which is within the reach of a vast number of purchasers.

Another object is the provision of an improved double acting ratchet lever, that is, a ratchet lever capable of having its mechanism reversed at will by the operator, for right-hand or left-hand rotation without the necessity for removing the wrench from the part to which it is applied.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawing in which similar characters of reference indicate similar parts throughout the several views.

Referring to the single sheet of drawing,

Figure 1 is a plan view of the ratchet lever with one of the cover plates partially broken away to show the internal mechanism in one position;

Figure 2 is a side elevational view in partial section on the plane of the line 2—2 of Figure 1;

Figure 3 is a fragmentary view similar to Figure 1 with the pawl in the other ratchet engaging position; and

Figure 4 is a sectional view through the ratchet member taken on the plane of the line 4—4 of Figure 1.

Referring to Figures 1 and 2, the ratchet lever or wrench, which is indicated in its entirety by the numeral 10, preferably includes a body member or handle 11, a ratchet member 12 and a pawl 13. The rotatable ratchet member 12 may consist of any form of wrench, including members having projecting wrench formations as distinguished from the socket type of wrench formation illustrated, and the present embodiment consists of a round metallic member having a plurality of teeth 14 located on its periphery, and having a non-circular socket 15 axially located in its body. It should be understood that while the socket 15 is shown as a square socket, any form of wrench socket such as hexagonal or other forms may also be employed.

The teeth 14 may take any of a number of different forms, but are preferably provided with side surfaces 16, 17 of substantially the same slope so as to make the same ratchet member adaptable for use in constructing ratchet levers of a number of different types, to adapt the ratchet member for use with a double acting pawl, and to eliminate any necessity for particular attention in assembling the ratchet lever with the pawl to assure the arrangement of the teeth in the proper direction. The present type of ratchet member may be inserted into its socket with either side forming the top, since the teeth are symmetrically shaped.

The ratchet member 12 is preferably formed with relatively flat surfaces 18 at each end, forming thrust bearings for the ratchet member for engaging parts of the body 11, and the ratchet member 12 is also preferably formed with cylindrical parts 19 at each end forming journals or trunnions for rotatably supporting the ratchet member in bearings 20 consisting of apertures in

the cover plates 21, 22. The ratchet member 12 is also preferably provided with a dished outer surface 23 leading from the outer edge 24 of the ratchet member to the socket 15 for more readily guiding a complementary non-circular part into the socket 15.

The body 11 may be formed of a bar of stock material of any shape, but it is preferably provided with a handle or grip 25 formed with a relatively thin web 26 which joins a pair of bordering transverse flanges 27, 28. The web 26 may have an aperture 29 for use in hanging up the ratchet lever, and the formation of the handle 25 with the relatively thin web 26 greatly decreases the weight of the finished wrench, while the transverse flanges 27 and 28 give increased bearing or gripping surface for the hand of the operator.

The handle 25 is preferably provided with a head of greater thickness as at 30 formed with recess 31 for receiving the cover plates 21 and 22 flush with the faces of the head 30. The width of the head 30 is also preferably increased to provide sufficient space for ratchet head 12 without weakening the structure of the head 30, but it should be understood that many of the advantages of the invention may be realized without providing a body of the specific shape illustrated.

The head 30 is preferably formed with a plurality of transverse bores 32, 33, 34 for providing sockets or recesses for receiving the operative mechanism of the ratchet lever. The bores 32, 33, 34 are located sufficiently close to each other so that they communicate with each other through the apertures 35, 36 so that the parts located in one bore may project into another bore and co-operate with the mechanism located therein. Since the recesses or sockets for the mechanism may be made in the shape of ordinary bores, it will be evident that these sockets may be very readily formed and/or finished by ordinary tools.

The bore 32 is of sufficient size to receive the ratchet member 12, the teeth 14 of which project into the bore 33 for engagement with the pawl 13. The pawl 13 preferably consists of a substantially cylindrical metal member having flat end surfaces 37, 38 and a lateral cylindrical surface 39. The cylindrical surface 39 is substantially complementary to the inner cylindrical surface of the bore 33 with sufficient clearance to permit the pawl 13 to be rotatably supported by the walls of bore 33.

Upon its side, opposite to the ratchet member 12, the pawl 13 is preferably provided with means for seating a spring 42, such as, for instance, a pin 41 driven into a socket or bore 40 in the pawl 13. The bore 34 is also preferably slotted at the side opposite pin 41, forming a socket or seat 43 for retaining the other end of the spring 42 in definite position. The spring 42 is thus tensioned between the side of pawl 13 and the seat 43 when the parts are in the positions of Figure 1 or 3, and this tension is maintained by the engagement of the teeth on the pawl 13 with the ratchet member 12.

The pawl 13 has a portion of its side removed at the point 44 to provide sufficient clearance between the side 44 of the pawl and the teeth 14 of the ratchet member to permit the operation of the pawl as described herein. At each end of the side 44 of the pawl, the pawl is provided with a tooth 45 having sloping sides 46, 47 substantially complementary to the sloping sides 15 and 17 of the teeth 14 on the ratchet member 12. The spring 42 in Figure 1 urges the right-hand tooth 45 into engagement with the teeth 14 and in Figure 2 the same spring urges the left-hand tooth 45 into engagement with the teeth 14.

The thickness or axial length of the cylindrical pawl 13 is preferably slightly less than the thickness of the head 31 to provide sufficient clearance between the pawl and cover plates 21 and 22 so that the pawl may move freely without binding, although the cover plates are securely fastened to the head 31. The thickness of the ratchet member 12 between the flat surfaces 18 is also slightly less than the thickness of the head 31 in order to permit free rotation of the ratchet member as well.

The side cover plates 21 and 22 constitute means for rotatably retaining the ratchet member and pawl within the bores 32, 33 and the plates 21, 22 are provided with apertures or bores 20 adapted to register with the ratchet member 12 to permit access to the wrench socket 15, and also to form bearings for the journals 19 of the ratchet member 12. The cover plates 21, 22 may be secured to the body 11 by a plurality of rivets 48 passing through the head 30 and plates 21, 22, provided with a head or riveted over outside of each plate, or any convenient form of device for securing the plates on the body may be employed.

One of the cover plates 21 is preferably provided with an aperture 50 which is axially located with respect to bore 33 and a pin 51 passes through the aperture 50, being secured in a bore 52 in the pawl 13, preferably by a drive fit. The upper end 53 of the pin 51 is laterally bent forming a portion of a crank or an actuating member accessible outside the ratchet lever for actuating the pawl 13 from the position of Figure 1 to the position of Figure 3 or vice versa. The bent end 53 of the pin 51 preferably extends rearwardly toward the grip of ratchet lever 10 in order to prevent interference between this pin and the parts to which the ratchet lever is applied.

It should also be noted that the size of the

bore 34 is determined by the relative movement of the pawl 13 and the bore 34 should be of sufficient size to permit either of the teeth 45 to come into engagement with teeth 14 on the ratchet member 12.

The operation of the present ratchet lever is as follows:

It will be observed that each of the teeth 45 is located at one side of the line of centers connecting the axis of the ratchet member 12 with the axis of the pawl 13, and consequently, when the ratchet member is moved in a clockwise direction in Figure 1 the side 16 of the adjacent tooth 14 cams against the side 46 of tooth 45 and rotates the pawl 13 counter-clockwise until one tooth 14 has passed tooth 45 of the pawl. The pawl 13 being urged in a clockwise direction by the spring 42 at this time, the tooth 45 then snaps into the space between the next two teeth 14 on the ratchet member 12, and it will thus be evident that the pawl 13 permits rotation of the ratchet member in a clockwise direction when the parts are in the position of Figure 1.

Rotation of the ratchet member 12 in a counter-clockwise direction in Figure 1 is resisted by the engagement of the side 46 of tooth 45 with the side 17 of the adjacent tooth 14, because such motion tends to draw the teeth 45 into closer engagement with teeth 14 and consequently the pawl 13 permits only a clockwise rotation of the ratchet member 12 when the parts are in the position of Figure 1.

The amount of movement of the pawl 13 during the normal ratchet operation, or the passage of teeth 14 past a pawl tooth 45, is not sufficient to carry the pawl 13 over dead center but the pin 51 may be utilized for moving the pawl 13 from the position of Figure 1 to that of Figure 3 by moving the pin in a counter-clockwise direction in Figure 1. During this movement the spring 42 is compressed until the pin 41 reaches the line of centers between the seat 43 of the spring 42 and axis of pawl 13, after which spring 42 tends to urge the pawl 13 in a counter-clockwise direction to the position of Figure 3. The operation of the pawl 13 in permitting counter-clockwise movement only of the ratchet member 12 will be evident from the previous description of clockwise operation.

The parts of the present ratchet lever are peculiarly simple, and they are adapted to be manufactured with a minimum amount of machine operations, although all of the parts may be constructed of the best tool steel, thereby constructing a ratchet lever of higher quality and greater durability at a minimum cost.

The provision of the body member with round sockets for receiving the ratchet member, pawl and spring also simplifies the manufacture of the body of the wrench, and the present construction is more durable and less apt to get out of order than the devices of the prior art, on account of the enlarged bearing surfaces which are provided for all of the moving parts.

The present ratchet lever may be utilized for either right-hand or left-hand operation without the necessity for removing the ratchet lever from the part to which it is applied and it is not necessary to give particular attention to the way in which the ratchet lever is applied, since the lever may be readily adjusted for the proper rotation at any time.

While we have illustrated and described a specific embodiment of our invention, many modifications may be made without departing from the spirit of the invention, and we do not wish to be limited to the precise details set forth, but desire to avail ourselves of all changes within the scope of the appended claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. In a ratchet lever the combination of a metal body having a plurality of transverse intercommunicating circular bores extending through said body, with a ratchet member having teeth of symmetrical shape, said ratchet member being located in the first and largest of said bores, a pawl comprising a substantially cylindrical metal member formed with flat ends and adapted to be rotatively received in the second of said bores, said cylindrical member having a portion cut out of one of its sides forming a pair of teeth adapted to fit between the teeth of said ratchet member, said pawl having a bore extending into a side opposite from said teeth and symmetrically located with respect to said teeth, a pin in said bore, a compression coil spring engaging said pawl directly and located about said pin, said spring having a seat formed in the third of said bores, a pair of plates carried by said body for confining said ratchet and pawl in said body and enclosing said spring, the center of said pawl and center of said ratchet member being in substantial alignment with each other, whereby either of said teeth may snap into operative position, said pawl and one of said plates being provided with aligned apertures and an actuating member comprising a pin passing through the aperture in said plate and driven into said pawl and fixedly secured therein, the end of said pin being bent over to form a pawl actuating lever.

2. In a ratchet lever, a body comprising a metal bar having one end formed with flat surfaces on the opposite sides and having the other end formed with a handle, said bar having a pair of transverse bores extending

from one flat surface to the other parallel to each other and overlapping and communicating with each other, a ratchet member having a plurality of teeth of symmetrical shape, said ratchet member being located in the first and largest of said bores and having a pair of axially extending trunnions, a pawl comprising a substantially cylindrical metal member formed with flat ends adapted to be rotatably received in the second of said bores, said cylindrical member having a pair of teeth adapted to fit the teeth of said ratchet member, and a pin carried by said pawl and oppositely located with respect to said teeth, said bar having a tapering opening formed with a seat at one end for a spring, a coil spring having one end engaging said seat and the other seated about said pin, a pair of metal plates carried by said bar engaging said flat surfaces and confining said pawl and ratchet member in said bores, said plates having registering bores for receiving the trunnions of said ratchet member, and one plate having a bore coaxially located with the axis of said pawl, a pin having one end secured in said pawl and having the other end extending through said latter bore, said pin having a laterally bent end extending substantially longitudinally of said bar, said pin being arranged with the latter end symmetrically located with respect to the teeth on said pawl, whereby said pin is adapted to point toward the left or right of the axis of the handle to indicate the engagement of one tooth or the other of said pawl with said ratchet member.

In witness whereof, we hereunto subscribe our names this 29th day of June, 1930.

NORRIS F. McNAUGHT.
EDWARD H. PETERSON.