July 26, 1932. N. F. McNAUGHT ET AL 1,868,840

RATCHET LEVER

Filed July 3, 1930

Fig. 1

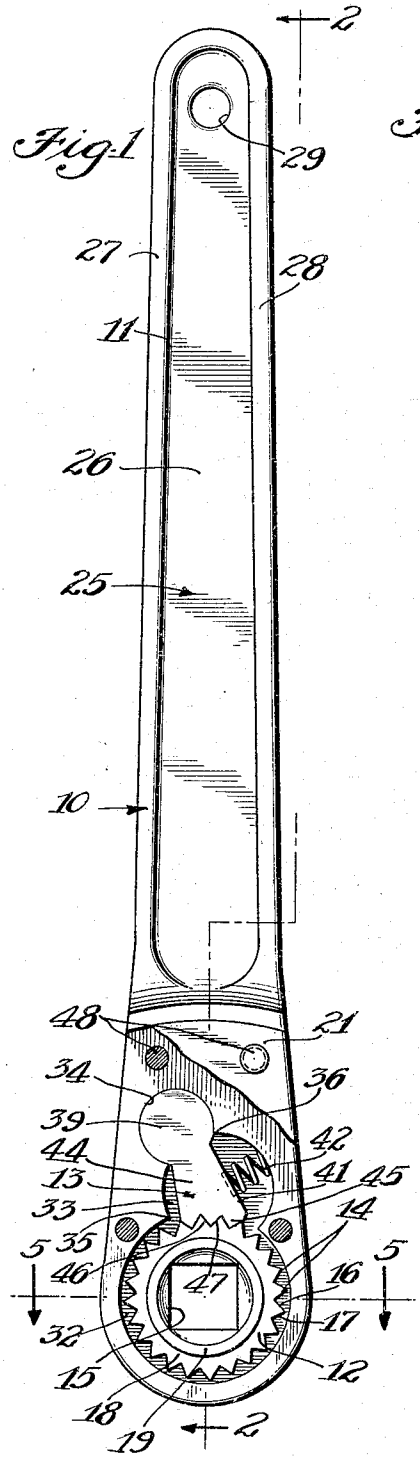


Fig. 2

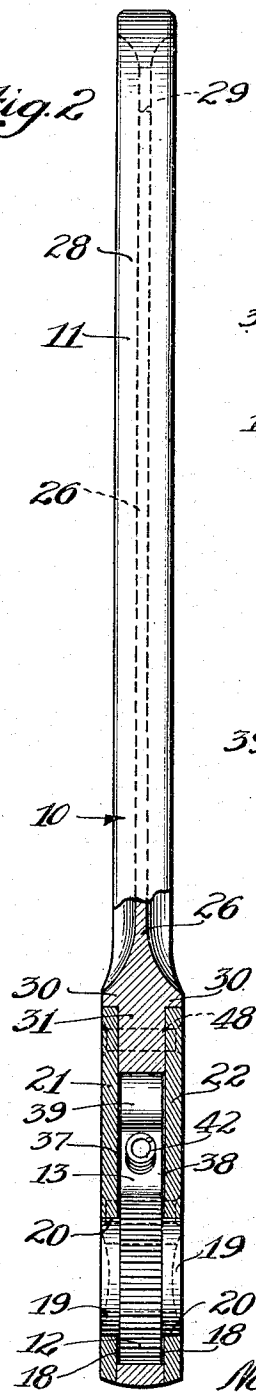


Fig. 4

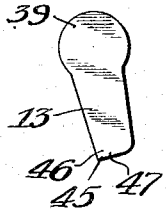


Fig. 3.

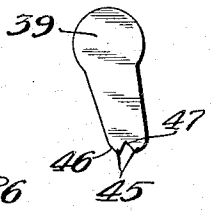
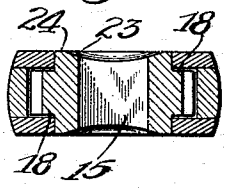


Fig. 5



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UNITED STATES PATENT OFFICE

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RATCHET LEVER

Application filed July 3, 1930. Serial No. 465,635.

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 ratchet lever of greater strength than the devices of the prior art, by virtue of the arrangement and organization of its part and the provision of pawl and ratchet engagement utilizing a greater number of teeth.

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:

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

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

Fig. 3 is a plan view of a modified form of pawl;

Fig. 4 is a plan view of another modified form of pawl;

Fig. 5 is a sectional view through the ratchet member taken on the plane of the line 5—5 of Fig. 1.

Referring to Figs. 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, 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 30 of the head. 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 cooperate 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 first bore 32 is of sufficient size to receive the ratchet member 12, the teeth of which project into the second bore 33 for engagement with the pawl 13. The pawl 13 preferably consists of a solid metal member made of tool steel or other high grade material and provided with a cylindrical formation or surface 39, which is substantially complementary to the inner cylindrical surface of the bore 34.

The pawl 13 of the present embodiment is formed with an outwardly projecting arm 44 extending into bore 33 and through the opening 19 into engagement with the teeth 14 of ratchet member 12. The opening 36 between bores 33 and 34 is of sufficient width relative to the width of the arm 44 at this point so as to permit a limited rotative movement of the pawl 13, sufficient to permit the pawl to engage teeth 14 or to be disengaged therefrom. The pawl 13 is preferably provided with upper and lower flat surfaces 37, 38 adapted to slidably engage the inside surfaces of the cover plates 21 and 22, and a spring 42 is tensioned between the side 41 of pawl 13 and the side wall of the bore 33, urging the pawl 13 into ratchet engaging position.

The present pawl may be provided with a single tooth 45 of a shape complementary to the spaces between the teeth 14 on the ratchet member 12, or the pawl may be provided with two or more teeth 45 as shown in Figs. 1 and 3. The sides 46, 47 of each of the teeth 45 are also preferably of substantially the same slope or angularity, and the teeth are so arranged that when a plurality of teeth 45 are employed as in Fig. 1, all of the teeth 45 engage the complementary teeth 14 on ratchet member 12 simultaneously.

When a single tooth is employed upon the pawl 13, the strength of the ratchet lever is limited to the strength of its weakest part, probably the shearing strength of a single tooth on the ratchet member 12. The strength of a single tooth may be made sufficient for most practical purposes, since the present pawl and ratchet member have teeth of substantial length, almost equal to the distance between the plates 21, 22. The breaking strength of the ratchet lever may, however, be greatly increased by providing a plurality of simultaneously engaging teeth 45, as shown in Fig. 1, thereby bringing more than one tooth of the ratchet member into play and eliminating any possibility of breakage of the ratchet teeth.

The thickness or depth of the pawl 13 is preferably slightly less than the thickness of the head 30 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 head 30. The thickness of the ratchet member 12 between the flat surfaces 18 is also less than the thickness of the head 30 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.

It should be noted that the bore 34 is disposed toward one side out of alignment with the line of centers between the bores 32 and 33 in order that the pawl 13 may be so supported that the pawl 13 will be cammed out of engagement with the teeth 14 by rotative movement of the ratchet 12 in one di-

rection and drawn into engagement with the teeth 14 by rotative movement in the opposite direction.

The operation of the present ratchet lever is as follows:

When the ratchet member 12 is rotated in a clockwise direction in Fig. 1, the side surfaces 16 of the teeth 14 cam against the side surfaces 46 of the teeth 45 on pawl 13, moving the pawl 13 in a counterclockwise direction against the tension of spring 42, and permitting rotation of the ratchet member 12 in this direction.

However, rotation of the ratchet member 12 in the opposite direction tends to draw the teeth 45 into closer engagement with the teeth 14, and the pawl 13 is maintained in ratchet engaging position by the spring 42. The ratchet lever may be utilized for right-hand or left-hand rotation by merely reversing the lever upon the part to which it is applied.

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.

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 is new and desire to secure by Letters Patent of the United States is:

1. In a ratchet lever the combination of a supporting body comprising a metal bar having a plurality of transverse circular bores extending through said body and having a pair of metal plates for enclosing said bores, said plates having apertures forming bearings for a ratchet member, said ratchet member having trunnions in said bearings and located in the first of said bores, said bores communicating with each other, a pawl comprising an elongated member formed with a substantially cylindrical knob, said pawl member having its body located in the second of said bores, and having said knob located in the third of said bores, the third of said bores having its walls extending about said knob over more than half the periphery of said cylindrical knob to retain said pawl member in place, and a compression coil spring located in the second of said bores engaging the wall of said second bores and engaging the body of said pawl member to urge said pawl to resilient engagement with said ratchet member, said ratchet member being provided with a plurality of substantially equally spaced teeth located on a curved outer surface and forming flat shoulders for engagement with said pawl, and said pawl being provided with a serrated surface complementary in form to said ratchet teeth and comprising equally spaced teeth located on a concavely curved surface.

2. In a ratchet lever, a supporting body comprising a metal bar formed with flat surfaces on its opposite sides adjacent one end and having a handle formed at the other end, said bar having a plurality of transverse circular bores extending from one flat surface to the other and said circular bores overlapping each other and communicating with each other, the first and largest of said bores forming a chamber for a ratchet member, a ratchet member having a non-circular aperture extending through the same and having a plurality of teeth about its periphery, axially projecting trunnions on each side of said ratchet member, plates carried by the metal bar engaging said flat surfaces on each side of said bar and means for securing said plates to said bar, said plates having apertures for rotatably receiving the trunnions on said ratchet member, the second of said bores forming a spring and pawl chamber, the third of said bores forming a circular socket for a complementary member formed on a pawl, a pawl having one end rotatably mounted in the said third bore and having a plurality of teeth for simultaneously engaging the teeth on said ratchet member, and a spring compressed between the wall of said second bore and the side of said ratchet urging said pawl into engagement with said ratchet member.

In witness whereof we hereunto subscribe our names this 28th day of June, 1930.

NORRIS F. McNAUGHT.
EDWARD H. PETERSON.