J. B. KITTERMAN.

WRENCH.

APPLICATION FILED FEB. 25, 1921.

1,409,554. **Patented Mar. 14, 1922.**

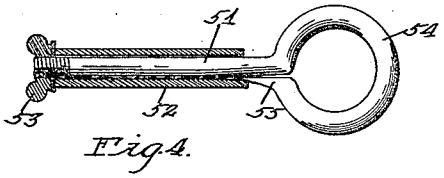

Fig. 4.

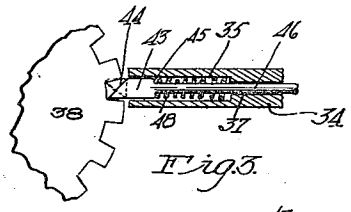

Fig. 3.

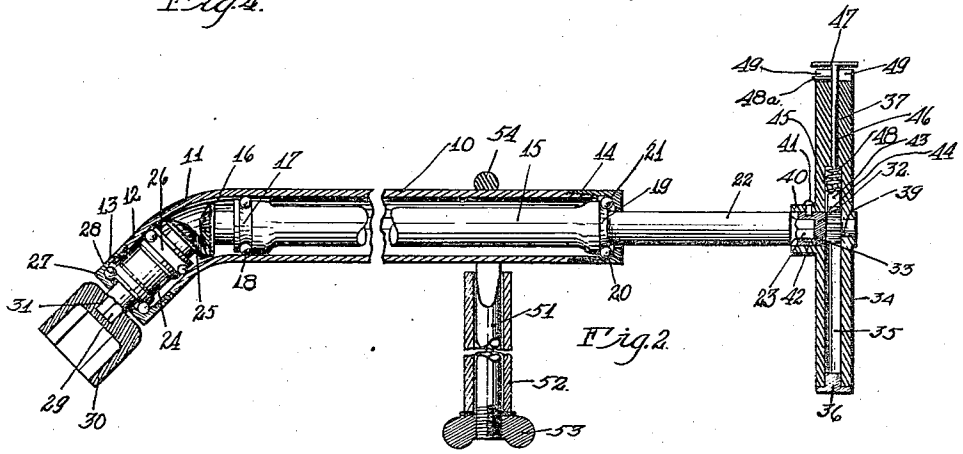

Fig. 2.

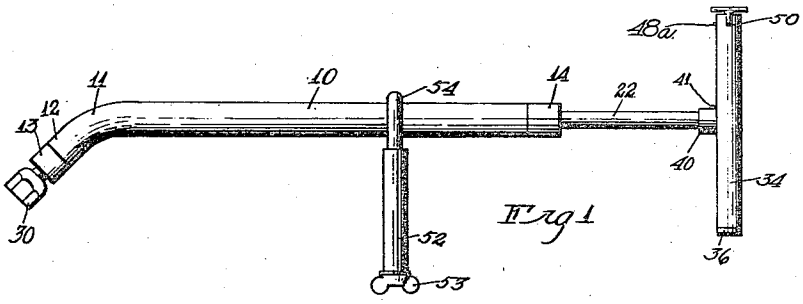

Fig. 1.

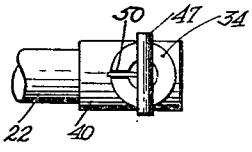

Fig. 5.

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UNITED STATES PATENT OFFICE.

JEROME B. KITTERMAN, OF CHILLICOTHE, IOWA.

WRENCH.

1,409,554. Specification of Letters Patent. Patented Mar. 14, 1922.

Application filed February 25, 1921. Serial No. 447,777.

To all whom it may concern:

Be it known that I, JEROME B. KITTERMAN, a citizen of the United States, and resident of Chillicothe, in the county of Wapello and the State of Iowa, have invented a certain new and useful Wrench, of which the following is a specification.

The object of my invention is to provide a simple, durable and inexpensive wrench of special design which is adapted to loosen or tighten nuts which are in such position that they are hard to reach with the ordinary wrenches.

More specifically it is the object of my invention to provide a wrench with a slender cylindrical body portion, said body portion being provided with one end arranged in angular relation thereto and designed to receive a rotatively mounted member within the body portion having outwardly projecting ends, each of said ends being formed with a shoulder, one of which is designed to receive a socket wrench member, and the other a ratchet handle member so arranged that the handle member of the socket member may be interchanged with each other.

A further object is to provide a socket wrench having a slender body portion bent at one end of a single piece of metal and to carry a rotatively mounted member within the body portion designed to carry a socket member at one end and a handle member at the other end and to provide therein improved means for mounting the rotative member in said body portion.

A further object is to provide in a socket wrench member having a rotatively mounted wrench operating member operated by imparting rotary movement to said wrench member, an improved auxiliary handle member which may be adjustably secured to the body member.

These and other objects will be apparent to those skilled in the art.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of my improved wrench.

Figure 2 is a longitudinal sectional view of the same showing a portion of the body member broken away.

Figure 3 is a detail sectional view showing a section of the ratchet and the manner in which the actuated pawl is operatively connected therewith.

Figure 4 is a detail sectional view of the auxiliary handle member.

Figure 5 is a detail end elevation of one of the handle members.

My improved wrench comprises a body portion 10 which is formed cylindrical and of comparatively small diameter and having one end curved at 11 so that a short member 12 is provided at an angle with the member 10. The end of the portion 12 is screw threaded at 13, while the end of the body portion 10 is screw threaded at 14.

The body portion 10 is designed to receive a shaft 15, the inner end of which is provided with a beveled gear 16 and a ball race 17 which is designed to receive the ball bearings 18, and are so arranged that they will just fit the inner face of the shell 10 and thereby form a bearing for the bevel gear 16.

The beveled gear 16 is designed to rest at the curved portion of 11 as clearly shown in Figure 2. The member 15 is also provided with a ball race 19 which is designed to carry the balls 20, the said balls being mounted in a cone cup 21 which is designed to be screw threaded to the screw threaded portion 14 in such a manner that the said cup forms a bearing to prevent the shaft 15 from moving longitudinally toward the right as shown in Figure 2.

The outside diameter of the member 20 is substantially the same as the diameter of the member 10. The member 15 is provided with an extension 22, the end of which is provided with a squared portion 23. The member 12 is designed to receive a rotatively mounted member 24 having a beveled gear 25 designed to mesh with beveled gear 16, the said member 24 being provided with a ball bearing member 26 similar to the bearing member 17, and also a cone cup 27 similar to the cup 20 and a ball bearing member 28 similar to the ball bearing 19. The outer end of the member 24 is provided with a squared portion 29 of the same size as the squared portion 23. This squared portion 29 is designed to receive a socket 30 which is provided with an opening 31 designed to fit the member 29. This member 30 may be of any desired size and provided with either a hexagonal or square

socket, each of which is provided with openings 31 so that any one of a number of different size sockets may be placed in position.

For rotating the member 22, I have provided a ratchet handle portion provided with a shaft 32, having a socket portion 33 which is of the same size as the opening 31. This member 32 is rotatively mounted in a handle portion 34 having a longitudinal opening 35, one end of which is provided with a plug 36 and the opposite end formed with a smaller opening 37. The member 32 is provided with a ratchet portion 38 and a pin 39 which are rotatively mounted in the handle portion 34, as clearly shown in Figure 2.

The handle portion 34 is provided with a hub 40 having an inwardly projecting pin 41 designed to enter an annular groove 42 in the member 32, to prevent the said member from pulling out of the hub longitudinally. One end of the opening 35 is provided with a pawl 43 having a beveled end 44 and a shoulder 45. A stem 46 is provided and mounted in the small opening 37 and is provided at its outer end with a hand portion 47. A spring 48 is provided for resting against the shoulder 45 and against one end of the opening 35 so that the said pawl may be held in yielding engagement with the ratchets 38.

Thus it will be seen that I have provided a ratchet handle so arranged that as the handle members 34 are rotated about the pivot 39 and the member 32 in a clockwise direction as shown in Figure 3, the ratchet 38 will be carried thereby which will in turn rotate the shaft 40, but after the member 34 is rotated in the opposite direction, the pawl 43 will jump over the ratchet 38 due to the bevel portion 44. If it is desired to rotate the shaft 40 in the opposite direction, the member 47 is grasped and the rod 46 pulled outward until the beveled end of the member 43 is out of engagement with the ratchet 38, after which the member 47 may be rotated through an angle of 180 degrees and permitted to drop in position, as shown in dotted lines in Figure 3.

To hold the member 43 against rotation, I have provided a pin 48^a designed to enter one of the slots 49 in the end of the member 34. There is also a slot 50 arranged midway between said slots 49 so that the member 43 may be rotated through an angle of 90 degrees, and the pin 48^a permitted to enter the slot 50 as shown in Figure 5, so that the parallel faces of the member 43 will rest adjacent to the ratchets 38, and thereby provide means for locking the ratchet member 38 in relation to the handle member 34 so that the said handle member may rotate the shaft 40 in both directions.

Thus it will be seen that I have provided means whereby the socket 30 may be rotated by merely rotating the shaft 40 through the short handled members 34, the said socket member 30 being designed to operate a nut set at an angle with the body portion 10.

By this construction, it is possible to remove a nut from a bolt which may have other mechanism around it in such a manner that it could not be reached with the ordinary wrenches. Sometimes it is desirable to place the socket 30 on the member 23 and the handle 34 on the member 29, which may be easily and quickly accomplished when so desired, thereby getting a different wrench arrangement.

To assist in preventing the body portion 10 from rotating, I have provided an auxiliary handle member 51 which is provided with a sleeve 52 and a wing nut 53 at one end. The opposite end is formed with a loop 54, having a tapered end 55. This loop is designed to surround the body portion 10, while the tapered portion 55 is mounted adjacent to the side of the member 51 in such a manner that the inner end of the sleeve 52 will clamp the end 55 adjacent thereto and cause the loop 54 to tightly engage the body portion 10.

By this arrangement it will be seen that I can easily and quickly adjust the position of the handle portion 51 relative to the body portion 10, or I may remove it entirely if it is desirable to do so.

The cylindrical portion 10 may be packed with hard oil so as to form plenty of lubrication for the ball bearings, the ball bearings 26 and 17 being arranged to take the lateral thrust of the gears 25 and 16. The longitudinal movement of the shafts 24 and 15 are taken care of by the bearings 19 and 28.

Thus it will be seen that I have provided a wrench of simple, durable and inexpensive construction which is especially adapted to operate in narrow places, and having the socket member arranged at an angle relative to the handle member.

The advantage of my improved wrench lies in the fact that the body portions 10 and 11 are formed of a single piece of metal which provides a very strong and rigid construction, and one which may be formed of very small diameter so that the socket members may be placed on nuts mounted in very narrow spaces.

A further advantage of my device lies in the manner in which the beveled gears are mounted within the casing to prevent them from moving either laterally or longitudinally. This is very important in wrenches of this kind where a comparatively small beveled gear has to be used in comparison with the amount of power transmitted, and for that reason it is very essential that the gears be held absolutely in mesh with each other, and it is also essential that they be so mounted that they produce the least amount of friction possible.

It is further to be seen that with my improved device the sockets may be used on either end of the wrench, and that the handle member may be operated as a ratchet handle or as a ratchet in either direction.

I claim as my invention:

1. A slender and cylindrical body portion having arranged at angles to each other, a rotatively mounted member in one end, a rotatively mounted member in the opposite end, beveled gears for operatively connecting the inner ends of said rotatively mounted members, a socket member designed to detachably fit the free end of either of said rotatively mounted members, a ratchet handle designed to be detachably connected with either end of said free ends, and an auxiliary handle member adjustably and detachably connected with said body portion.

2. A hollow cylindrical body portion of uniform diameter having ends arranged at angles to each other, a member rotatively mounted longitudinally in one of said ends having a beveled gear on its inner end and bearing members formed integral, and its outer end provided with means for detachably securing a wrench or handle member thereto, a similar rotative member for the opposite end of said body portion, each of said rotary members being capable of being moved longitudinally into its position within said body portion, with their respective beveled gears in mesh with each other, from its respective end, and adjustable means for securing said rotary members in position within said body portion.

3. A hollow cylindrical body portion of uniform diameter having its ends arranged at angles to each other, a member rotatively mounted longitudinally in each of said ends, a beveled gear for the inner end of each of said members, bearing members for each of said rotatively mounted members designed to engage the inner wall of said body portion, the outer end of each of said members being provided with means for detachably securing a wrench or handle member thereto, each of said rotary members being capable of being moved longitudinally into its position within said body portion, with their respective beveled gears in mesh with each other, from its respective end, and adjustable means for securing said rotary members in position within said body portion.

Des Moines, Iowa, February 16, 1921.

JEROME B. KITTERMAN.