W. F. RADFORD.
REVERSIBLE SOCKET WRENCH
APPLICATION FILED SEPT. 3, 1919.

1,372,453. Patented Mar. 22, 1921.

Fig. 1.

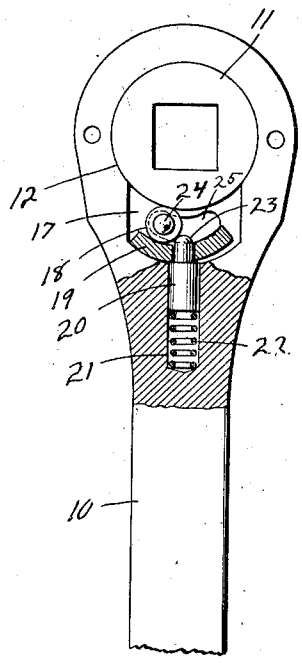

Fig. 2.

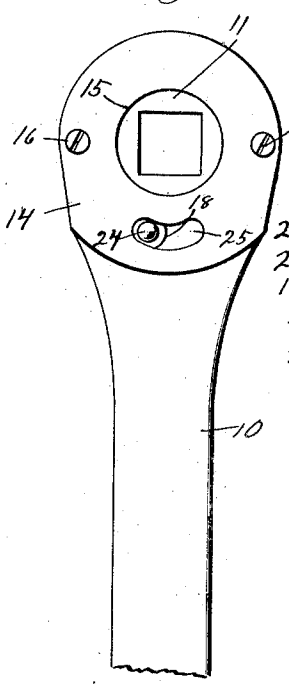

Fig. 3.

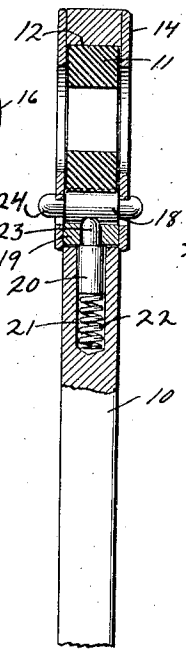

Fig. 7.

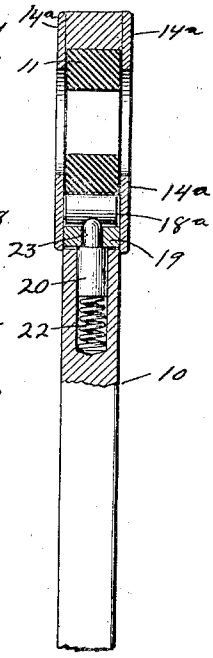

Fig. 4.

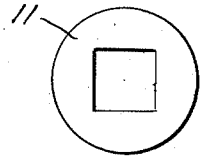

Fig. 6.

Fig. 8.

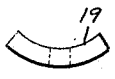

Fig. 5.

Inventor
Wm. F. Radford
By his Attorney
C. W. Fairbank

UNITED STATES PATENT OFFICE.

WILLIAM FRANCIS RADFORD, OF BOSTON, MASSACHUSETTS.

REVERSIBLE SOCKET-WRENCH.

1,372,453. Specification of Letters Patent. Patented Mar. 22, 1921.

Application filed September 3, 1919. Serial No. 321,319.

To all whom it may concern:

Be it known that I, WILLIAM F. RADFORD, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Reversible Socket-Wrenches, of which the following is a specification.

This invention is an improvement in that type of wrenches in which a gripping roller permits the work engaging part and handle member to be rotated relatively to each other in one direction but locks them against reverse movement. The main objects of my invention are to increase the life and efficiency of the wrench without materially increasing the cost of manufacture, and to provide more efficient, harder, and more durable parts with which the roller may engage to lock said parts against relative rotation. A further object is to provide simple and easily removed means for holding the parts in assembled relationship but permitting them to be very quickly taken apart for cleaning, inspection, replacement, or repair. A further object is to provide a simple and easily operated means for reversing the operation of the wrench by reversing the position of the gripping roller. Other objects and advantages are also secured by the preferred forms illustrated in the accompanying drawings.

In these drawings:

Figure 1 is a face view of one form of my improved wrench, one retaining plate being removed, and portions being broken away.

Fig. 2 is a face view of the wrench.

Fig. 3 is a central longitudinal section on a plane at right angles to the plane of Fig. 2.

Fig. 4 is a face view of the socket member or work engaging part.

Fig. 5 is an edge view of the track member.

Fig. 6 is a side elevation of the roller.

Fig. 7 is a view similar to Fig. 3 but showing a somewhat simplified form, and

Fig. 8 is a view of the roller employed in the form shown in Fig. 7.

In my improved construction there are employed two main parts, namely, a handle member 10 and a work engaging part or socket member 11. The handle member may be of any desired form, shape, or character, but is provided with a cylindrical aperture 12 receiving the socket member and within which the latter may rotate. The socket member or work engaging part presents an unbroken cylindrical peripheral surface and opposed end surfaces which may be flat and parallel if desired. It also has means for engaging with the work to prevent its rotation in respect to the work. As shown, the work engaging part has a non-circular socket or aperture adapted to fit the work. If the device is designed for use with the ordinary square nuts or bolt heads, this aperture or socket is made square and of a proper size to receive and fit the nut or bolt heads. The peripheral portion of the socket member is of substantially the same thickness as the adjacent part of the handle member, and is retained in the cylindrical aperture 12 by a pair of removable face or retaining plates 14. These may be made of sheet metal and cut to conform to the adjacent portion of the handle. Each plate has a central aperture 15, smaller than the outside diameter of the socket member 11 but larger than the socket of said member. The plates may be secured in place in any suitable manner, as for instance, by screws 16, which may be readily removed to permit the inspection, cleaning, replacement, or repair of the parts.

To control the relative rotation of the work engaging part and the handle, said handle is provided with a recess 17 at one side of and communicating with the cylindrical recess 12. Within this recess 17 there is provided a roller 18, a track member 19, and a plunger 20. The track member 19 presents a curved surface toward the periphery of the socket member and on such an arc that the end portions of the inner surface of the member 19 converge toward the periphery of the member 11. In other words, the distance between the opposed surfaces is greater at the center point of the member 19 than at the ends. The roller 18 is disposed between the track member 19 and the periphery of the socket member and is of such diameter that it may freely rotate when at or adjacent its middle position, but locks when forced toward the other end of the track member 19.

The track member 19, the socket member 11, and the roller 18, may be made of hardened steel and possess great wear resisting qualities. By means of the track member it is not necessary to harden or temper any portion of the handle member and the socket member may present a smooth uninterrupted cylindrical surface with which the roller may engage. When the head of

the roller or the track member becomes worn, or for any reason, fails to properly operate, it may be readily removed and replaced by a new one, upon the removal of one of the plates 14.

As an important feature of my invention I so mount the track member that it may move and may hold the roller in engagement with the socket member at all times, and irrespective of the direction of relative rotation or attempted rotation. To accomplish this I provide the plunger member 20 which fits in a socket 21 communicating with the central portion of the recess 17, and is pressed toward and into said recess by a coil spring 22. The plunger has a shoulder portion engaging with the rear surface of the track member so as to normally press the track member toward the socket member and the plunger also has a reduced end 23 extending loosely through an aperture in the track member, and to a point slightly beyond the inner surface of the latter. This plunger member serves a plurality of functions. It holds the track in engagement with the roller and the roller in engagement with the socket member at all times; it presents a stop preventing the roller from passing center position and gripping it at the other side when the handle member is oscillated clockwise from the position shown in Fig. 1; it limits or prevents lateral sliding movement of the track member in the recess 17; and it presents a center upon which the track member may tilt in either direction dependent upon the position of the roller. With the parts constructed and assembled as shown in Fig. 1, a movement of the handle member counterclockwise will cause the roller to jam between the periphery of the socket member and the lefthand end portion of the track member and cause the socket member to turn with the handle. During a reverse movement of the handle member, the roller will release and move toward the central position as far as the stop 23 and in that position will permit the free clockwise turning of the handle member.

In order to render the wrench capable of gripping movement in either direction without removal of the wrench, or in those constructions where the handle is so designed that the wrench can not be conveniently operated the other side up, I provide means whereby the roller may be shifted to the opposite side of the stop 23 when desired. This means is illustrated as projecting ends 24 extending through curved slots 25 in the retaining plates 14. These slots may be made of such width and length that the projecting ends are not guided or in any way controlled by the slots, although the slots may serve as guides, if desired. The ends project beyond the outer surface of the retaining plates to a sufficient extent, as for instance, as shown in Fig. 3, so that the workman may apply lateral pressure to these projecting ends to force the roller past the plunger 20 to a position upon the opposite side thereof. During such movement, the plunger will of course be forced endwise to a limited extent against the action of the spring 22. With the roller upon the opposite side of the plunger, it will be apparent that the handle member will grip during a clockwise turning and will release during a counter-clockwise movement.

In the ordinary straight bar handle construction, the wrench may be made symmetrical so that either surface may be applied to the work. With one surface applied the wrench will grip when moved in one direction and with the other surface applied, it will grip when moved in the opposite direction. Thus in such a form it is not essential that means be provided for reversing the position of the roller. In Figs. 7 and 8 I have shown a simplified form in which the roller 18^a does not have any projecting ends and the retaining plates 14^a do not have any slots corresponding to the slots 25 shown in Fig. 2. With this construction, the roller will always operate at the same side of the plunger although in case one end portion of the track member becomes worn, mutilated, or for any reason fails to properly operate, one of the retaining plates may be removed and the roller forced to the other side of the plunger, or removed and inserted at the other side, or the track member may be removed and inserted with the other end opposite to the roller. The wear will then come on the other and previously unused end portion of the track.

In my improved construction, all of the working parts are hardened but the wrench body or handle need not be hardened and therefore can be made of any desired metal. Without my improved track it would be necessary to harden the portion of the wrench body with which the roller engages as the desired durability cannot be secured without such hardening. The socket member presents an unbroken surface for contacting with the roller and this will grip efficiently in any position and as it has an unbroken surface it can be thoroughly hardened without danger of loss by fracture. All of the parts are of comparatively simple form and easy and inexpensive to manufacture. The operating parts are completely housed but access thereto may be easily gained by the removal of a part which normally does not sustain any wear or strain and may be of light inexpensive material. The track member may tilt to accommodate itself to the roller and socket member and the spring and plunger hold the parts in en-

gagement at all times so that there is no lost motion and no possible position from which the roller will not be quickly brought into operative locking engagement upon the slightest relative rotation of the socket member and handle. The track member maintains a constant friction on the roller irrespective of which side of the plunger the roller happens to be.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A wrench having a work engaging part presenting a cylindrical periphery, a handle member having an aperture receiving said part and within which it may rotate and presenting a recess at one side thereof, a track member loosely mounted within said recess, a roller between said track member and said periphery, and means for holding said track member at all times in engagement with said roller.

2. A wrench having a work engaging part presenting a cylindrical periphery, a handle member having an aperture receiving said part and within which it may rotate and presenting a recess at one side thereof, a track member within said recess, a roller between said track member and said periphery, and a spring for pressing said track member toward said periphery.

3. A wrench having a work engaging part presenting a cylindrical periphery, a handle member having an aperture receiving said part and within which it may rotate and presenting a recess at one side thereof, a track member within said recess, a roller between said track member and said periphery, a plunger projecting through the center of said track member and forming a stop to normally hold the roller from passing middle position, and a spring for forcing said plunger and track member toward said periphery.

Signed at Hyde Park, in the county of Suffolk and State of Mass., this 30 day of August, A. D. 1919.

WILLIAM FRANCIS RADFORD.