H. R. PALMER.

SOCKET WRENCH.

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990,382.

Patented Apr. 25, 1911.

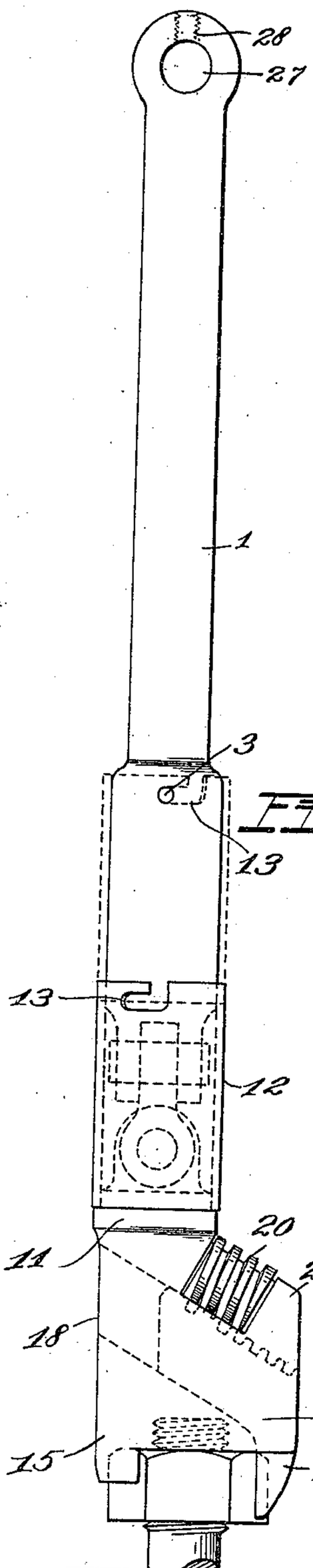

FIG. 1

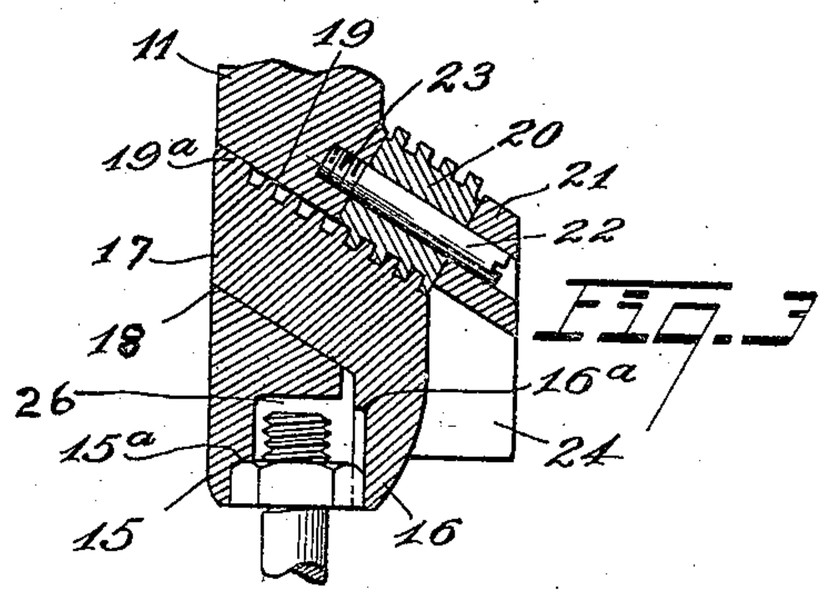

FIG. 3

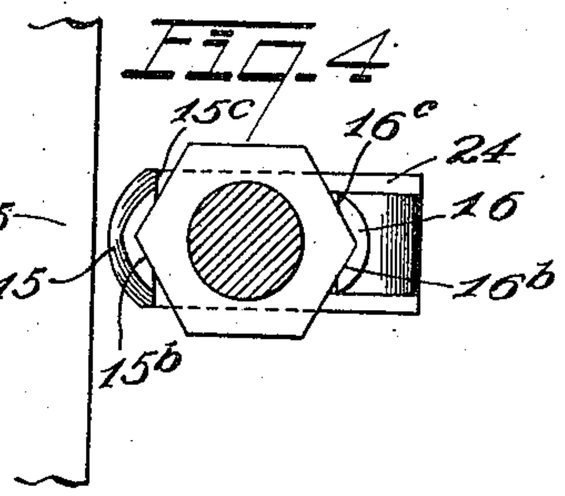

FIG. 4

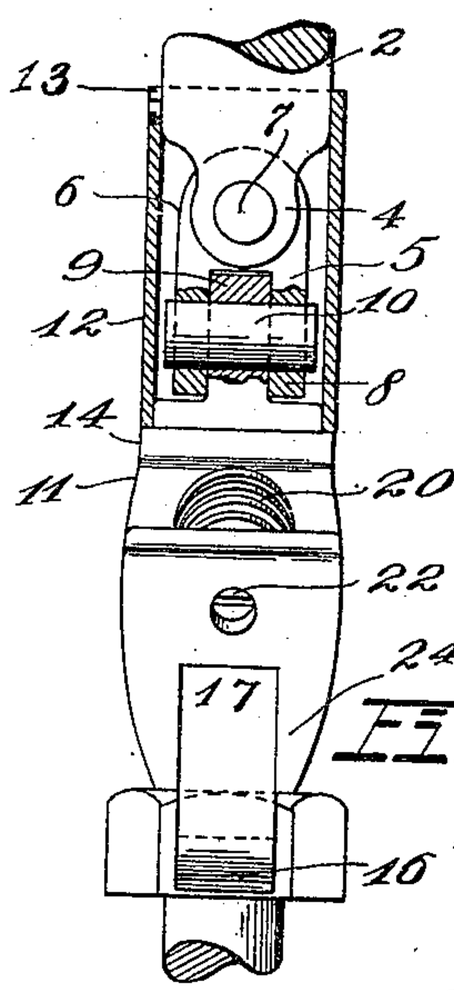

FIG. 2

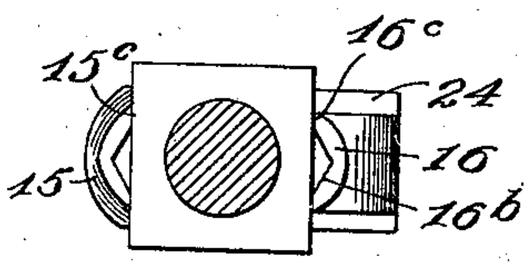

FIG. 5

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UNITED STATES PATENT OFFICE.

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SOCKET-WRENCH.

990,382. Specification of Letters Patent. Patented Apr. 25, 1911.

Application filed June 24, 1909. Serial No. 504,020.

To all whom it may concern:

Be it known that I, HERBERT R. PALMER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Socket-Wrenches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to socket wrenches, and has for one of its objects to provide a wrench of this character which is adjustable to accommodate a variety of sizes of nuts and bolts and which is adapted to operate upon a nut that is in close proximity to an obstruction and permit the operator to obtain a full half revolution of the wrench before it will be necessary for him to remove the same to take a new grip upon the nut. So far as I am aware, all socket wrenches that have been made prior to my invention are of the rigid type and are adapted to operate upon nuts of one size only.

By the invention disclosed herein, I have provided a socket wrench which will not only operate upon nuts of various sizes and under conditions set forth above, but will maintain a firm engagement with such nuts in all of the adjusted positions of the movable jaw.

The invention may be generally and further defined as consisting of the combinations of elements embodied in the claims hereto annexed and illustrated in the drawings forming part hereof, wherein—

Figure 1 represents a side elevation of a wrench constructed in accordance with my invention; Fig. 2 represents a view, partly in section and partly in front elevation, of the lower end of the wrench shown in the preceding figure; Fig. 3 represents a sectional detail of the lower end of said wrench; Fig. 4 represents a bottom plan view of said wrench, illustrating the manner in which it may operate in close proximity to an abutment, and Fig. 5 represents a similar view of the wrench showing the manner in which it operates upon a square nut.

Describing the parts by reference characters, 1 denotes the handle or shank of the wrench. This handle or shank is made of two parts which are pivotally connected together, the second part being in turn pivotally connected to the socket portion of the wrench. The lower end of the shank is enlarged, as shown at 2, and is preferably cylindrical in shape and is provided with a pin 3 at the upper end of such enlargement. The lower end of the enlargement is forked, as shown at 4, and the upper end of the second or intermediate shank member 5 is connected thereto by means of a tenon 6 inserted between the forks and a pin 7 extending through said forks and tenon and pivotally connecting the same. The lower end of member 5 is forked in the same manner as the lower end of 2 and the forks 8 thus formed receive a tenon 9 which is inserted therebetween and which is pivotally secured thereto by means of a pin 10. The forks 8 and tenon 9 are arranged at right angles with respect to the forks 4 and tenon 6, and the construction including the members 4 to 10 inclusive provides a universal joint between the shank or handle and the socket-portion 11 of the wrench.

In order to connect the socket and handle rigidly for ordinary operation of the wrench, I provide a sleeve 12 which is provided at its upper end with a bayonet slot 13 adapted to engage the pin 3 when the sleeve is elevated. When the sleeve is in the lowered position shown in full lines in Fig. 1, wherein it rests upon a ledge 14 projecting from the upper portion of the socket, the wrench is adapted for ordinary conditions of use in which a straight-line connection between the handle and socket is desirable. By lifting the sleeve to the position shown in dotted lines in Fig. 1 and locking the sleeve in such position by the engagement of the slot 13 with the pin 3, the handle may be turned at any desired angle with respect to the socket, for the purpose of working in more or less inaccessible places, the lower end of the sleeve when elevated clearing the universal joint. The lower cylindrical end 2 is of substantially the same diameter as

sleeve 13, whereby the sleeve may be retained in place by merely interlocking the slot 13 with the pin 3 in the manner shown in dotted lines in Fig. 1.

The socket portion of the wrench comprises a fixed jaw 15 and a movable jaw 16, the latter jaw depending from a shank 17. This shank forms an angle of about 120 degrees with the jaw 16 and is movable in an inclined slot 18 provided in the body of the socket member 11. This slot is inclined downwardly at an angle of about 60 degrees with respect to the axis of the socket. The shank 17 is provided in its upper surface with teeth 19 which are adapted to be engaged by a worm 20 mounted in a recess in a forwardly projecting portion 21 of the socket by means of a pin 22 which extends across said recess and is threaded into the socket body, as shown at 23. The outwardly projecting portion 21 is provided with a pair of depending cheeks 24 forming a guide and brace for the movable jaw 16 and shank 17.

The fixed jaw is provided at an end of the socket member which, for convenience of description, will be referred to hereinafter as the "rear" end. This jaw is generally triangular in shape, viewed from the lower end thereof, as will appear more particularly from Fig. 4, and is provided with an abutment 15^a for the reception of the upper corner or crown of the nut to which the wrench may be applied. The lower ends of the cheeks 24 are in substantially the same plane as this abutment and constitute an extension thereof against which the crowns of the nuts may engage as well as against the said abutment. By the construction described, the nut will be firmly engaged by the wrench.

Reference has been made to the inclination of the shank 17 and to slot 18 to the axis of the socket 11. The purpose of this inclination is to enable the wrench to grasp firmly the nuts of different size on which it is intended to operate. Furthermore, it permits the necessary range of movement of the movable jaw in the slot without causing any projection of the shank on the rear side of the wrench. This is important in providing clearance between the wrench and a nut which is close to an abutment or other obstruction. Furthermore, the particular angle specified will allow a wrench to operate upon standard nuts for bolts varying in diameter from one-quarter to one-half inch and will insure a firm grip in all adjusted positions between the movable jaw and the nut. For instance, in Fig. 1 the movable jaw is shown as engaging a nut of the maximum size for which the wrench is designed. With the shank adjusted forwardly and downwardly as shown, the lower end of the movable jaw is of such length as to be substantially flush with the bottom surface of the nut, thus, on the one hand, securing a maximum engagement of the movable jaw with the nut and, on the other hand, preventing the movable jaw from projecting below the nut and thus interfering with the operation of screwing the nut home. As the movable jaw is adjusted inwardly or rearwardly to accommodate smaller nuts, the jaw moves not only rearwardly toward the fixed jaw, but also upwardly along a line forming an angle of about 30 degrees to the horizontal (assuming that the wrench is operating with its axis vertical). This angle of inclination enables the movable jaw, as it moves rearwardly, to engage substantially the full length of any standard nut on which it may operate. In Fig. 3, the wrench is shown in the position which the parts occupy when operating upon the smallest size nut for which it is designed. In this position as well as in the maximum open position, the lower end of the jaw 16 extends substantially to the lower surface of the nut with which it is used, while the fixed jaw is of substantially the full length of the smallest nut with which the wrench is used, whereby the abutment 15^a in said fixed jaw may engage the crowns of all nuts of standard size for which the wrench is adapted.

By reference to Fig. 4, it will be seen that each jaw is provided with an angular notch, as shown at 15^b and 16^b, each notch merging respectively with plane surface 15^c and 16^c on each side thereof. The faces of the notches are shown as forming an angle of 120 degrees with each other, accommodating the wrench for hexagonal nuts. By providing the plane faces 15^c and 16^c on each side of the notches, the wrench is adapted to operate upon an ordinary square nut in the manner shown in Fig. 5, or, if occasion should require, upon opposite faces of a hexagonal or other nut having an even number of faces.

It will be observed that the rear surface of the wrench is free from projections and that the fixed jaw is located as close to the rear side of the wrench as possible while maintaining sufficient strength in said jaw. The purpose of this construction is to enable the wrench to be operated on nuts located close to an abutment or other obstruction indicated at 25 in Fig. 4. By this construction, it is only necessary to have enough clearance between the corner of the nut operated upon and the obstruction to receive the lower end of the jaw 15 therebetween, in order to enable the wrench to be rotated a full half turn before it will be necessary to shift the wrench. The forward projection of the cheeks 24 is such as to engage and firmly retain the shank 17 and the upper portion of jaw 16 when the wrench is in its maximum open condition. Further-

more, the jaw 16 is provided with an abutment 16ª similar to abutment 15ª and adapted to engage the upper surface of the corner of the largest nut for which the wrench is designed, the upper surface of such largest nut being engaged by the abutments 15ª, 16ª and the bottoms of the cheeks 24. To prevent the shank 17 and movable jaw 16 from being withdrawn from the slot, the upper end of the shank is made without teeth, as shown at 19ª.

In working on a nut located close to a corner, my wrench is capable of giving a full quarter turn to such nut, provided only that sufficient clearance exists between the nut and the sides of the corner to receive the fixed jaw therebetween.

Above the abutment 15ª, the body of the socket member 11 is recessed, as shown at 26, in order to accommodate the ends of the bolts where they project above the nuts.

In the specification and some of the claims, the wrench for convenience of description, is considered as having its axis vertical and the end having the fixed jaw is considered as the rear end. By the use of the terms "front," "rear," "top," and "bottom," I do not propose to be limited, however, to operating the wrench only in the position shown in Fig. 1, as it is capable of operation at any angle.

By the construction described, I have produced a socket wrench which possesses the strength, with practically the same capability of adjustment, as the ordinary monkey wrench.

The upper end of the handle 1 is shown as provided with a bore 27 for the reception of a handle (not shown) and a threaded aperture 28 above said bore for the reception of a screw (not shown) by means of which the handle may be secured in place.

Having thus described my invention, what I claim is:

1. In a socket wrench, the combination of a member having a fixed jaw provided with a notch for the corner of a nut and an abutment in said notch for the crown of such nut and having a slot which is inclined with respect to the longitudinal axis of said member, a shank in said slot having a notched jaw provided with an abutment for the crown of a nut, said abutment being located at a distance from the notched end of the movable jaw which is greater than the distance of the first mentioned abutment from the notched end of the former jaw, and means for adjusting said shank in said slot, the first mentioned abutment being arranged to engage the crowns of the nuts with which the wrench coöperates under all adjustments of the wrench.

2. A socket wrench having a fixed jaw provided with a notch and with a fixed abutment in said notch so located as to engage the crowns of all nuts on which the wrench is adapted to operate in all adjustments of the wrench and a complementary jaw slidable obliquely with respect to the fixed jaw and adapted to form the complementary part of the wrench with the fixed jaw and having therein a notch which is elongated with respect to the notch in the fixed jaw and adapted to receive the corners of all nuts in all adjusted positions of the slidable jaw.

3. A socket wrench provided with a fixed jaw having a notch therein and a fixed abutment in said notch adapted to engage the crowns of all nuts on which the wrench is adapted to operate in all adjustments of the wrench, a complementary jaw slidable obliquely with respect to the fixed jaw and having a notch therein and an abutment in said notch located at a greater distance from the notched end of the sliding jaw than the abutment in the first mentioned jaw is distant from the notched end of such jaw, and fixed abutments on opposite sides of said jaws, the abutment in the sliding jaw being so located as to be above the last mentioned abutments in all positions of the sliding jaw except its maximum open position.

4. A socket wrench provided with a fixed jaw having a notch therein and a fixed abutment in said notch adapted to engage the crowns of all nuts on which the wrench is adapted to operate and in all adjustments of said wrench, a complementary jaw sliding obliquely with respect to the fixed jaw and having a notch therein, and fixed abutments on opposite sides of said jaws, the sliding jaw having a fixed abutment in its notch which is located above the side abutments in all positions of the sliding jaw except the maximum open position, the abutment in the fixed jaw being substantially flush with the side abutments.

5. A socket wrench having a fixed jaw provided with a notch and a fixed abutment in said notch adapted to engage the crowns of all nuts on which the wrench is adapted to operate and in all adjustments of said wrench, and a complementary jaw slidable obliquely with respect to the fixed jaw and adapted to form with the fixed jaw the complementary part of the wrench and having a notch which is elongated with respect to the notch in the fixed jaw, said wrench being provided with a recess extending above the fixed jaw and there being one or more abutments additional to the first mentioned abutment for engaging the crowns of the nuts on which the wrench operates.

6. A socket wrench having a fixed jaw provided with a longitudinally extending notch and having a fixed abutment independent of said notch and so located as to engage the crowns of all nuts on which the

wrench is adapted to operate in all adjustments of the wrench and a complementary jaw slidable obliquely with respect to the fixed jaw and adapted to form the complementary part of the wrench with the fixed jaw and having a longitudinally extending notch adapted to receive the corners of all nuts on which the wrench is intended to operate in all adjusted positions of the slidable jaw.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

HERBERT R. PALMER.

Witnesses:
J. B. HULL,
JOHN H. HOGG.