R. H. OWENS.

WRENCH.

APPLICATION FILED NOV. 3, 1919.

1,423,142. Patented July 18. 1922.

Fig. 1.

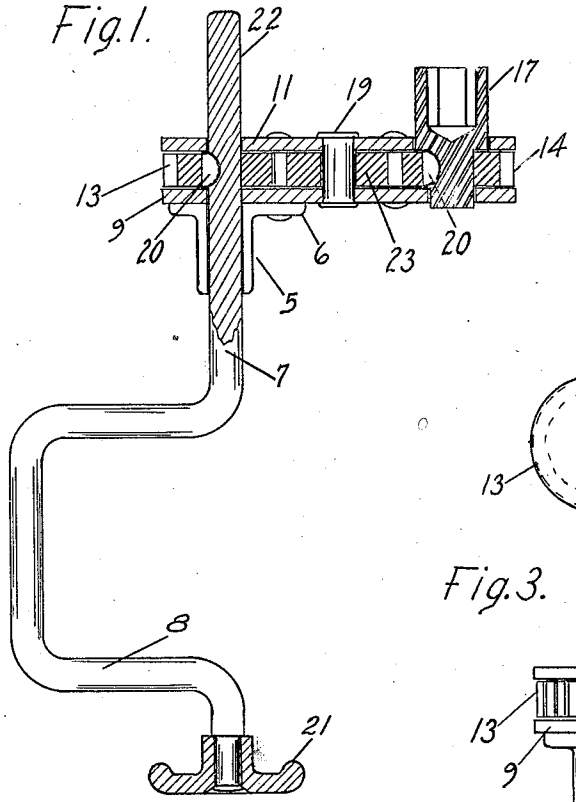


Fig. 2.

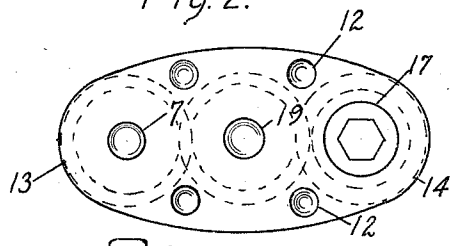


Fig. 3.

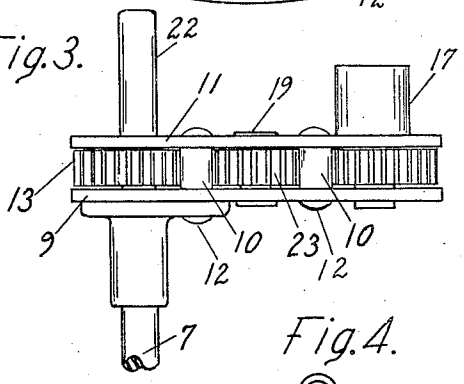
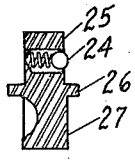


Fig. 6.

Fig. 5.



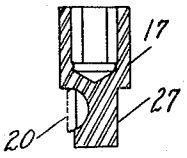


Fig. 4.

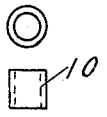
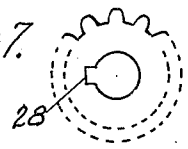


Fig. 7.



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UNITED STATES PATENT OFFICE.

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WRENCH.

1,423,142. Specification of Letters Patent. Patented July 18, 1922.

Application filed November 3, 1919. Serial No. 335,377.

To all whom it may concern:

Be it known that I, RALPH H. OWENS, a citizen of the United States, residing at Lincoln, in the county of Lancaster and State of Nebraska, have invented a new and useful Improvement in Wrenches, of which the following is a specification.

The invention relates to wrenches and has particular reference to the class of wrenches used for rotating bolts, nuts, or other parts situated in places inaccessible to ordinary hand tools. It applies especially to such places as are common in work of repairing of automobiles though not restricted to any particular use.

A further object of the invention is to provide a wrench of the above character, which can be easily and cheaply manufactured, having sufficient strength and durability for the purpose for which it is desired to apply the tool.

A further object of the invention is to provide in a tool of the above mentioned character a means whereby the several elements employed therein may be easily assembled with respect to each other.

A further object of the invention, which is specially shown by the construction, is to provide a practical means for operating the nuts of the connecting rods of the crank shaft of an automobile engine, more particularly on a Ford.

Other objects and advantages of the invention will be apparent from the further description in connection with the accompanying drawings.

In the drawings, forming a part of this specification and in which like numerals are employed to designate like parts throughout the same.

Figure 1 is a transverse sectional view of the wrench embodying my invention.

Figure 2 is a top plan view, and

Figure 3 is a side elevation of the wrench.

Figure 4 is a detail showing both in plan and in elevation the separating or spacing blocks.

Figures 5 and 6 are detail views of interchangeable nut-engaging elements.

Figure 7 is a face view of the driven gear with its key way.

In the construction shown, the wrench includes a driving spur gear 13, a driven spur gear 14, and a similar intermediate spur gear 23 meshing with both gears 13 and 14. The gears are held in assembled relation by means of the plates 9 and 11. Collars 10 of a length slightly greater than the width of the gears, hold the plates 9 and 11 in spaced apart relation and prevent friction between the plates and the gears. The collars 10 are held in place by means of rivets 12 or other suitable fastening means passing therethrough and through aligned apertures in the plates 9 and 11. The intermediate gear 23 rotates on a pivot 19 passing through the gear and through both plates, and secured to both plates against slipping. The driving gear 13 is keyed to a shaft 7 which is journalled in both plates. The shaft 7 is provided with a crank portion 8 and a hand grip 21 for purposes well understood. A plate 6 having integral therewith a sleeve 5, is secured to the plate 9 for the purpose of giving greater rigidity to the drive shaft 7 which passes through the sleeve 5. The driven gear 14 is keyed to the portion 27 of the nut-engaging means, the portion 27 being journalled in both plates.

As shown, shafts 7 and 27 are keyed to their respective gears by means of the Woodruff key 20. The key is rectangular in plan and has integral therewith a projection in the form of a segment of a curve. This segmental portion is driven into an appropriate cut in the shaft and thereby becomes in effect integral with the shaft. The rectangular portion of the key slides into a keyway in the gear. After assemblage, the shaft 7 remains fixed in position because the apertures in the plates 9 and 11 are not sufficiently large to permit the passage of the key. The plate 11 is however provided with an aperture large enough to permit the passage therethrough of the shaft 27 and its key, thus making the insertion and removal of the shaft 27 a simple matter. The purposes of this arrangement are more fully explained later in the description.

The plates 9 and 11 are identical in size and in shape, and differ only in the sizes of the apertures for receiving the shaft 27. The plates are also symmetrical about both axes, not only as regards the outline but also with regard to the centers of the bolt and pivot holes. It will readily be seen that this arrangement is of great convenience in assembling, but the primary object of the arrangement is to make possible the

interchangeability of the plates, whereby the wrench may be assembled with the socket on either side, as preferred.

An essential feature of my invention is the extension 22 of the shaft 7. In the operation of the wrench, the extremity of the extension 22 bears against a fixed part of the automobile and serves as an abutment to prevent swinging of the wrench on the nut as a pivot. In fact, repeated trials have shown that the wrench will not function properly without this pressure bearing. It must obviously be greater in length than the socket except where a fixed abutment is available above the nut.

In Figures 5 and 6 I have shown two of the nut-engaging elements which I use with my wrench. Each has the shaft portion 27 and key 20 which is adapted to slidably enter the central aperture and keyway 28 of the driven gear 14. The shaft portion is provided with a collar 26 which fits into the aperture in the plate 11. Integral therewith is a nut-engaging element. I contemplate the use of an assortment of these to fit the various nuts in use on automobiles and elsewhere, the two figures being intended merely to suggest by way of illustration the many possibilities in the way of variations for the nut engaging elements. Of course other rotatable tool elements, as for example screw drivers and drill bits could also be used in a similar manner without departing from the spirit of my invention.

Having thus described my invention what I believe to be new and desire to secure and protect by Letters Patent of the United States is—

1. In a wrench of the character described, a pair of spaced plates, a spur gear positioned between said plates, an operating shaft keyed to said spur gear and serving as a pivot therefor, a second spur gear between said plates and carrying a wrench element which protrudes beyond the outer surface of one of the plates, a third spur gear journalled between said plates and meshing with both the aforesaid first and second spur gears, said operating shaft extending through and beyond the plate on the side of the wrench element to a distance greater than that of the wrench element, thereby serving as a pressure bearing while the wrench is in operation.

2. A wrench comprising a train of gears, a wrench element carried by one of the end gears and extending beyond the plane of the gear, an operating shaft carried by the other end gear and protruding through said gear and beyond the plane of the outer surface of said wrench element, and means for holding said gears in assembled relation.

3. A wrench comprising a train of gears, an operating element secured to one of the end gears, a wrench element, a key secured to said wrench element, the second end gear of said train of gears being provided with a keyway in its socket for the reception of the key on the wrench element, the arrangement being such that the wrench element and its key may be readily removed from the socket of the gear without disassembling the wrench mechanism.

4. A wrench including a driving gear, a driven gear carrying a wrench element, a third gear interposed between the driving and driven gears to impart rotative motion to the driven gear when the driving gear is in rotation, plates disposed on either side of the gear assemblage, means passing through the plates for holding them in spaced relation, driving means secured to said driving gear and passing through said plates, a pivotal connection between said intermediate gear and said plates, a wrench element including a cylindrical portion of a length equal to the combined width of the driven gear and one of the plates, a shoulder on said cylindrical portion, a nut-engaging portion beyond said shoulder and integral with the cylindrical portion, an aperture in one of the plates for receiving the extremity of the cylindrical portion, an aperture in the other of said plates for receiving the shoulder, the centers of said two apertures being in alignment with each other and with the center of the socket of the driven gear, and means securing the wrench element and driven gear against relative rotation, the arrangement being such that the mechanism may be assembled with the nut-engaging portion of the wrench element extending beyond either side of the gear assemblage.

5. A wrench comprising a driving gear, a driven gear provided with a nut engaging element, an intermediate gear meshing with both the driving and driven gears, and a thrust bearing located in proximity to the driving gear and positioned perpendicularly thereto and extending in the same direction as the nut engaging element, said thrust bearing being positioned on the same side of the gears as the nut engaging element for preventing the swinging of the driving gear about the nut engaging means as a center.

6. An elongated base, a tool element rotatably mounted on said base near one extremity thereof, rotatable driving means on said base near the other extremity for driving said tool element, and a thrust bearing projecting from the base in the same direction as the tool element but to a greater distance, said last named means serving to prevent the swinging of the base about the tool element as a center.

7. A gear assemblage comprising a driving gear, a driven gear, and an intermediate gear, shafts for said driving and driven gears, the shafts being projected in the same

direction but to unequal distances beyond the gear assemblage, plates on either side of the gear assemblage, said plates being substantially elliptical in outline, aligned apertures in said plates for the reception of said shafts, other apertures in said plates, means passing through said last named apertures for holding the plates in spaced apart relation, the centers of the apertures and the peripheries of the plates being symmetrical about both axes of the plates.

8. A gear train, one of the end gears being a driven gear and the other a driving gear, means for holding the gears in assembled relation including a plate, a tool element fixedly connected centrally to the driven gear and projecting through and beyond the plate, and means preventing the swinging of said plate about the tool element as a center, said means passing through the center of the driving gear and extending from the plate to a distance greater than that of the tool element.

RALPH H. OWENS.