The present invention relates to an improved power socket wrench and particularly to a motor driven wrench handle assembly for running threaded members rapidly to their tightening position or for removing them after they have become loosened.

In many assembly and disassembly jobs threaded members such as bolts and nuts can be started and must be turned through a substantial number of revolutions before they are in position to be tightened. Heretofore it has been necessary to run the threaded members through the relatively free turning phase by hand or by rotating a hand wrench or working a ratchet wrench back and forth until the free threads are taken up. At that point the wrench can be effectively used to apply the torque to tighten the threaded member. Not only does the free turning operation constitute a waste of the operator's energy but it takes up a considerable amount of time thereby slowing up rapid assembly or disassembly operation.

In a preferred form, the power wrench of the present invention contemplates use for manually applying a high torque to tighten threaded members or to loosen them and provides advantages in speeding up operations by rapidly turning threaded members through the rotations necessary to bring them to tightening position or to remove them. In addition to mechanically rapidly turning threaded members, a feature of the invention permits utilization of the same wrench handle for manually tightening or loosening the threaded members. However the features of the invention are also applicable for mechanically tightening or loosening threaded members through hard turning rotation.

An object of the present invention is to provide an improved wrench handle which is motor driven and is capable of rapidly turning a threaded member through the free threading or relatively easy turning phase at a relatively rapid speed and can be used to manually torque the threaded member through the tightening or hard turning phase.

Another object of the present invention is to provide an improved power driven wrench handle capable of use for either loosening or tightening a threaded member and which can be used for power operation or manual operation without adjustment or time consuming conversion.

Another object of the invention is to provide an improved power driven wrench handle wherein the speed ratio can be readily and quickly changed.

A still further object of the invention is to provide a power driven wrench handle with an improved power transmission frame which permits transmission of rotation from the motor to the socket driven by the wrench but which will not permit the motor to be rotated when the wrench is manually operated and a torque is placed on the socket.

Other objects and advantages will become more apparent with the teaching of the principles of the invention in connection with the disclosure of the preferred embodiments thereof in the specification, claim and drawings, in which:

FIGURE 1 is a side elevational view of a power wrench handle constructed in accordance with the principles of the present invention and being in position for driving a socket;

FIGURE 2 is a view partially in horizontal section taken substantially along line II—II of FIGURE 1;
driving the motor in reverse. That is, the torque resistance of the threaded member will not rotate the worm gears, although the power loss from the motor to the wrench socket is not significant. The motor is a relatively high speed motor, preferably of the universal type and the gearing is chosen to reduce the speed of the socket to a relatively low speed.

Located in the drive shaft is a slip clutch 33. In the event the threaded member offers substantial resistance the slip clutch 33 will permit slippage with continued rotation of the motor. This permits the operator to turn on the motor, insert the threaded member down to its tightened position without closely watching when the threaded member reaches its tightened position. When the tightened position is reached the increased torque resistance will cause the clutch 33 to slip and the motor can be turned off at the switch 15. Thereafter the operator can manually turn the wrench to bring the threaded member to the proper tightness. However, because of the resistance of the worm gears the slip clutch 33 will not receive sufficient torque to slip when the wrench is being manually turned.

The cross shaft 28 and the side shafts 24 and 25 are supported by suitable bearing surfaces within the head 19. These are shown as plain bearings although ball bearings may be employed. The wrench head also provides a suitable bearing for one end of the drive shaft 20 while the other end is rotatably supported by the handle portion 12.

For various purposes different speed ratios may be desired between the motor and the connector 13. To accomplish a change in speed ratios the cap 21 can be removed and the cross shaft 28 and side shafts 24 and 25 can be lifted out of their position. Replacement shafts may be then inserted utilizing gears 29 and 30 and gears on the shafts 24 and 25 that mesh therewith of different ratios. With the use of worm gears the ratio may be changed without changing the size of the gears. It will of course be recognized that although the preferred form is illustrated and described, other mechanical arrangements may be employed for changing the speed ratios. For example, the side gears 26 and 27 and the rotary gear 23 may be changed.

It will also be appreciated that while in the preferred form the worm gears offer a simple and automatic irreversible drive that permits manual torquing of the wrench, in some environments other arrangements may be employed to lock the drive when the wrench is to be manually operated.

In operation, the operator selects the socket 11 to fit the nut or bolt to be threaded, and places the handle frame member 10 in place. The motor is then turned on by the switch 15 and the threaded member turned to tightening position. The motor is then turned off and the operator will then manually pull the wrench to bring the threaded member to the desired tightness. All this has been accomplished in a minimum time without recurrence of the wrench handle or changing or adjusting any of the parts.

The connector 13 is shown as provided with a rectangular socket 34 on the side opposite the stud for receiving and driving a member having a rectangular projection.

Thus it will be seen that I have provided an improved power wrench handle which meets the objectives and advantages hereinbefore set forth. The mechanism is reliable in operation and inexpensive to manufacture and obtains a substantial saving in operational time and operator effort in both mass production assembly operations and intermittent uses.

The drawings and specification present a detailed disclosure of the preferred embodiments of the invention, and it is to be understood that the invention is not limited to the specific forms disclosed, but covers all modifications, changes and variations thereof falling within the scope of the principles taught by the invention.

I claim as my invention:

A power wrench handle comprising an elongated frame member having a handle portion and a rotatable socket connector mounted thereon with a stud projecting from one side of the connector and a socket on the other side of the connector, a driving motor connected to said frame member, a drive shaft supported on said frame member and connected to said motor, a head at one end of said frame member supporting said socket connector and defining a gear housing, a rotary gear connected to said connector and positioned in said housing, a pair of side shafts in said housing positioned on each side of said rotary gear in the plane of said gear and having worms drivingly meshing with said gear, a cross shaft in said housing extending across said side shafts transversely of the axis of said rotary gear and positioned laterally of the side shafts on the side of said socket in said connector, first gear means connecting said cross shaft and said pair of shafts, a gear in the center of said cross shaft, and a meshing gear drivingly meshing with said center gear and connected to said drive shaft, said drive shaft being substantially in the plane of said pair of side shafts, said head and said housing projecting in the same general direction to enclose the socket side of the connector and said cross shaft.

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