This invention relates to power operated wrenches and particularly to a wrench of this type designed to be drivingly connected to a chuck and operated by a motor embodied in the device and forming a part thereof so that the motor may be used to open or close the chuck whenever required.

A primary object of the invention is to provide a housing for a power actuated shaft mounted closely adjacent a chuck and adapted for detachable attachment to the chuck so that the operating mechanism for a chuck jaw may be opened or closed by power whenever necessary by rotation of the motor in opposite directions.

A feature of the invention that is important is that the power wrench may be mounted upon a machine tool or other machine with its chuck engaging and operating shaft positioned for engagement with the chuck jaw operating screws so that the driven member of the power wrench can be conveniently moved to detachably connect with means for actuating the chuck jaw operating screws.

Another object of the invention is to provide a single hand lever movable to operate the motor in opposite directions and to actuate the driven member into and out of engagement with the chuck jaw operating means.

Another feature of advantage is that planetary differential speed reducing gearing is provided between the armature shaft of the motor and the driven member of the power wrench which is connected to the chuck jaw operating means.

With the above and other objects in view, the invention may include the features of construction and operation and set forth in the following specification and illustrated in the accompanying drawing.

In the accompanying drawing annexed hereto and forming a part of this specification I have shown the invention embodied in a wrench adapted for attachment to a machine tool of the horizontal type but it will be understood that the invention can be otherwise embodied and that the drawings are not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

In the drawings:

Fig. 1 is a front view of a power wrench made in accordance with the present invention;

Fig. 2 is a side elevation of the wrench shown in the preceding figure;

Fig. 3 is a view similar to Fig. 2 on an enlarged scale and shown partly in section;
axial movement is a shaft 30 the outer end of which is non-circular as shown for driving attachment to a chuck operating screw (not shown). Preferably two splines or keys 32 are provided secured in suitable grooves within the shaft 30 by suitable screws. To advance and retract the shaft 30 into and out of its operative position a cross pin 34 is provided extending through the shaft 30 and through an elongated slot formed in the sleeve 26. Slidable sleeve 26 and having the cross pin 34 extending therethrough is an annularly grooved collar 35. Slidable movements of the collar 35 will therefore extend or retract the shaft 30 relative to the sleeve 26.

Instead of the forward end of member 30 being formed with a square as shown in Figs. 1 and 3, this end may be formed with longitudinally extending splines or in the form of a pinion 31 as shown in Fig. 7.

To actuate the collar 35 a yoke member 38 is pivotally mounted within the frame member 10 for oscillation by a forwardly extending horizontal transverse shaft 40. The yoke member 38 has its arms engaging within the groove in collar 35.

For this purpose studs in the ends of arms of yoke 38 on which are mounted small shoes 37 a hand lever 42 attached to the transverse shaft 40 permits manual movements of the collar 35 and shaft 30 to be accomplished by movement of the lever 42 which is conveniently located in front of the frame member 10 or at a position convenient for access by the operator.

Referring to Fig. 1 the construction of the hand lever 42 will be understood. Oscillatory movements of the hand lever 42 with the shaft 40 and about the axis of shaft 40 also oscillates a housing 44 attached to the shaft 40. Within the housing 44 is a pivotal connection 46 for the lever 42 permitting limited oscillatory movement of the lever about an axis at right angles to the axis of shaft 40. Movement of lever 42 relative to its housing 44 about the axis of this connection 46 closes one of the other of a pair of switches 48 and 50. To aid in guiding the lever 42 in its movements an H-shaped opening 43 may be provided in a supporting bracket 45 mounted on the body member 10 and surrounding an intermediate part of the lever 42. This bracket opening 43 is shown in Fig. 6 and serves to limit movements of the lever 42 so that the motor 14 may be rotated only when the lever 42 and member 30 are in fully operative positions.

With one of the switches 48 or 50 closed the circuits to the motor 14 will rotate the motor in one direction. Rotation in the opposite direction will take place when the other switch is closed. Leads are provided in cable 52 for the wiring connections to the switches 48 and 50 and 46 is provided providing leads to the casing of motor 14. As the wiring to the motor 14 and the switches 48 and 50 is or may be conventional, further description is not thought to be necessary.

Referring to the form of the invention shown in Figs. 4 and 5 it will be seen that the body member 60 is laterally movable instead of having a shaft extendible axially from the head. To permit this lateral movement of head or casing 60 guideways 62 are provided within a fixed member 64 and also engaging a part of the machine with which the head 60 is to be used. To actuate the head or casing to operative and inoperative positions linkage is provided connected to a reach arm 66 extended to a position convenient for operation by means of a lever similar to lever 42 shown in Figs. 1 and 2. An arm 68 is pivotally mounted on a shaft 70 outstanding from fixed member 64 and has its outer end attached to the reach arm 66. Also attached to shaft 70 is a short lever 72. Movement of the reach arm 66 oscillates this lever. At the outer end of lever 72 is a connecting rod 74 the opposite end of the connecting rod being attached to a plate 76 secured to the head 60.

Mounted on the head 60 is a motor 78, the armature shaft of which has two pinions 80 thereon each engaging a member of a compound planetary differential gear 82. The gear teeth on the planetary gear 82, which are of unequal number, mesh with two other pinions 84 and 86. Gear 86 is secured to an end wall of the motor flange 88 and gear 86 is secured to a driving member 90 for the chuck operating member 92. Member 90 is mounted for rotation on anti-friction bearings 94. From the above description it will be seen that rotation of the motor 78 in either direction will rotate at a greatly reduced speed the driving member 92. Also by operation of the rod 66 the member 92 may be moved laterally into or out of a chuck operating member (not shown).

In Fig. 5 the driving member 92 is in the form of a shaft fitting within the shaft extension or sleeve portion of member 90 so as to be readily removed for substitution of other types of driving members. At the outer end of the member 92 are cut gear teeth adapted for meshing with a gear on the chuck for operating its jaws. To aid in supporting the member 92 with its gear in meshing relation a supporting bracket 94 may be attached to the head 60 and having an opening aligned with and rotatably engaging the outer end of the member 92.

I claim:

1. A power wrench comprising in combination, a motor, a speed reduction unit connected thereto, a shaft rotated by said motor through said unit, a spline connection between said unit and shaft permitting axial movement of said shaft, a manually operated lever for moving said shaft axially, and switches on said lever for opening and closing circuits for rotating said motor in opposite directions, said switches being opened and closed by movement of said lever at right angles to the direction of movement thereof to axially move said shaft.

2. A power wrench comprising in combination, a motor, a speed reduction unit connected thereto, a shaft rotated by said motor through said unit, a spline connection between said unit and shaft permitting axial movement of said shaft, a manually operated lever for moving said shaft axially, and switches on said lever for opening and closing circuits for rotating said motor in opposite directions, said switches being opened and closed by movement of said lever at right angles to the direction of movement thereof to axially move said shaft.

3. A power wrench comprising in combination, a motor, a speed reduction unit connected thereto, a shaft rotated by said motor, a spline connection between said shaft and unit permitting axial movement of said shaft, and a hand lever movable about one axis to move said shaft, said lever being movable about another axis to open and close circuit switches for said motor.

4. A power wrench comprising in combination, a motor, a speed reduction unit connected thereto, a shaft rotated by said motor, a spline connection between said shaft and unit permitting
axial movement of said shaft, a hand lever movable about one axis to move said shaft, said lever being movable about another axis to open and close circuit switches for said motor, and means to limit movements of said lever about said axes.

5. A power wrench for opening and closing work engaging chucks for machine tools comprising a casing mounted in position on said machine, a motor mounted thereon, a shaft slowly rotated by said motor, means to axially advance and retract said shaft relative to said casing, a manually operated lever for controlling axial movements of said shaft, and circuit switches for said motor on said lever, said switches being opened and closed respectively by movement of the lever in a direction at right angles to the direction of movement for moving said shaft.

6. A power wrench for work engaging chucks comprising, a motor, an extensible shaft slowly rotated thereby in opposite directions, a hand lever for extending and retracting said shaft, a housing for said hand lever, circuit switches for said motor within said housing, a pivotal mounting for said lever within said housing, whereby said lever may be oscillated in a plane at right angles to swinging movements of said housing, and whereby movement of said housing and lever in one plane will extend or retract said shaft, and movement of said lever relative to said housing about another axis will open and close said switches.

7. A power wrench for work engaging chucks comprising a casing mounted in position on a machine having a chuck, a motor mounted on said casing, a shaft slowly rotated by said motor, means to laterally move said casing and motor, a chuck engaging means on said shaft movable into and out of chuck engagement by lateral movements of said casing, a manually operated lever for controlling lateral movements of said casing, and means on said lever for starting and stopping rotation of said motor in either direction.

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