April 5, 1932. W. L. HODEAUX 1,852,776

PORTABLE UNIVERSAL POWER TOOL

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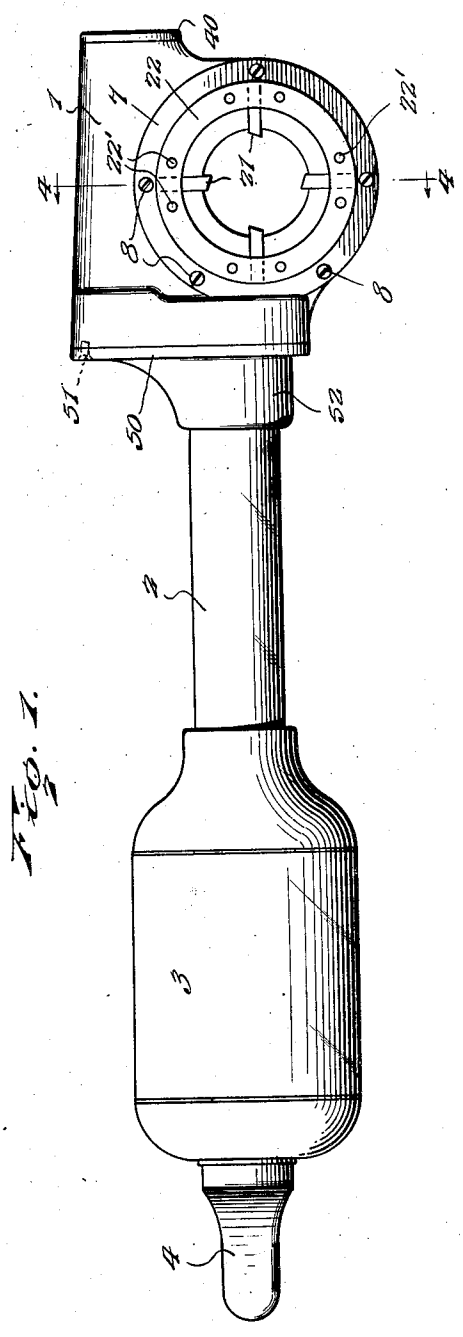

Fig. 1.

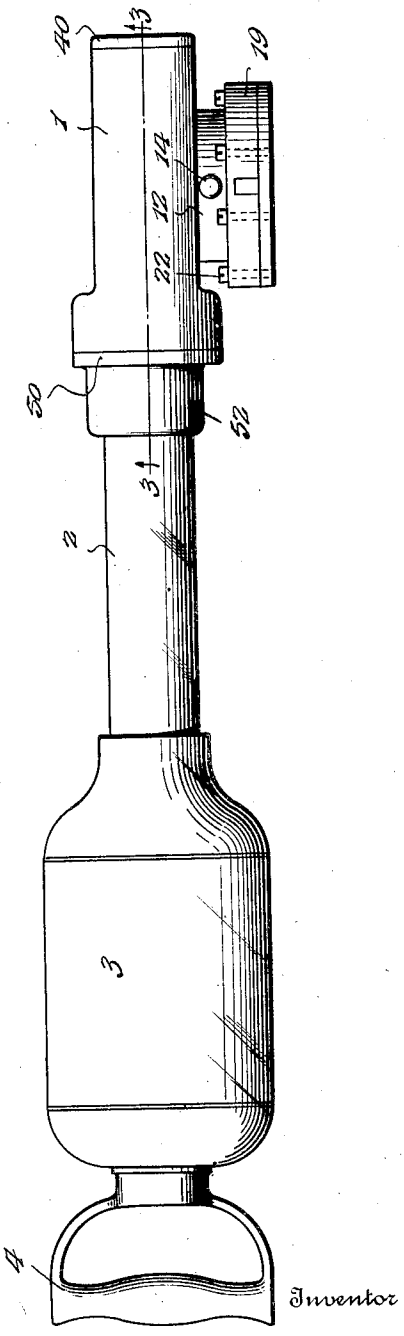

Fig. 2.

Inventor

W. L. Hodeaux.

By Lacey & Lacey, Attorneys

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Fig. 3.

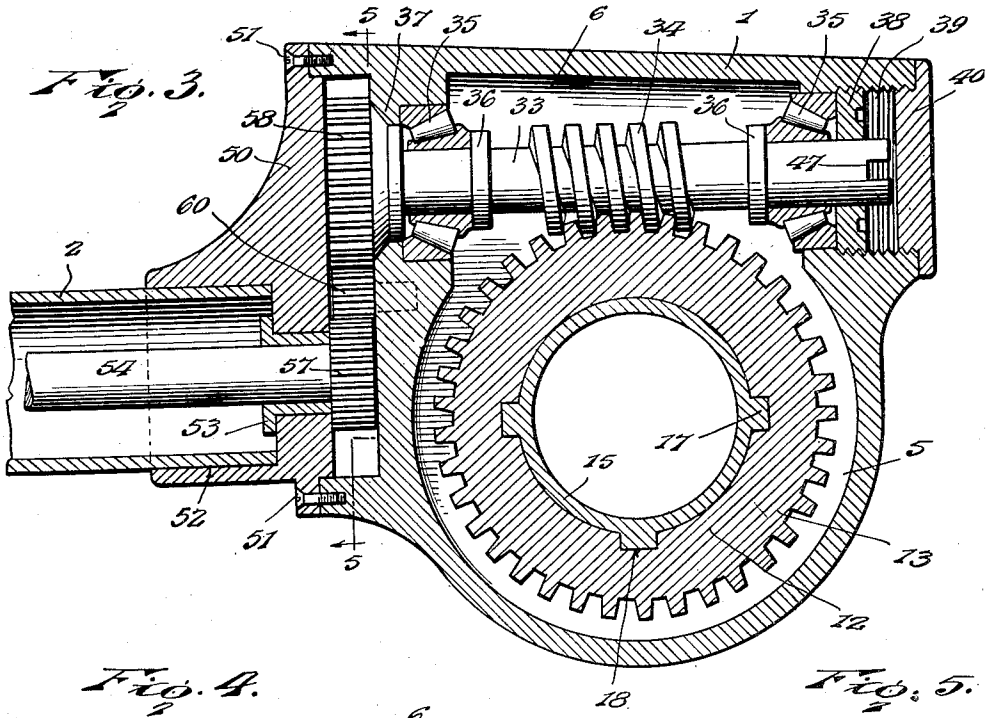


Fig. 4.

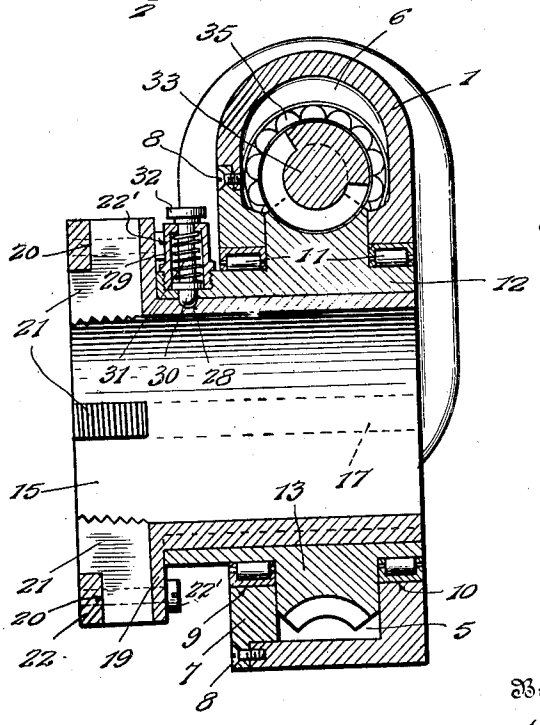
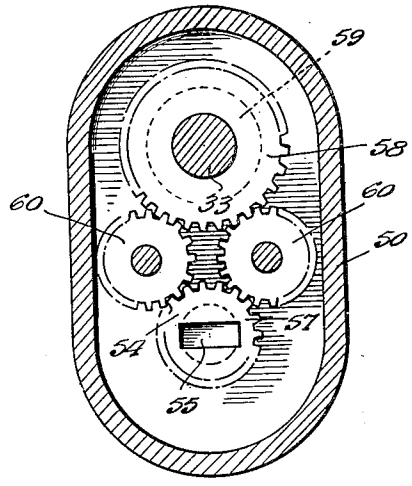


Fig. 5.



Inventor

W. L. Hodeaux

By Lacey & Lacey, Attorneys

April 5, 1932. W. L. HODEAUX 1,852,776

PORTABLE UNIVERSAL POWER TOOL

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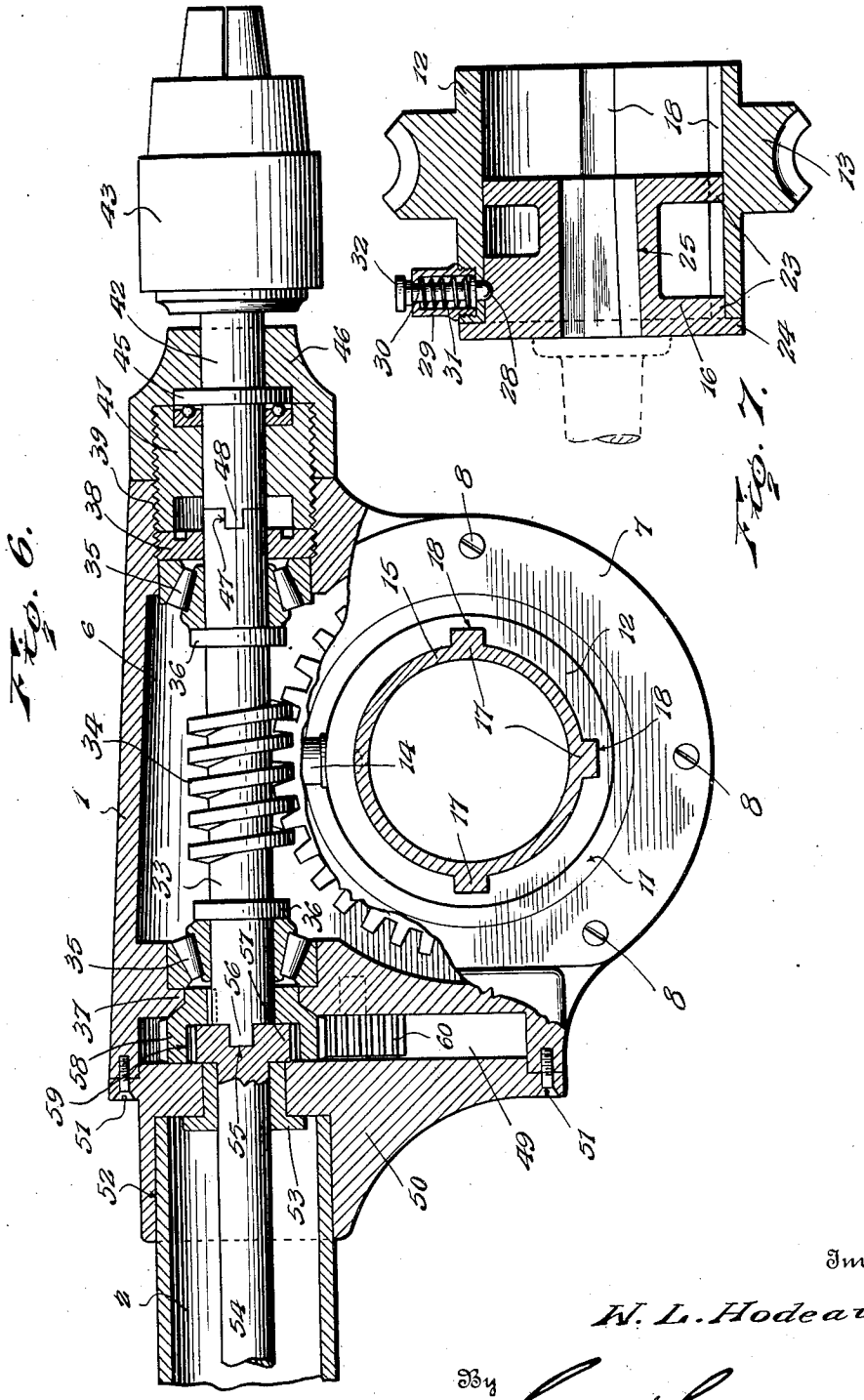

Fig. 6.

Fig. 7.

Inventor

W. L. Hodeaux.

By Lacey & Lacey, Attorneys

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PORTABLE UNIVERSAL POWER TOOL

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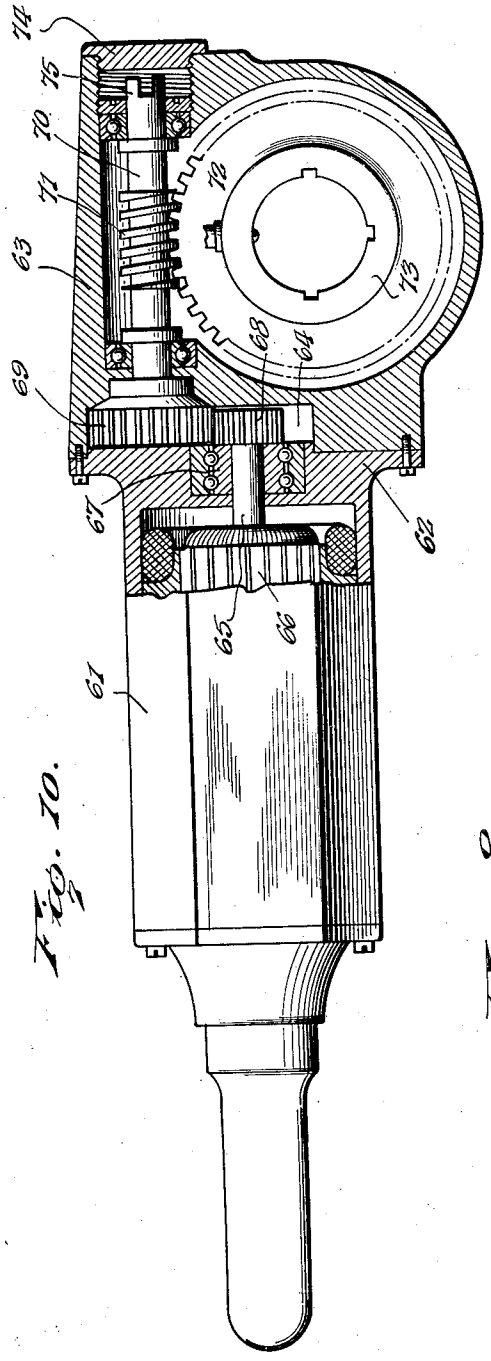

Fig. 10.

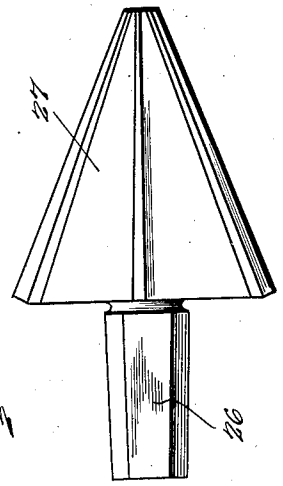

Fig. 9.

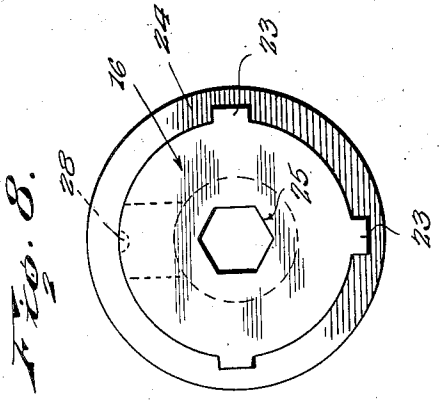

Fig. 8.

Inventor

W. L. Hodeaux.

By Lacey & Lacey, Attorneys

Patented Apr. 5, 1932 1,852,776

UNITED STATES PATENT OFFICE

WALTER L. HODEAUX, OF WEST PALM BEACH, FLORIDA

PORTABLE UNIVERSAL POWER TOOL

Application filed November 30, 1929. Serial No. 410,775.

This invention relates to tools and more particularly to a portable hand operated power driven tool, and one object of the invention is to provide a tool of the power driven type which may be easily transported from one place to another and of such size and construction that it may be easily held by a workman when in use.

Another object of the invention is to provide a tool of this character in which a working element may be directly connected with a worm shaft forming part of the tool for rapid rotation and other working elements engaged with a socket rotated from the worm shaft at a reduced rate of speed.

Another object of the invention is to so mount a drive shaft for the tool that it may be directly engaged with the worm shaft in end to end alinement therewith and cause the worm shaft to be rotated at a very rapid rate of speed and further permit rotary motion to be transmitted from the drive shaft to the worm shaft through the medium of cooperating gears and thereby reduce the rate of speed at which the worm shaft rotates.

Another object of the invention is to provide a tool of this character in which practically all parts thereof are enclosed and thereby allow the tool to be used without danger of injury to the operator.

Another object of the invention is to so form this tool that it will be well balanced and thereby permitted to be very easily held by the operator and used without great exertion.

The invention is illustrated in the accompanying drawings, wherein

Figure 1 is a view showing the tool in side elevation,

Fig. 2 is a top plan view thereof,

Fig. 3 is an enlarged sectional view taken on the line 3—3 of Fig. 2,

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 1,

Fig. 5 is a transverse sectional view taken on the line 5—5 of Fig. 3,

Fig. 6 is a view similar to Fig. 3 but showing the drive shaft directly engaged with the worm shaft and a chuck rotatably mounted at the front of the casing and engaged with the forward end of the worm shaft,

Fig. 7 is a sectional view through a socket forming part of the tool with the pipe threader shown in Fig. 4 removed from the socket and an adapter fitted therein so that a reamer or other implement may be used,

Fig. 8 is a view looking at the inner end of the adapter,

Fig. 9 is a side elevation of a reamer which may be engaged in the adapter shown in Figs. 7 and 8, and

Fig. 10 is a view partially in elevation and partially in longitudinal section of a modified form of the invention.

The improved power operated portable tool constituting the subject-matter of this invention consists of a casing, indicated in general by the numeral 1, carrying a rotatably mounted socket and worm shaft to be more fully set forth and this casing or housing is mounted at one end of a tubular shank 2 leading from the forward end of a motor casing 3 enclosing a motor which is preferably an electrically energized motor but may be any other type desired, such, for instance, as a motor operated by compressed air, steam or any other suitable medium. A hand-hold 4 is provided at the rear end of the motor casing, and from an inspection of Figures 1 and 2, it will be seen that, when the tool is in use, the hand-hold 4 may be grasped with one hand and the other hand engaged about the shank 2. In view of the fact that the casings 1 and 3 are disposed at opposite ends of the shank 2, they serve to counter-balance each other, thereby allowing the tool to be easily held by the hand grasping the shank and the other hand which engages the hand-hold 4 moved to guide the tool and retain it in its proper position.

The casing or housing 1 is preferably of a flat formation and its lower portion defines a chamber 5 which is substantially circular in shape, as clearly shown in Figure 3, and this chamber communicates with an upper chamber 6 of a cylindrical formation. At one side the chamber 5 is provided with a removable wall 7 held in place by a suitable number of screws 8 and this wall and the opposite side

wall of the chamber are formed with alined openings 9 and 10 into which are fitted roller bearings 11. These bearings serve to rotatably mount a socket 12 about which is formed a worm gear 13 and since the wall 7 and the opposite side wall of the chamber bear against opposite side faces of the worm gear this gear will be held in place and prevented from shifting longitudinally of itself but at the same time will be allowed to rotate freely. The socket projects outwardly from the removable wall 7 and this projecting portion of the socket carries a latch 14 by means of which a pipe threader 15 or adapter 16 may be retained in place when fitted into the socket. The pipe threader consists of a hollow tubular body of such diameter that it fits snugly within the socket and ribs 17 extend longitudinally of the body in spaced relation to each other circumferentially thereof and are received in grooves or seats 18 formed in the socket. Therefore, the pipe threader will be prevented from turning in the socket and when the socket is rotated the pipe threader will turn with it. About one end of the pipe threader is formed a circumferentially extending collar 19 having radially extending pockets 20 formed therein and into these pockets are fitted dies 21 held in place by a ring 22 when the screws 22′ are tightened. It will thus be seen that the dies will be firmly held in place but can be removed and others substituted. The adapter 16 shown fitted within the socket in Figure 7 is snugly received therein and has its body portion formed with ribs or lugs 23 to engage in the seats 18 and its outer end portion extended circumferentially to form a flange 24 which bears against the outer end of the socket when the adapter is fitted into the same. This adapter is formed with an axially extending bore 25 which is non-circular in cross section and preferably of the shape shown in Figure 8. Therefore, when the similarly shaped shank 26 of a reamer 27 or any other tool is fitted into the bore of the adapter, it will be prevented from turning in the bore and the reamer or other implement will turn with the adapter and socket. It will be understood that any tool having a shank receivable in the bore of the adapter may be fitted therein and it will also be understood that implements other than the pipe threader may be directly fitted into the socket. The pipe threader and the adapter are each formed with a latch receiving seat or recess 28 and by referring to Figures 4 and 7, it will be seen that the latch consists of a cup 29 screwed into the socket and through this cup extends a plunger 30 yieldably held in an operative position by a spring 31 and having a head 32 at its outer end so that the plunger may be drawn outwardly against the action of the spring. Therefore, the pipe threader and the adapter will be held in the socket and prevented from accidentally slipping out of place but may be released and easily removed when necessary.

Rotary motion is imparted to the socket by means of a worm shaft 33, the worm 34 of which meshes with the worm gear 13 and this worm shaft has its end portions engaged in thrust bearings 35 and formed with collars 36 bearing against the same. The thrust bearing for the inner or rear end of the worm shaft is seated against an annular shoulder 37, and in order to hold the worm shaft and bearings in place, there has been provided an abutment disk 38 which is screwed into the internally threaded forward end portion 39 of the chamber 6. By this arrangement the worm shaft and its bearings may be set in place and also permitted to be removed when repairs are necessary. After the disk 38 has been screwed tightly into place the outer end of the chamber is closed by a threaded cap 40 which serves to exclude dirt. This cap normally remains in place, but by an inspection of Figure 6, it will be seen that if it is desired to use the power tool as a high speed drill the cap may be removed, and a bushing 41 which is rotatably disposed about the shank 42 of a chuck 43 screwed into the threaded forward end portion of the chamber 6. This bushing 41 carries a bearing 44 engaged by a collar 45 formed by the shank 42 and the bushing is held in its proper position about the shank by means of a sleeve 46 which fits loosely upon the shank in front of the collar and has threaded engagement with the bushing. The forward end of the worm shaft is recessed, as shown at 47, to form a seat and at its rear end the shank of the chuck is formed with a rib or tooth 48 adapted to be snugly received in the seat of the worm shaft. Therefore, when the cap is removed and the bushing 41 screwed into place, the abutting ends of the worm shaft and shank of the chuck will be interlocked so that the chuck will rotate with the worm shaft. The rear end portion of the worm shaft extends into a chamber 49 formed in the rear portion of the casing 1 and this chamber which may be referred to as a gear chamber is closed by a cap 50 removably secured by screws 51. A portion of the cap is extended to form a pocket 52 into which fits the forward end of the shank or handle 2 and centrally of this pocket the cap is bored to receive a bushing or bearing 53 through which extends a drive shaft 54. This shaft 54 extends axially through the shank 2 and may have its rear end connected with the shaft of the motor within the housing 3 or form a continuation of the motor shaft. At its forward end the drive shaft is formed with a recess or seat 55 similar to the seat 47 of the worm shaft and adapted to receive a tooth 56 extending from the rear end of the worm shaft when the cap is set in place, as shown in Figure 6, and

when the drive shaft is so connected with the rear end of the worm shaft a direct connection will be established between these two shafts so that the worm shaft will be rotated at a high rate of speed and the tool may be used as a high speed drill. At its forward end the drive shaft carries a gear or pinion 57 which may be formed integral therewith or firmly secured upon the shaft in any desired manner and about the rear end portion of the worm shaft is secured a larger gear or pinion 58 which projects from the rear end of the worm shaft and is formed with a pocket 59 of such diameter that the gear 57 may be received therein. Idler gears 60 are rotatably mounted in the gear housing 49 to mesh with the gear 58, as shown in Figure 5, and by referring to this figure it will be seen that the gear housing is substantially oblong in shape, although it has rounded upper and lower ends. Therefore, when the cap, which corresponds in shape to the gear housing, is applied, as shown in Figure 6, the drive shaft 54 will have direct end to end connection with the worm shaft and cause the worm shaft to rotate at the same rate of speed as the drive shaft but by removing the screws 51 and reversing the cap so that it is secured to the casing 1 as shown in Figures 3 and 5, the drive shaft will enter the lower portion of the gear housing and its gear 57 will mesh with the two idler gears 60 and rotary motion will be indirectly transmitted to the worm shaft and cause the worm shaft to rotate at a reduced rate of speed. It will thus be seen that the speed at which the worm shaft rotates may be controlled.

When this tool is in use and it is desired to thread pipe, the cap is applied as shown in Figure 3 and the pipe threader fitted into the socket, as shown in Figure 4, where it will be secured by the latch 14. A pipe to be threaded is fitted into the pipe threader for engagement by the threading dies and the motor started. In view of the fact that rotary motion is indirectly transmitted to the worm shaft by means of the gears in the gear housing, the worm shaft will rotate at a slower rate of speed and the socket will be turned at such a speed that the dies may properly cut threads in the pipe. If pipes are to be cut into sections, it is desirable to have the socket rotate at a higher rate of speed so that a cutter which will be set in place instead of the thread cutter may quickly cut through a pipe and when this operation is to take place the cap will be released from the casing 1 and after being turned to the position shown in Figure 6 again secured. Therefore, the worm shaft will be directly driven from the drive shaft and will rotate at the same speed at which the drive shaft rotates. This will cause the socket 12 to be rotated at a higher rate of speed and pipe can be quickly cut into sections. If the tool is to be used as a drill, the cap is secured for direct engagement of the drive shaft with the worm shaft and the cap or plug 40 removed and the bushing of the chuck 43 screwed into the threaded forward end of the chamber 6 with the tooth at the rear end of the shank 42 engaged in the seat 47 at the forward end of the worm shaft. Therefore, the chuck will be engaged with the worm shaft in end to end alinement therewith and as the worm shaft has direct engagement with the forward end of the drive shaft the chuck will be rotated at the same speed as the drive shaft and holes may be easily and quickly bored. In some cases it is desired to have the chuck rotate at a reduced rate of speed in which case the cap or cover for the gear housing may be released and returned to the position shown in Figure 3, thereby indirectly transmitting rotary motion to the worm shaft and causing this worm shaft and the chuck to rotate at a reduced speed.

In Figure 10, there has been shown a modified form of the invention. Referring to this figure, it will be seen that the shank 2 is omitted and the forward end of the motor casing 61 is formed wth a head 62, corresponding to and taking the place of the cap 50. This cap is secured to the rear end of the casing 63 which corresponds to the casing 1 and forms a closure for the gear housing 64. The shaft 65 of the motor 66 projects forwardly from the bearing 67 through which it extends and carries a gear 68 which meshes with a gear 69 upon the rear end of the worm shaft 70. This worm shaft is similar in construction to the shaft 33 and its worm 71 meshes with the worm gear of a socket 72, corresponding to the socket 12, and adapted to have a pipe threader or the like 73 fitted therein. The forward or outer end of the chamber in which the worm shaft is mounted is closed by a removable cap 74 and a recess or seat 75 is formed in the forward end of the worm shaft so that when the cap 74 is removed a chuck can be connected with the forward end of the worm shaft similar to the manner in which the chuck shown in Figure 6 is applied. It will thus be seen that in this embodiment of the invention, the construction and mode of operation are quite similar to that previously described but the tool is more compact.

Having thus described the invention, I claim:

1. A power operated hand tool comprising a casing, a socket member rotatably mounted in said casing and including a worm gear, an open end of said socket member being exposed externally of said casing, an element removably engaged in said socket member through the exposed end thereof, a worm shaft rotatably mounted and meshing with said gear, a chuck engageable with one end of said worm shaft, a drive shaft having one

end directly engageable with the other end of said worm shaft, gears for transmitting rotary motion from said drive shaft to said worm shaft, and a mounting for said drive shaft selectively engageable with said casing to dispose said drive shaft in position for direct engagement with the worm shaft or transmission of motion from the drive shaft to the worm shaft through the medium of said gears.

2. A power operated tool comprising a casing, a worm gear mounted for rotation within said casing, means carried by the worm gear for supporting an operating tool, a worm shaft extending longitudinally in the casing above the worm gear and meshing with said worm gear, the rear portion of the casing being open and substantially oblong in shape, an operating shaft, gearing in said casing for indirectly transmitting motion from the operating shaft to the worm shaft, the front end of the operating shaft and rear end of the worm shaft being adapted for direct engagement with each other and a bearing member for said operating shaft conforming to the contour of the rear end of the casing, the front end of the operating shaft being engaged through one end portion of said bearing and the bearing being adapted to be selectively connected with the casing and support the operating shaft in a position to drive the worm shaft through the medium of the gearing or by direct engagement with the worm shaft direct.

3. A power operated tool comprising a casing, a worm gear mounted transversely within said casing for rotation therein, means carried by the worm gear for supporting an operating tool, a worm shaft extending longitudinally in said casing and meshing with said worm gear and provided at its front end with means for engagement with an operating tool, the rear end portion of said casing being substantially oblong in shape and having a chamber formed therein, an operating shaft, a bearing member for said operating shaft conforming to the contour of the rear end of said casing and detachably secured to the casing whereby the operating shaft may be supported in alignment with the worm shaft or out of alignment therewith, gearing for indirectly transmitting rotary motion from the operating shaft to the worm shaft when the shafts are out of alignment, and clutch members for directly connecting the front end of the operating shaft with the rear end of the worm shaft when the shafts are in alignment with each other.

4. A power operated hand tool comprising a casing, a socket member rotatably mounted in said casing and including a worm gear, an open end of said socket member being exposed externally of said casing, an element removably engaged in said socket member through the exposed open end thereof, a worm shaft rotatably mounted and meshing with said gear, a chuck engageable with the front end of said worm shaft, a drive shaft having its front end directly engageable with the rear end of said worm shaft when in axial alignment therewith, gears for transmitting rotary motion from said drive shaft to said worm shaft carried by adjacent ends of the said shafts, and a mounting for the first mentioned end of said drive shaft having the drive shaft eccentric thereto and adapted to be removably secured to the rear end of said casing with the said shafts in alinement for direct engagement of their adjoining ends when the mounting is in one position and with the shafts disposed out of alinement for transmission of motion from the drive shaft to the worm shaft through the medium of said gears when the mounting is in another position.

5. A power operated tool comprising a casing having a longitudinally extending chamber and a second chamber communicating with the longitudinally extending chamber through a side thereof, a worm gear rotatably mounted in the second chamber, means carried by said worm gear for supporting an operating tool, a worm shaft extending longitudinally in the first chamber and meshing with said worm gear, bearings in front and rear portions of the longitudinally extending chamber having end portions of the shaft engaged therein, a retainer threaded into the front end of the longitudinally extending chamber and engaging the front bearing to retain the bearings and shaft in place, an operating shaft directly engageable with said worm shaft, means to indirectly transmit rotary motion from said operating shaft to said worm shaft, a mounting for said operating shaft, the operating shaft being disposed eccentric to said mounting and means to secure said mounting to said casing with the operating shaft selectively disposed for direct or indirect transmission of motion to said worm shaft.

6. A power operated tool comprising a casing having a longitudinally extending chamber and a second chamber communicating with the longitudinally extending chamber through a side thereof, a worm gear rotatably mounted in the second chamber, means carried by said worm gear for supporting an operating tool, a worm shaft extending longitudinally in the first chamber and meshing with said worm gear, bearings for said worm shaft having end portions of the shaft engaged therein, a retainer threaded into one end of the longitudinally extending chamber and engaging one bearing to retain the bearings and shaft in place, an operating shaft directly engageable with said worm shaft, means to indirectly transmit rotary motion from said operating shaft to said worm shaft, a mounting for said operating shaft, and

means to secure said mounting to said casing with the operating shaft selectively disposed for direct or indirect transmission of motion to said worm shaft, a chuck having a shank adapted to be directly engaged with an end of the worm shaft through the last-mentioned end of said longitudinally extending chamber, and a mounting for said chuck including a sleeve rotatably receiving the shank and threaded into the chamber with its inner end contacting with the retainer.

7. A power operated tool comprising a casing, a worm gear mounted for rotation within said casing, means carried by the worm gear for supporting an operating tool, a worm shaft meshing with said worm gear, an operating shaft, gearing for indirectly transmitting motion from the operating shaft to the worm shaft, the front end of the operating shaft and rear end of the worm shaft being adapted for direct engagement with each other and a bearing member for the operating shaft adjustably secured to the casing, the bearing and casing being shaped to dispose the shafts out of concentric relation thereto whereby the bearing may be selectively attached to the casing in position to support the operating shaft in operative relation to said gearing for indirectly transmitting motion to the worm shaft or in direct connection with the rear end of said worm shaft.

In testimony whereof I affix my signature.

WALTER L. HODEAUX.