July 7, 1970 S. R. PIERCE 3,519,046

PALM POWER SCREW WRENCH

Filed Oct. 9, 1967 2 Sheets-Sheet 1

Fig. 1

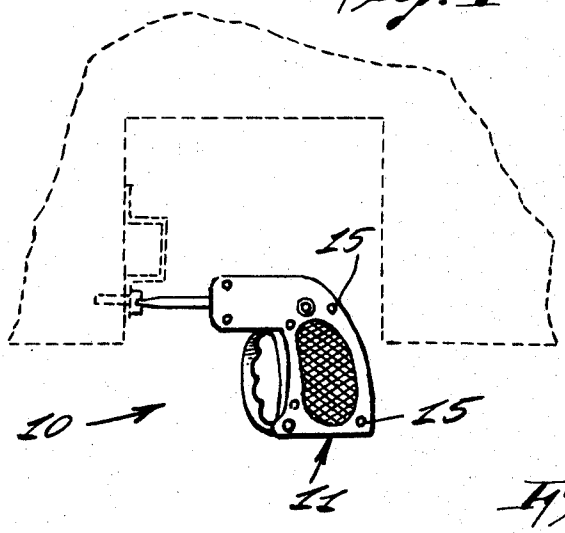

Fig. 2

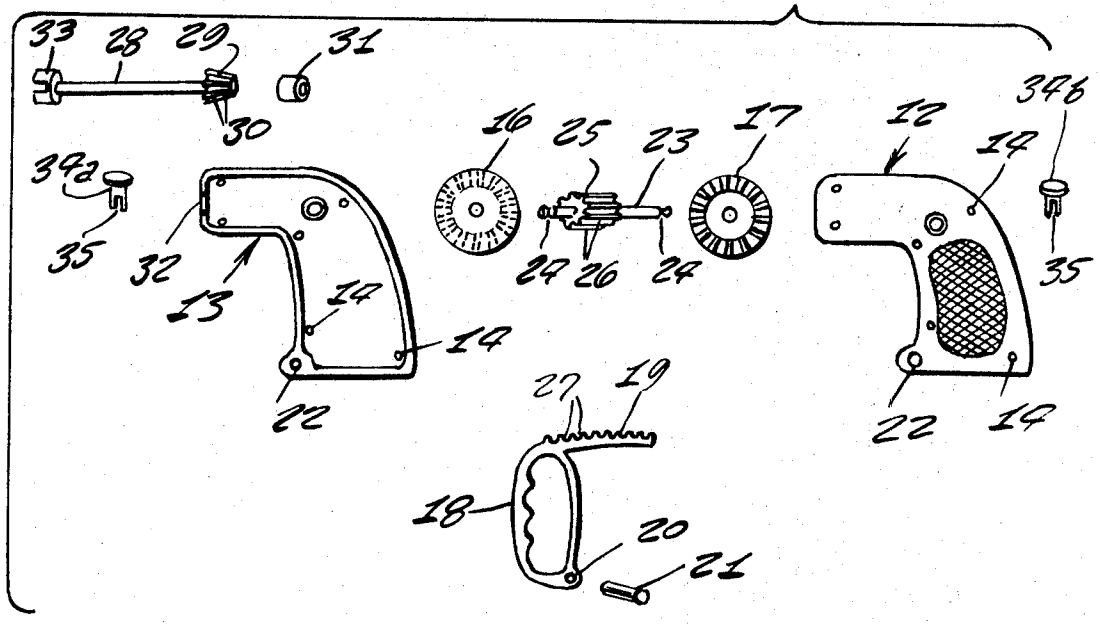

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FIG.3

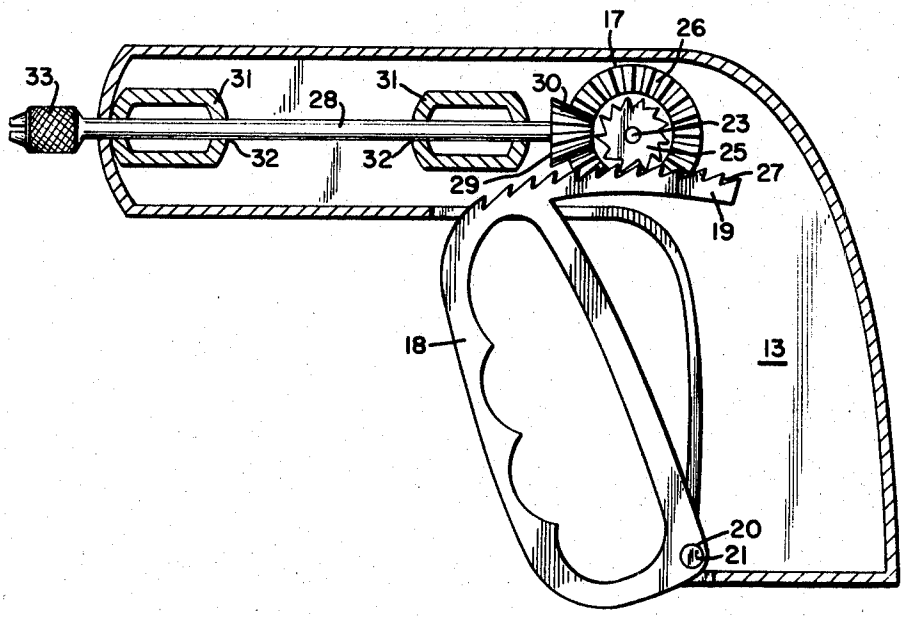


FIG.4

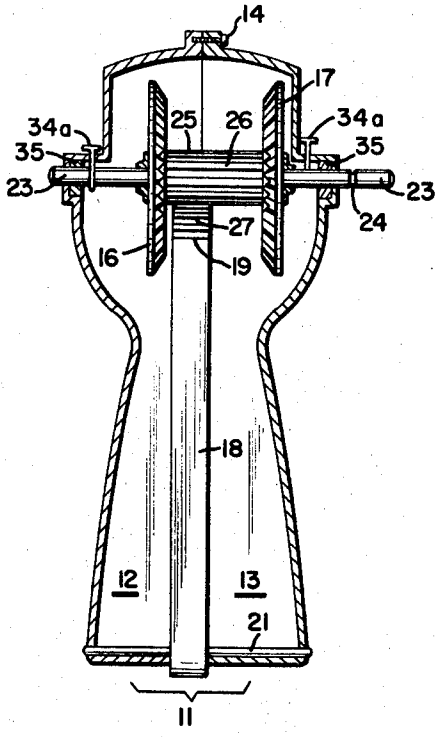
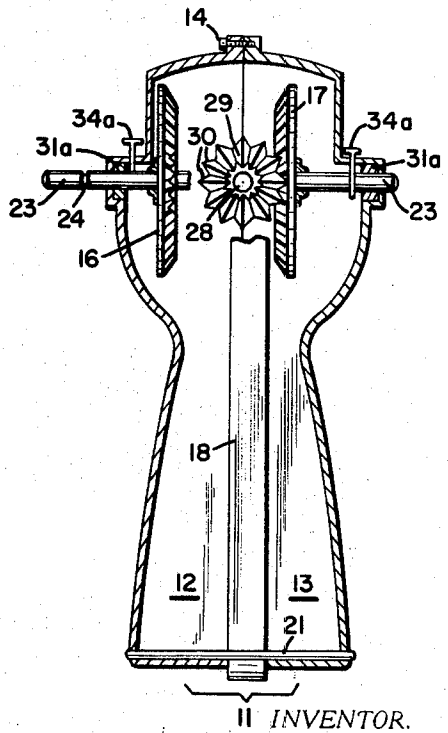


FIG.5



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PALM POWER SCREW WRENCH

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ABSTRACT OF THE DISCLOSURE

A tool for installing threaded fasteners in places having a minimum amount of excess space and where speed or torque is desirable, the tool including a trigger operated mechanism contained within a pistol-grip case.

This invention relates generally to tools. More specifically it relates to tools for turning threaded fasteners.

A principal object of the present invention is to provide a palm-power screw wrench for the purpose of installing threaded fasteners in places with a minimum amount of access space and where speed or torque is desirable.

Another object of the present invention is to provide a palm-power screw wrench which would be superior to ordinary screwdrivers in similar situations by reason that the handle and energy source are off-set from the shaft delivering the force, and turning action.

Yet a further object of the present invention is to provide a palm-power screw wrench having a superior ability to hold in a steady position while the turning force is being delivered to a threaded fastener which is superior compared to the sometimes awkward grip of a handle of a conventional screw driver and the untrue swivel action of the human wrist which accordingly sometime results in misalignment of the screw driver shaft and thereby slipping off the screw head, or resulting in a crooked screw installation.

Other objects of the present invention are to provide a palm-power screw wrench which is simple in design, inexpensive to manufacture, rugged in construction, easy to use and efficient in operation.

These and other objects will be readily evident upon a study of the following specification and the accompanying drawing wherein:

FIG. 1 is a side elevation view of the present invention shown in operative use;

FIG. 2 is an exploded side elevation view of the parts which comprise the present invention;

FIG. 3 is a side elevation view of the hollow case;

FIG. 4 is a cut-away view of a rear end elevation with right and left halves cut away; and

FIG. 5 is a cut-away view of a rear end elevation similar to FIG. 4.

Referring now to the drawing in detail, reference numeral **10** represents a palm-power screw wrench, according to the present invention, wherein there is a pistol-grip case made of high impact plastic or light metal alloy and which is of the size to comfortably fit the average size hand, the pistol-grip case **11** comprising a left-hand **12** and a right hand half **13** which are provided with a plurality of openings **14** for purpose of receiving securement screws **15** therebetween. The pistol grip case **11** is accordingly hollow so as to enclose a common ring and pinion gear **16** and **17**, the gears facing each other.

The present construction further includes a finger-grip **18** having an integral gear rack **19** at its upper end. The finger-grip has an opening **20** for receiving a pin **21** therethrough, the pin being mounted within openings **22** of the pistol-grip case halves **12** and **13**, thus providing pivotal means for the finger-grip **18**. A shaft **23** having locking tabs grooves **24** near each opposite end carries a

sufficiently wide, smaller diameter spur gear **25** thereupon, the teeth **26** of the gear **25** being engaged with the teeth **27** of the gear rack **19**. It is to be noted that the engaging teeth may be at an angle to provide a smooth ratchet action, if so preferred.

A drive shaft **28** carries a pinion gear **29** at one end, the teeth **30** of the pinion gear **29** being engageable with the ring gears **16** and **17**. It is to be noted that the pinion gear may comprise a beveled gear as is indicated in FIG. 2 of the drawing. Bearings **31** are mounted in the barrel opening **32** of the pistol-grip case for purpose of supporting the drive shaft **28**. A tool bit chuck **33** having friction-grip characteristics is adapted to screw driver bits, Allen-head bolts, small diameter wood drills and the like. Locking tabs **34** serve to hold the differential in a proper position.

FIG. 3 is a side elevation of the hollow case **11** with certain parts (listed below) removed to show the arrangement of essential components in the assembled position. The following parts, numerically designated in FIG. 2 have been removed: Left half of case **12**, left side ring bevel gear **16**, left side locking tab **34***a*.

Describing the viewed right hand half of case **13**, with remaining components in assembled position, finger-grip **18** with its integral gear rack **19** is secured to lower end of handle portion of case by means of a movable pin **21**, inserted through matching holes **22**, in right half of case **13** and left half **12** (not shown) and through corresponding hole **20**, in lower end of finger-grip **18**, giving it pivotal action allowing teeth **27**, of gear rack **19** to enmesh in sequence from rear end to forward end with the teeth **26** of the spur gear **25** located on gear shaft **23** between ring bevel gear **17** and ring bevel gear **16** (part removed). As teeth **27** are enmeshed in sequence with teeth **26** as a result of the pivotal action of **18**, the spur gear **25** is rotated in a counter-clockwise direction as viewed from this elevation.

In this view, ring bevel gear **17** is engageable with the pinion bevel gear **29**. Teeth of ring bevel gear **17** enmesh with bevel gear teeth **30** of pinion bevel gear **29**, with the resulting rotation of driveshaft **28**. The upper edge of gear **29** rotating away from the viewer, the lower edge rotating toward the viewer.

The driveshaft **28** extending the length of and an adequate distance beyond the forward end of the barrel portion of the case **13** is supported therein by two sleeve bearings **31** set in openings **32** of the interior surface of the case halves **13** and **12** (part removed) when joined together.

At the extreme forward end of driveshaft **28**, outside of the containment area of **13** and **12**, which when joined comprise the entire case **11** (partially shown), is fitted a chuck **33**, with friction grip characteristics for the purpose of holding the various adaptable screw bits for slot head screws, hex head screws, Allen head bolts and small drill bits.

FIG. 4 is a cut-away view rear end elevation with right and left halves **12** and **13** cut away at a point midway of the longitudinal axis of the gear shaft **23**. Teeth **27** of gear rack **19** are shown enmeshed with **26** of spur gear **25**. Gear shaft **23** with ring bevel gear **16**, spur gear **25** and ring bevel gear **17** positioned thereon in sequence from left to right and secured tightly to said shaft **23** by means of set screws turned against flat areas on shaft **23** at appropriate locations. Said assembly being supported in the enclosed area of the case **11** by means of sleeve bearings **35** set in openings provided in the interior surface of halves **12** and **13**. Gear rack **19** and spur gear **25** in their assembled locations obscures view of pinion bevel gear **29** located on driveshaft **28**. Ring bevel gear **16** is shown held in position to enmesh with pinion gear **29** (obscured by gear **25**) by means of locking tab

34*a* engaged with groove **24** near end of gear shaft **23**. Said position of gears results in counter-clockwise rotation of driveshaft **28** (obscured).

FIG. 5 is a cut-away view, rear end elevation, similar to FIG. 4 except that spur gear **25** and gear rack **19** are removed to show assembled location of pinion gear **29** on driveshaft **28**. In this view the gear shaft **23** with center section cut-away is shifted to the left with ring bevel gear **17** held in position to enmesh with pinion bevel gear **29** by means of locking tab **34***b* on right side of case half **13**, engaged in the groove **24** near right end of shaft **23**. Said position of gears results in clockwise rotation of driveshaft **28**.

In operative use, depending on the desired rotational direction of the drive shaft, for inserting or removing screws, the operator presses either protruding end of the axle shaft until it is flush with the surface of the case. He pushes down on the locking tab **34***a* or **34***b*, each of which is a metal bar set in a narrow slot one-quarter inch below the surface of the case perpendicular to the axle shaft. The notches **35** in the lower ends of the shaft tabs will fit into the grooves **24** near the ends of the shaft and make a firm enmesh of corresponding ring gears with the pinion gear **29**. For example, a clock-wise direction of drive shaft movement is desired to install a screw. By pushing the shaft on the right side of the case and securing the locking tab, then grasping the handle of the tool like a pistol and with all four fingers inserted on the finger-grip, the same is squeezed toward the handle, the gear rack enmeshing with the lower side of the center gear **25**, turning it forward. The right side of the ring gear **17** will enmesh with the pinion gear. Downward turn of the ring gear at the forward perimeter result in clockwise or righthand rotation of the pinion gear and drive shaft. When the last tooth of the gear rack is reached, the power stroke is completed. By exerting pressure on the finger guard with the backsides of the fingers, the trigger is returned to the original position. Due to the angle of the teeth on the gear rack and center gear, plus a spring action in the rack, shaft will remain fixed on the return stroke, undisturbed shaft and tool bit position resulting.

The tool can be manufactured in two models with different gear ratios to result in a low speed, high torque model, and a high speed, low torque model for extreme varying needs of the tool.

While various changes may be made in the detailed construction, it is understood that such changes will

be within the spirit and scope of the present invention as is defined by the appended claims.

I claim:

1. In a palm power screw wrench, the combination of a hollow case, the exterior surface of which is shaped in a manner to fit the contour of the average sized human hand in a gripping position, said hollow case being comprised of a right and left hand half, said case including a central compartment for containing a mechanism to rotate a drive shaft, said mechanism including a pair of ring bevel gears on a gear shaft, a spur gear upon said gear shaft between said ring bevel gears, said ring bevel gears being spaced apart accordingly for said spur gear, a notch near each end of said gear shaft, each of said notches being engageable by a slidable locking tab carried by said case for the purpose of holding said gear shaft to either side to cause either of said ring bevel gears to engage a pinion bevel gear on said drive shaft, drive means associated with said spur gear for rotating said gear shaft to drive said drive shaft, and said drive shaft having a tool bit chuck at its opposite end.

2. The combination as set forth in claim **1** wherein a finger-grip is secured pivotally free upon a pin carried between said pistol-grip case halves, said finger-grip having an integral gear rack, said gear rack being engaged with said spur gear of said gear shaft.

3. The combination as set forth in claim **2** wherein bearings are carried in the barrel portion of said pistol grip case, said bearings supporting said drive shaft at reasonable locations near the forward and rearward ends, and said drive shaft supporting said tool bit chuck.

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U.S. Cl. X.R.

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