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WRENCH FOR CRANKCASE DRAIN PLUGS

Filed Oct. 21, 1964

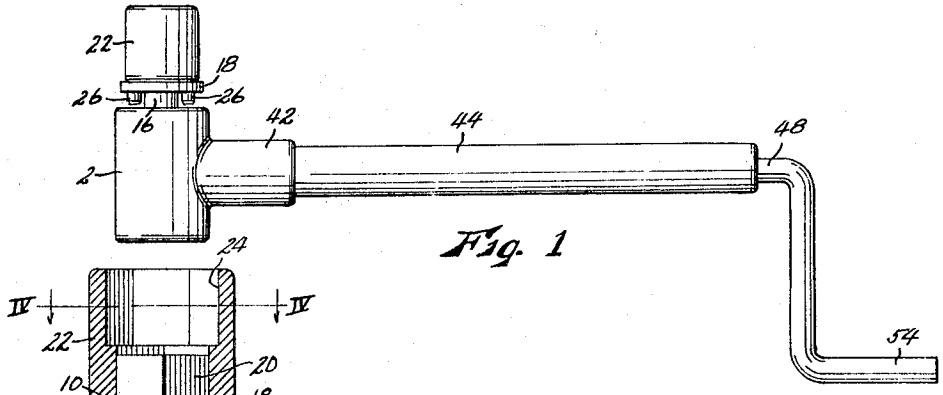


Fig. 1

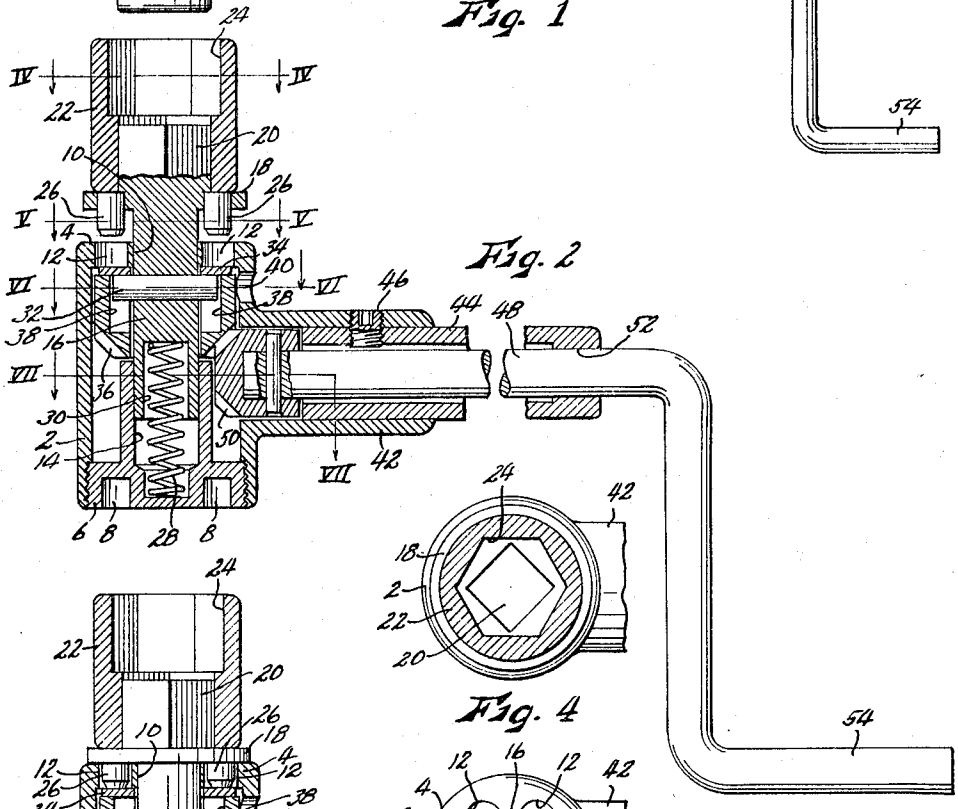


Fig. 2

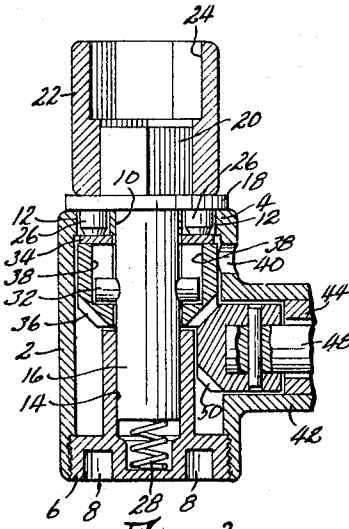


Fig. 3

Fig. 4

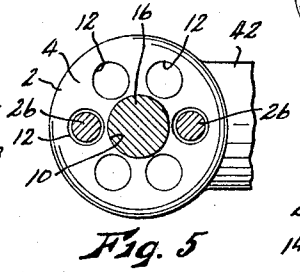


Fig. 5

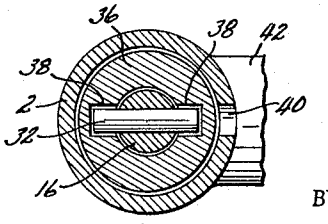


Fig. 6

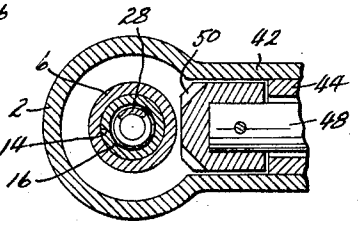


Fig. 7

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WRENCH FOR CRANKCASE DRAIN PLUGS

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This invention relates to new and useful improvements in wrenches, and has particular reference to a wrench especially adapted for removing and inserting the crankcase drain plugs of automotive engines and the like, although it will be readily apparent that the wrench is adapted for many other general usages.

When removing and inserting crankcase drain plugs with conventional wrenches, certain difficulties are often encountered. For example, after loosening the plug to a free-turning condition, it is generally necessary for the operator to perform the last few turns of the plug with his fingers, with the very real danger that when the plug is free, the hot oil gushing forth will burn his fingers and hands. Also, crankcase drain plugs are often relatively inaccessible, so that a conventional wrench can be turned only a small fraction of a turn before it encounters some obstruction, whereupon it must be disengaged from the plug and re-engaged at another angle before it can be turned further. Also, use of a conventional wrench as just described is excessively slow and tedious, under circumstances wherein all possible speed and convenience is usually desirable.

The principal object of the present invention is, therefore, the provision of a wrench which overcomes all of the above enumerated difficulties, in that it permits the operator's hands to be disposed at a safe distance when removing the plug, is provided with an extension handle which may remain stationary once the plug is engaged, and which may extend to a zone of ample space for manipulating an operating means at the distal end of said handle, and which is capable of very fast and continuous operation without requiring periodic disengagement thereof from the plug.

Another object is the provision of a wrench of the character described wherein a wrench socket is operable selectively to be rotated either by turning a crank at the distal end of the extension handle, or to be locked against rotation in this manner and turned by bodily movement of said extension handle, in the manner of an ordinary fixed-handle wrench. The latter type of operation is desirable in the initial loosening and final tightening of the plug, when a torque greater than can conveniently be applied by the crank mechanism may be required.

Briefly, the structure of the invention may be summarized as including a body member carrying an axially rotatable wrench socket, locking means for selectively permitting or preventing rotation of said socket relative to said body member, a rigid handle extending transversely to the socket axis and affixed to said body member, and means at the extended end of said handle to rotate said socket relative to said body member when said locking means is disengaged.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing, wherein:

FIG. 1 is a side elevational view of a wrench embodying the present invention,

FIG. 2 is an enlarged, foreshortened longitudinal sectional view of the wrench as shown in FIG. 1, said wrench being set for crank operation,

FIG. 3 is a fragmentary view, similar to FIG. 2, with the wrench set for operation by turning of the extension handle,

FIG. 4 is a fragmentary sectional view taken on line IV—IV of FIG. 2,

FIG. 5 is a fragmentary sectional view taken on line V—V of FIG. 2,

FIG. 6 is a fragmentary sectional view taken on line VI—VI of FIG. 2, and

FIG. 7 is a fragmentary sectional view taken on line VII—VII of FIG. 2.

Like reference numerals apply to similar parts throughout the several views, and the numeral **2** applies to a hollow cylindrical body member formed of steel or other suitable material, one end of said body member being closed by an integral end wall **4**, and the other end thereof being closed by a threaded plug **6** having recesses **8** for engagement by a pin wrench. End wall **4** has a circular orifice **10** formed centrally therein, and a series of holes **12** (six as shown) formed therethrough and arranged in a circle about orifice **10**. Plug **6** is provided internally with a cylindrical socket **14** which opens toward and is axially aligned with orifice **10**.

Mounted coaxially in body member **2** is a spindle shaft **16**, said spindle being supported for rotation and axial sliding movement in orifice **10** of end wall **4** and in socket **14**, and extending outwardly from end wall **4**. Outwardly from said end wall, the spindle is provided with an integral peripheral flange **18**, and an integral squared lug **20** extending outwardly from said flange coaxially with the spindle. Said lug is adapted to support an ordinary wrench socket **22** having a hexagonal recess **24** adapted to engage a crankcase drain plug (not shown) in the usual manner. This wrench socket is interchangeable with others in order to permit adaptation of the wrench to drain plugs of any size.

Flange **18** of the spindle overlies end wall **4** of the body member, and a pair of short pins **26** are fixed in said flange at diametrically opposite sides of spindle **16**, extending parallel to said spindle toward said end wall, whereby to enter a diametrically opposite pair of holes **12** of said end wall, thereby locking said spindle and body member against relative rotation, whenever said spindle is moved longitudinally inwardly relative to said body member, as shown in FIG. 3.

Inward movement of the spindle is limited by engagement of flange **18** with end wall **4**. Said spindle is biased resiliently outwardly by a compression spring **28** disposed of socket **14** of plug **6**, said spring abutting at its respective ends against the base of said socket and against the base of a socket **30** formed therefor in the inner end of the spindle. Outward movement of the spindle is limited by a pin **32** inserted transversely therethrough within the body member, both ends of said pin projecting outwardly from the spindle, and being urged by spring **28** against a washer **34** surrounding the spindle and disposed against the inner surface of end wall **4**, as shown in FIG. 2. In this position, pins **26** are out of engagement with holes **12** of end wall **4**, and the spindle may therefore rotate freely relative to the body member.

Mounted coaxially on spindle **16** within body member **2**, and longitudinally retained between washer **34** and plug **6**, is a bevel gear **36**. Said bevel gear is freely rotatable in body member **2**, though not movable therein in a direction parallel to its axis. Spindle **16** is axially slidable in the hub of the gear, but is not rotatable therein by virtue of the fact that the projecting end portions of pin **32** are engaged in longitudinally elongated grooves **38** formed internally in the gear hub. Pin **32** may be fitted loosely in the spindle, being inserted therein after the spindle is assembled in the body member, by inserting it through a hole **40** of the body member in normal alignment therewith, but before bevel gear **36** is inserted. Once the gear is inserted, it secures the pin against accidental dislodgment.

Body member **2** is provided with an integral tubular side outlet **42** at right angles to the spindle axis, and a

tubular extension handle 44 is secured therein by screw 46. Said handle may be of any desired length, and a crank shaft 48 is disposed coaxially and rotatably therein. A bevel gear 50 is affixed to the inner end of said crank shaft within body member 2, and is meshed with gear 36. Gear 50 is externally cylindrical and fits in side outlet 42 of the body member with sufficient snugness to serve as a bearing for the inner end of crank shaft 48. At its outer end, handle 44 provides a second journal bearing 52 for the crank shaft. The crank shaft extends outwardly from the gear end of the handle, and the extended portion is transversely offset to form a crank 54 by means of which the shaft may be manually rotated.

In use, the operator engages wrench socket 22 on a crankcase drain plug, or other work piece to be rotated, in the usual manner, handle 44 projecting in whatever direction may be dictated by the accessibility of said drain plug, and then presses body member 2 toward socket 22, thereby causing spindle 16 to slide inwardly relative to the body member, against the pressure of spring 28, and causing pins 26 to enter a pair of the holes 12 of the body member. Since there are six different angular positions of handle 44, relative to the spindle, at which engagement of pins 26 in holes 12 can be affected, little difficulty is experienced in making the engagement even when the drain plug is of difficult access. Preferably, this operation is carried out with one of the operator's hands pressing directly on body member 2, and the other hand steadying handle 44. The parts then have the relative positions shown in FIG. 3, and socket 22 may be turned by direct manual lateral pressure on handle 44 to loosen the drain plug engaged by socket 22, in the manner of an ordinary fixed-handle socket wrench. This type of operation is advantageous in supplying the often substantial torque required to initially loosen a drain plug which has been tightly set. During this operation there is no tendency to rotate crankshaft 48 of crank 54, since spindle 16 and the body member are locked against relative rotation.

After the drain plug has been initially loosened to a comparatively free-turning condition as described above, the operator allows spindle 16 to be extended outwardly by spring 28, thereby disengaging pins 26 from body member holes 12 and freeing the spindle for rotation in the body member. The operator preferably then uses one hand to support the wrench by holding handle 44, and the other hand to turn crank 54, said crank then functioning through crankshaft 48, gears 50 and 36, pin 32 and spindle 16 to rotate socket 22 to complete the removal of the drain plug. This operation as performed by the present wrench has the advantage that it permits the operator's hands to be disposed remotely from the drain plug so as to remove any danger of being burned by hot oil, also that it may be performed without moving handle 44, which is a substantial advantage when removing drain plugs which are of difficult access, and also that it may be performed at a high speed in that rotation of the drain plug is continuous and as fast as crank 54 can be turned, and does not require either a reciprocating motion as with a ratchet wrench, or repeated engagements and disengagements thereof with the drain plug, as with a fixed-handle

wrench. Insertion of a drain plug is carried out by substantially reversing the above procedure, pins 26 being engaged in holes 12 only when performing the final tightening of the plug, this operation normally requiring more torque than can conveniently be supplied by the crank and gear linkage shown.

While I have shown and described a specific embodiment of my invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. A wrench comprising:
   (a) a tubular body member,
   (b) a spindle carried rotatably and coaxially in said body member and extending outwardly therefrom, said spindle being longitudinally movable in said body member to a limited degree and being provided externally of said body member with a peripheral flange,
   (c) a plurality of pins fixed in said flange eccentrically to said spindle and extending toward said body member in a direction parallel to said spindle, said pins terminating short of said body member when said spindle is moved to the outer limit of its longitudinal movement, the wall of said body member confronting said flange being provided with holes capable of being aligned with said pins and to receive said pins when said spindle is moved longitudinally inwardly with respect to said body member, whereby said spindle and body member are locked against relative rotation,
   (d) a spring biasing said spindle longitudinally outwardly,
   (e) a work engaging member outed on the extended end of said spindle and operable by rotation thereof,
   (f) an elongated handle affixed at one end to said body member and extending therefrom angularly to the axis of said spindle, and
   (g) operating means carried by said body member and handle and operable from the distal end of said handle to rotate said spindle without movement of said handle or body member.

2. A wrench as recited in claim 1 wherein the wall of said body member confronting said flange is provided with a plurality of sets of said holes, said sets being angularly offset with respect to said spindle and each adapted to receive said pins therein.

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