Feb. 13, 1962 W. A. DAVIS 3,020,790

CRANKCASE DRAIN PLUG WRENCH

Filed Sept. 4, 1959

Fig. 1

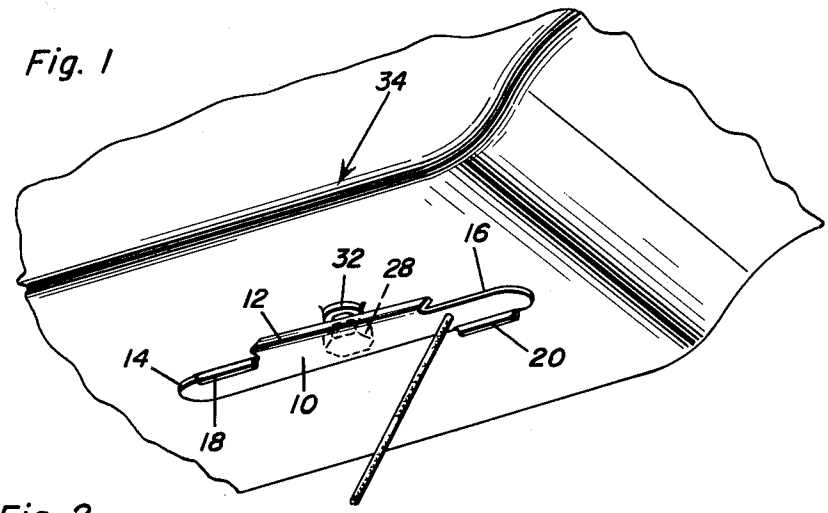


Fig. 2

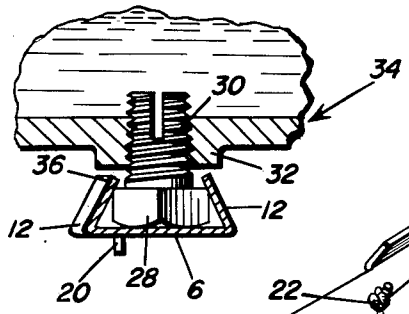


Fig. 3

Fig. 4

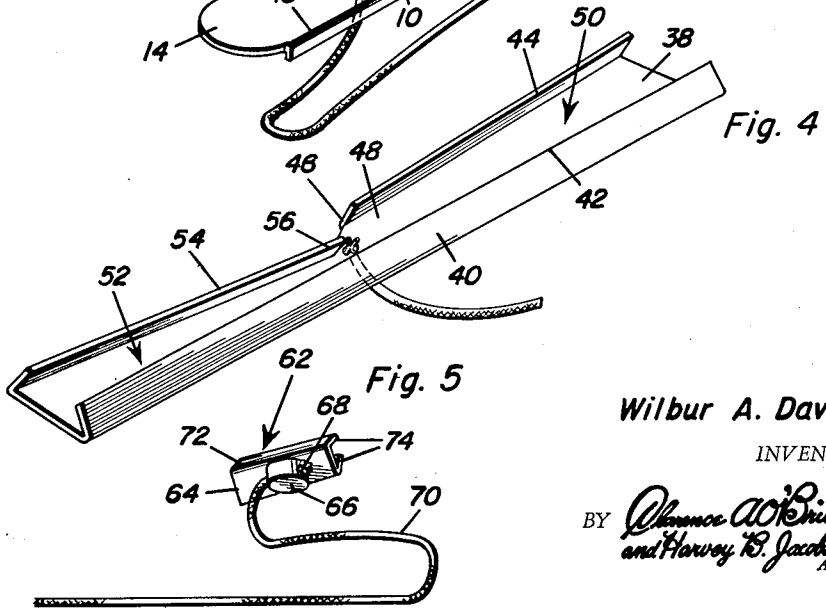


Fig. 5

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CRANKCASE DRAIN PLUG WRENCH

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The present invention relates to a novel and improved wrench which is adapted to be used manually and which is expressly constructed and designed to facilitate the removal of a bolt-type plug (sometimes called a screw plug) from the usual threaded drainage hole in a crankcase, for example, the crankcase commonly associated with the engine of an automobile.

More specifically, the wrench, that is the several embodiments herein under consideration, is a rigid sheet metal or an equivalent type which is characterized by a plate of elongated form and which is slipped into place after the bolt has been initially loosened. The plate has lengthwise flanges which are of requisite length and which are laterally disposed relative to the surface of the plate which contacts the bolt, said flanges serving as wedging and friction gripping jaws. A pull cord is attached to the plate of the wrench so that by winding the cord around the shank of the bolt and pulling on the cord it will cause a rotation of the wrench and will remove the bolt-plug.

One improvement resides in utilizing elongated flanges which converge toward one end of the plate and which flanges also slope toward each other and a central longitudinal portion of the plate to overhang the plate to provide a wedging and secure retaining action so that the bolt will wedge itself tightly between the jaws and will not slip or fall out after it is removed from the crankcase.

The invention features, as mentioned, several adaptations or embodiments of the broad idea, that is of an elongated plate having opposed cooperating jaw-forming flanges. The particulars and features which distinguish these embodiments one from the other will, however, be passed over at this stage and will be set forth in proper detail in the following specification.

Other objects, features and advantages will become more readily apparent from the following description and the accompanying illustrative drawing.

In the drawing wherein like numerals are employed to designate like parts throughout the views:

FIG. 1 is a view in perspective of the improved wedge action spin-type wrench illustrating how it is constructed and intended to be used.

FIG. 2 is a view on a larger scale which shows the crankcase in section, the drain plug or bolt in elevation and the wrench in section and applied to the head of the bolt.

FIG. 3 is a view on an enlarged scale and showing the improved wrench in perspective.

FIG. 4 is also a view in perspective but showing a modified embodiment of the wrench.

FIG. 5 is another perspective view on a smaller scale showing a further modification.

Reference will be made first to FIGS. 1 to 3 inclusive and particularly to FIG. 3. In this figure the aforementioned elongated flat faced plate is of requisite length and width and the median or body portion **6** is wide at the right-hand end portion **8** and gradually narrows toward the left hand end portion **10**, the lengthwise edges being provided with opposed duplicate friction gripping flanges **12**. These flanges correspond in length and are limited to the median portion and they converge toward the left hand end. Contrawise these flanges diverge toward the right-hand end. With the flanges terminating short the end portions **14** and **16** project in the manner shown. The alternate edge portions of **14** and **16** are provided with reinforcing laterally bent lips **18** and **20**. A suitable hole or opening is provided at **22** and one end of a pull rope or cord is passed through the hole and formed into a knot **24** and is thus anchored in place. The free end portion of this pull cord (used for spinning and whipping the wrench) is denoted by the numeral **26**. Not only do the flanges or jaws **12** slope inwardly toward the lengthwise median portion of the plate the edges actually overhang the plate. Moreover the cross-section of the flanges is preferably proportional with the head **28** of the screw-plug or grain bolt as brought out in FIG. 2. The shank or stem of the bolt **30** is threaded into the drain hole **32**. Incidentally, the crankcase is denoted at **34** in FIG. 2 and this figure brings out the cooperative association of the wedging and friction gripping jaws with the peripheral portion of the head **28** of the bolt. The cross-section is preferably such that the wedge-like receptacle formed by the plate and jaws is deeper than the thickness or cross-section of the head **28**. It follows that the edge portions **36** actually project beyond the bolt head in the direction of the shank of the bolt as illustrated. The same basic principles underlie the modifications seen in FIGS. 4 and 5. In FIG. 4 for example the elongated flat faced plate is denoted by the numeral **38** and the lengthwise flange **40** extends the full length of the plate and is sloped so that the edge **42** overlies the cooperating thrust surface of the plate. Along the opposite longitudinal edge selectively usable flanges are provided. That is to say, one overhanging and sloping flange is denoted at the right as at **44** and has its end **46** slanted inwardly toward the median portion of the flange **40** to thus provide one wedge portion **50**. A similar wedge portion **52** is provided at the left hand end portion and this is defined in part by the other sloping and slanting flange **54**. The end portion **56** of this flange also terminates at the central or median portion **48** of the plate and is inwardly inclined toward the flange **40**. The wrench (FIG. 4) here under consideration is intended for holding bolt heads while tightening a nut on the bolt's shank portion. No string is required.

In the modification seen in FIG. 5 the over-all wedge-type friction gripping wrench is denoted by the numeral **62**. Here the wedge-shaped flat faced plate is denoted at **64** and at the center and on one side there is a cylindrical stud-like projection **66** to which the knotted end **68** of the pull cord or rope **70** is connected. In this instance the flanges are commensurate with the length of the short plate and the flanges **72** converge toward the right-hand end as denoted at **74**. The flanges also slope toward each other so that the edge portions overhang the wedge-shaped plate **64**.

In FIG. 5 the cylindrical member is a sawed-off form intended for use in removing drain oil plugs on cars which have limited space between oil pan and tie rods and above all the body **64** and jaws **74** must be short otherwise one gets a whip action in rotation. Therefore, its use is limited to possibly three bolt sizes only.

It will be evident from the construction shown that one wrench will fit many or several different sizes of bolt heads. The sides of the jaws are sloped to form a binding and friction clamping action over the bolt head to prevent it from falling out of the wrench. When torque pressure is applied for a loosening action against the bolt head, due to the initial resistance of the bolt, it will have a tendency to lock itself in the wrench. The pull cord or rope in one case may be used as a spinning or wrench propelling device and in both cases it serves as a means of not permitting the wrench or the bolt

to drop into the oil receiver. This pull cord is used to jerk the wrench free of the removed plug. The main application is where the wrapping and pulling of the rope will create a rapid spin action. The wrench may be regarded as adjustable by push pressure to fit either square or hexagon shaped heads on bolts or nuts. It can be used in the hand as a simple back-up wrench. It has been found to be adaptable for practical use on so-called foreign make cars.

In addition to the above it may be added that this wrench was obviously primarily designed to be used by service station attendants for changing crankcase oil. It is designed to fit various sizes of bolts. The attendant employs the wrench to wedge the same properly on the bolt head and initially loosen the bolt, holds the cord in one hand and with the other hand spins the wrench to remove the bolt. This enables him to remove the plug or bolt without getting hot dirty oil on his person or his work clothing and, of course, by hanging onto the cord, he will not lose the plug in the receiver in which the oil is trapped.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and chanegs will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A manually usable wrench comprising an elongated plate having a flat surface portion thereof designed to bear firmly against the head of a bolt, the longitudinal edges of said plate having longitudinal flanges, said flanges converging lengthwise toward one end of the plate and defining a wedge-like space between themselves into which the bolt head may be moved to seat itself whereupon the flanges then jam upon and frictionally grip the then lodged head and serve as jaws when torque is applied, said flanges being relatively inclined and outwardly convergent to one side of said plate, and a flexible element having one end secured to said plate.

2. A manually usable wrench comprising an elongated plate having a flat surface portion thereof designed to bear firmly against the head of a bolt, the longitudinal edges of said plate having longitudinal flanges, said flanges converging lengthwise toward one end of the plate and defining a wedge-like space between themselves into which the bolt head may be moved to seat itself whereupon the flanges then jam upon and frictionally grip the then lodged head and serve as jaws when torque is applied, and a flexible element having one end secured to said plate, said flanges sloping toward each other at their outer free lengthwise edges, at least one of said outer edges overhanging the adjacent marginal edge portion of said plate.

3. The structure defined in claim 2 and wherein said flanges are of equal length and are confined to the median portion of the plate with their ends spaced inwardly from the transverse end portions of said plate.

4. The structure defined in claim 2 and wherein said flanges are of equal length and are confined to the median portion of the plate with their ends spaced inwardly from the transverse end portions of said plate, said lengthwise edges of said flanges being spaced from said plate a distance greater than the thickness of the head of the bolt, whereby when the head is fully seated and gripped the free lengthwise edges project beyond the head in a direction toward the shank of the bolt.

5. A manually usable wrench comprising an elongated plate having a flat surface portion thereof designed to bear firmly against the head of a bolt, the longitudinal edges of said plate having longitudinal flanges, said flanges converging lengthwise toward one end of the plate and defining a wedge-like space between themselves into which

the bolt head may be caused to seat itself whereupon the flanges then jam upon and frictionally grip the then lodged head and serve as jaws that is when the intended torque is applied, said flanges being commensurate in length with the over-all length of the plate and having their edge portions overhanging marginal edges of the plate, the median part of the plate on one side being provided with a stud and one end of a flexible element being secured to said stud.

6. A manually usable wrench comprising an elongated plate having a flat surface portion thereof designed to bear firmly against the head of a bolt, the longitudinal edges of said plate having longitudinal flanges, said flanges converging lengthwise toward one end of the plate and defining a wedge-like space between themselves into which the bolt head may be moved to seat itself whereupon the flanges then jam upon and frictionally grip the then lodged head and serve as jaws when torque is applied, and a flexible element having one end secured to said plate, one flange being of a length corresponding with the length of the plate, said flange being on one edge of the plate, there being a pair of flanges on the opposite edge of the plate and said last named flanges having their inner ends toward the median portion of the plate spaced apart and diagonally angled so that the portions of the plate on opposite sides of the median part of the plate constitute distinguishably different wedge-shaped selectively usable wrenches.

7. A manually usable wrench comprising an elongated plate having a flat surface portion thereof designed to bear firmly against the head of a bolt, the longitudinal edges of said plate having longitudinal flanges, said flanges converging lengthwise toward one end of the plate and defining a wedge-like space between themselves into which the bolt head may be moved to seat itself whereupon the flanges then jam upon and frictionally grip the then lodged head and serve as jaws when torque is applied, one flange being of a length corresponding with the length of the plate, said flange being on one edge of the plate, there being a pair of flanges on the opposite edge of the plate and said last mentioned flanges having their inner ends toward the median portion of the plate, spaced apart and diagonally angled so that the portions of the plate on opposite sides of the median part of the plate constitute distinguishably different wedge shaped selectively usable wrenches.

8. A manually usable wrench comprising an elongated plate having a flat surface portion thereof designed to bear firmly against the head of a bolt, the longitudinal edges of said plate having longitudinal flanges, said flanges converging lengthwise toward one end of the plate and defining a wedge-like space between themselves into which the bolt head may be moved to seat itself whereupon the flanges then jam upon and frictionally grip the then lodged head and serve as jaws when torque action is applied, said flanges being relatively inclined and outwardly convergent to one side of said plate.

9. A manually usable wrench comprising an elongated plate having a flat surface portion designed to bear firmly against the head of a bolt, the longitudinal edges of said plate having longitudinal flanges, said flanges converging lengthwise toward one end of the plate and defining a wedge-like space between themselves into which the bolt head may be moved to seat itself whereupon the flanges then jam upon and frictionally grip the then lodged head and serve as jaws when torque is applied, one flange being of a length corersponding with the length of the plate, said flange being on one edge of the plate, there being a pair of flanges on the opposite edge of the plate and said last mentioned flanges having their inner ends toward the median portion of the plate, spaced apart and diagonally angled so that the portions of the plate on opposite sides of the median part of the plate constitutes distinguishably different wedge-shaped selectively usable wrenches, the inner end of one of said last mentioned

flanges being spaced closer to said one flange than the inner end of the other of said last mentioned flanges.

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