

Nov. 6, 1962

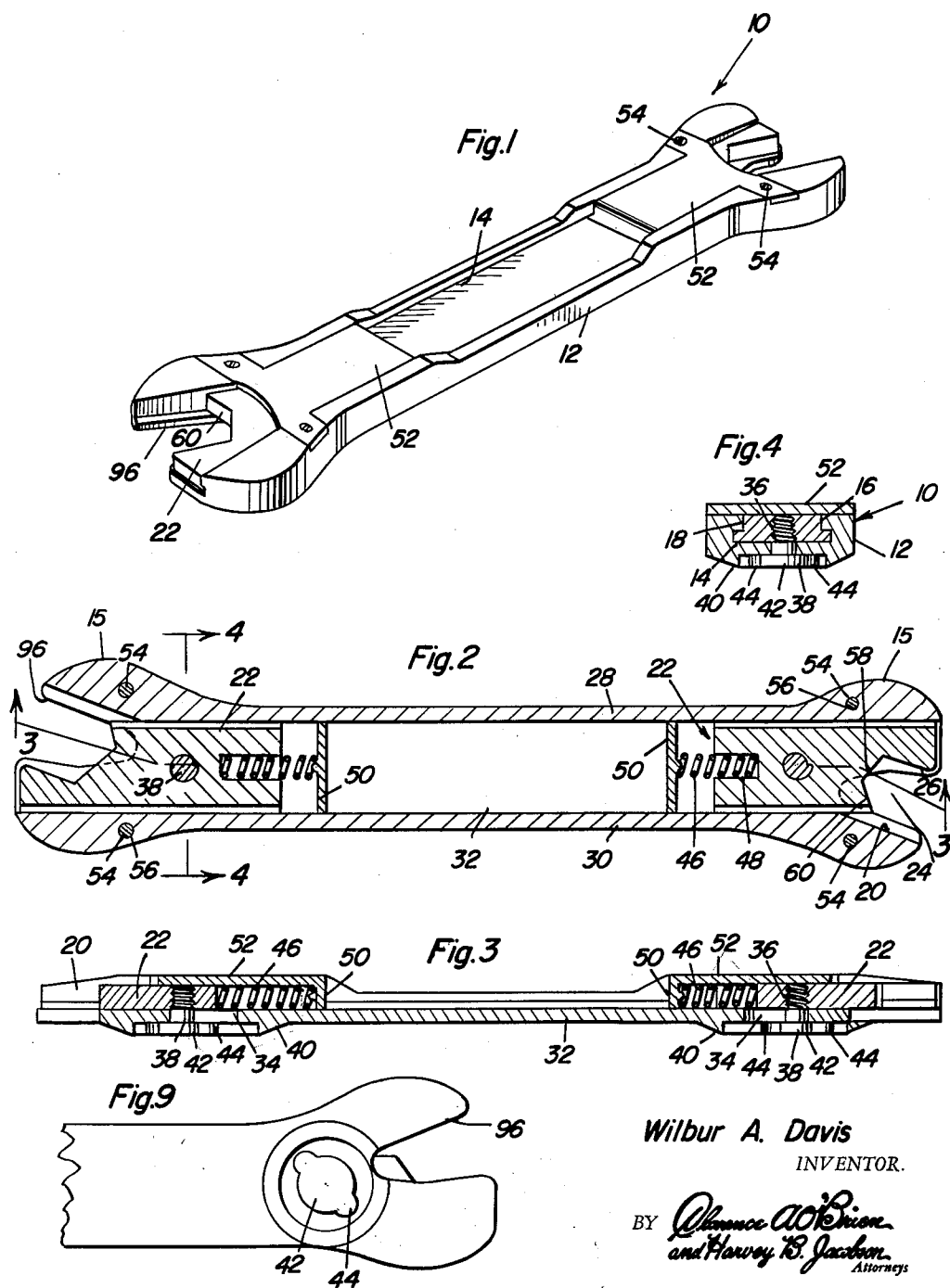
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3,062,079

END WRENCH WITH SLIDABLE JAW INSERT

Filed Feb. 23, 1960

2 Sheets-Sheet 1



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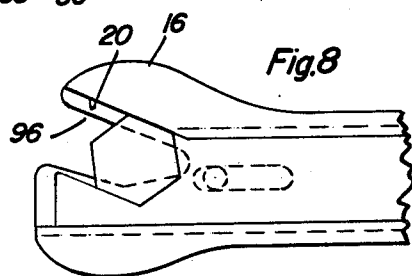
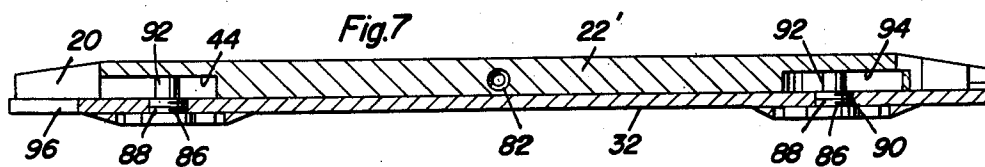
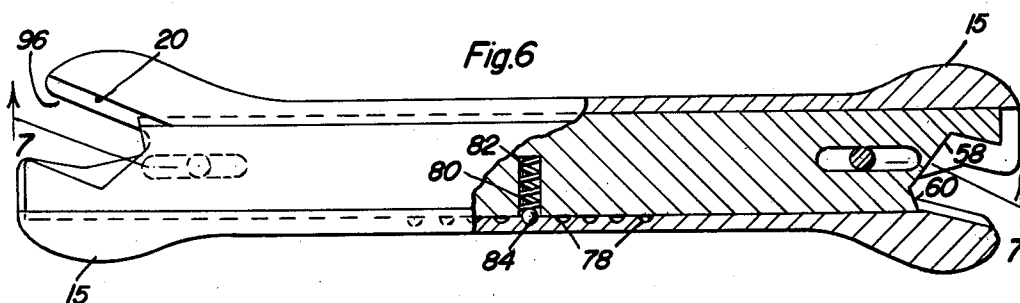
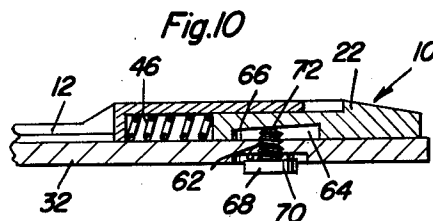
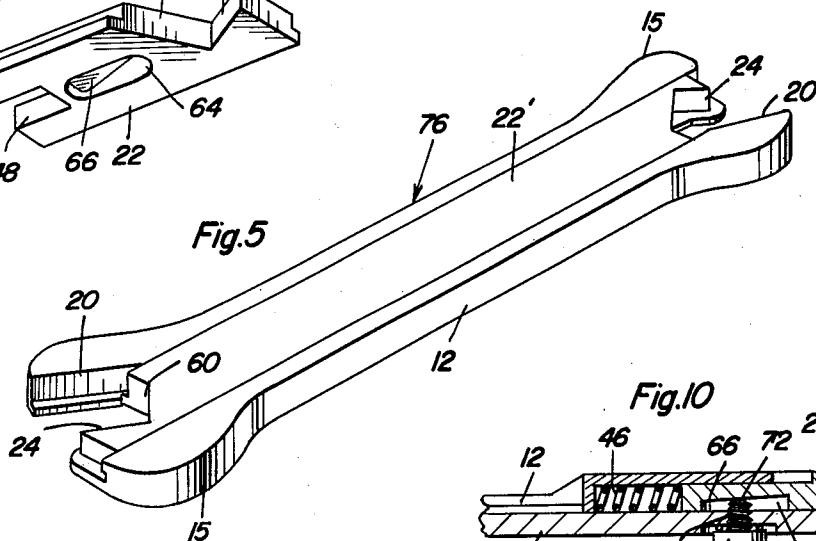
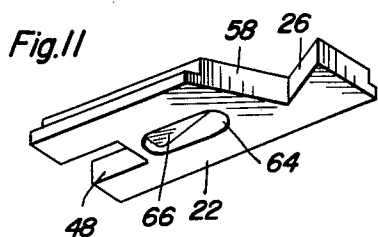
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3,062,079

END WRENCH WITH SLIDABLE JAW INSERT

Filed Feb. 23, 1960

2 Sheets-Sheet 2



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3,062,079

END WRENCH WITH SLIDABLE JAW INSERT

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Filed Feb. 23, 1960, Ser. No. 10,294

3 Claims. (Cl. 81-129)

This invention relates to a novel and useful end wrench, and more particularly to an end wrench which is particularly well adapted for engagement with even sided polygonal heads of fasteners. The end wrench of the instant invention is also particularly well adapted to be quickly adjusted for the various sizes of polygonal headed fasteners.

Many repairmen and the like are constantly in need of a versatile end wrench which may be quickly set for engagement with a certain size of headed fastener. End wrenches known heretofore have been provided with a pair of opposing fixed jaws which are specifically adapted for engagement with only one size headed fastener. There have of course been other forms of end wrenches having opposing jaws with one of the jaws mounted for sliding movement relative to the other jaw but for the most part these have been provided with screw threaded adjusting means for positioning the jaws relative to each other. These previously known end wrenches, such as the more commonly known crescent wrench, may be used for only short periods of time before the adjustment of the jaws must be corrected inasmuch as constant use of these types of wrenches causes the adjusting means to move slightly each time the wrench is engaged with a fastener. More recently, certain types of lock means have been devised for use with the adjusting means of crescent wrenches, however, it becomes bothersome to have to adjust the end wrench to correctly position the jaws relative to each other and then manipulate a locking means to retain the adjusting means in its adjusted position. Of course, with this type of wrench each time the relative positioning of the jaws is changed, the locking means must be disengaged, the screw threaded adjusting means must be manipulated, and then the locking means must again be engaged. This repeated process each time the wrench must be adjusted for engagement with different sized fasteners is not only tiring but also time-consuming.

The main object of this invention is to provide an end wrench having a stationary jaw and a movable jaw mounted for movement toward and away from the stationary jaw with nut or fastener gripping surfaces disposed at an acute angle relative to the sliding movement of the sliding jaw whereby, unless the fastener is extremely hard to turn, a retaining means for retaining the sliding jaw in adjusted positions relative to the stationary jaw will not be needed. In this case, the frictional engagement of the sliding jaw with the stationary jaw for movement along a path disposed at an acute angle to the parallel and opposed gripping surfaces of the wrench when a fastener is disposed between the gripping surfaces of the wrench will be sufficient to maintain the gripping jaws in their adjusted positions relative to each other.

A further object of this invention, in accordance with the immediately preceding object, is to provide a means for resiliently urging the sliding jaw away from the stationary jaw with an abutment means being provided on the sliding jaw for engaging the surfaces of the fastener adjacent those being gripped by the wrench being provided for moving the sliding jaw into correct position relative to the stationary jaw to frictionally engage and grip the opposite side surfaces of the equal sided polygonal head of a fastener.

Yet another object of this invention, in accordance with the preceding objects, is to provide means for resiliently retaining the sliding jaw in adjusted positions relative to

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the fixed jaw whereby it will not be necessary to constantly adjust the relative positioning of the two gripping jaws.

Another object of this invention in accordance with the immediately preceding object, is to provide a double-ended wrench with the sliding jaws of each end of the wrench being formed integrally and each end of the wrench being specifically adapted to be resiliently retained in adjusted positions of different increments. That is to say, one end of the wrench could be, in cooperation with the means for resiliently retaining the sliding jaw in adjusted positions relative to the fixed jaw, adapted to be successively or adjustably positioned in increments of a sixteenth of an inch with the other end of the jaw being adapted to be positioned in increments of one-thirty second of an inch.

Yet another object of this invention is to provide a means for frictionally retaining the sliding jaws in adjusted positions relative to the fixed jaws.

A still further object of this invention is to provide a means for limiting the movement of the sliding jaw away from the stationary jaw by means of the resilient means urging the two jaws away from each other.

Another object of this invention, in accordance with the immediately preceding object, is to provide a means for adjusting the limiting means whereby the wrench may be pre-set for headed fasteners of varying dimensions.

Yet another object of this invention is to provide a means for retaining the jaws of the wrench in engagement with the fastener against movement of the wrench axially of the fastener in at least one direction.

And a final object to be specifically enumerated herein is to provide an end wrench which will conform to the conventional forms of manufacture, be of simple construction and easy to operate so as to provide a device that will be economically feasible, long lasting and desirable by persons whose jobs require that they tighten or remove fasteners having even sided polygonal heads.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of a preferred form of end wrench;

FIGURE 2 is a longitudinal horizontal sectional view of the end wrench shown in FIGURE 1 taken substantially upon a plane passing through the center thereof and showing the details of its construction;

FIGURE 3 is a longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 3-3 of FIGURE 2;

FIGURE 4 is a transverse vertical sectional view taken substantially upon the plane indicated by the section line 4-4 of FIGURE 2;

FIGURE 5 is a perspective view of a modified form of end wrench similar to that illustrated in FIGURE 1 but of more simple construction;

FIGURE 6 is a top plan view of the modified form of end wrench shown in FIGURE 5 with portions thereof being shown in section;

FIGURE 7 is a longitudinal vertical sectional view taken substantially upon the plane indicated by the section line 7-7 of FIGURE 6;

FIGURE 8 is a fragmentary plan view of the form of the wrench illustrated in FIGURE 6 shown with a hexagonal headed fastener engaged between the gripping surfaces thereof on one end of the wrench;

FIGURE 9 is a fragmentary plan view of the bottom side of the wrench illustrated in FIGURE 8;

FIGURE 10 is a fragmentary vertical sectional view

of a modified form of one end of the wrench illustrated in FIGURES 1 through 3; and

FIGURE 11 is a perspective view of the sliding jaw used in connection with the modified form of the invention illustrated in FIGURE 10.

Referring now more specifically to the drawings, the numeral 10 generally designates the preferred form of end wrench comprising the present invention. The end wrench 10 comprises an elongated handle 12 having an inverted T-shaped groove 14 formed in its upper surface.

Both ends of the handle 12 are identical and are slightly enlarged as at 15 and inasmuch as both ends are identical, only one end of each of the embodiments of the wrench 10 disclosed herein will be described. The T-shaped groove 14 is provided with opposite side walls 16 and 18 and the side wall 16 is outwardly divergent at one extremity to form a first gripping surface 20. It is to be understood that although the gripping surface 20 is illustrated as being substantially straight, that it may be provided with knurling or teeth if it is so desired.

Disposed in each end of the inverted T-shaped groove 14 is a sliding jaw generally designated by the reference numeral 22. The sliding jaw 22 is complementary in cross-section to the T-shaped groove and is therefore limited for sliding movement in either direction longitudinally of the groove 14. The outer end of the sliding jaw 22 is provided with a recess 24 which is offset to one side of the jaw 22 and is provided with a gripping surface 26 which is parallel to the gripping surface 20. The gripping surfaces 20 and 26 oppose each other and are adapted to engage opposite sides of a fastener having a head polygonally shaped with an equal number of sides.

The handle 12 of the end wrench 10, is provided with a longitudinally extending inverted T-shaped groove 14 and includes a pair of sides 28 and 30 interconnected by a lower bight portion 32. Each end extremity of the bight portion 32 is provided with an elongated slot 34 communicating with the inverted T-shaped groove 14, and the sliding jaw 22 is provided with an internally threaded bore 36 which is registerable with the slot 34. A headed fastener 38 is threadedly engaged in the threaded bore 36 and projects from the lower surface of the bight 32. The bight portion 32 is provided with a surrounding shoulder 40 which is adapted to at least partially enclose the head 42 of the threaded fastener 38 which is provided with suitable radially extending lugs 44 for facilitating the manipulation of the threaded fastener 38. In this manner, it will be noted that the sliding jaw 22 may be frictionally retained in adjusted position relative to the handle 12 by means of the threaded fastener 38. When the threaded fastener 38 is not retaining the sliding jaw 22 in adjusted positions relative to the handle 12, the compression spring 46 which has one end seated in the longitudinally extending notch 48 formed in the sliding jaw 22 and the other end frictionally engaged with the downwardly projecting flange 50, forming a part of the cover plate 52, normally urges the sliding jaw 22 outwardly of the corresponding end of the handle 12 and thereby normally urges the gripping surfaces 20 and 26 away from each other. The cover plate 52 is retained in position over the sliding jaw 22 by means of suitable threaded fasteners 54 which are engaged in suitable threaded bores 56 formed in opposite sides of each end of the handle 12.

The recess 24 is also provided with suitable angulated surfaces 58 and 60 which are adapted to engage, in surface to surface contacting relation, the sides of a fastener having a hexagonal head between the opposite sides engaged by the gripping surfaces 20 and 26. It is to be noted that the wrench 10 illustrated in the drawings is particularly adapted for use in connection with hexagonal headed fasteners and that a single angulated or abutment surface would be provided if the wrench 10 were adapted for use in connection with fasteners having square heads.

In operation, the end wrench illustrated in FIGURES

1 through 4 of the drawings has its sliding jaws 22 resiliently urged outwardly of the corresponding ends of the wrench 10, and it will be noted that when the gripping surfaces 20 and 26 are positioned to embrace a fastener having a hexagonal head the two sides of the hexagonal heads of the fasteners seated within the recess 24 will conform to and will be positioned in surface to surface contacting relation with either of the abutment surfaces 58 or 60. In this manner, as a headed fastener is engaged by the wrench 10, the head of the fastener is moved inwardly of the corresponding end of the wrench until four adjacent sides of the hexagonal head of the fastener are in surface to surface contacting relation with the gripping surfaces 20 and 26 and the abutment surfaces 58 and 60. The handle 12 of the wrench 10 may then be pivoted about the axis of rotation of the fastener to either tighten or loosen the same. It will be noted that the acute angle at which the gripping surfaces 20 and 26 are disposed relative to the longitudinal sliding movement of the sliding jaw 22 will not necessarily require that the threaded fastener 38 be utilized to maintain the sliding jaw 22 in fixed position relative to the handle 12 while turning the fastener.

With reference to FIGURES 10 and 11 of the drawings, there will be seen a modified form of the wrench illustrated in FIGURES 1 through 4 which is identical to that disclosed in FIGURES 1 through 4 with the exception of the headed fastener for retaining the sliding jaw in adjusted positions relative to the handle 12. In this form of the invention, a threaded bore 62 is provided in the bight portion 32 of the handle 12 and a recess 64 is formed in the bottom of the sliding jaw 22 which is provided with an inclined abutment wall 66. It will thus be apparent that the knurled head 68 of the threaded fastener 70 may be manipulated to adjust the penetration of the innermost end 72 thereof into the recess 64 to limit the outward movement of the sliding jaw 22.

With particular attention now directed to the modified form of wrench illustrated in FIGURES 5 through 8, it will be seen that the modified form of wrench is generally designated by the reference numeral 76. The wrench 76 is substantially identical in all respects to the wrench 10 with the exception that instead of two sliding jaws 22 being provided there is but one sliding jaw 22' provided which has formed on its opposite ends a pair of recesses 24.

In this form of the wrench the side wall 12 is provided with a series of longitudinally aligned and spaced recesses 78 and the sliding jaw 22' is provided with a transversely extending blind bore 80 in which there is disposed a compression spring 82 which acts against a ball detent 84 selectively engageable in the recesses 78. It is to be understood that the recesses 78 will be positioned longitudinally along the handle 12 to provide the adjustment of the gripping surfaces 20 and 26 of the wrench 76 in increments of possibly odd sixteenths of an inch on one end of the wrench 76 and even sixteenths on the other end of the wrench 76. It will be noted that the threaded fastener 86 provided with wrench 76 includes a threaded portion 88 threadedly engaged in threaded bore 90 formed in the bight portion of the wrench 22. There is also provided a shank portion 92 which projects into the recess 94 formed in the undersurface of the sliding jaw 22' adjacent each end thereof. Therefore, if it is desired, after the sliding jaw 22' has been correctly positioned, the threaded fastener 86 may be manipulated to engage its shank portion 92 with the bottom of the recess 94 to frictionally retain the sliding jaw 22' in adjusted position relative to the handle of the wrench 76.

It will be noted that the opposite ends of the bight portions 32 of the wrenches 10 and 76 are provided with suitable notches 96 which register with the recesses 24 to provide clearance for the shank of a fastener being engaged between the gripping surfaces 20 and 26. It will be noted that the sides of the notches 96 are outwardly

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divergent which provides for a larger shank on a fastener having a larger head thereon. Further, the portions of the bight portion 32 surrounding the notches 96 define shoulder portions which are adapted to underlie the head of a fastener and thereby facilitate the maintaining of the wrenches 10 and 76 in engagement with the fastener. After the head of the fastener has been engaged and the fastener has been removed slightly, the edges or shoulders of the bight portion 32 surrounding the notch 96 may be engaged beneath the head of the fastener to resist movement of the latter axially of the fastener in at least one direction.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes 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. An end wrench comprising a stationary jaw, a slidable jaw mounted for sliding movement relative to said stationary jaw, said jaws having generally parallel gripping surfaces inclined at an acute angle relative to the direction of movement of said slidable jaw, whereby said gripping surfaces are mounted for movement toward and away from each other to grip opposite sides of the polygonal head of a fastener disposed therebetween, said slidable jaw being provided with abutment means inclined relative to the gripping surface thereon adapted to engage a side between said opposite sides of said polygonal head upon movement of said jaws to embrace said fastener, whereby the gripping surface of said slidable jaw will be moved toward the gripping surface on said stationary jaw, means resiliently urging said slidable jaw relative to said stationary jaw in a direction to increase the spatial relationship of said gripping surfaces, means limiting movement of said slidable jaw away from said stationary jaw said limiting means being adjustable.

2. The combination of claim 1 wherein said abutment means includes at least one abutment surface inclined rel-

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ative to said gripping surfaces adapted to conform to and engage at least one side of a polygonal head of a fastener disposed with its opposite side surfaces in abutting relation with said gripping surfaces.

3. An end wrench comprising an elongated handle, a generally U-shaped longitudinally extending groove formed in said handle in at least one end thereof, one side surface of said groove adjacent the outer end thereof being outwardly divergent relative to the other side surface defining a stationary jaw gripping surface, a sliding jaw slidably disposed in said groove having a gripping surface formed thereon opposite end parallel to said side surface gripping surface, whereby said gripping surfaces are mounted for movement toward and away from each other to frictionally engage and grip the opposite sides of an even sided polygonal head of a fastener disposed therebetween, the bight portion of said handle being provided with a notch in said one end adapted to receive the shank of a fastener with which said jaws are engaged, said notch having outwardly divergent sides to accommodate the larger shanks of larger fasteners, said bight portion projecting slightly inwardly at least of said stationary jaw gripping surface toward said sliding jaw and defining a retaining flange adapted to engage the undersurface of the head of a fastener.

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