Oct. 14, 1958 S. YAVNER 2,855,814

OPEN END WRENCH WITH SLIDABLE JAW FACE

Filed Oct. 24, 1956

FIG. 1

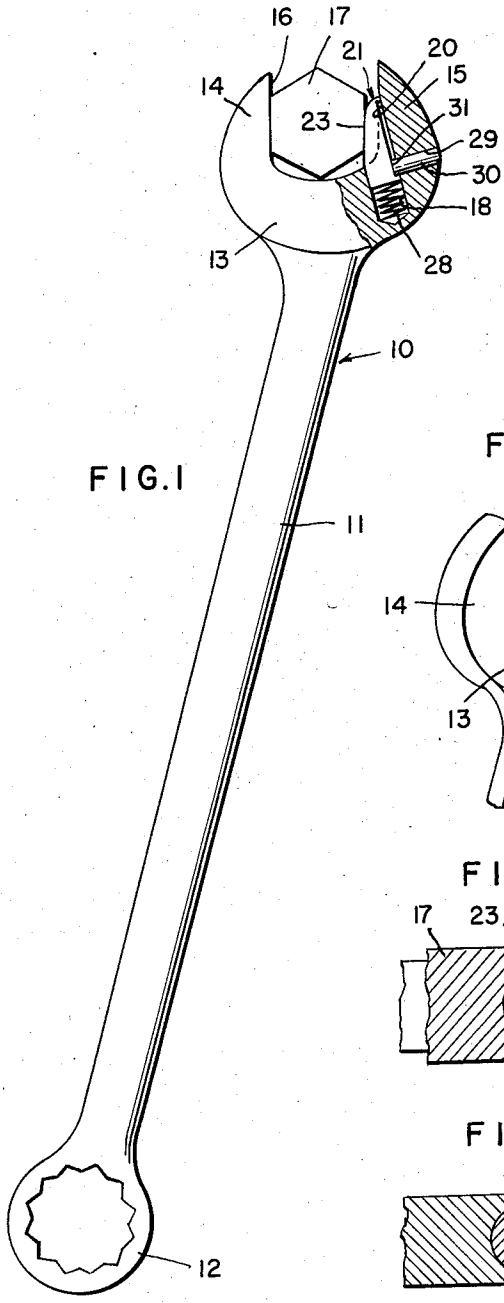


FIG. 2

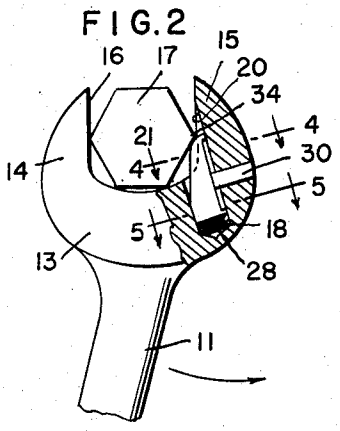


FIG. 3

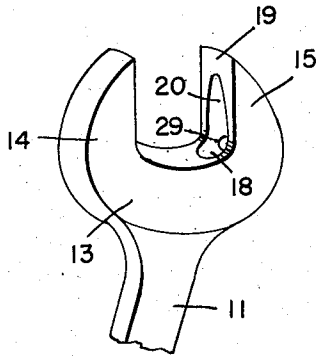


FIG. 6

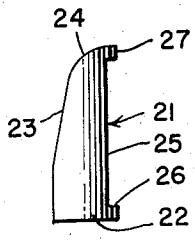


FIG. 4

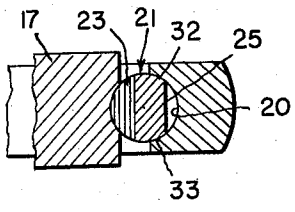


FIG. 7

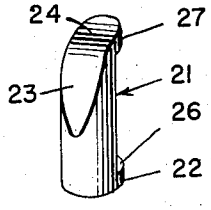
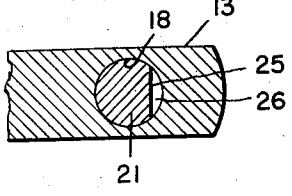


FIG. 5



Inventor
Sylvan Yavner

By Shoemaker & Mattare
ATTYS

United States Patent Office 2,855,814 Patented Oct. 14, 1958

2,855,814

OPEN END WRENCH WITH SLIDABLE JAW FACE

Sylvan Yavner, Norfolk, Va., assignor to Syco Manufacturing Company, Inc., a corporation of Virginia

Application October 24, 1956, Serial No. 618,113

4 Claims. (Cl. 81—179)

This invention relates generally to open end wrenches and more particularly to improvements in wrenches of this type as are, for example, disclosed in my prior Patents 2,592,781, April 15, 1952, and 2,646,711, July 28, 1953.

Open end wrenches are particularly useful in tightening or loosening nuts, bolts, couplings and the like where such elements are impossible to manipulate by a box end wrench or socket wrenches (such as a coupling in a conduit) or in any case where the nut or the like is sufficiently accessible to permit an open end type wrench to be used. Generally speaking, an open end wrench is easier to use than a box end wrench unless the position of the nut or the like is such as to permit turning the wrench a full 360°, a condition not often encountered in practice. Likewise, an open end wrench is usually preferable to a ratchet handle drive and socket assembly where space permits the open end wrench to be engaged upon the nut or the like even though the wrench cannot be swung through a complete 360°, a condition often encountered in practice.

However, even though open end wrenches are desirable, as above exemplified, their cost of manufacture must necessarily be maintained at a sufficiently low level as to render them economically feasible. To accomplish this goal, open end wrenches must require only a minimum amount of machining and special preparation in their component parts above and beyond that required to manufacture an open end wrench of conventional design.

It is, therefore, a primary object of this invention to provide a novel combination of component parts which in themselves require only the simplest machining operation for their construction and in which these component parts may be used in combination with an open end wrench of entirely conventional design with only the simplest of modifications thereto.

More specifically, an object of this invention resides in the provision of a wrench as set forth in the preceding object wherein the conventional open end wrench need undergo only two simple drilling operations to prepare the same for conversion to an open end slidable jaw face wrench as embodied in this invention.

Another object of this invention resides in a wrench of the character above described wherein the jaw face and retaining pin for the same are so constructed as to be fabricated from round stock so as to require only simple drilling operation on a conventional open end wrench to ready the same for their reception in combination therewith.

In the drawings:

Fig. 1 is a plan view of a wrench constructed in accordance with this invention with a portion thereof being broken away to show details of internal construction and illustrating the manner in which the wrench operatively engages an associated nut;

Fig. 2 is a view similar to Fig. 1 but showing the position of parts as the wrench is swung in a direction to effect the ratcheting action;

Fig. 3 is a perspective view of the wrench head assembly with the jaw face and component parts being removed and illustrating the recess in the head for the reception of such jaw face;

Fig. 4 is an enlarged sectional view taken substantially along the plane of section line 4—4 in Fig. 2 illustrating the relationship between the jaw face and the adjacent wrench bill;

Fig. 5 is a sectional view taken along the plane of section line 5—5 in Fig. 2 showing further details of the jaw face;

Fig. 6 is an elevational view of the jaw face per se; and

Fig. 7 is a perspective view of the jaw face.

Referring more particularly to Figs. 1–3 inclusive, reference numeral **10** designates the wrench assembly in its entirety and which will be seen to include an elongate handle portion **11** which may be provided at one end with a conventional box and mechanism **12** and which is provided at its opposite end with the ratchet assembly. The ratchet assembly includes the head portion **13** and projecting from one side thereof a jaw member **14** and from the other side generally parallel to the jaw **14** the bill **15**.

The jaw **14** is provided with a flat inner face **16** which is adapted to engage against one side of an associated nut, bolt or the like such as that indicated by the reference character **17** in Fig. 1.

The head **13** is provided with a recess **18** of circular cross section and which extends to a depth within the head substantially equivalent to that shown in Figs. 1 and 2, it being noted that this recess is angled with respect to the inner face **16** of the jaw **14** such that a projection of the axis of the recess is convergent with a plane containing the inner face **16** beyond the free end of the jaw **14**, the purpose of which will be presently apparent. As is shown most clearly in Fig. 3, the recess **18** opens at the juncture between the head **13** and the bill **15** and the inner face **19** of the bill **15** is provided with a trough **20** of semi-circular cross section which merges smoothly with the recess **18** and in actual practice the trough and recess are formed during a single machining process as will be presently described.

The jaw face indicated generally by the reference character **21** is slidably received within the recess **18** and is movable therein in a direction of the axis of such recess. The jaw face as is shown most clearly in Figs. 6 and 7 incorporates a cylindrical base portion **22** which is snugly received within the recess **18** and which cooperates therewith to positively guide the jaw face. The jaw face is provided with an intermediate portion which incorporates a flat surface **23** which tapers toward the outer free end of the jaw and which is machined so as to extend parallel to the aforementioned inner face **16** of the jaw **14** and it is this flat surface of the jaw piece which is cooperable with the inner face **16** of the jaw **14** to engage an opposite side of the nut or bolt **17** so that the nut or bolt is properly engaged whereby when the wrench as shown in Fig. 1 is rotated with its handle **11** swinging to the left in that figure, the member **17** will be turned. The flat face **23** of the jaw face merges smoothly with the cam nose surface **24**, it being preferred that the cam nose surface be of convex configuration as in shown.

The opposite side of the jaw piece is provided with a flat surface **25** which is diametrically opposed to the aforementioned nut engaging flat surface **23** and which extends an appreciable distance within the intermediate portion of the jaw and of a length sufficient to accommodate for the movement of the jaw piece between its fully retracted and fully projected positions as explained

hereinafter and, in a preferred form, the surface **25** terminates not only short of the base end of the jaw piece so as to provide the limiting abutment shoulder **26** but also short of the outer or free end of the jaw piece to provide the semi-circular bearing shoulder **27**.

As is shown most clearly in Figs. 1 and 2, the recess **18** receives a suitable spring **28** which normally biases the jaw piece to its fully projected position as is shown in Fig. 1, but permits the same to be fully retracted as is shown in Fig. 2. To limit the fully projected position of the jaw piece, the head end of the jaw is provided with a bore **29** extending generally perpendicular to the recess **18** and receiving therein a suitable pin **30** whose inner end portion **31** is so positioned as to terminate closely adjacent the flat surface **25** of the jaw piece and within the path of movement of the abutment shoulder **26** so as to engage thereagainst and limit the axial outward movement of the jaw piece.

In conjunction with the extent or depth to which the surface **25** is machined, it will be appreciated from a study of Fig. 4 that the depth to which this surface is cut is approximately equal to the average depth of the trough **20** so that at any position of the jaw piece, a substantial longitudinal extent of the jaw piece bears against and is guided by the opposite side wall portions of the trough **20**. This feature is illustrated most clearly in Fig. 4 wherein it will be noted that those longitudinally extending side wall portions **32** and **33** of the jaw piece bear against opposite side wall portions of the trough **20** and thus form a substantial longitudinal extent of the jaw piece which is directly bearing against and is guided by both the recess **18** and the trough **20** regardless of the position of the jaw piece.

Fig. 5 illustrates that the area of surface engagement between the jaw piece and the wall portion of the head **13** defining the recess **18** below the flat surface **23** is the major portion of a circle in cross section whereas the jaw piece in the cylindrical base portion **22** completely circumferentially engages within the recess **18**, thus attaining a maximum of bearing surface between the jaw piece and the recess **18** while at the same time permitting the pin **30** to cooperate therewith to limit and fix the outermost position of the jaw piece.

As will be appreciated from the above, the provision of a recess of circular cross section and a semi-circular trough in conjunction with a jaw piece of generally cylindrical configuration permits a maximum amount of bearing surface to be attained between the jaw piece and the wrench head assembly so that the jaw piece is at all times positively guided and backed up by the wrench head assembly while at the same time permitting the component parts to be economically manufactured and requiring a minimum of expensive machining operations.

In this respect, it is to be noted that the wrench assembly **10**, other than the provision of the recess **18**, trough **20** and bore **29**, is of entirely conventional construction. For example, a ratchet type of open end wrench of a ¾ inch size can, in accordance with this invention, be easily constructed from a conventional open end wrench of larger size, say 15/16 inch, by merely performing a single drilling operation which simultaneously produces the trough **20** and the recess **18** in a single operation and then performing a second drilling operation to provide the bore **29**. This permits the ratchet jaw to be fabricated from round stock and also the retaining pin **30** can be fabricated from rod or round stock. Thus, the total expenditure for constructing an open end ratchet wrench in accordance with this invention is very little and involves not a great deal more than is required for manufacturing a conventional type of open end wrench and indeed the construction of an open end ratchet wrench in accordance with this invention involves only a minimum more than is required to produce a conventional open end wrench.

Due to the fact that the recess **18** is angled with respect

to the inner jaw surface **16**, it will be obvious that when the jaw piece is moved from its fully projected position toward its retracted position, the flat face **23** thereon becomes increasingly spaced away from the said surface **16**. Consequently, when the wrench is moved in the ratcheting direction as is illustrated in Fig. 2, only a very slight pressure of the corner **34** of the nut engaging upon the cam nose **24** will be required to start the ratchet jaw toward its retracted position and permit the assembly to ratchet. Also, after the ratcheting action is stopped and the wrench is swung again in a tightening or loosening direction, such as the case may be, the fact that the surface **23** is closest to the surface **16** in the fully projected position of the ratchet jaw will ensure proper engagement of the wrench with the nut or headed member with which it is engaged to exert more or less a wedging action thereon to achieve good bearing contact.

Of course, it is to be appreciated that when the headed member **17** is turned by the ratchet wrench, the resistance to rotation of the member **17** will tend to press the jaw piece **21** firmly against the associated bill and head and, of course, the relatively large area of bearing contact established between these component parts as mentioned above is instrumental in achieving a very strong and rugged construction.

It is to be further appreciated, of course, that the particular type of ratchet construction disclosed herein and forming this invention may be associated either with an open end wrench having a fixed jaw opening i. e. for use with one particular size of nut or the like, or the principles of this invention may be embodied in an adjustable open end wrench without departing from the spirit of this invention.

It is to be understood that the element or portion **27** of the sliding jaw may be omitted if desired since sufficient surface area of the sliding jaw without the addition of this portion will engage against the trough to properly stabilize and hold the sliding jaw in place although, of course, the projection does offer an additional bearing surface when used.

I claim:

1. An open end wrench comprising a handle having a head at one end, a jaw projecting outwardly from said head at one side thereof and having a flat inner face for engagement with a side of an associated nut, a bill projecting outwardly from the other side of said head extending generally parallel to said jaw and having a face opposed to said inner face of said jaw, said head having a recess therein of circular cross section extending angularly with respect to said inner face of the jaw such that a projection of the axis of said recess is convergent with a plane containing said inner face of the jaw beyond the free end of the same, said face of the bill having a semi-circular trough therein merging smoothly with said recess, a slidable jaw piece received within said trough and said recess, said jaw piece having a cylindrical base portion contained within said recess, an intermediate portion having a flat surface extending parallel to said inner face of the first mentioned jaw and terminating in a cam nose, said jaw piece having a further flat face extending from said base portion, defining an abutment shoulder thereat, and into said intermediate portion, said further flat face being of a length greater than the axial movement of said jaw piece between its fully retracted and its fully projected position and positioned at that side of said jaw piece opposite the first flat surface thereof, a spring interposed within said recess normally biasing said jaw piece to its fully projected position, a pin carried by said head and disposed in the path of movement of said abutment shoulder to fix the fully projected position of said jaw piece, and the opposite side portion of said jaw piece extending between the flat surfaces thereof being of segmental profile and bearing at least partially upon surface portions of said bill defining said trough.

2. The open end wrench as defined in and by claim 1

wherein said further flat face on said jaw piece terminates short of said cam nose end of the jaw piece leaving a bearing shoulder of semi-circular cross section at said free end of the jaw piece which engages throughout its external surface within the bottom of said trough in said bill.

3. A wrench of the character described comprising an elongate handle having a head at one end, first and second jaw elements projecting outwardly from said head at opposite sides thereof and each having a flat inner face, said inner faces being disposed in parallel relationship and spaced apart a distance corresponding to a standard wrench size, said head having a recess therein of circular cross section adjacent one of said jaws and presenting an opening between said jaws, the longitudinal axis of said recess extending in outwardly convergent relation to a plane containing the inner face of the other jaw such that a continuation of such axis intersects such plane at a point lying beyond said other jaw, said recess being inset with respect to the inner face of said one jaw and the inner face of said one jaw having a semi-circular trough therein merging smoothly with and forming a continuation of the wall surface defining said recess, a slidable jaw piece received within said trough and recess, said jaw piece having a flat surface parallel to the inner faces of said jaws and disposed in opposed relation to the inner face of said other jaw, means carried by said head and engaging said jaw piece for maintaining said flat surface in opposed relation to the inner face of said other jaw, means within said recess normally urging said jaw piece to an outwardly projecting position and permitting the same to be urged inwardly into the recess to a withdrawn position, the outer end of said jaw piece terminating in a rounded cam nose merging smoothly with said flat surface, and the angular disposition of the axis of said recess with respect to the plane containing the inner surface of said other jaw being such that when said jaw piece is urged to its outwardly projecting position, the flat surface thereof will be offset from the inner face of said one jaw toward said other jaw so as to be spaced from the inner surface of said other jaw by an amount corresponding to a standard wrench size smaller than the standard size represented between said jaws.

4. An open end wrench comprising a handle having a head at one end, a jaw projecting outwardly from said head at one side thereof and having a flat inner face for engagement with a side of an associated nut, a bill projecting outwardly from the other side of said head extending generally parallel to said jaw and having a face opposed to said inner face of said jaw, said head having a recess therein of circular cross section extending angularly with respect to said inner face of the jaw such that a projection of the axis of said recess is convergent with a plane containing said inner face of the jaw beyond the free end of the same, a slidable jaw piece received within said recess, said jaw piece having a cylindrical base portion contained within said recess, an intermediate portion having a flat surface extending parallel to said inner face of the first mentioned jaw and terminating in a cam nose, said jaw piece having a further flat face extending from said base portion, defining an abutment shoulder thereat, and into said intermediate portion, said further flat face being of a length greater than the axial movement of said jaw piece between its fully retracted and its fully projected position and positioned at that side of said jaw piece opposite the first flat surface thereof, a spring interposed within said recess normally biasing said jaw piece to its fully projected position, a pin carried by said head and disposed in the path of movement of said abutment shoulder to fix the fully projected position of said jaw piece, and the opposite side portion of said jaw piece extending between the flat surfaces thereof being of segmental profile and bearing at least partially upon surface portions of said bill defining said recess.

References Cited in the file of this patent

UNITED STATES PATENTS

879,155	Ellis	Feb. 18, 1908
1,308,440	Morrison	July 1, 1919
1,898,388	Parker	Feb. 21, 1933
2,565,154	Wedvik	Aug. 21, 1951
2,592,781	Yavner	Apr. 15, 1952
2,697,372	Lane	Dec. 21, 1954
2,712,259	Cowell	July 5, 1955

FOREIGN PATENTS

268,643	Germany	Dec. 23, 1913