Oct. 25, 1966 R. L. WEAVER 3,280,669

SLIDING SIDE JAW WRENCH HAVING A RATCHET BOTTOM AND SHOULDER STOP MEANS ON A JAW

Filed Sept. 30, 1965

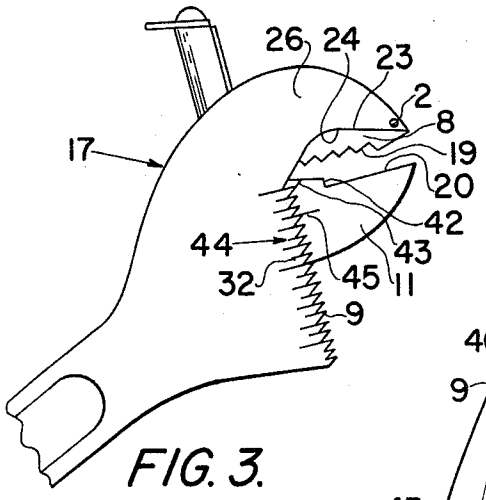

FIG. 3.

FIG. 1.

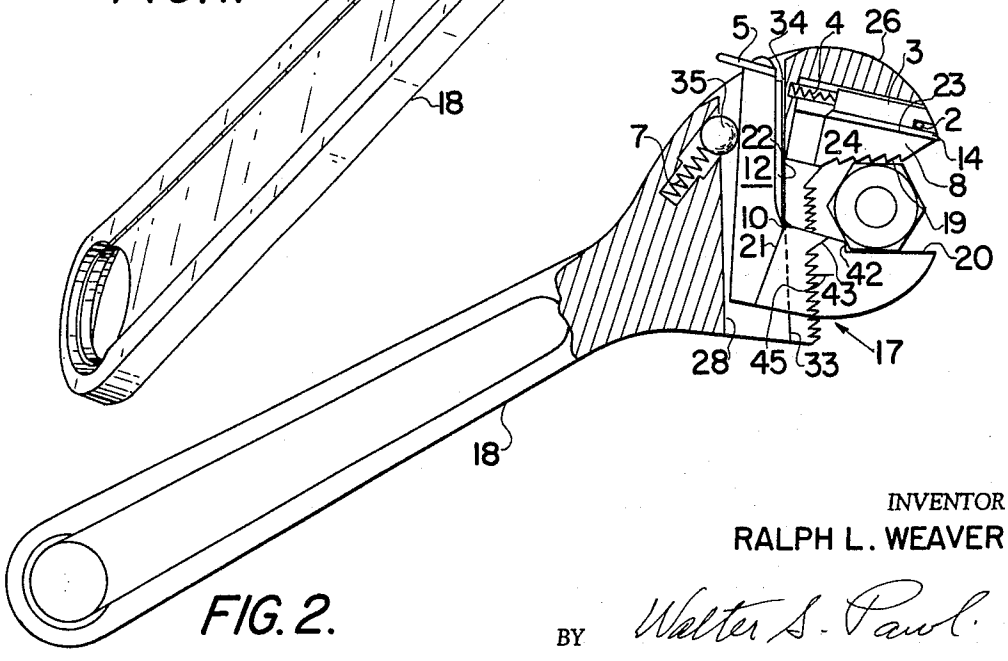

FIG. 2.

INVENTOR

RALPH L. WEAVER

BY Walter S. Paul

ATTORNEY

United States Patent Office

3,280,669
Patented Oct. 25, 1966

1

3,280,669

SLIDING SIDE JAW WRENCH HAVING A RATCHET BOTTOM AND SHOULDER STOP MEANS ON A JAW

Ralph Lee Weaver, 4322 Annapolis Road, Baltimore, Md.

Filed Sept. 30, 1965, Ser. No. 491,523
10 Claims. (Cl. 81—146)

This invention relates to end wrenches of the quick adjustable type and is a continuation-in-part of my pending application Ser. No. 407,989 for Automatically Adjustable Wrench, filed November 2, 1964.

The object of this invention is to make a simple, instantly adjustable and strong wrench with an automatically tightening grip upon application of turning force on the handle in the proper direction and immediate release of the grip when a force is applied in the opposite direction. Another object is to construct a wrench with a fixed jaw on the end of a handle at one side of the head of the wrench and a ratchet bottom extending from the base of said jaw to the opposite side of the wrench, and an adjustable jaw having a toothed base biased against said ratchet bottom for sliding inwardly along said bottom with little restriction into locking engagement against a piece of work to be gripped between the jaws.

A further object is to form the ratchet bottom by means of a series of pointed teeth extending across said bottom and being inclined toward said fixed jaw, and to provide a series of complementary teeth in the base of the adjustable jaw to form a closely fitting pawl means for firm locking engagement with the ratchet bottom in any adjusted position, against separation of the jaws to loosen the grip on the work in the above wrench.

A further object is to improve the operation of wrenches of this type having a ratchet release jaw by providing a shoulder stop on the other jaw spaced outwardly of its base, so that when the wrench is applied to the work piece to be turned, the shoulder will prevent the inner edge of the work piece hitting the bottom of the wrench opening between the jaws and causing it to bind thereagainst and against the ratchet release wedge when it is desired to turn the wrench in the release direction during ratchet operation.

A further object is to improve the operation of the ratchet wedge member by eliminating the outer spring and letting the member be biased outwardly against a positive stop in the wrench size reducing direction, thus providing a positive grip on the work piece without any counterbias tending to make the jaws slip over the work piece.

A further object is to reenforce both jaws by internal corner web portions between each jaw and its perpendicularly extending base portion.

Other objects will become apparent in the following description of the details of the invention, as illustrated in the accompanying drawing, wherein:

FIG. 1 is a perspective view of a preferred form of a wrench made in accordance with the present invention,

FIG. 2 is a side view thereof, showing the head in section, with a nut engaged by its jaws, and

FIG. 3 is full side view of the head portion showing the scale of 1/16" divisions that may be used for indicating the setting of the opening between the jaws.

2

The scale shown is 1" long and will indicate the setting of the jaws for hexagonal nuts or bolts from 1/8" to 1" in increments of 1/16" of size. In FIG. 3, the wrench is set for 3/16" nuts, in FIG. 2, it is set for 9/16" nuts. The shoulder **42** near the bottom of the movable jaw was found to be necessary to facilitate ratcheting operation by keeping the work piece off the bottom of the opening between the jaws and permitting free inward movement of the slidable face piece **8** against spring **4** to release the work piece without meeting any resistance by contact of the work piece against the bottom of the wrench opening.

The form of the invention illustrated comprises an adjustable open-end wrench having a handle **18**, having a fixed jaw **26** at one side of the head end **17**, which has a ratchet bottom **9** extending from the base of jaw **26** to the other side of the head end. Reinforcing side web portions **40** extend across the inside corner between the jaw **26** and bottom **9**.

The movable jaw **11** having pawl means formed in its bottom **32** for engagement with said ratchet bottom **9** has a lever **12** connected to its bottom **32** by web **13**. The head end of the wrench is provided with a guide bore **28** in which lever **12** is loosely slidably mounted and the web **13** slides in a slot through the ratchet base **9** connecting with the guide bore **28**. The sides of this slot project into the top of the guide bore to form guide rails **33** for the top **22** of the lever **12**, and a guide groove **34** is formed between these rails under the base of jaw **26**. The web **13** has an extended portion along the top of lever **12** which slides through said groove and a corner portion **41** extending between this top portion and the inner face **20** of the jaw **26**. A shoulder **42** is formed at the top of this corner portion and is extended across the entire width by filler portions **43** on the sides of the corner portion **41**. The top **22** of lever **12** on both sides of web **13** has a portion **21** normally slanting away from said guide rails at the fulcrum point **10**. A resilient bias is provided by spring **7** through a ball bearing **35** on the bottom of lever **12**, so as to normally bias the pawl means **32** in the bottom of the movable jaw **11** to engage the ratchet bottom **9**, the fulcrum point **10** for this biasing leverage being slidable along the rails **33** in accordance with the adjustment of the movable jaw **11**. Thus, when a piece of work, like a nut, bolt head, pipe or nipple, etc., is placed in between the open jaws of the wrench, all that is necessary to do to adjust the wrench snugly around it, is to push the movable jaw **11** to close the jaws firmly about the work, and upon releasing this pressure on the movable jaw, the spring **7** will automatically latch the pawl bottom **32** into firm engagement with the ratchet bottom **9**, and the wrench will stay locked in this adjustment even tighter when a torque is applied to the work by the wrench in the operating direction, but if a reverse torque is applied the grip of the jaws on the work will loosen. Obviously, for use as a pipe wrench, the faces of the jaws **19** and **20** could both be provided with pointed serrations inclined in the direction of operating torque such as shown on face **19** in order to be able to bite into the round surface of a pipe or rod, and to release the bite upon application of releasing torque. To facilitate the use of this wrench as a pipe wrench the jaws

could be made to converge slightly, as shown e.g. by the dotted lines at **27** in FIG. 2 in my pending application, to provide a wedging grip as the work piece tends to roll outwardly into the narrower spacing of the jaws as the operating torque is applied. Upon application of reverse torque, the work piece will tend to release itself by rolling inwardly of the jaws into the wider spacing between the jaws.

Normally, in order to open the jaws wider from any previously adjusted position, all that is necessary to do is press the end of lever **12** down against the ratchet spring **7** to permit the jaw **11** to be pushed up out of engagement with the ratchet bottom **9**, and the end of the lever **12** may be instantly pushed into any wider opened position of the jaw **11** before releasing the upward pressure on the jaw. If the lever is pushed all the way in until it is stopped by edge of the washer **5** striking the outer end of the guide rails **33**, the jaw **11** will be in its most widely opened position, and the wrench is just as strong in this fully opened adjustment as it is in any other adjustment. A scale **44** of 1/16" divisions may be inscribed on the side of the wrench head along the bottom **9**, with cooperating index marks **45** along the bottom of the movable jaw **11**, to enable presetting the jaws to any adjustment before applying the wrench to the particular size of nuts, etc.

In order to further facilitate the use of this wrench as a pipe wrench, one of the jaw faces may be made on a wedge-shaped face piece slidably mounted in the jaw to move along the inclined plane of the wedge for moving the face of the jaw to vary the spacing between the substantially parallel jaw faces.

As shown, e.g., the fixed jaw **26** may be provided with a wedge-shaped face piece **8** having an inclined plane surface **23** slidably engaging the surface **24** on the stationary portion of the jaw, which has a guide bore **25** back of this surface **24** for loosely receiving a plunger portion **3**, which is connected to the back of the wedge-shaped face piece by an axial web portion **14** extending through a guide slot **15** between the guide bore and the surface **24**. The plunger portion **3** is slidably mounted between a spring **4** in the inner end of the guide bore **25** and a stop pin **2** in the outer end thereof. A most suitable range of wedge-angles that may be used to provide desired characteristics of the wrench for the type of work that may be contemplated is between about 10° and 25°.

Furthermore, for specialized work, it may be desirable to use an outwardly biased wedge-shaped face piece on the movable jaw **11**, or on both jaws **26** and **11**, or on one of the pair of jaws of a fixed end wrench, or even on both jaws for use on a limited range of sizes of work pieces.

Removal of the stop pin **2** allows the wedge-shaped face piece **8** to be removed for repairs or replacement when a different type of face piece or spring is desired. Likewise, removal of the disc **5** permits removal of the movable jaw for repairs or replacement by a new or different type of movable jaw as desired.

The pointed serrations on the face **19** are shown as sharp teeth pointed in the direction of applied torque to provide a good grip. However, any other type of high friction surface might be used, as may be desired. Furthermore, the outer end of face piece **8** may be widened to the full width of the sliding surface **24** to provide a larger gripping surface on face **19** if desired, as well as a large sliding surface on the face piece **8**, without limiting its maximum release movement into the jaw **26**.

Many other obvious modifications in design and arrangement of parts may be made without departing from the spirit and scope of the present invention, as defined in the appended claims.

What is claimed is:

1. A wrench comprising

a handle having a fixed jaw with a substantially straight inner face formed at one side of its head end, and a ratchet bottom extending normally from the base of said jaw to the other side of the head end,

a movable jaw with a substantially straight inner face slidably mounted in said head end for adjustment relative to said stationary jaw from the other side of said head end, and having pawl means formed in its bottom resiliently biased against said ratchet bottom for interlocking engagement therewith in any adjustment toward said fixed jaw,

said fixed jaw having a wedge-shaped face piece slidably mounted in the stationary portion of the jaw to slide on an axis inclined outwardly toward the other jaw and resiliently biased outwardly for automatic tightening of the wrench grip on the work upon turning the wrench in the desired direction, and loosening it when the wrench is turned in the opposite direction,

said movable jaw having a shoulder extending from its face spaced from its bottom for stopping the work clear of said ratchet bottom when applying the wrench thereto, so as to facilitate the loosening of the wrench grip without causing the work to strike and possibly damage said ratchet bottom as the wedge shaped face piece slides inwardly in its loosening direction and the work tends to pivot around said shoulder but is restricted thereby from slipping inwardly against said ratchet bottom

2. A wrench comprising

a handle having a fixed jaw with a substantially straight inner face formed at one side of its head end, and a ratchet bottom extending normally from the base of said jaw to the other side of the head end,

said ratchet bottom having a series of pointed teeth extending crosswise thereof and being inclined toward said fixed jaw,

a movable jaw with a substantially straight inner face slidably mounted in said head end for adjustment relative to said stationary jaw from the other side of said head end, and having pawl means formed in its bottom resiliently biased against said ratchet bottom for interlocking engagement therewith in any adjustment toward said fixed jaw,

said pawl means on the bottom of the movable jaw being complementary thereto so as to readily slide over the ratchet bottom when the movable jaw is pushed toward the fixed jaw to any adjusted position, and so as to interlock firmly with the ratchet bottom against separation of the jaws from said adjusted position,

said fixed jaw having a wedge-shaped face piece slidably mounted in the stationary portion of the jaw to slide on an axis inclined outwardly toward the other jaw and resiliently biased outwardly for automatic tightening of the wrench grip upon turning the wrench in the desired direction and loosening it when the wrench is turned in the opposite direction,

said movable jaw having a shoulder extending from its face spaced from its bottom for stopping the work clear of said ratchet bottom when applying the wrench thereto, so as to facilitate the loosening of the wrench grip without causing the work to strike and possibly damage said ratchet bottom as the wedge shaped face piece slides inwardly in its loosening direction and the work tends to pivot about said shoulder but is restricted thereby from slipping inwardly against said ratchet bottom.

3. A wrench having at least one of its jaws provided with a wedge-shaped face piece, slidably mounted therein to slide on an axis inclined outwardly toward the other jaw and resiliently biased outwardly for automatic tightening of the wrench grip upon turning the wrench in the desired direction and loosening it when the wrench is turned in the opposite direction, said wrench having a ratchet bottom,

said other jaw having a shoulder extending from its face spaced from its bottom for stopping the work

clear of said ratchet bottom when applying the wrench thereto, so as to facilitate the loosening of the wrench grip without causing the work to strike and possibly damage said ratchet bottom as the wedge shaped face piece slides inwardly in its loosening direction and the work tends to pivot about said shoulder but is restricted thereby from slipping inwardly against said ratchet bottom.

4. A wrench as defined in claim 3,

said one jaw having a guide bore back of a sliding surface for said wedge-shaped face piece,

said face piece having a plunger portion slidably mounted in said guide bore and connected to the back of said wedge-shaped face piece by an axial web extending through a guide slot between the guide bore and said sliding surface,

said plunger portion being biased outwardly against a stop in said guide bore for resilient movement of said wedge-shaped face piece inwardly to facilitate reception of a work piece into the jaws by sliding inwardly in releasing direction and to tighten the grip in the work piece by sliding outwardly in the wedging direction.

5. A wrench as defined in claim 4, having said other jaw slidably adjustable with respect to said one jaw which is fixed and provided with said wedge-shaped face piece.

6. A wrench as defined in claim 2,

said fixed jaw having a guide bore back of a sliding surface for said wedge-shaped face piece,

said face piece having a plunger portion reciprocable in said guide bore and connected to back of said wedge-shaped face piece by an axial web extending through a guide slot between the guide bore and said sliding surface,

said plunger portion being biased outwardly by a spring in said guide bore for resilient movement of said wedge-shaped face piece inwardly to facilitate reception of a work piece into the jaws by sliding inwardly work piece by sliding outwardly in the wedging in releasing direction and to tighten the grip on the direction.

7. A wrench comprising

a handle having a fixed jaw formed at one side of its head end, and a ratchet bottom extending from the base of said jaw to the other side of the head end,

said ratchet bottom having a series of pointed teeth extending crosswise thereof and being inclined toward said fixed jaw,

a movable jaw slidably mounted in said head end for adjustment relative to said stationary jaw from the other side of said head end, and having pawl means formed in its bottom resiliently biased against said ratchet bottom for interlocking engagement therewith in any adjustment toward said fixed jaw,

said pawl means on the bottom of the movable jaw being complementary thereto so as to readily slide over the ratchet bottom when the movable jaw is pushed toward the fixed jaw to any adjusted position, and so as to interlock firmly with the ratchet bottom against separation of the jaw from said adjusted position,

said fixed jaw having a wedge-shaped face piece slidably mounted therein and resiliently floated for automatic tightening of the wrench grip upon turning the wrench in the desired direction and giving way to loosen it when the wrench is turned in the opposite direction, and

said movable jaw having a shoulder extending from its face spaced from its bottom for stopping the work clear of said ratchet bottom when applying the wrench thereto, so as to facilitate the loosening of the wrench grip when the wrench is turned in release direction without causing the work to strike

and possibly damage said ratchet bottom as the wedge shaped face piece slides inwardly in its loosening direction and the work tends to pivot about said shoulder but is restricted thereby from slipping inwardly against said ratchet bottom.

8. A wrench as defined in claim 7,

said fixed jaw having a guide bore back of a sliding surface for said wedge-shaped face piece,

said face piece having a plunger portion reciprocable in said guide bore and connected to back of said wedge-shaped face piece by an axial web extending through a guide slot between the guide bore and said sliding surface,

said plunger portion being biased outwardly by a spring in said guide bore for resilient movement of said wedge-shaped face piece inwardly to facilitate reception of a work piece into the jaws by sliding inwardly in releasing direction and to tighten the grip on the work piece by sliding outwardly in the wedging direction.

9. A wrench as defined in claim 8,

a pair of reinforcing webs on opposite sides of the wrench extending across the corner between said fixed jaw and said ratchet bottom.

10. A wrench comprising

a handle having a fixed jaw formed at one side of its head end, and a ratchet bottom extending from the base of said jaw to the other side of the head end,

said ratchet bottom having a series of pointed teeth extending crosswise thereof and being inclined toward said fixed jaw,

a movable jaw slidably mounted in said head end for adjustment relative to said stationary jaw from the other side of said head end, and having pawl means formed in its bottom resiliently biased against said ratchet bottom for interlocking engagement therewith in any adjustment toward said fixed jaw,

said pawl means on the bottom of the movable jaw being complementary thereto so as to readily slide over the ratchet bottom when the movable jaw is pushed toward the fixed jaw to any adjusted position, and so as to interlock firmly with the ratchet bottom against separation of the jaws from said adjusted position,

said head end having a guide bore therethrough from side to side below the ratchet bottom, connected to an axial slot in said ratchet bottom,

said movable jaw having a lever slidable in said bore and connected therewith by an axial web slidable within said slot in the ratchet bottom,

a resilient biasing means in the bottom of said guide bore under said fixed jaw and bearing against the bottom of said slidable lever, said lever having a fulcrum point near the base of the movable jaw slidably engaging the top of the guide bore on the opposite sides of the slot,

the opposite sides of said connecting slot forming straight guide rails for the top of said lever, said guide rails extending under said fixed jaw forming a guide groove therebetween coextensive with said connecting slot,

said web connecting the bottom of the movable jaw to the lever being extended across the corner between said movable jaw and the lever and along the top of the entire length of the lever for slidable engagement in said guide groove, and

the top of said lever being slanted away from said guide rails from said fulcrum point toward the outer end of said connecting slot to clear the rails when the movable jaw and lever are pivoted around the fulcrum point against the resilient bias to raise the pawl means over the ratchet teeth as the movable jaw is pushed into adjusted position or the lever

is pushed down to release the jaw so it may be moved outwardly,

said fixed jaw having a wedge-shaped face piece slidably mounted therein and resiliently biased for automatic tightening of the wrench grip upon turning the wrench in the desired direction and loosening it when the wrench is turned in the opposite direction,

said movable jaw having a shoulder extending from its face spaced from its bottom for stopping the work clear of said ratchet bottom when applying the wrench thereto, so as to facilitate the loosening of the wrench grip without causing the work to strike and possibly damage said ratchet bottom as the wedge shaped face piece slides inwardly in its loosening direction and the work tends to pivot about said shoulder but is restricted thereby from slipping inwardly against said ratchet bottom.

References Cited by the Examiner

UNITED STATES PATENTS

577,770	2/1897	Martin	81—165
1,253,227	1/1918	Gaisser	81—146
1,473,123	11/1923	Pearce et al.	81—179
2,565,154	8/1951	Wedvik	81—179
2,646,711	7/1953	Yavner	81—179
2,754,709	7/1956	Cullen	81—146
2,929,287	3/1960	Wolbaum	81—179 X
3,198,041	8/1965	Davis	81—179 X

FOREIGN PATENTS

598,711	10/1925	France.

WILLIAM FELDMAN, *Primary Examiner.*

MILTON S. MEHR, *Examiner.*