Aug. 30, 1966 R. L. WEAVER 3,269,227

AUTOMATICALLY ADJUSTABLE WRENCH

Filed Nov. 2, 1964

FIG. 4.

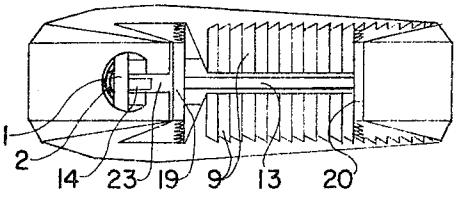
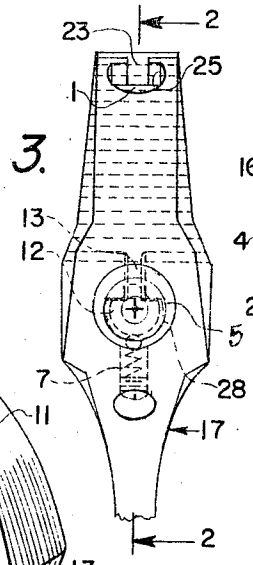


FIG. 3.



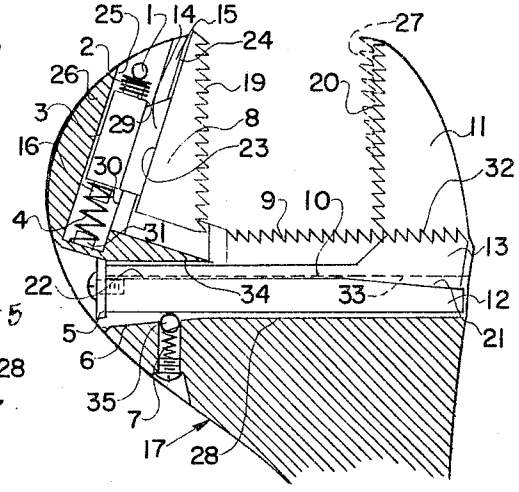


FIG. 2.

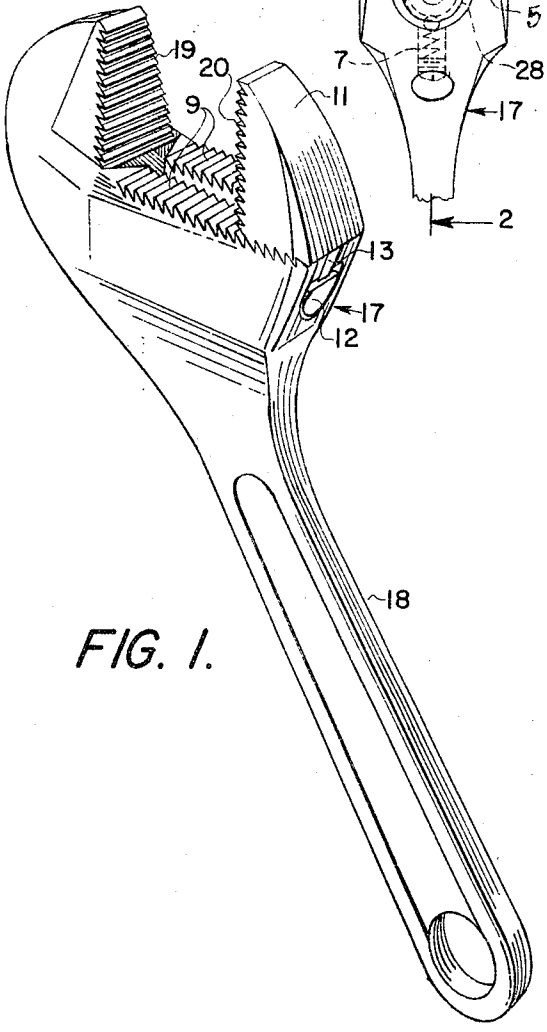


FIG. 1.

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AUTOMATICALLY ADJUSTABLE WRENCH

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9 Claims. (Cl. 81—147)

This invention relates to end wrenches of the quick adjustable type without requiring any screw-threaded adjustment parts.

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 looking 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 provide gripping serrated teeth pointed in opposite directions on the inner surfaces of the opposite jaws which are substantially parallel to each other, but converge slightly toward their outer ends so as to tighten about the work as it tends to be moved into the wedge angle of the jaws upon operation of the above wrench.

A further object is to provide a slidable wedge piece on the inner side of the fixed jaw resiliently floated in normal position, so as to move the wedge piece inwardly of said jaw to facilitate moving the work piece into the jaws or while turning the wrench in a releasing direction without restriction and so as to slide the wedge piece outwardly of said jaw to tighten the grip and prevent the work piece from slipping out of the jaws while there is any operative turning force applied.

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

FIG. 1 is a perspective view of one form of the invention,

FIG. 2 is a sectional view of the head of the wrench taken on the line 2—2 of FIG. 3,

FIG. 3 is an elevational view of the head as viewed from the left of FIG. 2, and

FIG. 4 is a plan view of the head as viewed from the top of FIG. 2.

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.

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. The top **22** of lever **12** 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, 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, nad 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** would be provided with pointed serrations inclined in the direction of operating torque 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 line at **27** in FIG. 2, 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.

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 reciprocably floated between two springs **2** and **4** in the guide bore **25**. A pin **1** and a lug **31** form stops for the stop lugs **29** and **30** respectively, on the ends of plunger portion **3** to provide limited resilient reciprocation for the wedge-shaped face

piece 8 from a normally floated position, to automatically tighten or release the grip of the jaws on a work piece. Spring 2 is preferably made stronger than spring 4, but any suitable design of springs as well as reciprocating strokes, and wedge-angles may be used to provide desired characteristics of the wrench for the type of work that may be contemplated.

Furthermore, for specialized work, it may be desirable to use resiliently floated 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 1 allows the wedge-shaped face piece to be removed for repairs or replacement when a different type of face piece or springs are 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 faces 19 and 20 are shown as sharp teeth pointed in the direction of applied torque to provide a good grip. However, any other type of high friction surfaces might be used, as may be desired.

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 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 cross-wise 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 to said pointed teeth on the ratchet bottom 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 by 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 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.

2. A wrench as defined in claim 1,
the opposite sides of said 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 slot,
said web connecting the bottom of the movable jaw to the lever being extended 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 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.

3. A wrench as defined in claim 2, and a stop washer on the end of said lever forming a shoulder against the end of said guide bore to limit the extent of opening of the jaws.

4. A wrench as defined in claim 1,
said fixed jaw having a wedge-shaped face piece slidably mounted in the stationary portion of the jaw and resiliently floated 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.

5. A wrench as defined in claim 4,
said stationary portion 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 floated between two springs in said guide bore for resilient movement of said wedge-shaped face piece 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,
the faces of both jaws having frictional gripping surfaces with pointed serrations inclined in the operative direction of said wrench to faciiltate tightening the grip on the work piece in the operative turning direction and releasing it in the opposite turning direction.

6. A wrench as defined in claim 2,
said fixed jaw having a wedge-shaped face piece slidably mounted in the stationary portion of the jaw and resiliently floated 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.

7. A wrench as defined in claim 6,
said stationary portion 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 floated between two springs in said guide bore for resilient movement of said wedge-shaped face piece 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,
the faces of both jaws having frictional gripping surfaces with pointed serrations inclined in the operative direction of said wrench to facilitate tightening the grip on the work piece in the operative turning direction and releasing it in the opposite turning direction.

8. A wrench as defined in claim 3,
said fixed jaw having a wedge-shaped face piece slidably mounted in the stationary portion of the jaw and resiliently floated 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.

9. A wrench as defined in claim 8,
said stationary portion 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 floated between two springs in said guide bore for resilient movement of said wedge-shaped face piece 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,

the faces of both jaws having frictional gripping surfaces with pointed serrations inclined in the operative direction of said wrench to facilitate tightening the grip on the work piece in the operative turning direction and releasing it in the opposite turning direction.

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