Dec. 12, 1950 J. S. COLLISON 2,533,436

SELF-LOCKING WRENCH

Filed May 29, 1946

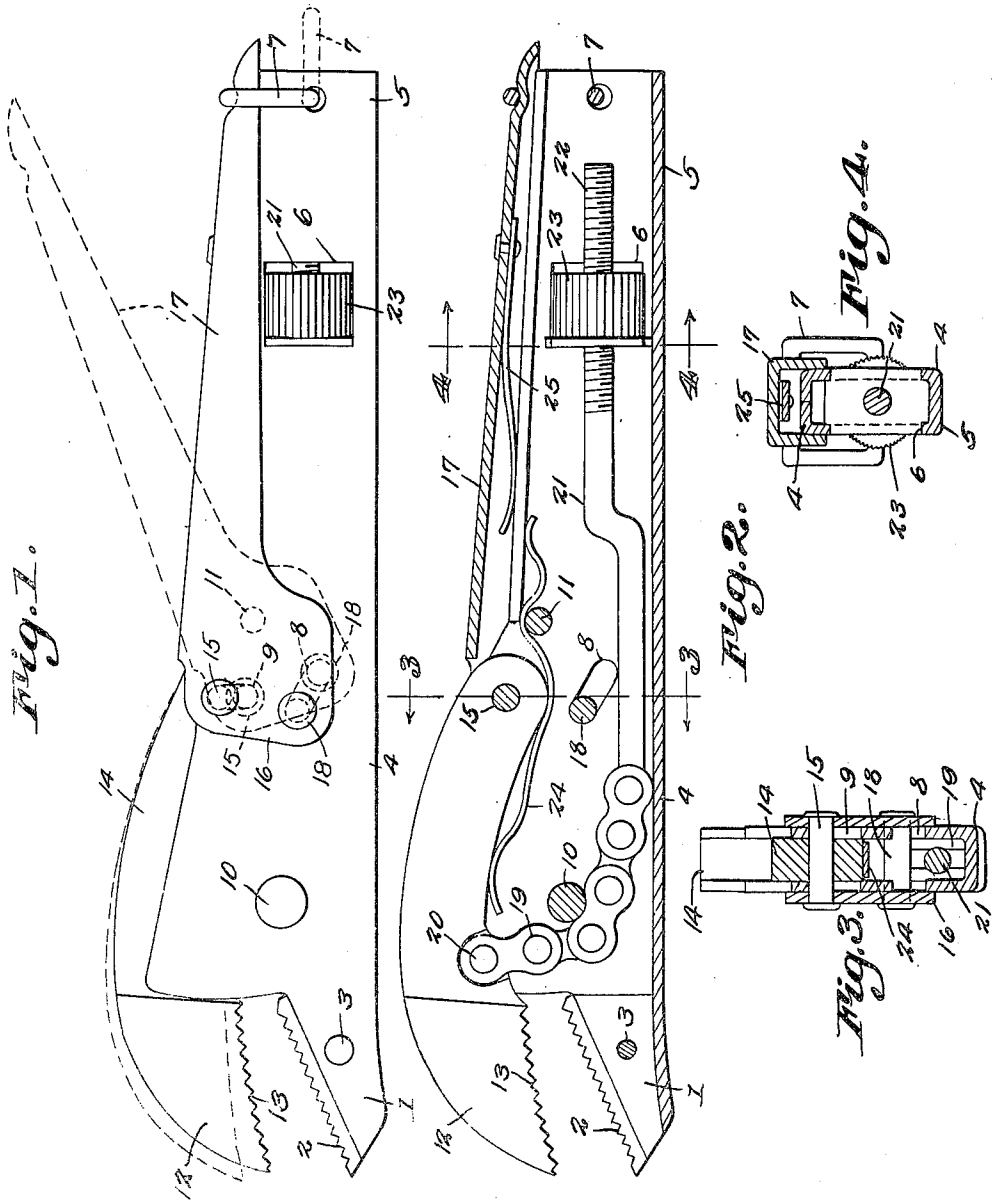


Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

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Patented Dec. 12, 1950 2,533,436

UNITED STATES PATENT OFFICE

2,533,436

SELF-LOCKING WRENCH

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Application May 29, 1946, Serial No. 673,108

1 Claim. (Cl. 81—84)

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This invention relates to wrenches, one of the objects being to provide a wrench the jaws of which are mounted in a new and novel manner whereby, when the handles of the wrench are drawn towards each other, the movable jaw is given both a pivotal and tilting action so as to insure a firm grip upon an object interposed between the jaws.

A further object is to provide a movable jaw the operating handle of which is mounted for compound movement whereby the desired motion of the movable jaw is effected.

A still further object is to provide a wrench the movable jaw of which has one of its fulcrums in the end of a flexible connection between said jaw and an adjusting element whereby said fulcrum can be brought to any desired maximum position relative to the fixture preparatory to applying the wrench to the object to be gripped.

Another object is to provide, in a wrench, an improved self-locking arrangement.

Another object is to provide a wrench the working parts of which, other than the operating handle and the adjusting nut, are housed within the wrench where they are protected from rough handling.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claim, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawing the preferred form of the invention has been shown.

In said drawing:

Figure 1 is a side elevation of the wrench.

Figure 2 is a vertical longitudinal section therethrough.

Figure 3 is a section on line 3—3, Figure 2.

Figure 4 is a section on line 4—4, Figure 2.

Referring to the figures by characters of reference, 1 designates the fixed jaw of the wrench which preferably is in the form of a tapered block having a toothed working face 2. This block is secured by means of a rivet 3 or the like in one end portion of a longitudinally channeled body 4 which can be formed of strong sheet metal and is open along the top. That end of this body remote from the jaw 2 constitutes one of the handles of the wrench and has been indicated generally at 5. It has an opening 6 extending transversely therethrough and also may if desired be provided, in its end portion, with a pivoted link 7 adapted to swing into and out of position across the open top of the channeled body. Furthermore there are provided with the sides of this body 4 at a point between jaw 1 and opening 6, opposed forwardly extending slots 8 and opposed upwardly extending slots 9, these slots 9 being located above the slots 8 and being slightly shorter. In back of the jaw 1 is a guide pin 10 extending transversely of the body 4. Another transverse or supporting pin 11 is positioned in the body back of and adjacent to the slots 9.

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The movable jaw 12 of the wrench is positioned opposite to the jaw 1 and has a toothed or serrated working face 13, if desired. This jaw is located at one end of an arm 14 which extends backwardly and downwardly into the body 4 and carries a pivot pin 15 which is slidably and rotatably mounted at its ends in the slots 9. This pin is carried by a yoke 16 which straddles a portion of the body 4 and is located at one end of a channeled movable handle 17. This handle is adapted to straddle the body 4 and handle 5 longitudinally thereof and a pin 18, constituting both a fulcrum and a locking pin, in a manner to be described, is located in the end portion of the yoke and is adapted to slide within the slots 8.

A chain or other flexible device indicated at 19 is connected at one end to the arm 14 at a point adjacent to jaw 12, as shown at 20. This chain extends under and beyond the guide pin 10 and is connected at its other end to a stem 21 which is screw-threaded as at 22 and engaged by a nut 23 exposed within the openings 6 and held against longitudinal movement of the handle 5 by the walls of the openings. A leaf spring 24 bears at one end on the pin 11, and exerts a constant upward thrust against the arm 14, while another leaf spring 25 is secured to the inner side of the handle 17 and bears downwardly on a portion of the body 4 so as to hold the handle 17 normally pressed outwardly at its back or free end. This back or free end can be engaged by the link 7 when the two handles are positioned as shown in full lines in Figure 1.

Obviously when the link 7 is shifted from the position shown by solid lines in Figures 1 and 2, the handle 17 is free to be thrust upwardly by spring 25 substantially to the position indicated by broken lines, in Figure 1.

The operation of the wrench is as follows: Normally, the jaw 12, lever 17, and pins 15 and 18

are positioned as shown in broken lines in Figure 1. The jaws are then positioned loosely about the work. Nut 23 is rotated to exert a pull on chain 19. This causes the jaws to engage the work between them more tightly. During rotation of the nut, arm 14 pivots on pin 15. The position of the lever 17 and pins 15 and 18 so far is not changed.

With the jaws now engaging the work, the user presses lever 17 toward handle 5. The lever pivots on pin 18, which is a sliding pivot point. This will move the inner end of arm 14 upwardly and will tighten the jaws on the work, the arm 14 now pivoting on pin 20. The pivot point 18 of lever 17 is now moving forwardly. At the same time, the work itself is resisting the tightening action more and more, and is exerting a force on the parts in a direction exactly opposite to that imposed on the parts by the user. In other words, the work is attempting to force the inner end of arm 14 downwardly while the user is forcing it upwardly.

These opposing forces will in effect become substantially equal, with the work gripped very tightly by the jaws, when pin 15 reaches the upper end of slots 9. However, pin 18 will not have fully reached the end of its own travel in the longer slots 8. Immediately, the pivot point of lever 17 changes from pin 18 to pin 15, and continued pressure on lever 17 causes the pin 18 to travel into the end of its slots in a path roughly at right angles to the path of the opposing forces described above. The jaws are thus locked on the work.

The link 7, after the locking action has taken place, may be placed in the full line position of Figure 1 to prevent accidental unlocking, such as might occur if the free end of the handle lever were accidentally struck.

What is claimed is:

A wrench comprising a longitudinally channeled body; a handle and a stationary jaw rigid with the body at its opposite ends; a stem mounted in the handle for adjustment longitudinally thereof; a yoke straddling said handle; a handle lever rigid with and projecting from the yoke; a pivot pin connecting the yoke and the body, there being a pair of smooth-walled slots in the body, said pin being freely slidable in said slots; a movable jaw; an arm rigid with and extending from the movable jaw; a pivot pin connecting said arm, yoke, and body, there being a second pair of smooth-walled slots, shorter than the first named pair, in which said second named pin is freely slidable; a chain connected at opposite ends to the arm and stem respectively, the connection between the arm and chain being disposed between the movable jaw and said pivot pins, the longer slots extending approximately radially of said connection between the arm and chain and the shorter slots extending along an arcuate path having said connection between the arm and chain as its approximate center; means in the body and engaged by said chain for holding the ends of the chain out of line, said chain and stem constituting means for effecting preliminary adjustment of the movable jaw on the work in the direction of the stationary jaw, the arm pivoting on the second named pivot pin during said preliminary adjustment, said handle lever when pressed toward the handle of the body pivoting on the first named pivot pin for part of its travel until the second named pivot pin reaches the end of the shorter pair of slots to engage the jaws tightly with the work, said handle lever pivoting on the second named pivot pin during the rest of its travel until the first named pivot pin reaches the ends of the pair of longer slots to lock the jaws on the work.

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