

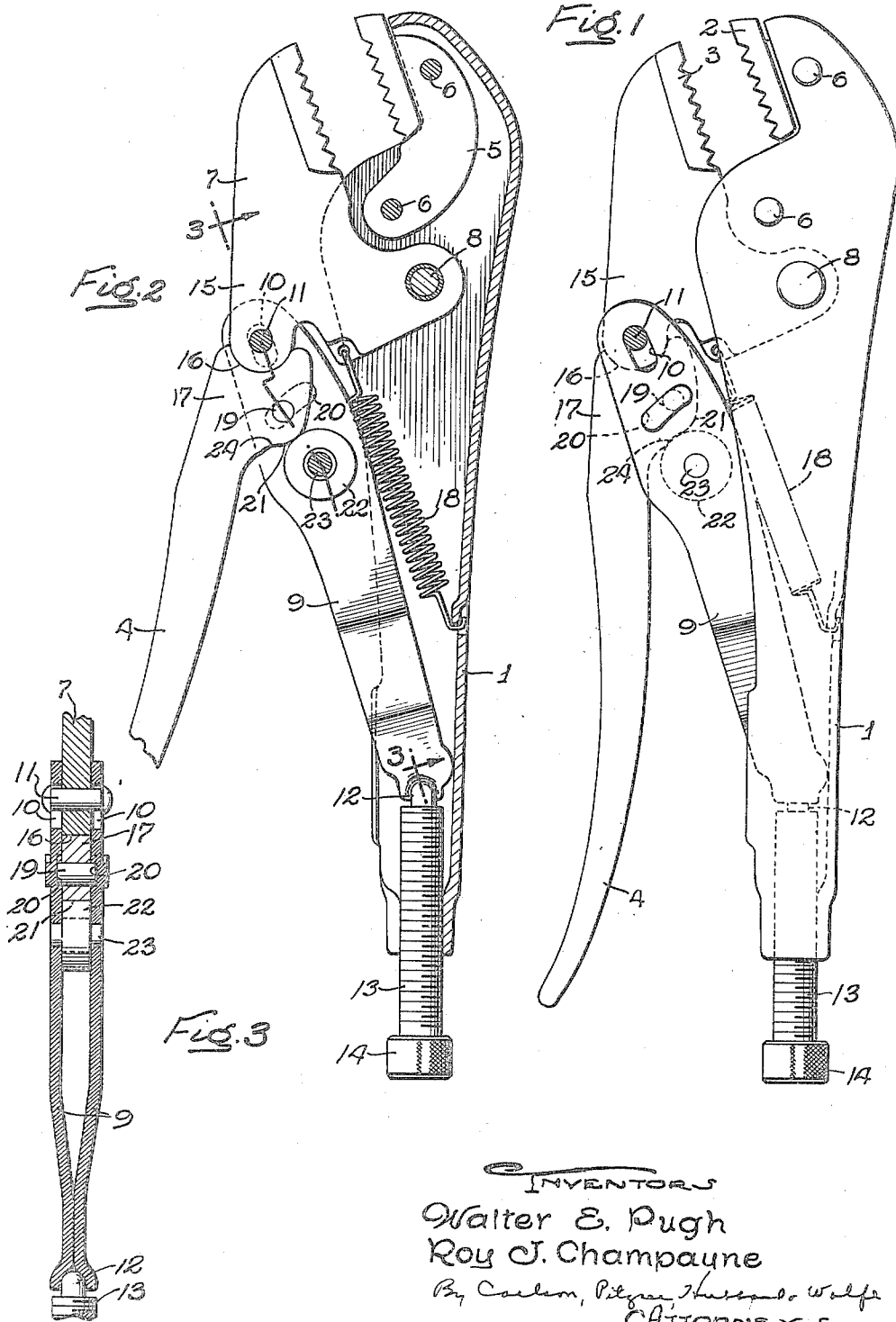
Feb. 7, 1950

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2,496,308

LEVER ACTUATED PIVOTED JAW WRENCH

Filed July 19, 1945



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UNITED STATES PATENT OFFICE

2,496,308

LEVER ACTUATED PIVOTED JAW WRENCH

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Application July 19, 1945, Serial No. 606,001

9 Claims. (Cl. 81—84)

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This invention relates to adjustable wrenches and particularly to those having a movable jaw actuated by swinging an operating lever toward and away from a handle in which the fixed jaw is supported.

The main object is to provide a wrench of the above character in which the operating lever is more easily operable than in prior wrenches.

A more detailed object is to provide a novelly arranged cam and follower for effecting final clamping motion of the movable wrench jaw.

The invention also resides in the novel construction and arrangement of the cam in order to impart simplicity, durability, and ease of actuation to the wrench structure.

Other objects and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings, in which

Figure 1 is a side view of a wrench embodying the novel features of the present invention.

Fig. 2 is a similar view but with the handle shown in section.

Fig. 3 is a section taken along the line 3—3 of Fig. 2.

The wrench shown for purposes of illustration includes an elongated handle 1 having one jaw 2 fixed thereto at one end and a second opposed jaw 3 pivotally supported on the handle for manual adjustment relative to the fixed jaw to accommodate different sizes of work and also for clamping and unclamping motion at a substantial mechanical advantage produced by swinging an operating lever 4 toward and away from the handle 1. Herein, the handle is a channel of U-shaped cross section open along one side and tapering longitudinally. The fixed jaw 2 is formed on a member 5 which is disposed between the sides of the handle at the head end and made rigid with the handle by rivets 6 at opposite ends of the jaw. The toothed face of the jaw thus projects from the open side of the channel.

The movable jaw 3 is formed on one end of a bell crank in the form of a triangular plate 7, one arm of which projects in between the sides of a handle 1 and is pivoted on a pin 8 disposed midway between the jaws and spaced from the inner ends of the latter. A spring 18 stretched between the handle 1 and the bell crank urges the latter in a direction to open the jaws of the wrench. The outwardly projecting arm 15 of the bell crank extends in between the ends of flat strips 9 riveted together near their other ends to form a substantially straight link. One end of the latter has short longitudinal slots 10 there-

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in receiving opposite ends of a pin 11 which projects through and is fast in the bell crank 7. A sliding lost motion connection is thus provided between the link 9 and the outer arm of the bell crank 7.

The other end of the link 9 is recessed or otherwise shaped to interfit with an adjustable abutment formed by the end 12 of a screw 13 threading through the tubular end portion of the handle 1 substantially longitudinally of the latter. The position of the abutment 12 along the handle may thus be varied by turning the knurled head 14 on the outwardly projecting end of the screw.

The rear end of the bell crank arm 15 is rounded to form an arcuate rearwardly projecting surface 16 received in a socket on the head 17 of the operating lever 4 which is thus swingable relative to the bell crank 7 and the movable jaw 3 about an axis located on the center of curvature of the surface 16. To limit the outward swinging of the lever, a pin 19 projects through the head 17 with its opposite ends slidable in elongated depressions 20 disposed on the inner sides and extending transversely of the links 9.

A novelly arranged cam and follower mechanism is provided for shifting the bell crank arm 15 longitudinally of the handle so as to actuate the movable jaw 3 during outward and inward swinging of the lever 4. In the embodiment shown, the cam is a surface 21 on the lever head 17 having a gradual rise terminating in a slight depression 24 adjacent the handle proper. The follower for this cam is a roller 22 disposed between the links 9 and rotatable on a pin 23 connecting these links. The cam thus forms a means carried by the link 9 for wedging the bell crank arm 15 away from the roller and the link so as to extend at a powerful mechanical advantage the effective length of the connection between the handle abutment 12 and the movable jaw 3, lengthening and shortening of this connection being permitted by the slot 10.

In the use of the wrench, the nut, bolt, pipe, or other part to be turned is placed between the jaws 2 and 3, and, with the lever 4 swung outwardly as shown in Fig. 2, the head 14 is screwed in until the jaws are nearly closed against opposite sides of the work. Now, by gripping the handle and the operating lever in one hand, the lever is swung inwardly to the position shown in Fig. 1 or until the work is gripped by the jaws. In this motion, the rise of the cam 21 acting as an effective wedge is forced in between the bell crank surface 16 and the roller 22 so as to spread

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the two apart and force the bell crank arm 15 and the pin 11 along the slot 19 to close the jaw 3 onto the work. If the jaw is properly adjusted to suit the size of the workpiece, the depression 24 in the cam surface will be presented to the roller 22 thereby producing an overcenter action whereupon the longitudinal compression in the linkage tends to hold the lever 4 inwardly in its actuated position. Thus, the work remains clamped even though the hand pressure on the lever 4 is removed.

Retraction of the jaw 3 is effected by moving the lever 4 outwardly to the position shown in Fig. 2. Initial spacing of the jaws to adapt the wrench for use on a workpiece of a different size may be effected by again turning the adjusting screw either in or out depending on whether the next workpiece is smaller or larger.

We claim as our invention:

1. A wrench comprising an elongated handle, a jaw fixed on one end of the handle, an opposed second jaw, a bell crank carrying said second jaw and pivoted on one end of said handle, said bell crank having an arm projecting laterally of the handle and movable longitudinally thereof to move said second jaw toward and away from said fixed jaw, a link extending longitudinally of and having one end pivoted at the other end of said handle, the other end of said link having a sliding pivotal connection with said bell crank arm, a follower roller on said link spaced from said connection, an operating lever pivoted on said bell crank arm, and a cam surface on said lever engaging said follower roller and operable by swinging of the lever toward said handle to wedge said roller and said arm apart and thereby move the movable jaw toward said fixed jaw.

2. A wrench comprising an elongated handle, a jaw fixed on one end of the handle, an opposed second jaw, a bell crank carrying said second jaw and pivoted on one end of said handle, said bell crank having an arm projecting laterally of the handle and movable longitudinally thereof to move said second jaw toward and away from said fixed jaw, a link extending longitudinally of and having one end pivoted at the other end of said handle, the other end of said link having a sliding pivotal connection with said bell crank arm, a follower roller on said link spaced from said connection, an elongated operating lever, arcuate surfaces on said bell crank arm and one end of said lever forming a pivotal connection therebetween, and a cam surface on said lever adjacent said pivotal connection and operable during swinging of the lever toward said handle to wedge said roller and bell crank arm apart and thereby move said jaws toward each other.

3. A wrench comprising an elongated handle, a jaw fixed on one end of the handle, a second jaw pivoted on said handle to swing toward and away from said fixed jaw, means at the other end of said handle providing an abutment adjustable longitudinally of the handle, a link bearing against said abutment at one end and having a pin and slot connection at the other end with said movable jaw at a point spaced from the jaw pivot, a follower roller on said link spaced from said connection, and an operating lever pivoted on said movable jaw adjacent said pin and slot connection and having a cam surface engaging said follower roller and operable by swinging of the lever toward said handle to wedge said roller and said movable jaw apart

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and thereby move the movable jaw toward said fixed jaw.

4. A wrench comprising an elongated handle, a jaw fixed on one end of the handle, a second jaw pivoted on said handle for movement toward and away from said fixed jaw, an elongated link pivoted at one end on the other end of said handle and having a sliding pivotal and connection at the other end with said movable jaw, an operating lever pivoted on said movable jaw adjacent said connection, and a cam and follower therefor mounted on said link and lever and operable by swinging of the lever toward said handle to wedge said movable jaw along the link and toward said fixed jaw.

5. A wrench comprising an elongated handle having a jaw fixed thereto, a bell crank pivoted on said handle and carrying a jaw movable toward and away from the fixed jaw, said bell crank having an arm projecting laterally from the pivot thereof and movable longitudinally of the handle, a link movably mounted on and extending longitudinally of said handle, means on the end of said handle remote from said jaws engaging the end of said link and movable relative to the handle to adjust the link longitudinally relative to said handle, an operating lever pivoted on the movable jaw near the other end of said link to swing laterally toward and away from the handle, and a cam surface and a follower mounted on said lever and link intermediate the ends of the link and coacting during swinging of the lever relative to said handle to actuate said bell crank arm, said cam and follower moving with an overcenter action as the lever approaches the handle so as to hold the jaws closed after the actuating force on the lever is released.

6. A wrench comprising an elongated handle, a jaw fixed on one end of the handle, a bell crank pivoted on said handle and having an arm spaced from the bell crank pivot, said arm having an arcuate end surface facing toward the opposite end of said handle, a jaw on said bell crank movable toward and away from said fixed jaw during lateral movement of said arm in opposite directions, an elongated link extending along said handle and fulcrumed at one end on the other end of the handle, the other end portion of said link comprising spaced strips straddling said bell crank arm and pivotally and slidably connected to the arm beyond said arcuate surface, an operating lever projecting between said strips and having an arcuate surface complementing and fitting around said first surface to form a pivotal connection between the arm and lever, a cross pin connecting said strips at a point spaced from said connection, and means journaled on said pin between said strips and acting on said lever to shift the lever and said bell crank along said link and swing said movable jaw toward the fixed jaw when the lever is swung toward said handle.

7. A wrench comprising an elongated handle, a jaw fixed on one end of the handle, a second jaw pivoted on said handle and swingable toward and away from the fixed jaw during movement of a projection of said movable jaw away from and toward the other end of the handle, an elongated link extending along said handle and fulcrumed at one end of the other end of the handle, said link having two laterally spaced strips at the other end straddling said projection, means providing a pivotal connection between the ends of said strips and said projection while permitting relative sliding of the two in a direction longi-

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itudinally of the link, an operating lever disposed between said link strips in the plane of said jaw projection and pivotally connected at one end to the latter, the other end of said lever being swingable laterally of said handle, a cross pin connecting said strips at a point spaced from said lever, and means journaled on said pin between said strips and acting on said lever to shift the lever and said jaw projection away from said other handle end and swing said movable jaw toward said fixed jaw when said lever is swung toward the handle.

8. A wrench comprising an elongated handle, a jaw fixed on one end of the handle, an elongated link extending along said handle and fulcrumed at one end on the other end of the handle, a second jaw pivoted on said handle for movement toward and away from said fixed jaw and having a sliding pivotal connection with the other end of said link, said movable jaw having an arcuate surface adjacent said connection and facing toward said other handle end, an elongated operating lever having at one end a complementary arcuate surface interfitting with the first arcuate surface so as to lie in the plane of said movable jaw, said arcuate surfaces forming a pivotal connection between said movable jaw and lever permitting swinging of the free end of the lever toward and away from the handle, and means connecting said lever and link and operable by swinging of the lever toward said

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handle to shift the lever bodily along said link in a direction to swing said movable jaw toward the fixed jaw.

9. A wrench comprising an elongated handle, opposed jaws being movable toward and away from the other jaw, an elongated link extending along said handle and fulcrumed at one end on the other end of said handle, a pin and slot connection between said movable jaw and the other end of the link with the slot of such connection extending longitudinally of the link, an operating lever pivoted on said movable jaw adjacent said connection, and means connecting said lever and link and operable by swinging of said lever toward said handle to move said movable jaw toward said fixed jaw.

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