

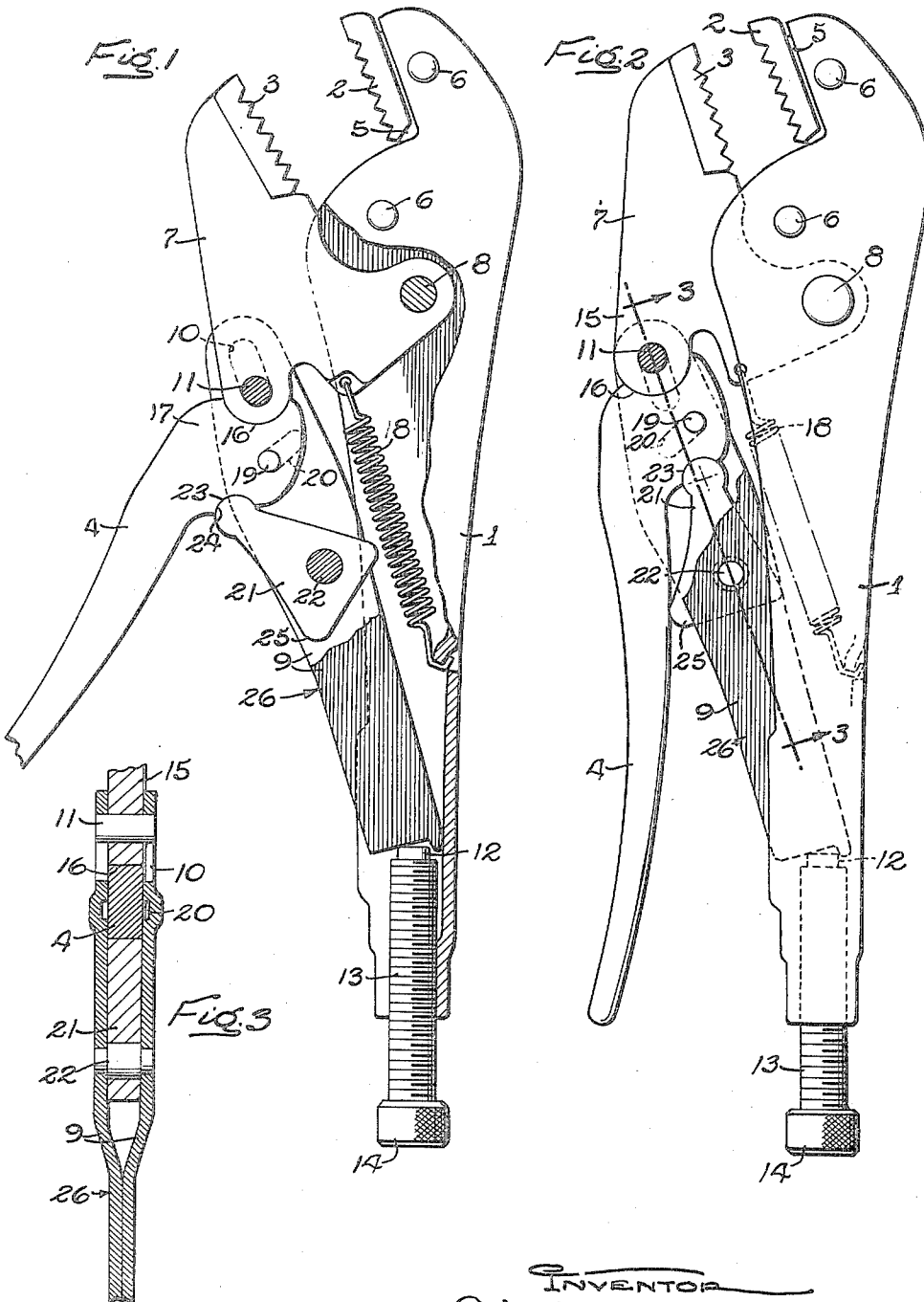
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LEVER ACTUATED PIVOTED JAW WRENCH

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LEVER ACTUATED PIVOTED JAW WRENCH

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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 having a toggle actuator of novel construction and more constant leverage than in prior wrenches.

A more detailed object is to utilize one end portion of the operating lever as one element of the toggle and to support the other toggle element of comparable length on the wrench handle through the intermediary of an elongated link mounted on the handle for endwise adjustment.

Another object is to construct the supporting link in a novel manner to guide the movable parts and hold them in proper operating relation.

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 invention with part of the handle shown in section.

Fig. 2 is a similar view with the wrench jaws closed.

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

In the drawings, the wrench is shown for purposes of illustration as comprising 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. 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

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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 an elongated substantially straight link 26. At their spaced ends, the strips have short longitudinal slots 10 therein receiving opposite ends of a pin 11 which projects through the bell crank arm 15 and is rigid therewith. A sliding lost motion connection is thus provided between the link 26 and the outer arm 15 of the bell crank 7.

The other end of the link 26 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 a convex rearwardly projecting surface 16 received in a concave 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. The thickness of the head corresponds to the spacing of the strips 9 by which the head is guided in its swinging motions. 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 strips 9.

The head 17 of the lever 4 constitutes one element of a toggle whose other element is formed by a link 21 which is substantially shorter than the supporting link 26 and is disposed between the strips 9 of the latter so as to be guided thereby in its swinging movements. One end of the link 21 is pivoted on a pin 22 bridging the strips 9 about midway between the ends of the latter. The other end of the link has a convex surface 23 which seats in a concave socket 24 on the side of the lever head 17 opposite from the lever pivot, thereby forming a pivotal connection between the two. The two links 17 and 21 of the toggle are of substantially the same length and are relatively short so that a substantially uniform leverage ratio of the toggle obtains for all positions of adjustment of its supporting link 26.

Inward swinging of the lever 4 is limited as shown in Fig. 2 by engagement of the lever handle with a lateral projection 25 which, in the

straightened position of the toggle, is disposed substantially opposite from the pivot 22 and projects beyond the open side of the handle 1. Engagement of the lever with the stop 25 preferably takes place when the toggle links have moved slightly over-center, the lever 4 then being urged toward and held automatically against the handle 1.

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. 1 to collapse the toggle 17, 21 and open the jaws, 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. 2 or until the work is gripped by the jaws. In this motion, the toggle is straightened to force the pins 11 and 22 apart at a substantial mechanical advantage. The bell crank 7 is thus swung to close the jaw 3 onto the work. If the jaw is properly adjusted to suit the size of the workpiece, the lever 4 will come substantially into abutment with the stop 25 thereby producing an over-center 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. 1. 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.

I claim as my invention:

1. A wrench comprising an elongated handle, a jaw fixed on one end of the handle, a bell crank pivoted on said handle and carrying a jaw opposing said first jaw, an abutment at the other end of said handle adjustable longitudinally thereof, an elongated link extending along said handle and pivoted on said abutment, said link comprising generally flat strips spaced to receive said bell crank between them and having pin and slot connections with the bell crank, an operating lever projecting in between said strips adjacent the bell crank and pivotally connected at one end of the latter, the other end of said lever projecting outwardly and laterally from said handle, a second link disposed between said strips and pivotally connected thereto intermediate the ends of the strips, and means providing a pivotal connection between said second link and said lever whereby to form a toggle which is straightened when said lever is swung inwardly toward the handle.

2. A wrench comprising an elongated handle, a jaw fixed on one end of the handle, a bell crank pivoted on said handle and carrying a jaw opposing said first jaw, an abutment at the other end of said handle adjustable longitudinally thereof, an elongated link extending along said handle and pivoted on said abutment, said link having a sliding lost motion connection with said movable jaw and comprising generally flat strips disposed side by side and spaced to receive said bell crank between them, an operating lever projecting in between said strips and pivotally connected at one end to said bell crank, the other end of said lever projecting outwardly and laterally from said handle, a second link disposed between said strips and pivotally connected

thereto intermediate the ends of the strips, and means providing a pivotal connection between said second link and said lever to constitute the two a toggle which is straightened when said lever is swung inwardly toward the handle.

3. 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, an operating lever pivoted on said bell crank arm adjacent said connection, a second link pivoted on said first link intermediate the ends thereof to swing in the plane of said lever, and means pivotally connecting said second link and said lever at a pivot offset from a line through the fulcrums of said first link and said lever whereby to constitute said lever and said second link a toggle which is straightened as the lever is swung toward said handle.

4. A wrench comprising an elongated handle, opposed jaws mounted on one end of said handle, one jaw being movable toward and away from the other, an elongated link extending along said handle and pivotally connected at one end on the other end of said handle the other end of said link having a sliding lost motion connection with said movable jaw, an elongated operating lever pivotally connected to said movable jaw and swingable laterally toward and away from the handle, a second link pivoted at one end on said first link intermediate the ends thereof, and means pivotally connecting the other end of said second link and said lever to form therewith a toggle which is straightened to actuate said movable jaw when the lever is swung toward said handle, each of the two pivotal connections between said lever and said jaw and second link being formed by interfitting convex and concave surfaces integral with the adjacent margins of the respective parts and each extending through only a partial revolution.

5. A wrench comprising an elongated handle, opposed jaws mounted on one end of said handle, one jaw being movable toward and away from the other, an elongated link extending along said handle and pivotally connected at one end on the other end of said handle the other end of said link having a sliding pivotal connection with said movable jaw, an elongated operating lever pivotally connected to said movable jaw and swingable laterally toward and away from the handle, a second link pivoted at one end on said first link intermediate the ends thereof, an arcuate surface on the other end of said second link, and a complementary arcuate surface on the adjacent margin of said lever interfitting with said first arcuate surface to pivotally connect said second link and the lever in the plane of the two and form a toggle which is straightened to actuate said movable jaw when the lever is swung toward said handle.

6. 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

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and having one end pivoted at the other end of said handle, the other end of said link having a sliding and pivotal connection with said bell crank arm, an operating lever pivoted on said bell crank arm adjacent said connection, a cross pivot on said link at a point spaced from said lever, and an arm journaled on said pivot and pivotally connected to and cooperating with said lever to form a toggle which is straightened by movement of the lever toward said handle.

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