Feb. 24, 1948. F. A. SNELL 2,436,497

WRENCH WITH TOGGLE-ACTUATED PIVOTED JAW

Filed March 23, 1945

Fig. 1

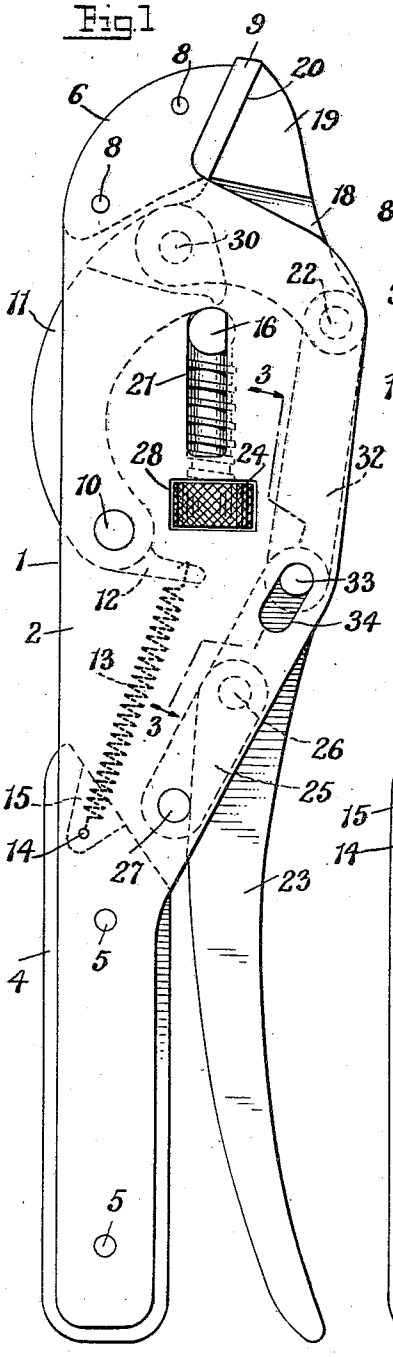


Fig. 2

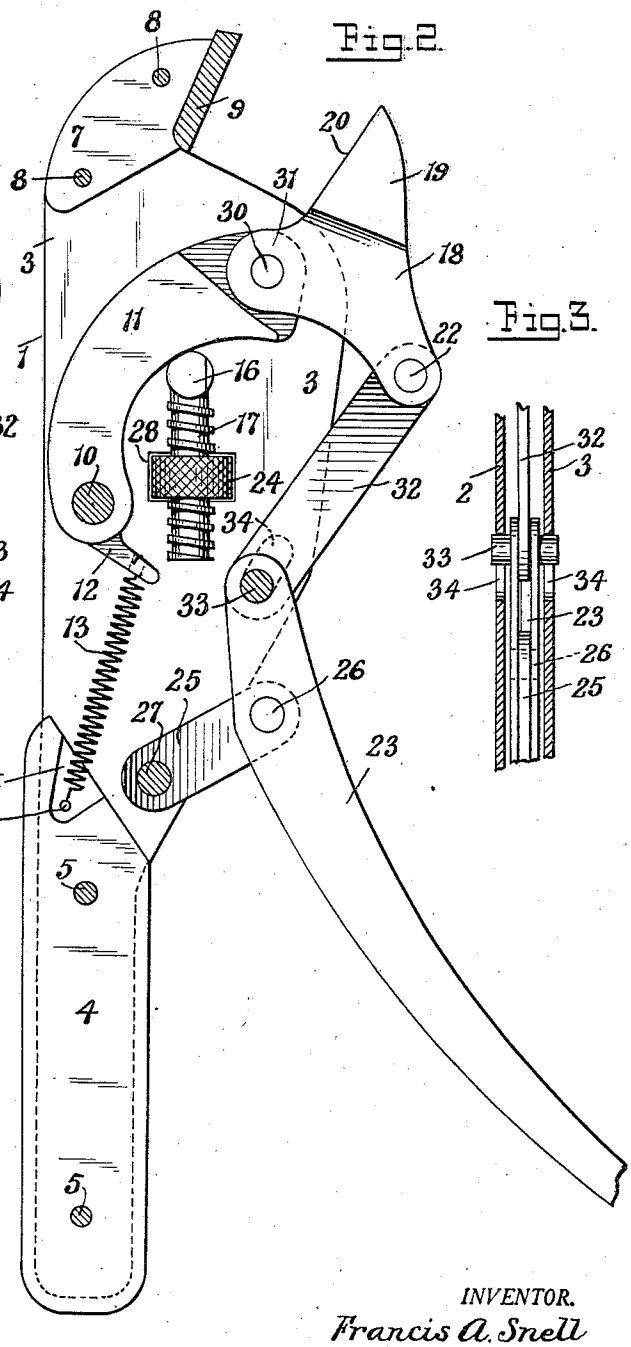


Fig. 3

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Patented Feb. 24, 1948 2,436,497

UNITED STATES PATENT OFFICE

2,436,497

WRENCH WITH TOGGLE-ACTUATED PIVOTED JAW

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Application March 23, 1945, Serial No. 584,431

13 Claims. (Cl. 81—84)

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This invention relates to wrenches, and more particularly to the type having a movable jaw adjustable with respect to a fixed jaw to enable nuts, bolts, pipes and other elements upon which a wrench is normally used, to be firmly engaged between the jaws and very quickly released or disengaged when desired. Examples of this type of wrench found in my Patents No. 2,388,580, 2,399,454 and 2,420,020.

The primary object of the present invention is to provide a wrench of this character, wherein a movable jaw is adapted to be adjusted to any position desired in respect to a stationary jaw, and while arranged to be pivotally shifted from its adjusted position to instantly free the object engaged between the jaws, it will also be instantly restored to clamping position, wherein its gripping surface will be parallel to that of the stationary jaw, upon closing movement of an operating handle.

Another object of the invention is to provide a wrench of this character which may be readily adjusted to fit any desired size of nut or other like object, and which, due to the pivotal movement of one of its jaws by means of a suitable toggle arrangement, may be readily released from gripping engagement with the nut or other object without the necessity for altering the adjustment means.

The invention further contemplates the provision, in a wrench of this kind, means by which the adjustment of the jaws, when once set for a nut or other object of a certain size, will remain constant, despite repeated opening and closing movements of the pivoted and adjustable jaw.

In the accompanying drawing, in which an illustrative embodiment of the invention is shown, Fig. 1 is a side elevation of a wrench constructed in accordance with the invention; Fig. 2 is a side elevation of the wrench in open position, with one side wall of the frame omitted, and certain parts being shown in section, to disclose construction; and Fig. 3 is a sectional view on the line 3—3 of Fig. 1, looking in the direction of the arrows.

Referring to the drawings, 1 indicates a frame member constituting the fixed handle portion and fixed jaw of the wrench. The frame includes two side plates or walls of similar shape and respectively indicated at 2 and 3, said walls being held in spaced relation at one end by a handle insert 4 maintained in place between the walls 2 and 3 by means of the rivets 5. At its opposite end, the frame walls 2 and 3 are shaped

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to form the stationary jaw 6. This jaw portion 6 of the wrench is reinforced by one or more inserts 7, maintained between the side walls 2 and 3 by the rivets 8. The jaw 6, thus formed, is provided with a face plate 9, which may be roughened if desired, to afford a non-slipping grip on a nut or other object to be engaged between the jaws of the wrench.

Pivotally mounted between the walls 2 and 3 on a pin 10, is a curved or arcuate link member 11, which is provided at its end adjacent to the pivot 10, with a finger 12 engaged by one end of a coil spring 13. The opposite end of the coil spring is attached to a pin 14 provided in a recess 15 in the handle insert 4. The coil spring 13 constantly urges the curved link 11 toward a cross head 16 on an adjustment screw 17, the cross head 16 being guided in slots 21 provided in the walls 2 and 3 of the frame. A nut 24 engages the screw 17, said nut being exposed through apertures 28 in the walls 2 and 3 and is thus accessible for rotation to raise or lower the cross head in the slots 21 and thereby determine the position of the curved link 11 and that of the movable jaw 19 pivotally secured thereto.

Pivotally mounted on a pin 30 in the end of the curved link 11 is the movable jaw 19 having a gripping face 20. The jaw 19 is of substantially bell-crank shape, having one arm 31 which is that pivotally attached to the link 11, and having its other arm 18 in the form of a clevis, pivotally connected by the pin 22 to one end of a link 32.

The actuating lever or handle for the wrench is shown at 23, the same being preferably of channel shape in cross section, and between its walls at one end, it carries a pivot pin 33 to which the second end of the link 32 is attached. This pivotal connection between the link 32 and the actuating lever or handle 23 is pivotally as well as slidably movable in a pair of angularly disposed slots 34 provided in the walls 2 and 3 of the frame 1, said slots thus constituting guide means for the pivot pin 33.

A link 25 has one end pivoted at 27 between the walls 2 and 3 of the frame 1 and its other end pivoted at 26 between the sides of the actuating handle or lever 23, the latter connection being located between the sliding pivot 33 and the free end of the actuating handle.

It will be seen that the curved link 11 and the link 32, when taken in conjunction with the movable jaw 19, form a linkage system, the arrangement being such that when the handle 23 is moved toward the fixed frame or stationary handle 1,

the gripping face 20 of the movable jaw 19 assumes a parallel relation to the face of the portion 9 of the stationary jaw 6, and a decided clamping action is effected when the pin 26 passes the over center position, to lock the parts in close clamping relation with any object to be grasped between the jaws. It will be seen that this effect is maintained, regardless of the position of the jaws relative to each other, as determined by the positioning of the cross head 16 in the slots 21 when adjusted to any desired point by manipulation of the nut 24. It will thus be noted that the wrench may be readily adjusted to any size nut or other object, within its range of normal operation according to the size of the parts thereof, and when once adjusted, the nut or other object to be held, may be firmly grasped and the jaws locked thereon by compressing the actuating handle 23 toward the fixed handle 1. It will also be seen that when it is desired to release the object so grasped, the nut 24 need not be adjusted, but by merely releasing the handle 23, the jaw 19 is caused to swing away from the jaw 6 about the pivot 30, whereby the object is readily released. When releasing the object by swinging the handle 23 outwardly, or to the position shown in Fig. 2, it will be noted that the slots 34 permit descent of the pivot pin 33 to the lower ends of these slots, and this descending movement of the pivot 33 under the swing of the handle 23, exerts a longitudinal pull on the link 32 causing it to impart a swinging movement to the movable jaw 19, thus swinging said jaw about the pivot 30 to bring its gripping face 20 to the angular position shown in Fig. 2, and at once permitting the release of the object then located between the jaws. A reverse movement of the handle 23, or a swing of the same toward the fixed handle 1, causes the pivot pin 33 to ascend in the slots 34 to the position of Fig. 1, such rising movement of the pin 33 causing link 32 to be moved upwardly and the movable jaw thus swung about its pivot 30 to bring its gripping face parallel to the face of the fixed jaw 6 and at the correct distance therefrom according to the position of the cross head 16. Since the actuating handle 23 is pivotally mounted directly upon the fixed frame 1, although having a slight sliding movement relatively thereto because of the mounting of the handle pivot 33 in the slots 34, the relationship of the movable handle to the fixed handle 1 is more or less constant.

In my Patent No. 2,383,580 I have shown an arrangement of linkage in which a parallel disposition of the several links is had when the jaws of the wrench are parallel. I have found however, that the desired parallelism of the jaws can be attained by linkage which is other than parallel, an example of which is the structure herein described. That is to say, in the present structure it will be noted that the distance between the centers of the two pivot points 22 and 30 is less than the distance between the centers of the two pivots 10 and 33, and that the distance between the centers of the two pivots 22 and 33 is less than the distance between the centers of the two pivots 10 and 30.

Certain advantages follow from an arrangement of this character since it enables a more symmetrical design to be employed; the manufacturer's tolerances can be greater, and it is also possible to provide means for compensating for wear by the shift of one or more of the pivotal points into additional holes provided for them, should such an arrangement be found desirable or necessary.

While I have described one embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

Having described my invention, what I claim is:

1. In a tool of the character described, a frame including a fixed jaw, a movable jaw, a pair of links, each link being pivoted at one of its ends to the frame, the pivot for one of the links having a limited shifting movement relative to the pivot for the other link, said links having their ends remote from their pivots pivotally attached to the movable jaw, an actuating handle pivotally connected to the shifting pivot, and a link pivoted at one end to the actuating handle and at its other end to the frame.

2. In a tool of the character described as provided for in claim 1, wherein guide slots are provided in the frame in which the shifting pivot has a limited sliding movement.

3. In a tool of the character described, a frame including a fixed jaw, a movable jaw, a link pivotally secured to the frame, a second link pivotally attached to the frame by a shifting pivot, means in the frame for accommodating the shifting pivot and allowing the same a limited shifting movement, the links being pivotally attached to the movable jaw, an actuating handle pivotally attached to the shifting pivot, and a link pivotally coupling the actuating handle to the fixed frame.

4. A tool of the character described comprising, a frame including a fixed jaw, a movable jaw, a link pivotally attached to the frame and having an end pivotally attached to the movable jaw, a second link having an end pivotally attached to the movable jaw, a pivot attached to and slidably mounted in the frame and engaging the second end of the second link, a third link pivoted at one end to the frame, an actuating handle, the third link having its other end pivotally attached to the handle, and one end of the handle being pivotally attached to the sliding pivot.

5. A tool of the character described comprising, a fixed jaw, a fixed frame member and a movable actuating handle, one end of the actuating handle being pivotally attached to one end of a link, a movable jaw to which the opposite end of the link is pivotally attached, a pivoted link mounted in the frame and having an end pivotally attached to the movable jaw, means in the frame for adjustably limiting the pivotal movement of the latter link, a third link having an end attached to the actuating handle and a second end attached to the frame, and means in the frame for affording a sliding movement to the pivotal connection between the actuating handle and the first link.

6. A tool of the character described comprising, a frame having a portion constituting a stationary jaw, said frame having a pair of spaced walls, a link pivotally mounted between the walls, an adjustable stop located between the walls, spring means operative to urge the link toward the stop, a movable jaw pivoted on the link, a second link having one end pivotally secured to the movable jaw, an actuating handle pivotally secured to the second end of said link, the walls of the frame each having a slot, the connecting pivotal point of the actuating handle and the second link being disposed in the slots and slidable

therein upon swinging movement of the actuating handle, and a third link having one end pivotally secured to the actuating handle and its other end pivotally secured to the frame.

7. A tool of the character described comprising, a frame having a pair of spaced walls and a fixed jaw portion, a movable jaw located between the walls, a link pivoted between the walls and having one end pivotally secured to the movable jaw, means for adjusting the position of said link, the walls of the frame being slotted, an actuating handle having a pivot pin slidable in said slots, a second link having an end pivotally secured to the pivot pin and its other end pivotally secured to the movable jaw, and a third link pivoted at one end to the actuating handle and at its other end to the frame.

8. A tool of the character described comprising, a frame having spaced walls, a fixed jaw carried by the frame, a curved link pivotally mounted between the walls, an adjustable stop against which the link is urged, spring means for urging the link toward the stop, a movable jaw pivotally secured at one end of the link, the walls of the frame being provided with slots extending angularly in respect to the frame, an actuating handle having a pivot pin at one end located in the slots and capable of sliding movement therein for the length of the slots, a link having one end connected to said pin and its other end pivotally attached to the movable jaw, and another link having one end pivoted between the walls of the frame and its other end pivotally secured to the actuating handle at a point below the movable pivot pin for said handle.

9. A tool of the character described comprising, a fixed frame having slots and including a stationary jaw, a movable jaw of substantially bell-crank shape having a part disposed within the frame, a pivoted link mounted in the frame and pivotally attached to the movable jaw, an actuating handle, a second link having one end pivotally attached to one end of the handle, said point of pivotal connection between the handle and the second link being slidable in the slots in the frame in a direction longitudinally of the second link, the second end of the second link being pivotally secured to the movable jaw, a third link pivoted at one end to the actuating handle at a point between the sliding pivot and the free end of the handle, and the other end of said link being pivotally attached to the frame.

10. In a tool of the character described, a fixed frame having a stationary jaw, a movable handle, a movable jaw, a pair of links pivoted at one end

to the frame, the opposite ends of the links being pivotally attached at spaced points to the movable jaw, a pin-and-slot connection between one end of one of the links and the frame whereby said link is both pivotally and longitudinally movable in respect to the frame, said pin constituting a pivotal connection for one end of the movable handle, and a link connecting the movable handle to the fixed frame.

11. In a tool of the character described, a frame including a fixed jaw, a movable jaw, a pair of links, each link being pivoted at one of its ends to a pivot pin secured in the frame, a handle pivoted at one of its ends to the pivot at one end of one of the links and which attaches said link to the frame, the last-mentioned pivot being slidable in the frame said links having their ends remote from the pivots pivotally attached to the movable jaw, and a third link pivoted at one end to the handle and at its other end to the frame.

12. In a tool of the character described in claim 11, wherein the first two links are arranged in non-parallel relation, and the pivot which connects the third link to the handle is located at a distance from the point of attachment of the handle to the frame.

13. In a device of the character described, a frame including a fixed jaw, a movable jaw, a pair of links, each link being pivoted on a pivot pin at one of its ends to the frame, one of the links having its pivot to the frame slidable in the frame, said links being pivoted on pivot pins at their opposite ends to the movable jaw, the distance between the pivots for one of said links being greater than the distance between the pivots for the second link, a handle pivotally connected to the link at the slidable pivot, and a link pivotally coupling the handle to the frame.

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