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QUICK-ADJUSTING TOGGLE WRENCH

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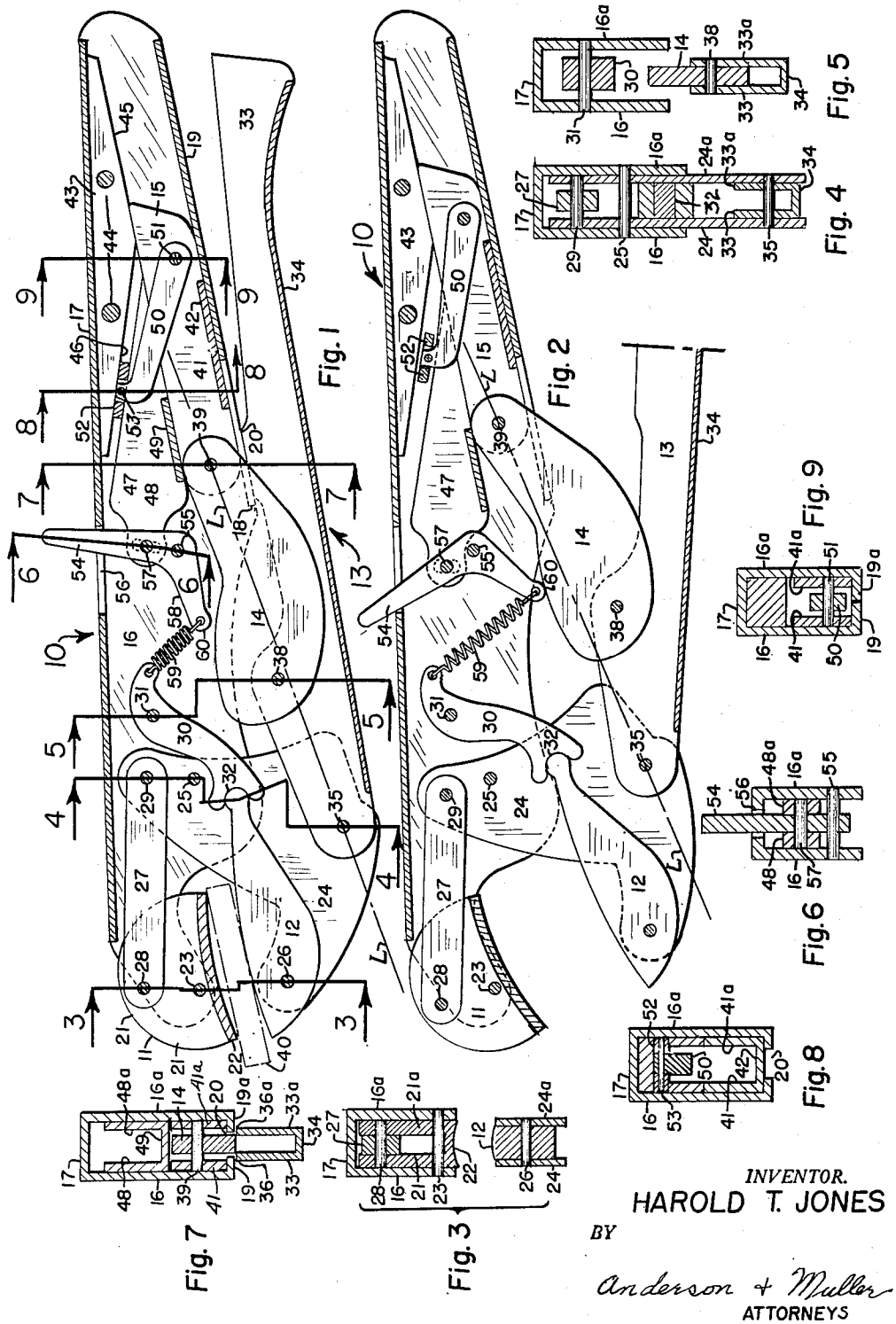


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

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QUICK-ADJUSTING TOGGLE WRENCH

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19 Claims. (Cl. 81—84)

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This invention relates to improvements in toggle actuated wrenches of the general type disclosed in Patent 2,280,005, and more particularly to quick adjusting mechanism for the same.

One of the objects of the invention is to provide a wrench which may be adjusted to all sizes of objects, within its range of adjustment, without manual adjustment of screws, etc., formerly employed to effect the desired adjustment.

Another object is to provide the wrench with means for quickly adjusting the gripping force thereof.

Another object is to provide the wrench with a finger actuated member which controls positioning of certain parts for effecting locking of the wrench and also for releasing it.

Another object is to provide a jaw construction in which the gripping faces of the jaws remain parallel in all positions of adjustment thereof.

A further object is to provide the jaws with curved surfaces for more effectively gripping an object.

Still further objects, advantages, and salient features will become more apparent from a consideration of the description to follow, the appended claims, and the accompanying drawing, in which:

Figure 1 is a side elevation of the wrench with portions broken away to reveal details of the actuating linkage;

Figure 2 is a similar view showing the linkage in another position of adjustment;

Figure 3 is a section taken on line 3—3, Figure 1;

Figure 4 is a section taken on line 4—4, Figure 1;

Figure 5 is a section taken on line 5—5, Figure 1;

Figure 6 is a section taken on line 6—6, Figure 1;

Figure 7 is a section taken on line 7—7, Figure 1;

Figure 8 is a section taken on line 8—8, Figure 1;

Figure 9 is a section taken on line 9—9, Figure 1.

Referring in detail to the drawing, the wrench comprises in general, a handle 10, having a jaw 11 at one end thereof, a movable jaw 12 pivotally secured to the handle, an operating lever 13 pivotally secured to the movable jaw, a toggle link 14 pivotally secured at its lower end to the operating lever, and at its upper end to a movable abutment 15 carried by the handle and adapted to be positioned relative thereto by certain structure to be hereinafter described.

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Handle 10 is formed with parallel side walls 16, 16a, connected together at the top by a web 17. Forwardly of point 18, that is to the left in Figures 1 and 2, the walls and web forming a U-shaped cross section. Rearwardly of point 18, the side walls are bent inwardly to form a lower web comprising portions 19, 19a (see Figure 9), this rearward portion thus being a box section, and a slot 20 is provided in the lower web (see Figures 1, 7, and 8) for a purpose to be hereinafter set forth.

Jaw 11 is U-shaped in cross section having side walls 21, 21a connected by a web 22, the outer face of which forms a concave gripping surface, this surface being concave in a longitudinal direction of the jaw as shown in Figures 1 and 2, and also in cross section as shown in Figure 3. This jaw is secured to the handle by a pivot pin 23 which extends through the side walls of the jaw and through the side walls of the handle, as best shown in Figure 3.

A pair of spaced plates 24, 24a, comprising a portion of a lower movable jaw, are pivotally secured to the side walls of the handle by pivot pin 25, as best shown in Figure 4, and between these plates the jaw 12 is disposed, being secured to the side plates by pivot pin 26. The gripping face of this jaw is convex longitudinally and in cross section and is of complementary shape of concave jaw 11.

A link 27 is secured at its forward end to jaw 11 by pivot pin 28 (see Figures 1 and 3), and at its rearward end to plates 24, 24a, by pivot pin 29. A link 30 is secured at its upper end to the side walls of the handle by a pivot pin 31, as best shown in Figures 1 and 5, and its lower end is provided with a socket 32 which pivotally receives the rearward end of jaw 12. When plates 24, 24a swing about pivot pin 25 link 27 rotates jaw 11 about its pivot pin 23 and link 30 rotates jaw 12 about its pivot pin 26. The relative positions of the various pivot pins are so chosen that the gripping faces of jaws 11, 12, remain parallel, or substantially parallel, in all relative positions thereof.

Operating lever 13 is U-shaped, having spaced side walls 33, 33a, joined by a web 34. The forward end of the operating lever is disposed between plates 24, 24a (see Figure 4) and is secured thereto by pivot pin 35. Side walls 33, 33a are so shaped that they abut webs 19, 19a (see Figures 1 and 7) at points 36, 36a, respectively. Toggle link 14 has one end disposed between walls 33, 33a and is secured thereto by pivot pin 38. A portion of this link extends through slot 20 and has the upper end thereof secured to movable abutment 15 by a pivot pin

39. It will be observed that when the jaws of the wrench are engaged with an object 40, pivot pin 38 is above straight line L which extends between pivot pins 35, 39, thus retaining the jaws in locked position. The abutment of walls 33, 33a with webs 19, 19a at points 36, 36a limits the distance which pivot pin 38 moves above line L.

Abutment 15 is U-shaped having side walls 41, 41a connected by a web 42. Web 42 and the lower edges of the side walls lie in a plane and may slide along the flat surface formed by the upper surfaces of webs 19, 19a. This surface tapers upwardly and rearwardly toward the inner surface of web 17. A wedge block 43 is fixedly secured to the handle by any suitable means, such as rivets 44, and has a surface 45 parallel to web 19 and a surface 46 at an acute angle thereto. A wedge 47 having side walls 48, 48a, connected by a web 49 is disposed between surface 46 and the top surface of the abutment member 15. A link 50 is secured at its lower end to abutment 15 by pivot pin 51 (see Figures 1 and 9) and at its upper end to a block 52 by a pivot pin 53 (see Figures 1 and 8). It will now be apparent that when wedge 47 is forced rearwardly its top surfaces abut block 52, which in turn abuts surface 46 and its lower surface abuts the top of abutment 15 which prevents abutment 15 from moving rearwardly. Forward movement of wedge 47 is effected by a lever 54 secured to the handle by pivot pin 55 (see Figures 1 and 6), this lever projecting through a slot 56 and being secured to the wedge by a pivot pin 57. Lever 54 is L-shaped, the lower leg 58 thereof having one end of a spring 59 secured thereto, the other end of the spring being secured to link 30. This spring normally urges wedge 47 rearwardly and also urges jaw 12 toward jaw 11. Leg 58 is provided with a camming portion 60 which engages the top edge of toggle link 14 when the upper end of the lever is moved forwardly.

Assuming that the spring 59 has urged jaws 11, 12 together, which is the normal position thereof when the wrench is not in use, and it is desired to grip an article, the operation is as follows:

Lever 54 is pressed to the left a slight distance moving wedge 47 away from block 52 thus releasing abutment member 15. Operating lever 13 is then squeezed toward handle 10 against the urge of spring 59 and due to the engagement of parts 36, 36a on the inclined webs 19, 19a abutment member 15 will slide to the right as 36, 36a slide along the webs, thus opening the jaws. When the jaws have been opened a sufficient distance to receive an object, such as 40, the squeezing action is relaxed which permits spring 59 to urge the jaws against the object. Lever 54 is next urged further to the left so that cam 60 engages the upper edge of toggle link 14 which forces the operating lever away from the handle and moves pivot 38 below line L. If a light gripping force is desired on the object, lever 54 is moved to a position wherein pivot pin 38 is only a slight distance below line L. If a heavy force is desired, lever 54 is moved a greater distance so that pivot pin 38 is a considerable distance below line L, as shown, for example, in Figure 2. Lever 54 is then released which locks abutment 15. Operating lever 13 is again squeezed which moves pivot pin 38 above line L thus locking the jaws on the object. When it is desired to release the wrench from the object lever 54 is moved to the left releasing abutment member 15 and upon squeezing of the operating lever, as before described, 36, 36a move along webs 19, 19a opening the jaws away from the object.

It will now be apparent that all movements of the jaws are controlled by lever 54 and a squeezing action of operating lever 13. It will also be apparent that the squeezing force of the jaws on an object is also controlled by lever 54.

The concave-convex jaw construction has been found to more effectively grip an article even with smooth faced jaws. The parallel motion of these jaws also provides an improved construction for gripping objects having parallel sides but this construction is not essential in the broadest aspects of the invention, and it will be apparent that the toggle link abutment locking mechanism may be employed with any type of jaw construction.

The curvature of the convex-concave jaw construction may be as described with the curves complementary and a circular curve may be employed. Thus in Figure 1, the center of curvature (with the jaws closed together) would be at a point below the jaws. It is apparent, however, that the lower jaw may be concave and the upper jaw convex, the center of curvature then being above the jaws. It is also apparent that if the refinement of the curved jaw construction is not desired, the jaws may be made planar and, if desired, may be serrated. Also, they may be curved longitudinally as shown in Figures 1 and 2 but straight in cross section, rather than curved, as shown in Figure 3.

Having described the invention, what I claim as new is:

1. A wrench comprising an elongated handle provided with an upper jaw at the forward end thereof, a lower movable jaw mounted on said handle arranged to cooperate with the upper jaw to grip an article, a toggle for operating the movable jaw comprising an operating lever pivotally engaged at the forward end thereof to the movable jaw and a toggle link pivotally engaged at one end to the operating lever intermediate the ends thereof and at its other end to movable abutment means carried by said handle, the operating lever extending longitudinally adjacent the handle in spaced relation thereto and arranged to be squeezed by a hand engaging the wrench to lock the toggle, a control device movably mounted on said handle intermediate the ends thereof adapted to be actuated by a finger of a hand holding the wrench, and means operatively connected to said control device including a movable member engageable with various different portions of said abutment means in its various different positions of adjustment for selectively securing said abutment means in a desired position relative to said handle.

2. A wrench in accordance with claim 1 including means actuated by said control device and engageable with a portion of said toggle for moving said toggle link to a position wherein the toggle is unlocked.

3. A wrench in accordance with claim 1 including means on said handle for effecting movement of said abutment means relative to said handle when said abutment means is free to move.

4. A wrench in accordance with claim 3 wherein said means for effecting movement of said abutment means comprises guide means disposed angularly to the longitudinal axis of said handle, adapted to effect movement of said abut-

ment means thereälong when said operating lever is squeezed.

5. A wrench in accordance with claim 4 including resilient means for urging said movable abutment means to a locked position.

6. A wrench in accordance with claim 1 including means operated in response to movement of said operating lever for retaining said jaws in parallel relation in all positions of adjustment thereof.

7. A wrench in accordance with claim 1 wherein said last named means includes a movable wedge disposed within said handle.

8. A wrench comprising an elongated handle provided with an upper jaw at the forward end thereof, a lower movable jaw mounted on said handle arranged to cooperate with the upper jaw to grip an article, a toggle for operating the movable jaw comprising an operating lever pivotally engaged at the forward end thereof to the movable jaw and a toggle link pivotally engaged at one end to the operating lever intermediate the ends thereof and at its other end to movable abutment means carried by said handle, the operating lever extending longitudinally adjacent the handle in spaced relation thereto and arranged to be squeezed by a hand engaging the wrench to lock the toggle, a control lever mounted for movement relative to the handle and having a portion between the ends of the handle, adapted to be actuated by a finger of a hand holding the wrench, and means operatively connected to said control lever for electively locking said abutment means in a predetermined position relative to said handle.

9. A wrench in accordance with claim 8 including means on said control lever adapted to move said toggle link to an unlocked position.

10. A wrench in accordance with claim 8 wherein said handle member is channel shaped and said control lever has a portion disposed between the side walls thereof, said portion extending upwardly passing through a slot in the bight of the channel.

11. A wrench in accordance with claim 8 including resilient means for urging said control lever to a position in which said abutment member is locked against movement.

12. A wrench in accordance with claim 8 including resilient means for moving said abutment means to a locked position.

13. A wrench comprising an elongated handle provided with a movable upper jaw at the forward end thereof, a movable lower jaw mounted on said handle arranged to cooperate with the upper movable jaw, said jaws having opposed gripping faces adapted to grip an article, resilient means for urging said jaws toward each other, a toggle for operating the movable lower jaw comprising an operating lever pivotally engaged at the forward end thereof to the movable lower jaw and a toggle link pivotally engaged at the forward end thereof to the operating lever and at its other end to movable abutment means carried by said handle, the operating lever extending longitudinally adjacent the handle in spaced relation thereto and arranged to be squeezed by a hand engaging the wrench to lock the toggle, means for selectively securing said abutment means in a desired position relative to said handle and means including said abutment means for effecting opening of said jaws when said operating lever is squeezed toward said handle.

14. A wrench in accordance with claim 13 including means for retaining said jaws in parallel relation in all positions of adjustment thereof.

15. A wrench comprising an elongated handle member having a portion thereof adapted to be squeezed by the hand of a user and provided at the forward end thereof with an upper jaw, a lower movable jaw mounted on said handle member arranged to cooperate with the upper jaw to grip an article, toggle means for operating the movable jaw comprising a combined operating and release member pivotally engaged at the forward end thereof to the movable jaw and a toggle link pivotally engaged at its forward end to the combined operating and release member and at its rear end to the handle member, the combined operating and release lever extending longitudinally adjacent the handle member in spaced relation thereto and having a portion adapted to be squeezed by a hand of the user to lock the toggle, a finger actuator device carried by one of said members and movable relative to the portion thereof adapted to be squeezed, said device being movable to a position in which said combined member serves as a locking lever which may be squeezed toward the handle member to lock the toggle means and the jaws on an article held between the latter, and movable to another position in which the combined member serves as a release lever which may be squeezed toward the handle member when the toggle means is locked to release the jaws from the article, at least one of said members being channel shaped in cross section, said finger actuator device having a portion extending from the outside of the bight of the channel to the inside thereof.

16. A wrench comprising an elongated handle, an upper jaw at the forward end thereof, a lower movable jaw mounted on said handle arranged to cooperate with the upper jaw to grip an article; a toggle for operating and locking the movable jaw consisting of an operating lever pivotally connected at its forward end to the movable jaw, a toggle link pivotally connected to the operating lever intermediate its ends, means engaging the other end of said toggle link adapted to slide along said handle with said link, lever and movable jaw while the toggle is locked and a control device in said handle for selectively locking said means in desired position.

17. A wrench comprising an elongated handle, an upper jaw at the forward end thereof, a lower movable jaw mounted on said handle arranged to cooperate with the upper jaw to grip an article; a toggle for operating and locking the movable jaw consisting of an operating lever pivotally connected at its forward end to the movable jaw, a toggle link pivotally connected to the operating lever intermediate its ends, means engaging the other end of said toggle link adapted to slide along said handle and effecting the movement of said toggle and movable jaw with the toggle being in the locked position.

18. A wrench comprising an elongated handle, an upper jaw at the forward end thereof, a lower movable jaw mounted on said handle arranged to cooperate with the upper jaw to grip an article; a toggle for operating and locking the movable jaw consisting of an operating lever pivotally connected at its forward end to the movable jaw, a toggle link pivotally connected to the operative lever intermediate its ends, means slidable in the handle pivotally connected to said toggle link, and a control device in said handle operatively connected with said means for selectively effecting sliding motion of said means

and said lever with the toggle locked, or locking said means to the handle in desired position.

19. A wrench comprising an elongated handle, an upper jaw at the forward end thereof, a lower movable jaw mounted on said handle arranged to cooperate with the upper jaw to grip an article; a toggle for operating and locking the movable jaw consisting of an operating lever pivotally connected at its forward end to the movable jaw, a toggle link pivotally connected to the operating lever intermediate its ends, sliding means in the handle connected to the toggle link movable with the operating lever rearwardly and forwardly with the toggle locked, and means for locking said sliding means to the handle in desired position.

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