Oct. 26, 1954 C. H. REYNER 2,692,522

LEVER-AND-LINK ACTUATED, SLIDABLE JAW WRENCH

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Fig. 1.

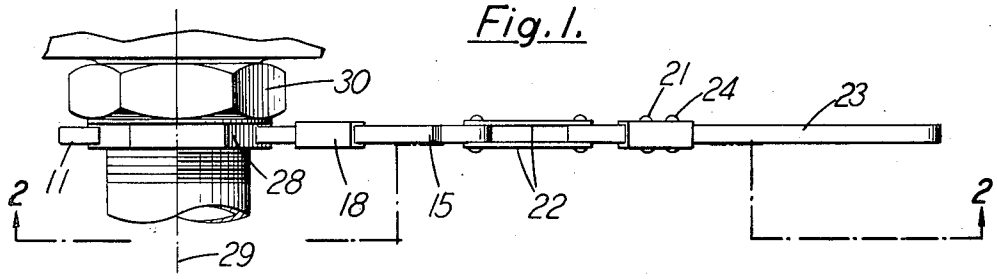


Fig. 2.

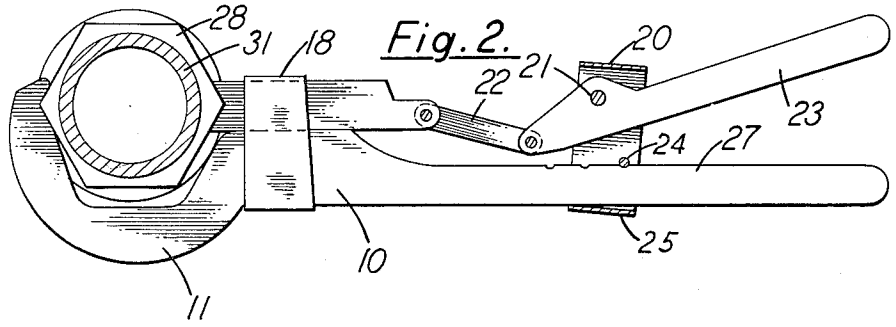


Fig. 3.

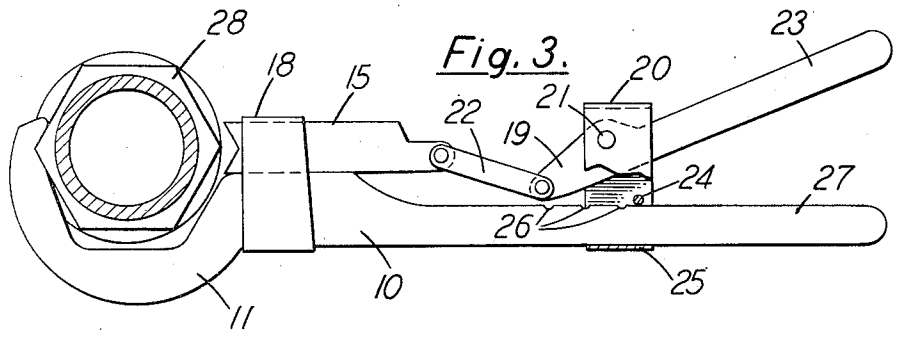


Fig. 4.

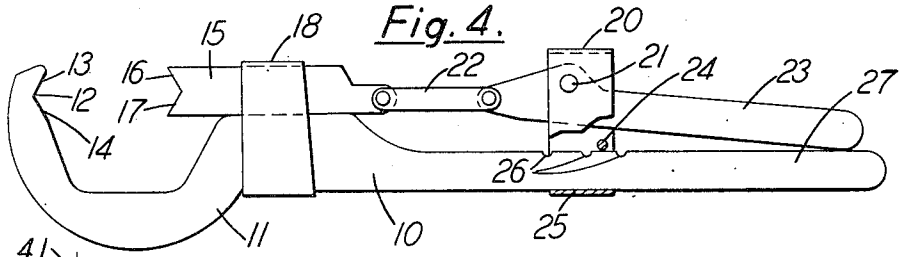
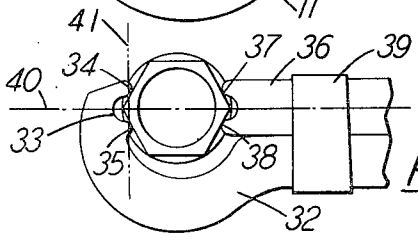


Fig. 5.



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LEVER-AND-LINK ACTUATED SLIDABLE JAW WRENCH

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1 Claim. (Cl. 81—88)

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This invention relates to the construction of wrenches. A primary consideration in its development has been the creation of a structure having a minimum dimension in the direction of the axis of the bolt or nut to which the wrench is applied. The use of so-called "lock nuts" is very common in several types of mechanical installations, and at pipe connections. The principal function of a lock nut is to fit into tight engagement with a heavier nut which carries the primary forces of the connection, the purpose of the lock nut being to prevent rotation of the primary load-carrying nut as a result of vibration or accident. Since the lock nut bears tightly against the primary nut, loosening of the lock nut usually requires the application of two wrenches—one to the lock nut and one to the heavier primary nut. This situation results in the necessity for the mechanic to manipulate these two tools in very close quarters, particularly when the nut assembly is adjacent a relatively large surface disposed perpendicular to the axis of the connection.

The present invention was developed as a result of these requirements. In order to maximize the amount of grip on the lock nut with respect to the amount of force applied to the nut itself, the preferred form of the present invention provides for the engagement of the nut upon opposite corners rather than on the "flats." Several other types of wrenches involve the use of corner engagement, as in the case of the standard socket wrench. The present invention incorporates the use of this principle in its preferred form as a means of applying the requisite amount of torque to the nut with a minimum amount of force tending to compress the locked nut against the threaded pipe on which it is mounted. As is obvious, a reduction in the amount of pressure will result in decreasing the net amount of torque which must be applied to loosen the nut, since the binding effect of the nut against the internal threads is reduced.

The preferred form of the present invention includes a frame member having a C-shaped end, the outer extremity of which is provided with a notch of an angle similar to the corner angle of the nut with which the wrench is expected to cooperate. Directly opposite this nut, a slideable jaw member is mounted for movement toward and away from the fixed notch on the frame. A toggle system operated by a handle serves to position the jaw member, and the toggle system preferably includes a fulcrum or pivot member capable of having its position with respect to the frame easily altered to accommodate various sized nuts. The toggle action operated by the handle will generate a relatively small amount of movement under high mechanical advantage. Rack and gear or cam systems could be used in place of the toggle arrangement, resulting in somewhat different mechanical advantage characteristics. Handle means are preferably provided in conjunction with the toggle and with the frame, arranged in such a fashion that a manual gripping action serves to urge the jaw member tightly into engagement with a nut so that the nut is, in effect, suspended between the fixed notch and a similarly-shaped notch in the jaw member. In this fashion, the C-shaped portion of the frame operates to reach around the nut to grasp one of the corners thereof on the opposite side from that of the remainder of the device.

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The several features of the present invention will be discussed in detail through a discussion of the particular embodiments illustrated in the accompanying drawing. In the drawing:

Figure 1 shows a top view illustrating the engagement of a wrench constructed according to the present invention with a lock nut.

Figure 2 shows a section taken on the plane 2—2 of Figure 1 (substantially perpendicular to the axis of the fitting).

Figure 3 shows the first stage in the adjustment of the wrench to permit removing it from engagement with the lock nut.

Figure 4 illustrates the position of the components of the wrench after the unit has been released completely from the pipe fitting, and prepared for adjustment to a nut of another size.

Figure 5 shows a modified form of the present invention illustrating a different formation of the engaging surfaces of the frame and jaw member.

Referring to Figures 1 to 4, the illustrated wrench includes a frame member 10 having a C-shaped end 11. A V-shaped notch 12 is provided at the outer extremity of the C-shaped portion, and the notch may be considered as forming the pair of engaging surfaces 13 and 14. A similar notch is formed on the movable jaw member 15, which establishes the pair of engaging surfaces 16 and 17.

A collar 18 is fixed with respect to the frame 10, preferably by spot welding. This collar provides a slideable mounting and guideway for the jaw member 15 permitting movement toward and away from the notch 12. The relative po-

sition of the surfaces 13, 14, 16, and 17 is such that a plane can be drawn connecting the intersection points of the notches, and this plane will operate to bisect the angles of the notches. The sliding movement of the jaw member 15 is preferably parallel to this plane. The positioning mechanism for the jaw member 15 includes a lever indicated at 19 which is pivotally mounted on the pivot or fulcrum member 20 on the pin 21. Links 22 connect the lever 19 with the jaw member 15, and clockwise rotation of the handle 23 with respect to the frame 10 will result in generating a toggle action moving the jaw member 15 toward the notch 12 in the frame.

Preferably, the fulcrum member 20 is adjustable to several positions along the frame 10. One method of accomplishing this includes the construction of the fulcrum member as a collar of rectangular cross section, with a pin 24 disposed at a distance above the transverse portion 25 which is slightly greater than the depth of the frame at this point. With the fulcrum member arranged generally perpendicular to this portion of the frame, the fulcrum member can be slid into various positions in which the pin 24 can engage one of the notches 26. Application of force resulting from the engagement of the jaw member with a nut will tend to rotate the fulcrum member in a clockwise direction, and will cause the pin 24 and the transverse portion 25 to create a jamming action positively positioning the fulcrum member and the parts associated therewith. Preferably, a handle section 27 is formed as a continuation of the frame, and the application of gripping force between the handle portions 23 and 27 will generate the required force to move the jaw member into engagement with the nut and also to provide a firm grasp upon the tool for the application of torque.

When in use, the wrench is first placed in the position indicated in Figure 4. With the fulcrum member 20 in this relative position with the frame 10, the assembly connected to the fulcrum member may be moved so as to adjust the gap between the jaw member and the frame to the proper amount to accommodate the nut as indicated at 28. When the nearest notch 26 to provide this adjustment is selected, a manual gripping action can be applied between the handle portions 23 and 27 forcing the jaw member into firm engagement with the nut 28 as shown in Figure 2. A top view of the unit in the position shown in Figure 2 is presented in Figure 1; and it will be noted that the wrench described provides for the application of torque to the lock nut with a minimum dimension in the direction parallel to the axis 29 of the fitting. This arrangement provides the maximum amount of space available for the application of other tools to the primary nut 30. Grasping the lock nut 28 upon its opposite corners will provide a minimum amount of force across the diameter of the nut which would tend to compress the nut and increase the severity of the engagement of the threads with those of the pipe 31.

Referring to Figure 5, a slightly modified form of the present invention is illustrated which presents a different formation of the engaging notches in the frame and jaw members. It frequently becomes necessary to use the wrench with nuts having square, octagonal, or hexagonal formations. Obviously, it is not handy to keep available a series of wrenches of substantially the same size for this type of work. The formation of the engaging surfaces illustrated in Figure 5 will permit the wrench to be used regardless of the corner angles encountered on the nuts. The frame member 32 is provided with a recess 33 terminating in a pair of rounded engaging surfaces indicated at 34 and 35. The jaw member 36 is similarly formed, providing the opposite engaging surfaces 37 and 38. The jaw member 36, as in the case of the form of the invention previously described, is slideably mounted with respect to the frame 32 within the confines of the fixed collar 39. The relative position of the engaging surfaces 34 and 35 and also 37 and 38 is such that they are arranged in both cases on opposite sides of a common plane 40. The pair of engaging surfaces 34 and 35 may be considered as directly opposite each other with respect to a normal 41 to the plane 40. As in the case of the first-mentioned form of the invention, it is preferred that the movement of the jaw member 36 be parallel to the plane 40.

The particular embodiments of the present invention which have been discussed and illustrated herein are for illustrative purposes only and are not to be considered as a limitation upon the scope of the appended claim. In the claim, it is my intent to claim the entire invention disclosed herein, except as I am limited by the prior art.

I claim:

A wrench, comprising: a frame having an engaging surface, handle means, and means forming a guideway disposed substantially parallel to and offset from said handle means; a jaw member slidably mounted in said guideway for movement toward and away from the engaging surface of said frame; means for slidably positioning said jaw member along said guideway including a lever, a pivot member supporting said lever at an intermediate point on said lever for rotation on an axis spaced from said handle means in a plane substantially parallel to the sliding movement of said jaw member, said pivot member being adjustably mounted to various positions on said frame, and link means connecting the end of said lever means adjacent said jaw member to said jaw member; and handle means formed on the opposite end of said lever means from said link means, said frame means, jaw member, pivot member, and handle means being in substantially coplanar relationship.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
297,640	Schmemann	Apr. 29, 1884
350,935	Leslie	Oct. 19, 1886
654,524	Descher et al.	July 24, 1900
1,725,301	Plante	Aug. 20, 1929
2,154,531	Roche	Apr. 18, 1939
2,587,263	Wortelmann	Feb. 26, 1952