Aug. 3, 1954 B. BURNS 2,685,218

TOGGLE-ACTUATED, PLIER TYPE WRENCH

Filed Aug. 21, 1952

Fig. 1

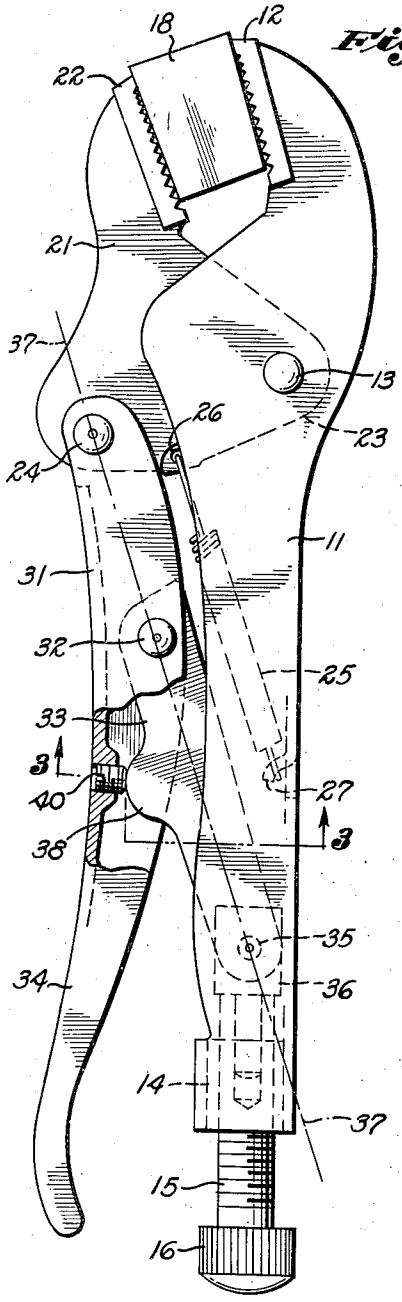


Fig. 2

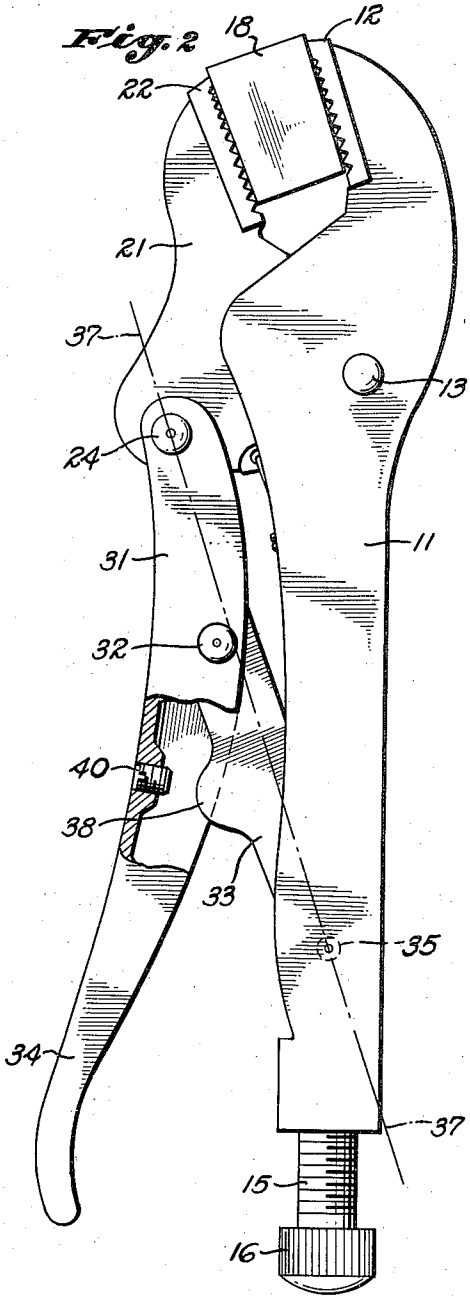
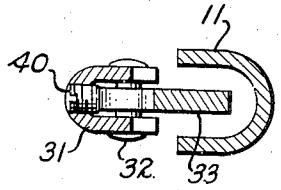


Fig. 3



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TOGGLE-ACTUATED, PLIER TYPE WRENCH

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1 Claim. (Cl. 81—84)

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My invention relates to wrenches and especially to wrenches which may be locked on the article to which they are applied.

Wrenches of the type in which it is intended that my invention be embodied are generally known as toggle wrenches or vise wrenches. Such wrenches of this type as are in use at the present time generally comprise and include a non-movable jaw and a relatively movable jaw which is capable of being adjusted toward said non-movable jaw and then being clamped upon an object positioned between it and said non-movable jaw.

Thus, once the movable jaw has been adjusted against the surface of an object located between it and the non-movable jaw and clamped thereupon, the wrench will remain upon the object until it is dislodged therefrom through the medium of a handle pivoted to said movable jaw. Since it is possible to over-adjust the movable jaw, it frequently is very difficult to dislodge said jaw from clamping contact with an object after it has once been clamped thereupon in an over-adjusted condition. Due to this peculiar characteristic of prior art wrenches, it is frequently necessary to apply as much force in the process of opening such wrenches to release the movable jaw from an object as is necessary in initially clamping the movable jaw against the object.

The closing and clamping operation is performed by gripping a pair of handles and forcing them toward one another in much the same manner as the handles of a pair of ordinary pliers are manipulated. In such a situation the hand works in a position of maximum advantage and can apply great closing force with little conscious physical strain. The user of the wrench can thus close and lock an over-adjusted tool inadvertently or without being aware of the degree of over-adjustment. In the opening or releasing operation, however, when it is necessary to force the handles apart, one hand works in an unnatural position and at a disadvantage. It will be observed frequently that a wrench may be closed and locked on the work with one hand and without apparent expenditure of undue force, but when a similar force is required for release, both hands must be used. Such wrenches are frequently used in confined spaces and it is necessary to place the hands holding the handles of the wrench in such confined spaces and apply the releasing force. The consequent sudden release of the movable jaw frequently results in the abrasion of the hands of the user of the wrench upon adjacent objects.

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It is, therefore, a primary object of my invention to provide an improvement in wrenches of the vise wrench type which will lessen the probability of their being over-adjusted in the first instance when originally gripping the wrench and will enable them to be more readily released than has been possible with prior art wrenches.

It is another object of my invention to provide an improvement in vise wrenches which can be readily incorporated in already existing wrenches of this type and which can be easily and cheaply manufactured.

A further object of my invention is the provision of a vise wrench which will provide to the user thereof a greater mechanical advantage in unlocking the movable jaw of the wrench from an object than is provided in other wrenches of the same type.

Other objects and advantages of the present invention will be evident from the following specification and the accompanying drawing, which is for the purpose of illustration only, in which:

Fig. 1 is a vertical, elevational view, partially in section, of a wrench embodying the improvement which is the subject matter of my invention;

Fig. 2 is a vertical, elevational view, partially in section, showing the manner in which a wrench, embodying the improvement which is the subject of my invention, may be released from an object on which it is clamped; and

Fig. 3 is a cross-sectional view taken on the broken line 3—3 of Fig. 1.

My invention can be readily applied to a type of wrench now in wide use and which was in public use prior to my conception of the invention herein. This old type of wrench will be first described for the purpose of explaining the manner in which my improvement modifies the action of prior art wrenches.

The words "stationary" and "movable" are used herein merely for identification and for the purpose of illustrating the manner in which one portion of a vise wrench constructed in accordance with my invention acts in relationship to another portion. As a matter of fact, the whole wrench is readily movable.

The words "upper", "lower", "upwardly", "downwardly", and other words denoting position, are used herein merely for convenience in identification and denote the positions of parts in the drawing. In actual use, of course, the wrench may be moved into any desired orienta-

tion in relation to the user or to the center of the earth.

Vise wrenches as now generally manufactured and sold consist of a stationary member 11 formed from a metal sheet bent into a channel section and having a stationary jaw 12 welded or otherwise fixed to the upper end thereof. The stationary member 11 extends downwardly and has a threaded socket 14 in the lower end thereof in which an adjusting bolt or screw 15 is threaded. The screw 15 has a knurled head 16 by which it can be readily turned by the fingers of the user.

A first pivot pin 13 passes through the stationary member 11 and has disposed thereupon a movable member 21, preferably formed of a casting or forging, which bears a movable jaw 22 at its upper end which is adapted to be moved with the movable member 21 to cooperate with the stationary jaw 12 in clamping an object 18. A generally triangular extension 23 formed integrally with the movable member 21 and being thin enough to extend into the channel in the stationary member 11 permits the engagement of the movable member 21 by the first pivot pin 13. The movable member 21 is thus enabled to pivot around the center of the first pivot pin 13 which passes through the lower inner corner of the triangular extension 23.

A second pivot pin 24 passes through the lower, outer corner of the generally triangular extension 23 of the movable member 21. A tension spring 25 is hooked at its upper end in a hole 26 in the generally triangular extension 23 of the movable member 21 and at its lower end to a projection 27 formed integrally with and extending downwardly into the channel of the stationary member 11.

Pivoted on the second pivot pin 24 is a locking handle 31 which is also formed of sheet metal into a channel section, the upper end of the locking handle 31 being bifurcated to extend upon each side of the generally triangular extension 23 and to engage the pivot pin 24. A third pivot pin 32 extends through the locking handle 31 and engages the upper end of a toggle link 33. The lower end of the toggle link 33 is pivoted on a fourth pivot pin 35 which passes through a pivot block 36 pivoted on or resting against the adjusting screw 15 to permit the positioning of the lower end of the toggle link 33 by the adjusting screw 15 and thus facilitate the longitudinal translation of the toggle link 33 within the channel of the stationary member 11.

The operation of the prior art vise wrench described above is as follows: the wrench is grasped in the hand of the user with the end 34 of the handle 31 about an inch away from its closed position and the adjusting screw 15 is rotated to move the fourth pivot pin 35 and its associated block 36 up or down within the channel of the stationary member 11 until the movable jaw 22 and the non-movable jaw 12 can be brought into contact with the surface of a workpiece or object 18 which it is desired to grip. When the movable jaw 22 has been so adjusted against the surface of the workpiece 18 that both the movable jaw and the non-movable jaw 12 are firmly positioned against the workpiece, the movable jaw 22 is firmly clamped upon the workpiece 18 by moving the end 34 of the locking handle 31 toward the stationary member 11 and thus shifting the center of the third pivot pin 32 a little to the right of a line 37—37 which joins the centers of the second pivot pin 24 and the fourth pivot pin 35, as best shown in Fig. 1. Ordinarily, as best seen in Fig. 2 of the drawing, when the movable jaw 22 is not clamped against the surface of an object, the center of the third pivot pin 32 will lie slightly to the left of the line 37—37. The amount of movement permitted to the third pivot pin 32 as it is urged by the locking handle 31 to the right of the line 37—37 is controlled by a stop 38 formed integrally with the toggle link 33 whose abutment on the inside of the locking handle 31 stops the movement of the locking handle 31 in respect to the movement of the toggle link 33 and thus prevents the further movement to the right of the third pivot pin 32.

The handle 31 and its associated toggle link 33 thus constitute a toggle linkage and it will be readily understood that, as the third pivot pin 32 has its center moved to the right past the line 37—37 into its locked position, the toggle linkage constituted by the handle 31 and its associated link 33 can exert a theoretically infinite leverage between the locking handle 31 and the movable jaw 22. After the third pivot pin 32 passes to the right of the line 37—37, the toggle linkage is locked, that is, the pressure exerted by the workpiece 18 on the movable jaw 22 tends to hold the third pivot pin 32 in its over-center position. This pressure may well be so great, in fact, that when the release of the jaw 22 from the object 18 is attempted by moving the end 34 of the locking handle 31 away from the stationary member 11, as great a force must be applied to the locking handle 31 as was originally necessary to lock the movable jaw 22 against the object 18. It is frequently very difficult to apply the force necessary to release the wrench from the object 18, especially where the wrench is being utilized in a relatively inaccessible position. Then, too, when the wrench is being utilized in close quarters, the sudden release of the jaw 22 from the object 18 against which it is clamped frequently results in the abrasion of the hands of the user of the wrench upon the surrounding objects.

It should be borne in mind that the toggle linkage can be set so that the workpiece may be firmly gripped by the user clamping the fingers of one hand about the end 34 of the locking handle 31 and the stationary member 11 and squeezing the locking handle 31 in the direction of the stationary member 11. Thus, it is frequently possible to lock the wrench upon the object 18 in confined spaces where two hands could be used only with great difficulty. It is the object of the improvement hereinafter to be described to provide means for readily releasing the toggle even when the wrench is in such an awkward position. It should be understood that the wrench, as above described, is in public use and was in such use prior to my conception of the improvement which is the subject matter of my invention and which will be now described.

The remedy for the above difficulties, which is the subject of this application, is to provide an adjusting screw 40 which is threaded in the locking handle 31 and which projects inwardly and engages the stop 38. This screw 40 controls the degree to which the toggle formed by the toggle link 33 and the upper part of the handle 31 may be "set." As the wrench is closed, the pivot pin 32 is forced toward and across a straight line between the pivot pins 24 and 35. It is only after the pivot pin 32 has crossed this line that the toggle is locked and force must be applied to the handle 31 to open the wrench. The amount of force which must be so supplied is proportional to the distance the pivot pin 32 moves over this

line. This distance is controlled by the position of the inner end of said screw 40, the further the screw projects inwardly from the inner side of the handle 31, the shorter the distance the pivot pin 32 moves over the line and the easier the wrench can be opened.

It should be further borne in mind that by the proper use of the two adjusting screws 15, which are employed in the present art wrenches, and screw driver actuated screw 40, the improvement of my present invention, it will be extremely unlikely that the jaws will ever be clamped too tightly upon a workpiece. Should screw 40 project too far inwardly toward stop 33 of link 33, the jaws will have a tendency to spring open from the locked position. The user then by a slight turn of screw 40 away from stop 38 will find that the jaws will probably lock on the workpiece and further the jaws will be readily released with a minimum of force which can be applied with one hand to the movable handle 31. Should the user wish to employ the wrench for temporary clamping, in much the same manner as he would an ordinary pair of pliers, he need merely advance the screw 40 a few turns creating an unstable condition in the toggle.

When it is desired to release the movable jaws 22 from the surface of the object 18 upon which the wrench is clamped, the user may turn the screw 40 inwardly, by means of a screw driver, should the wrench have been clamped too tightly on the object 18 due to an over-adjustment of screw 15.

I thus provide by my invention an improvement in wrenches of the vise wrench type which permits such wrenches to be readily and easily removed from objects upon which they have been clamped. By the provision of my improvement, the user of the wrench is afforded a much greater mechanical advantage in releasing the wrench from an object upon which it has been clamped than he is afforded when initially clamping the wrench upon an object. Therefore, the user of the wrench is always assured that he may remove it from an object upon which it has been clamped with greater ease than he clamps the wrench initially upon the object. Of course, the improvements which I have described above may be readily embodied in already existing wrenches and therefore will permit the improvement of the actuation of such wrenches at a moderate cost to the owner and user thereof.

Although I have shown and described a preferred embodiment of my invention, it will be appreciated that other elements may be substituted for the particular elements shown herein without departing from the spirit of my invention, and I, therefore, do not intend to be limited to the specific construction shown, but desire to be afforded the full scope of the following claim.

I claim as my invention:

In a toggle mechanism, the combination of: a stationary handle; a toggle member pivoted on a first pin carried by said stationary handle; a movable handle pivoted at its upper end on a second pin to said toggle member; a link pivotally connected at its upper end to a third pin located on said movable handle, and pivotally engaged to a fourth pin at its lower end, said fourth pin being engaged to the upper end of a first adjustable screw threaded in the lower end of said stationary handle; a second adjustable screw threaded in said movable handle in such a position that it coacts with a stop located intermediate the ends of said link limiting the position of said link to control the ultimate position of said link relative to said movable handle, said second adjusting screw having a tool-receiving means and being recessed in said movable handle so as to present a continual smooth surface on said movable handle.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,201,918	Petersen	May 21, 1940
2,280,005	Petersen	Apr. 14, 1942
2,299,454	Borchers	Oct. 20, 1942
2,312,947	Westman	Mar. 2, 1943
2,514,130	Jones	July 4, 1950
2,589,511	Redmon	Mar. 18, 1952