

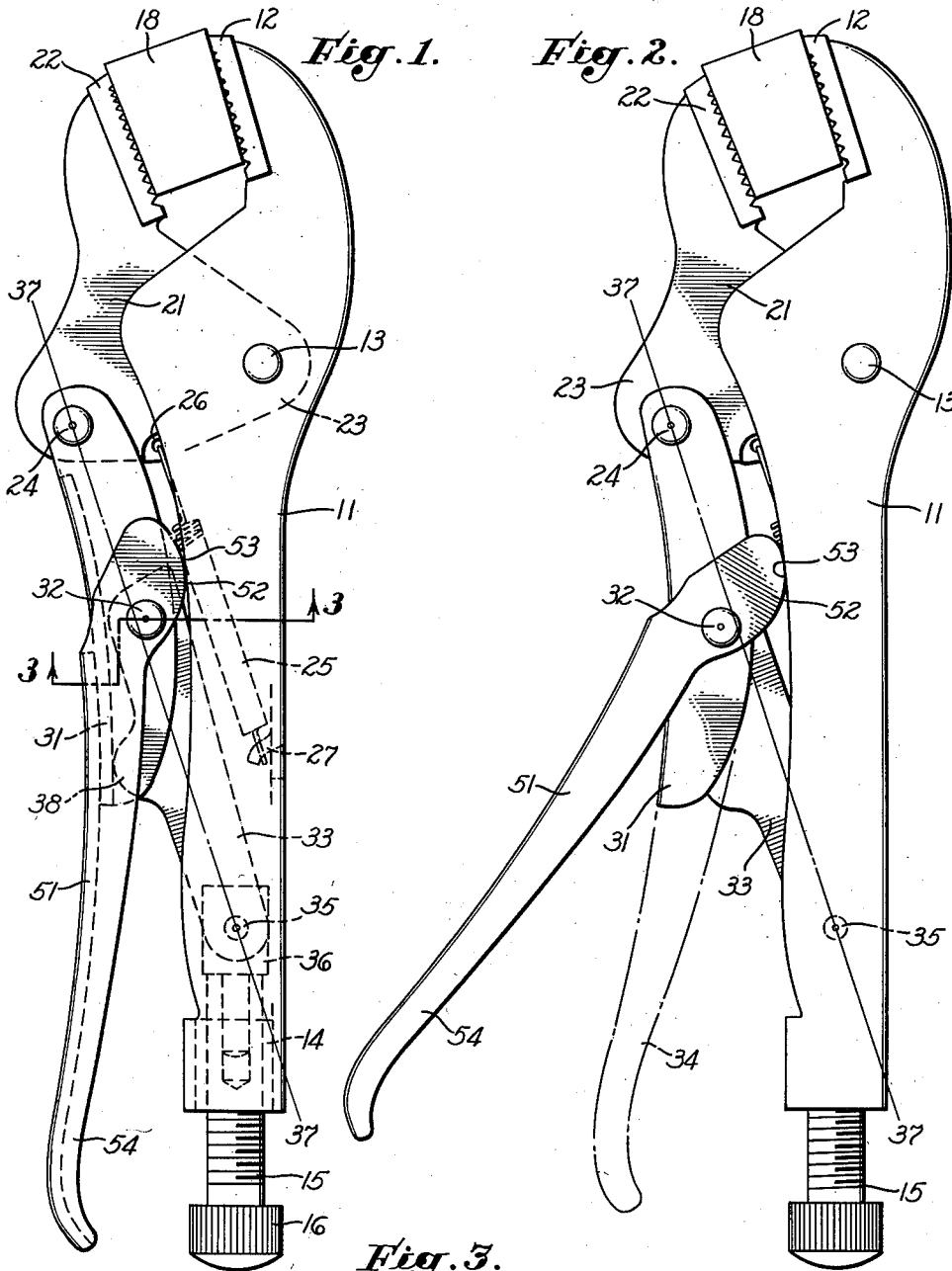
March 25, 1952

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2,590,750

RELEASE MEANS FOR TOGGLE-ACTUATED WRENCHES

Filed June 1, 1948



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# UNITED STATES PATENT OFFICE

2,590,750

## RELEASE MEANS FOR TOGGLE-ACTUATED WRENCHES

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Application June 1, 1948, Serial No. 30,335

3 Claims. (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 very aware of the degree of overadjustment. 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 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 was provided in the initial locking of the movable jaw against said object.

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, and in which:

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

Fig. 2 is a vertical, elevational view 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 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 position of parts in the drawing. In actual use, of course, the wrench may be moved into any orientation in relation to the user or to the center of the earth which is desired.

Vise-wrenches as now generally manufactured and sold consist of a stationary member ||

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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. In the vise-wrench of the prior art, the end 34 of the locking handle 31 extends downwardly, as shown by the dot-dash line in Fig. 2. The lower end of the toggle link 33 is pivoted on a fourth pivot pin 35 which passes through a pivot block 36 piloted 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 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,

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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. In order to release the wrench from an object upon which it has been clamped it is frequently necessary for the user to grasp the stationary member 11 in one hand, the locking handle 31 in the other hand, and to move the locking handle 31 away from the stationary member 11. The pressure holding the toggle closed may be so great that with the wrench in an awkward position, as when clamped upon a bolt which is surrounded by other parts, it is physically impossible to release the wrench. 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 now be described.

In order to overcome the difficulty encountered in releasing prior art vise-wrenches from objects upon which they are clamped, I provide an improvement which consists of a tripping handle

51 which may be formed of sheet metal bent into channel shape and which fits over and around the locking handle 31. If the tripping handle 51 is to be installed upon a wrench of the prior art type, it is necessary to cut off the end of the locking handle 31 a short distance below the third pivot pin 32. However, if the improvement which is the subject matter of my invention is to be utilized in constructing a new vise-wrench the locking handle 31 may be entirely discarded and a second toggle link which will cooperate with the toggle link 33 may be substituted therefor. The tripping handle 51 is retained in operative relationship with the toggle linkage constituted by the remainder of the locking handle 31 and the toggle link 33 through the medium of the third pivot pin 32 upon which it is adapted to be rotated. The tripping handle 51 is bifurcated at its upper end and extends beyond its mounting upon the pivot pin 32 for a short distance to form a plurality of integral lobes which constitute cam members 52 positioned one on each side of the remainder of the locking handle 31, and adapted, when the toggle linkage constituted by the remainder of the locking handle 31 and the toggle link 33 is locked, to contact or almost contact the under side of the stationary member 11 at points 53. The lower end 54 of the tripping handle 51 extends downwardly into a position in which it can be readily grasped by the hand of the user.

When the wrench is initially clamped upon the object 18, the remainder of the locking handle 31 and the associated tripping handle 51 move downwardly together, as a unit, in setting the toggle linkage constituted by the remainder of the locking handle 31 and the toggle link 33. Thus, when the end 54 of the tripping handle 51 is moved inwardly toward the stationary member 11, the jaw 22 is carried into clamping engagement with the surface of the object 18.

When it is desired to release the movable jaw 22 from the surface of the object 18 upon which the wrench is clamped, the lower end 54 of the tripping handle 51 is moved outwardly and away from the stationary member 11, thus pressing the cams 52 against the stationary member 11 and forcing the center of the third pivot pin 32 to the left of the line 37-37 and breaking the toggle. Through the utilization of the tripping handle 51, the user of the wrench is provided with a leverage of at least 4:1 on the third pivot pin 32, that is, one pound of an outward pressure on the end 54 of the tripping handle 51 produces at least four pounds of pressure at the points 53 against which the cams 52 bear.

The leverage obtained by the utilization of the tripping handle 51 can be modified as desired by suitable design of the cams 52. As soon as the toggle linkage is broken by the action of the cams 52 on the points 53 of the stationary member 11, the center of the third pivot pin 32 moves to the left of the line 37-37 and releases the movable jaw 22 from the object 18 against which it was clamped.

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 experiences when 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 claims. I would particularly point out that my invention is an improvement on an old form of vise-grip wrench, this old form having a handle 34 (shown in dotted lines in Fig. 2 of the drawing), my tripping handle 51 not being found on such an old form of wrench. The patent to Kash, 2,489,895, also shows such an old wrench to which Kash has added a tripping handle 13.

I claim as my invention:

1. An improvement on an old and well-known form of vise-grip wrench which has: a first, or stationary, jaw member having a first or stationary jaw at its upper end above a first pivot pin, said first jaw member having a handle projecting downwardly below said pivot pin; an adjusting screw threaded in the lower end of said handle, the axis of said screw pointing in the general direction of said first pin and the head of the screw being below the lower end of said handle in a position convenient to the user of the wrench; a second or movable jaw member pivoted on said first pin and carrying a second, or movable, jaw at its upper end, said second jaw being so placed as to cooperate with said first jaw in gripping an object placed between the jaws; a second pivot pin carried by said second jaw member, the axis of said second pin being substantially parallel with the axis of said first pin, the axis of said second pin being offset from a plane passing through said first pin and between said jaws; a third pivot pin; a first toggle member pivoted on its upper end on said second pin and pivoted at a point above a lower extension thereon on said third pin; a second toggle member pivoted at its upper end on said third pivot pin and engaging the upper end of the screw at its lower end; and in combination with said old elements a tripping member pivoted on said third pin and having a handle extending downwardly below said third pin, said handle engaging said extension on said first toggle member so as to push it inwardly when said handle is pushed inwardly, said tripping member having a cam on its upper end above said third pivot pin so placed as to engage said first or stationary jaw member and force said third pivot pin outwardly when the lower end of the tripping member is pulled outwardly.

2. In a toggle mechanism, the combination of: a stationary member; a movable member pivoted on a first pin carried by said stationary member; a first toggle member pivoted at its upper end on a second pin carried on said movable member; a second toggle member pivoted at its upper end on a third pin carried above a lower extension

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of said first toggle member and said second toggle member bearing at its lower end on said stationary member; a tripping member pivoted on said third pin; a cam formed on said tripping member above said third pin; and a handle 5 formed on said tripping member below said third pin, said handle being so positioned as to press on said extension of said first toggle member when the handle is pressed inwardly and said cam being so positioned as to press against said 10 stationary member when said handle is pulled outwardly.

3. A wrench of the class described comprising pivotally connected stationary and movable jaws, the stationary jaw being provided with a handle, 15 toggle mechanism connected with the movable jaw and having for one of its components a lever movable toward and from the handle of the stationary jaw, and an extension piece arranged exteriorly of the lever and pivotally connected 20 at its forward end to the lever intermediately of the ends thereof and engaging said lever and extending rearwardly therefrom and forming a handle arranged opposite the handle of the sta- 25 tionary jaw and adapted to be grasped simul-

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taneously with the same for moving the lever inwardly for closing the jaws, said extension piece being also movable away from the handle of the stationary jaw and having means engage- 5 able with the same to forcibly retract the lever away therefrom.

BRUCE BURNS.

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