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RELEASING MEANS FOR SELF-LOCKING PLIER TYPE TOGGLE WRENCH

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2 Sheets-Sheet 1

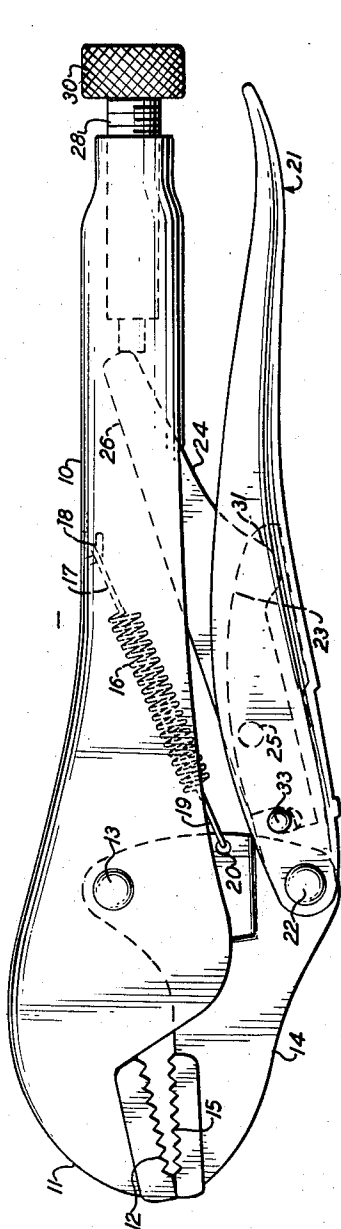


Fig. 1

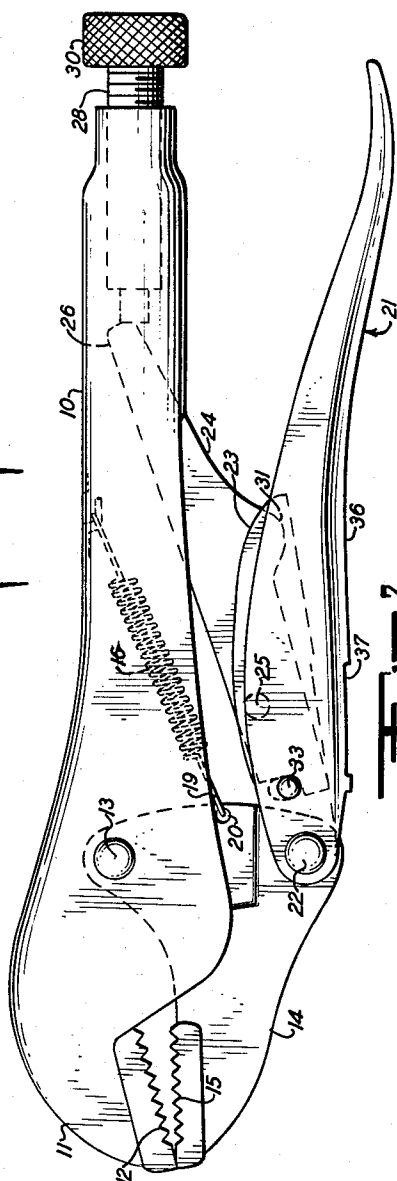


Fig. 2

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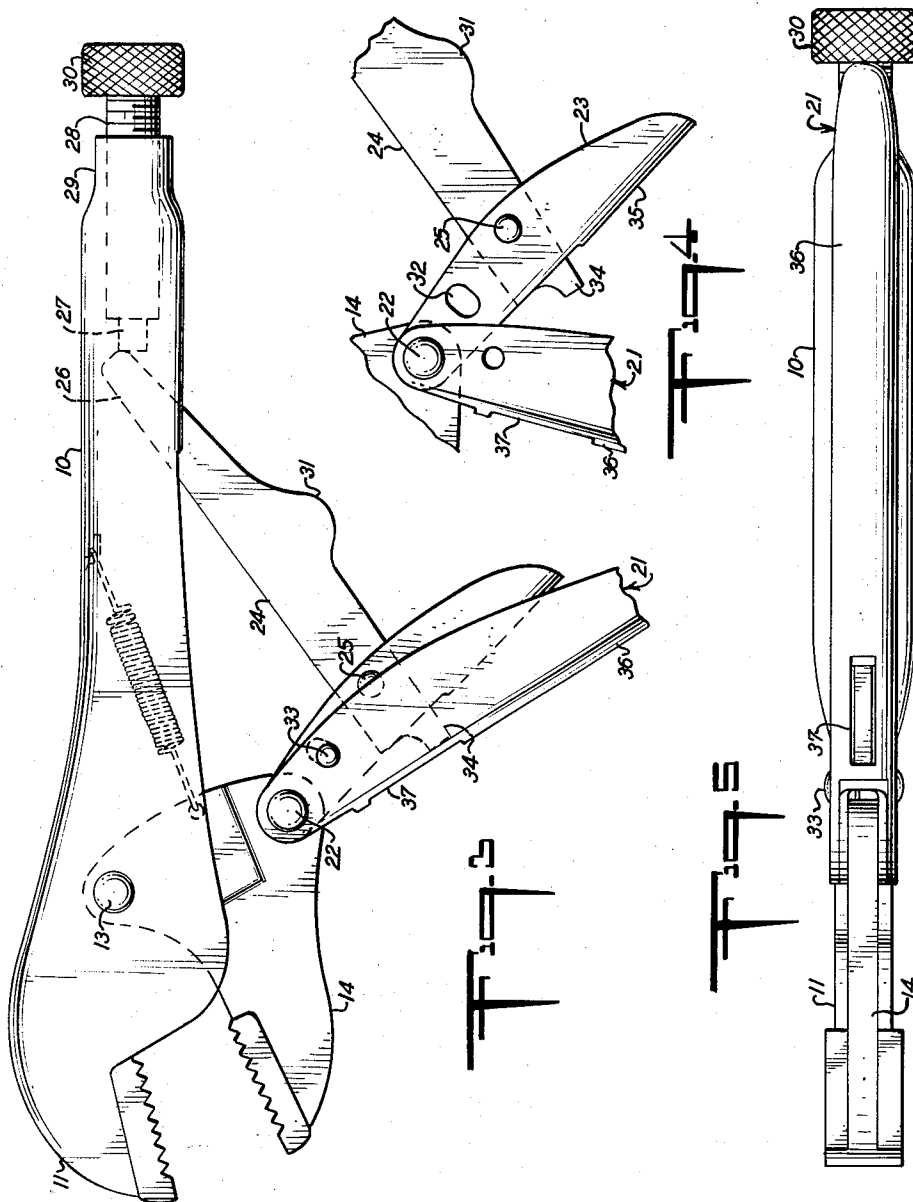
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RELEASING MEANS FOR SELF-LOCKING PLIER TYPE TOGGLE WRENCH

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5 Claims. (Cl. 81—370)

This invention relates to tools and more particularly to a releasing means for self-locking plier type toggle wrenches and is an improvement over the wrench shown and described in my prior Patent No. 2,280,005, issued April 14, 1942.

Toggle wrenches of this general type have been utilized by mechanics for many years and have proved extremely effective for performing a wide variety of operations, since the same are adjustable to accommodate many different sizes and shapes of work and furthermore, the degree of gripping pressure may be conveniently adjusted in order to securely hold a part and at the same time, not distort or mutilate the same. Since wrenches of this type are self-locking in work gripping position, they may be applied to work and thereafter will serve to hold the same without the necessity of maintaining a manual clamping pressure thereon and the wrench will thus operate to hold work without further attention from the user.

Since a toggle mechanism is utilized to apply the work clamping or gripping pressure, a relatively small tool may be provided which will exert an exceedingly high work gripping pressure which insofar as holding the work is concerned, is advantageous, but this also necessitates the application of a relatively great force in order to break the toggle and separate the work gripping jaws. The closing operation of the wrench is accomplished by moving an actuating lever toward a handle much in the nature of the operation of a pair of pliers and the application of the force necessary to close the jaws in this manner is relatively convenient to apply. However, in breaking the toggle and releasing the work gripping jaws, it is necessary to move the actuating lever away from the handle and it has been found that in certain instances, the application of the pressure or force necessary to accomplish this result is somewhat difficult to apply and at times may result in more or less minor injury to the user. One way of breaking the toggle and separating the work engaging jaws is to pull the actuating lever away from the handle, but upon breaking the toggle in this manner, the actuating lever tends to jump away from the handle with considerable force and where the wrench is being utilized in a relatively confined space, this may result in contact of the hands of the user with surrounding objects and consequent possible injury. The most convenient and effective way to break the toggle and open the work gripping jaws is to force the actuating lever away from the handle by the thumb of the hand of the user which grips the handle and since, relatively great force may be exerted by the thumb in this manner, the opening operation is relatively easy. However, where utilizing the tool in a confined space, it is sometimes inconvenient, if not impossible, to grip the tool in such a manner that the thumb may be utilized in the manner above indicated and consequently, breaking of the toggle and opening of the work gripping jaws may sometimes present somewhat of a problem.

In the present toggle wrench of the type under consid-

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eration, the force required to break the toggle and open the work gripping jaws is the same as the force required to close such jaws and, of course, this force varies directly in accordance with the adjustment of the tool.

The present invention contemplates the inclusion in a tool of this type of force multiplying means to facilitate breaking of the toggle and opening of the work gripping jaws and this force multiplying means is provided in such a manner, that the force required to break the toggle and open the work gripping jaws is materially less than the force required to close the same.

It is accordingly an object of the invention to provide a releasing means for self-locking plier type toggle wrenches which may be conveniently and economically manufactured from readily available materials and incorporated in self-locking plier type toggle wrenches without materially changing the physical dimensions thereof and without materially increasing the cost of manufacture.

A further object of the invention is the provision of releasing means for self-locking plier type toggle wrenches in which a force multiplying mechanism is incorporated for materially reducing the force required to break the toggle and open the work engaging jaws.

A still further object of the invention is the provision of a releasing means for self-locking plier type toggle wrenches which may be incorporated in such wrenches without in any way affecting the normal work gripping operations or the adjustment of the capacity and work engaging pressure of such wrenches.

Another object of the invention is the provision of a releasing means for self-locking plier type toggle wrenches which will materially facilitate breaking of the toggle and opening of the work gripping jaws when the wrench is being utilized in a relatively confined space.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawing wherein:

Fig. 1 is a side elevational view of a plier type toggle wrench constructed in accordance with this invention and showing such wrench closed in a work gripping position and with the self-locking toggle in locked position;

Fig. 2 a side elevational view similar to Fig. 1 and showing the manner in which the force multiplying means moves the toggle from locked to unlocked position to break the same;

Fig. 3 a fragmentary side elevational view of a toggle wrench constructed in accordance with this invention and showing the same in open position prior to moving the jaws to work engaging and gripping position;

Fig. 4 a fragmentary side elevational view of the toggle and force multiplying mechanism with certain of the parts moved out of normal position to better show the structure thereof; and

Fig. 5 a bottom plan view of the plier type toggle wrench shown in Fig. 1.

With continued reference to the drawing, there is shown a toggle type wrench incorporating toggle releasing means and constructed in accordance with this invention and which may well comprise an elongated handle 10 having a fixed jaw 11 at one end thereof, which jaw may be provided with serrated work gripping teeth 12, but, of course, any other suitable work gripping surface or face may be provided. Pivotaly mounted on the handle 10 by a pivot pin or other suitable means 13 is an opposed work engaging jaw 14 which is provided with serrated work engaging teeth 15 which serve to cooperate with the teeth 12 on the fixed jaw 11 to grip work therebetween. A tension spring 16 is connected at one end 17 to a hook 18 on the handle 10 and the opposite end 19 of the spring 16 extends through an aperture 20 in the jaw 14 to connect the spring 16 thereto and urge

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the jaw 14 away from the fixed jaw 11 toward open position.

A primary actuating lever 21 of channel cross section is pivotally connected at one end by a pivot pin 22 or other suitable means to the pivoted jaw 14 and the actuating lever 21 is disposed in the plane of the handle 10. A secondary actuating lever 23 of considerably less length than the primary actuating lever 21 is also pivotally connected at one end by the pivot pin 22 to the pivoted jaw 14 and it is to be noted, that the secondary actuating lever 23 nests within the channel of the primary actuating lever 21 and is pivotally movable relative thereto. A link 24 is pivotally connected by a pivot pin 25 or other suitable means inwardly of one end thereof to the secondary actuating lever 23 and the opposite end 26 of the link 24 engages an abutment 27 on the handle 10. The abutment 27 may take the form of a screw threaded member 28 threadedly engaging the end 29 of the handle 10 and the screw threaded member 28 may be provided with a finger engaging knob 30 to facilitate adjustment of the same. Also provided on the link 24 intermediate the length thereof is a transversely extending boss 31, the purpose and operation of which will be later described.

A transverse slot 32 is provided in the secondary actuating lever 23 between the pivot pin 22 which pivotally mounts the secondary actuating lever 23 on the pivot jaw 14 and the pivot pin 25 which connects the secondary actuating lever 23 to the link 24. Fixed to the primary actuating member 21 and extending through the slot 32 is a cross pin 33 which permits limited pivotal movement between the primary actuating lever 21 and the secondary actuating lever 23. The link 24 is provided with a longitudinally extending lug 34 at the pivoted end thereof and, as clearly shown in Fig. 1, the lug 34 overlies the cross pin 33 when the jaws 11 and 14 are closed and the toggle provided by the link 24 and secondary actuating lever 23 is over dead center and in self-locking position. Also it will be seen from an inspection of Fig. 1, that the boss 31 on the link 24 engages the web 35 of the secondary actuating lever 23 when the toggle is in self-locking position and this engagement serves to prevent further movement of the toggle away from dead center.

In operation and with the work engaging jaws 11 and 14 open, as shown in Fig. 3, the primary actuating lever 21 may be pivotally moved about the pivot pin 22 toward the handle 10 and this will serve to engage the web 36 of the primary actuating lever 21 with the web 35 of the secondary actuating lever 23. An elongated slot 37 is provided in the web 36 in the primary actuating lever 21 to provide clearance for the longitudinally extending lug 34 on the link 24 and after engagement of the web 36 of the primary actuating lever 21 with the web 35 of the secondary actuating lever 23, further pivotal movement of the primary actuating lever 21 will also serve to pivotally move the secondary actuating lever 23 about the pivot pin 22 thereby actuating the toggle to close the work engaging jaws 11 and 14. The wrench may be operated in this manner until the toggle passes over dead center and into self-locking position, at which time, the boss 31 on the link 24 will engage the web 35 of the secondary actuating lever 23 to prevent further movement of the toggle mechanism.

Upon completion of this work gripping operation, the parts are in the position shown in Fig. 1 and when it is desired to break the toggle and move the jaws 11 and 14 apart to release the work, it is only necessary to move the primary actuating lever 21 away from the handle 10 which will result in outward movement of the primary actuating lever 21 with relation to the secondary actuating lever 23 and movement of the cross pin 33 in the transverse slot 32 in the secondary actuating lever 23. Such movement of the cross pin 33 will result in

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the same engaging the longitudinally extending lug 34 on the link 24 and since the provision of the pivot pin 22 which constitutes a fulcrum for the primary actuating lever 21 and the provision of the cross pin 33 spaced from the pivot pin 22 provides a lever of the second class, there is provided a force multiplying means which results in the application of a force by the pin 33 to the lug 34 far greater than the force applied to the primary actuating lever 21 to move the same away from the handle 10. This movement of the primary actuating lever 21 and the engagement of the cross pin 33 with the longitudinally extending lug 34 results in moving the link 24 outwardly to move the toggle back over dead center and break the same thereby releasing the work engaging jaws 11 and 14 from gripping position and as a result of the force multiplying means described above, the force which must be applied to the primary actuating lever 21 to accomplish this result, is far less than the force required to move the primary actuating lever 21 toward the handle 10 and the jaws 11 and 14 to work gripping position. Only a relatively light relative movement between the primary actuating lever 21 and the secondary actuating lever 23 is necessary to accomplish the above result and consequently the physical dimensions of the wrench incorporating this toggle releasing means are not materially increased by the inclusion of this mechanism therein.

It will be seen that by the above described invention there has been provided a relatively simple, yet highly effective releasing means for a self-locking plier type toggle wrench and one which will materially facilitate releasing the jaws from work clamping engagement and operation of the wrench in a relatively confined space.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawing and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. A plier type toggle wrench comprising an elongated handle having a fixed jaw at one end, an opposing jaw pivotally mounted on said handle, resilient means for moving said pivoted jaw away from said fixed jaw and a toggle mechanism for moving said pivoted jaw toward said fixed to work clamping position, said toggle mechanism comprising a primary actuating lever pivotally mounted at one end on said pivoted jaw and disposed in the plane of said handle, a secondary actuating lever pivotally mounted at one end on said pivoted jaw at the same point as said primary lever, a link pivotally connected adjacent one end to said secondary lever, the opposite end of said link engaging an abutment on said handle, a transverse slot in said secondary lever between the pivoted end thereof and the pivotal connection with said link, a cross pin fixed to said primary lever and extending through said slot to permit limited pivotal movement between said primary lever and said secondary lever and a longitudinally extending lug on the pivotally connected end of said link, said secondary lever and said link providing a toggle so proportioned as to pass over dead center and lock with said jaws in work clamping position, said lug engaging said cross pin when said toggle is in locking position whereby upon movement of said primary lever away from said handle and relative to said secondary lever, said cross pin will move in said slot and apply a force to said lug greater than that applied to said primary lever to move said link and secondary lever to break said toggle and release said jaws from clamping position.

2. A plier type toggle wrench comprising an elongated handle having a fixed jaw at one end, an opposing jaw pivotally mounted on said handle, resilient means for moving said pivoted jaw away from said fixed jaw and a

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toggle mechanism for moving said pivoted jaw towards said fixed jaw to work clamping position, said toggle mechanism comprising a primary actuating lever pivotally mounted at one end on said pivoted jaw and disposed in the plane of said handle, a secondary actuating lever pivotally mounted at one end on said pivoted jaw, a link pivotally connected adjacent one end to said secondary lever, the opposite end of said link engaging an abutment on said handle, a transverse slot in said secondary lever between the pivoted end thereof and the pivotal connection with said link, a cross pin fixed to said primary lever and extending through said slot to permit limited pivotal movement between said primary lever and said secondary lever and a longitudinally extending lug on the pivotally connected end of said link, said secondary lever and said link providing a toggle so proportioned as to pass over dead center and lock with said jaws in work clamping position, said lug engaging said cross pin when said toggle is in locking position whereby upon movement of said primary lever away from said handle and relative to said secondary lever, said cross pin will move in said slot and apply a force to said lug greater than that applied to said primary lever to move said link and secondary lever to break said toggle and release said jaws from clamping position.

3. A plier type toggle wrench comprising an elongated handle having a fixed jaw at one end, an opposing jaw pivotally mounted on said handle, resilient means for moving said pivoted jaw away from said fixed jaw and a toggle mechanism for moving said pivoted jaw towards said fixed jaw to work clamping position, said toggle mechanism comprising a primary actuating lever pivotally mounted at one end on said pivoted jaw and disposed in the plane of said handle, a secondary actuating lever pivotally mounted at one end on said pivoted jaw, a link pivotally connected adjacent one end to said secondary lever, the opposite end of said link engaging an abutment on said handle, a transverse slot in said secondary lever between the pivoted end thereof and the pivotal connection with said link, a cross pin fixed to said primary lever and extending through said slot to permit limited pivotal movement between said primary lever and said secondary lever and a longitudinally extending lug on the pivotally connected end of said link overlying said cross pin, said secondary lever and said link providing a toggle so proportioned as to pass over dead center and lock with said jaws in work clamping position, whereby upon movement of said primary lever away from said handle and relative to said secondary lever, said cross pin will move in said slot and apply a force to said lug greater than that applied to said primary lever to move said link and secondary lever to break said toggle and release said jaws from clamping position.

4. A plier type toggle wrench comprising an elongated handle having a fixed jaw at one end, an opposing jaw pivotally mounted on said handle, resilient means for moving said pivoted jaw away from said fixed jaw and a toggle mechanism for moving said pivoted jaw toward said fixed jaw to work clamping position, said toggle

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mechanism comprising a primary actuating lever pivotally mounted at one end on said pivoted jaw, a secondary actuating lever pivotally mounted at one end on said pivoted jaw, a link pivotally connected adjacent one end to said secondary lever, the opposite end of said link engaging an abutment on said handle, a transverse slot in said secondary lever between the pivoted end thereof and the pivotal connection with said link, a cross pin fixed to said primary lever and extending through said slot to permit limited pivotal movement between said primary lever and said secondary lever and a longitudinally extending lug on the pivotally connected end of said link overlying said cross pin, said secondary lever and said link providing a toggle so proportioned as to pass over dead center and lock with said jaws in work clamping position whereby upon movement of said primary lever away from said handle and relative to said secondary lever, said cross pin will move in said slot and apply a force to said lug greater than that applied to said primary lever to move said link and secondary lever to break said toggle and release said jaws from clamping position.

5. A plier type toggle wrench comprising an elongated handle having a fixed jaw at one end, an opposing jaw pivotally mounted on said handle, resilient means for moving said pivoted jaw away from said fixed jaw and a toggle mechanism for moving said pivoted jaw towards said fixed jaw to work clamping position, said toggle mechanism comprising a primary actuating lever pivotally mounted on said pivoted jaw, a secondary actuating lever pivotally mounted on said pivoted jaw, a link pivotally connected adjacent one end to said secondary lever, the opposite end of said link engaging an abutment on said handle, a transverse slot in said secondary lever between the pivoted end thereof and the pivotal connection with said link, a cross pin fixed to said primary lever and extending through said slot to permit limited pivotal movement between said primary lever and said secondary lever and a longitudinally extending lug on the pivotally connected end of said link overlying said cross pin, said secondary lever and said link providing a toggle so proportioned as to pass over dead center and lock with jaws in work clamping position whereby upon movement of said primary lever away from said handle and relative to said secondary lever, said cross pin will move in said slot and apply a force to said lug greater than that applied to said primary lever to move said link and secondary lever to break said toggle and release said jaws from clamping position.

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