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C. H. ORTMAN
TOGGLE PLIERS HAVING AN ADJUSTABLE ABUTMENT MEANS AND A
RESILIENT BIASING MEANS
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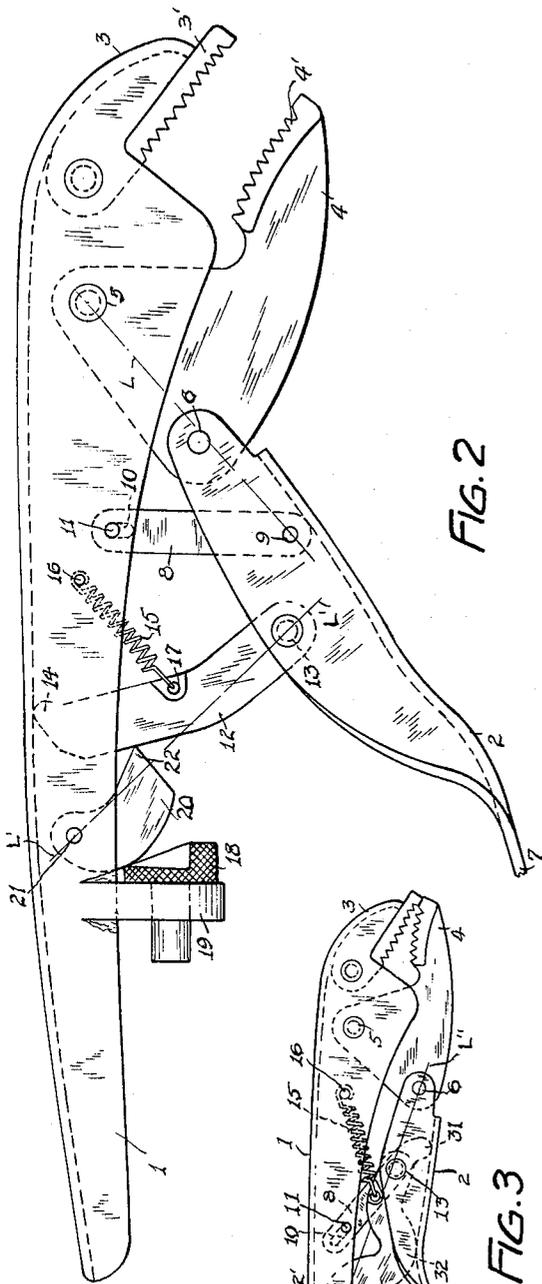


FIG. 2

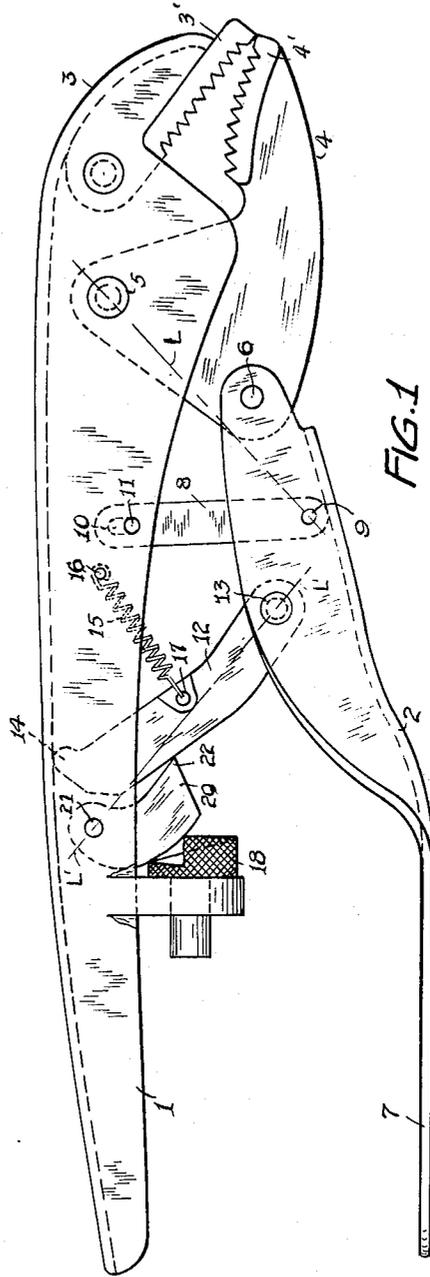


FIG. 1

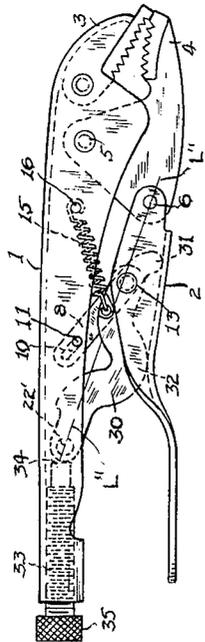


FIG. 3

INVENTOR.
CHARLES H. ORTMAN
BY
Arthur H. Van Horn
ATTORNEY

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TOGGLE PLIERS HAVING AN ADJUSTABLE ABUTMENT MEANS AND A RESILIENT BIASING MEANS

Charles H. Ortman, Chardon, Ohio, assignor of one-third to Ira J. Warner, Cleveland, Ohio
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 2 Claims. (Cl. 81-379)

This invention relates to pliers of the pivoted jaw vise grip type and more particularly pliers of this type provided with means to easily and quickly exert, lock and release a powerful grip on a piece placed between the jaws of the pliers.

This invention is an improvement over the structure disclosed in my copending application, Serial No. 238,102, filed November 16, 1962, now Patent No. 3,190,155.

One of the objects of the present invention is the provision of a tool of this type of extreme simplicity of construction and so constructed that the same may be quickly and easily adjusted to grip pieces of various sizes and shapes between the jaws of the tool.

Another object is to provide a tool of this type which is capable of powerfully gripping a piece between its jaws and to maintain such grip as a result of only relatively light closing pressure on the handles.

A further object of the invention is to provide means whereby the jaws may be held open by mechanical means to receive a piece therebetween and then a quick adjustment of the jaw closing and gripping means to the approximate positions to provide a powerful grip on the piece between the jaws is effected upon the application of a relatively light manual closing pressure on the handle.

Still another object of the invention is to reduce to a minimum the number of parts required to carry out the objects of this invention.

Still another object is to provide means for holding the jaws in open position to receive a piece of selected size therebetween, together with means for effecting a vise-like grip on the piece by the jaws and to releasably retain the grip without manual effort on the part of the user.

Other objects and advantages of this invention will become more apparent as the following description of two embodiments thereof progresses, reference being made to the accompanying drawing in which like reference characters are employed to designate like parts throughout the same.

In the drawings:

FIGURE 1 is a side elevation of a vise grip type of pliers showing the empty jaws in closed position;

FIGURE 2 is a view similar to that shown in FIGURE 1 showing the jaws in open position to receive a piece; and

FIGURE 3 is a side elevation of a slightly modified form of pliers embodying my invention.

In carrying out my invention, two forms of which are shown in the drawings, and first referring to FIGURES 1 and 2, the pliers comprise a pair of handles indicated at 1 and 2, respectively, the handle 1 forming an integral part of and terminates in a fixed jaw 3 at its forward end. A movable jaw 4 is pivoted at 5 on the fixed jaw and is provided with a gripping surface 4' which coacts with a gripping surface 3' on the jaw 3 to effectively grip a piece placed therebetween when the jaws are moved relatively toward each other.

The handle 2 is pivotally connected at 6 at its forward end with the rear portion of the movable jaw 4. The handles 1 and 2 are preferably of channel form, that is, substantially U-shape in cross section, the handle 2 terminating rearwardly in a flattened portion 7. A link 8 is permanently and pivotally attached within the channel portion of the handle 2 at one end, as at 9, while

the other end of the link is provided with an elongated slot 10 receiving a pin 11 bridging the channel portion of the handle 1 and allowing relative longitudinal movement of the link along the pin for a limited distance determined by the length of the slot 10, the pin 11 being disposed in the lower end of the slot 10, as in FIGURE 1, when the jaws are closed about a piece and in the opposite end of the slot when the jaws are in open position, as in FIGURE 2.

A lever or arm 12 which may be slightly bowed in a longitudinal direction is pivotally mounted within the channel section of the handle 2 at one end, as at 13, while its opposite end terminates in a toe portion 14 having sliding contact with the bottom wall of the channel portion of the handle 1. A coil spring 15 is anchored at one end, as at 16, in the channel portion of the handle 1 and is secured under tension at its other end in the mid-section of the arm or lever 12, as at 17.

I have provided adjustable means comprising a rotatable cam member 18 mounted in the bracket 19 formed on the fixed handle 1 in which the cam surface of the cam has sliding engagement with the dog 20 pivotally carried at 21 in the handle 1 and which is provided with a nose portion 22 which firmly engages the rear edge wall of the member 12. The pivotal position of the dog 20, when it is in engagement with the arm 12, is adjusted by means of the rotatable cam. This is illustrated in FIGURES 1 and 2, respectively. It will be noted that the toe portion 14 is always in engagement with the bottom of the channel portion of the handle 1 due to the tension of the spring 15 and also the position of the dog 20 engaging the rear wall of the arm 12 when the cam is adjusted to the desired position. Thus it will be seen that the arm 12 is backed up by the cam and dog 20 so that upon a closing pressure being applied to the handles 1 and 2, the arm 12 will move in a counter clockwise direction about the pin 13.

In the operation of the vise grip pliers, as shown in FIGURES 1 and 2 and referring first to FIGURE 1, the jaws 3' and 4' are at rest in substantially closed position, there being no piece between the same and in such position of the parts, if an imaginary straight line L is drawn through the centers represented by the pins 5 and 9, respectively, it will be noted that the center represented by the pin 6 lies on one side of this line. When it is desired to separate the jaws to receive a piece therebetween, and while holding the handle 1 of the rigid jaw, the pivoted handle 2 is moved in a counter clockwise direction substantially to the position shown in FIGURE 2. In so moving the handle 2, it will be noted that the center represented by the pin 6 now crosses to the opposite side of the imaginary straight line L, the limit of movement of the handle 2 being determined by the length of the link 8 connecting the two handles. When these handles are in the position shown in FIGURE 2, the link will be drawn downwardly so that the pin 11 will reside in the outer end of the slot 10. Under these conditions, the jaws will remain separated without the use of the hands for convenience in placing a piece between the jaws.

With the piece between the open jaws, the cam 18 is rotated to bring the nose 22 of the dog 20 into back-up engagement with the rear edge of the lever 12. With the parts in this position and with the toe 14 of the lever 12 in engagement with the bottom surface of the channeled handle 1, and with the two jaws being in contact with the piece, the handle 2 may be then moved toward the handle 1 about its fulcrum 6. Since the dog 20 and lever 12 are now in adjusted position, further pressure on the handle 2 will cause the fulcrum 6 to pass to the right across the imaginary straight line L to release the "hold-open" position of the jaws and further movement of the handle 2 toward the handle 1 will cause the link 8 to

move in the direction of the handle 1 and the pin 11 to seek the seat in the opposite end of the slot 10.

It will be noted in FIGURE 2 that the nose portion 22 of the dog 20 where it engages with the arm 12 lies on one side of an imaginary straight line L' passing through the centers represented by the pins 21 and 13, respectively. It will be noted from FIGURE 1, and assuming a piece (not shown) is gripped between the jaws 3' and 4', that a closing pressure on the handle 2 in the direction toward handle 1 will shift the nose of the dog 20 which is in engagement with the rear edge of the arm 12 to the opposite side of the imaginary straight line L', and with the parts in this position, a piece is firmly gripped between the jaws even when the hands of the user are removed from the handles of the pliers.

From the above, it will be seen that this embodiment of the invention provides a vise grip type pliers which when the jaws are in open position to receive a piece therebetween, the handles may be retained in such position while an adjustment is made through the cam and dog to approximate the proper closing characteristics of the jaws about the piece. The handles are then moved to bring the jaws into gripping engagement with the piece and the adjustment of the cam trimmed to a degree to permit a further closing effort against the handles to shift the point of contact between the nose 22 of the dog 20 and the rear edge of the arm 12 to the left side of the imaginary straight line L'. In such position, the jaws impose a powerful gripping force upon the piece and will retain this gripping force even without further effort of the user of the pliers to retain the handles in closed position. The handles will remain in closed position until forcibly released by the user by moving the handle 2 slightly in a counter clockwise direction sufficient to bring the point of contact of the nose 22 against the arm 12 to the opposite side of the imaginary straight line L'.

In FIGURE 3, I have illustrated a modified form of the invention which involves the same principles as those described in connection with the first embodiment.

In this modified form of the invention, it will be noted that the link 8 is disposed in an oblique direction between the handles and that the arm corresponding to the arm 12 in the previously described embodiment is indicated at 30 and comprises a flat member having a forward toe portion 31 which engages the bottom wall of the channeled portion of the handle 2. This arm is pivotally connected to the handle 2 by a pin 13 at its forward end portion and then extends rearwardly into an intermediate humped portion 32 which, at its outer surface, is also in engagement with the inner surface of the bottom wall of the channeled handle 2. The arm 32 terminates at its opposite end in a rounded portion engageable with the inner end of an adjusting screw 33 as at 34, the adjusting screw being threaded into the end of the handle 1 and is provided with a knurled grip 35 for operating the screw.

The operation of this form of the invention is similar to that of FIGURES 1 and 2 except that if an imaginary straight line L'' is drawn through a point indicated at 22' and the pin 6, it will be traversed from one side or the other of such imaginary straight line by the axis of the pin 13, depending upon the "hold-open" position or the locked gripping position of the jaws. Preliminary adjustment of the jaws to receive a piece in contact therewith is made in the manner somewhat similar to that disclosed in FIGURES 1 and 2 except that the cam 18 in those figures is displaced by the threaded member 33, the inner end of which abuts the adjacent end of the arm 32.

Various changes may be made in the details of construction and arrangement of parts of the invention with-

out departing from the spirit thereof or the scope of the appended claims.

I claim:

1. In a tool of the vise grip plier type, a handle having a relatively fixed jaw, a movable jaw pivotally mounted on the fixed handle and jaw, a movable handle pivotally connected with the movable jaw at a point rearwardly of the center defining the pivotal axis of the movable jaw, a link pivoted at one end to said movable handle and provided with a longitudinal slot near its other end, means carried by the fixed handle and operable along the slot to provide a fulcrum for said movable handle when the same is depressed to close the jaws on a piece therebetween, an arm pivotally carried at one end by said movable handle and provided with a handle engaging toe member, said arm having sliding engagement at its other end with a wall of said fixed handle, resilient means attached to said arm and to said fixed handle to normally engage the arm at its said other end with said fixed handle, said link pivot on the movable handle being located between said pivotal connection of the movable jaw with the movable handle and the pivotal connection of the one end of the arm with the movable handle, and adjustable means on the fixed handle for limiting the sliding movement of the arm along the fixed handle in one direction.

2. In a tool of the vise grip plier type, a handle having a relatively fixed jaw, a movable jaw pivotally mounted on the fixed handle and jaw, a movable handle pivotally connected with the movable jaw at a point rearwardly of the center defining the pivotal axis of the movable jaw, a link pivoted at one end to said movable handle and provided with a longitudinal slot near its other end, means carried by the fixed handle and operable along the slot to provide a fulcrum for said movable handle when the same is depressed to close the jaws on a piece therebetween, an arm pivotally carried at one end by said movable handle and provided with a handle engaging toe member, said arm having sliding engagement at its other end with a wall of said fixed handle, resilient means attached to said arm and to said fixed handle to normally engage the arm at its said other end with said fixed handle, said link pivot on the movable handle being located between said pivotal connection of the movable jaw with the movable handle and the pivotal connection of the one end of the arm with the movable handle whereby when said jaws are gripping a piece by relative movement of said handles toward each other said pivot connecting the movable handle and movable jaw will lie on one side of an imaginary straight line passing through the respective pivotal center of the fixed handle and movable jaw and the center defining the pivot of the said arm and pivot connecting the movable handle and movable jaw will lie on the opposite side of said imaginary line when the said jaws are released from gripping engagement with a piece, and adjustable means on the fixed handle for limiting the sliding movement of the arm along the fixed handle in one direction.

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WILLIAM FELDMAN, *Primary Examiner.*

MILTON S. MEHR, *Examiner.*