ABSTRACT OF THE DISCLOSURE

A vise type pliers tool having cooperative clamping jaws with a joint lever arrangement for locking the position of one of the jaws relative to the other, with the amount of opening being determined by a wedge system operatively connected to the knee joint arrangement.

This invention relates to vise type pliers tools, commonly referred to as "vise grips" and, more particularly to a tool of such a type having an improved means for adjusting the spacing between the clamping jaws at which such jaws will lock into clamped position.

Hand pliers tools are now available which have knee joint lever arrangements permitting a user to lock the clamping jaws of the tool about an object, such as about a bolt head or a nut, with such jaws exerting a substantial pressure on the object. Most vise pliers of this type are provided with means for adjusting them so that they can be clamped in locked position on objects of different sizes. That is, the distance between the clamping jaws at which the jaws will lock into clamping position can be varied.

To permit this adjustment, most common tools of this type are provided with a bolt or the like in adjusting engagement with the locking lever arrangement and extending from the butt end of the tool handle. Turning of the bolt adjusts the positioning of the lever arrangement so that the amount of jaw opening at which such jaws will lock will change. In this manner, the tool can be made to accommodate objects of different sizes.

To adjust such a vise grip to the proper jaw opening to clamp a given object, it is usually necessary to first approximate the proper adjustment by screwing the bolt either in or out. Then the tool must be placed about the object and an attempt made to clamp and lock the tool onto the object. If the tool adjustment is not proper to provide locking of the jaws, the tool must be removed from the object and the bolt again turned in a direction to provide the proper adjustment. Often, this cycle of adjusting and trying the tool can be repeated several times before the proper adjustment is obtained.

From the above, it will be appreciated that adjusting a conventional vise grip pliers is time consuming and awkward. Furthermore, it requires the use of two hands which is especially disadvantageous in those instances wherein there is a minimum of room about the object to be clamped in which to work.

Accordingly, an object of the present invention is to provide a vise type pliers tool which is automatically adjustable to provide the proper distance between the clamping jaws for locking onto a given object.

Another object of the invention is to provide a vise type pliers tool of the character described in which such automatic adjustment is quickly obtained, and which is simple and easy to use.

Still another object of the invention is to provide such a vise type pliers tool which can be operated with only one hand.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

Referring to such drawing:

FIGURE 1 is an elevational view of a preferred embodiment of the vise grip pliers of the invention depicting the same in its normal, unclamped position and in which the clamping jaws are closed;

FIGURE 2 is a view similar to FIGURE 1, but with portions of the tool handle structure broken away to illustrate the mechanism of the pliers, and with a hand shown in phantom holding the pliers and maintaining the jaws open for engagement with an object;

FIGURE 3 is an elevational view of the pliers of FIGURE 1 with portions of the handle structure broken away and depicting the pliers grasping an object before the clamping jaws have been locked into clamped position onto such object;

FIGURE 4 is an elevational view of the pliers similar to FIGURE 3 showing the pliers locked onto the object; and

FIGURE 5 is a sectional view of the pliers taken on planes indicated by the lines 5-5 of FIGURE 4 and depicting some details as to its construction.

For a general description of the invention, reference is now made to the drawings wherein there is shown a vise grip type pliers tool, referred to by the reference numeral 11. The tool includes a handle structure 12 having on the forward end thereof a clamping jaw 13. A second clamping jaw 14 is pivotally secured to the handle structure intermediate the gripping portion 16 of the handle and the jaw 13. A knee joint lever arrangement 17 is provided for locking the clamping jaw 14 in a set position with respect to the jaw 13 with an object between such jaws. This knee joint arrangement includes a pressure lever 18 which, upon being drawn toward the handle structure 12, causes a knee joint 19 to be moved toward the handle past its dead center position to thereby provide the desired clamping and locking to take place.

As mentioned before, tools of this type are usually provided with means for adjusting the locking position so that they can accommodate objects of different sizes. More particularly, the linking lever 21 of the knee joint lever arrangement 17 of most tools of this type is longer than that of the invention and extends into the handle structure to adjacent the back wall 22 thereof. A bolt usually extends through a tap in the butt end of the handle, and its threaded end engages the end of the linking lever. The bolt threadably engages the handle so that upon turning it will either be advanced further into the handle or retracted therefrom. Thus, by turning the bolt, the position of the end of the lever 21 can be changed. This will vary the distance between the jaws at which the knee joint lever arrangement 17 will lock the jaws. Thus, the tools can be locked onto objects of different sizes.

As mentioned before, however, this type of adjusting arrangement usually requires several adjustments before the proper adjustment for an object is obtained.
more, two hands generally must be used to effect the adjustments.

As a particularly salient feature of the instant invention, the free end 23 of the lever 21 is pivotally secured to a wedge 24. Wedge 24 extends into a wedge pocket 26 in the handle structure 12. A second wedge 27 is also provided within the pocket 26 and extends along the back wall 22 of the handle structure 12. The extent to which wedge 27 extends into pocket 26 can be varied by sliding it longitudinally along the handle. The tool 11 of the invention is also provided with a torsion spring 28 positioned to bear against the pressure lever 18 rearwardly of the knee joint 19 and urge apart the pressure lever 18 and the handle structure 12. As shown in FIGURE 1, the torsion spring 28 thus acts to normally urge clamping jaw 14 into engagement with clamping jaw 13.

The simple manner in which the tool can be used to grip and clamp an object is depicted in FIGURES 2, 3, and 4. As shown in FIGURE 2, the user first urges pressure lever 18 rearwardly toward handle structure 12 in the direction indicated by arrows 29. This causes wedge 24 to move inwardly further into pocket 26, and jaw 14 to be thereby pulled away from jaw 13. Then, as shown in FIGURE 3, the clamping jaws are placed about an object 31 to be clamped, and the pressure against lever 18 is released so that spring 28 urges jaws 13 and 14 toward one another to engage the object. Wedge 27 is then slid rearwardly along back wall 22 of the handle into pocket 26 until it tightly engages the forward end of the linking lever 21, as shown in FIGURE 3. Then, as shown in FIGURE 3, the linking lever 21 is formed by the ends of the lever members 38 and 39 being flared inwardly, and the forward end of the wedge 24 is pivotally secured between these ends by means of a pin 43. The free end of the wedge 24 is thus therein, and before, projects into wedge pocket 26 formed in the handle structure 12. As shown, the pocket 26 is provided by handle back wall 22 and side walls 32 and 33, and by two meeting flanges 44, each of which projects inwardly from one of the side walls of the handle structure into engagement with the other flange. The smaller end of the wedge 27 also projects into the pocket 26, and the button 30 is secured to this wedge by a pin 46 which extends through a slot 47 in the back wall 22 of the handle structure. The wedge 27 is normally urged forward by means of a tension spring 48 secured between the forward end of the wedge and a pin 49 extending between the handle walls 32 and 33. Pin 49 also passes through the loops of tension spring 28 to secure such spring to the handle structure. As shown, a shorter end 51 of the torsion spring is resiliently urged against the back wall 22 of the handle while a longer end 52 thereof passes between the lever members 38 and 39 of the link lever 21 and into resilient engagement with the inner wall of the pressure lever 18 rearwardly of the knee joint 19. In the manner discussed before, torsion spring 28 acts to resiliently urge clamping jaw 14 toward clamping jaw 13.

The pliers tool 11 is conventionally provided with lever means for facilitating release of it from an object being clamped. Specifically, a release lever 24 is pivotally secured between the side walls 36 and 37 of the pressure lever 18 near its free end. The forward end 54 of this lever is curved to be in engagement with the linking lever 21 when the pliers are in the locked position. As will be readily appreciated from FIGURE 4, when the forward end 56 of this lever is moved toward the pressure lever 18, such pressure lever will be moved outwardly away from the linking lever. This moves the knee joint 19 to the unlocked position. As was discussed before, to use the tool of the invention to clamp an object pressure lever 18 is first moved in the direction of arrows 29 to separate the jaws so that they may be placed about the object. After the jaws are so placed about the object, the pressure on lever 18 is released and torsion spring 28 urges the jaws into engagement with the object. This will automatically move the end 23 of necessity of 21 in the forward direction, causing the lever arrangement 17 to lock the tool onto the object. When the wedge 27 is moved rearwardly against the pressure spring 48 into tight engagement with the wedge 26, the two wedges will hold the lever 21 in the proper positioning for locking. Then when the pressure lever 18 is moved closer to the handle 12 the pivot point of the knee joint 19 will be moved past the dead center position, i.e., past the point at which it is in alignment with the pivot points provided by the pins 38 and 43, to a location closer to the handle structure. This will result in the tool being locked to the object since force must be exerted to move the pressure lever 18 away form the handle 22 to bring the knee joint away from the handle structure past the dead center position.

What is claimed is:

1. A vise type pliers tool comprising a handle having a clamping jaw at the front end thereof, a second clamping jaw pivotally secured to said first clamping jaw in confronting relationship thereto, a pressure element having an end portion thereof pivotally secured to said second jaw, spring means engageable with said element for urging said jaws into clamping engagement, said handle at the rear end thereof defining a wedge pocket having forwardly diverging opposed surfaces, a first wedge slidable along one of said surfaces in varying angular relationship therewith, a lever having its end portions pivotally attached respectively to the forward end of said first wedge and to a medial portion of said element, a second wedge slidable along the other of said surfaces, said jaw in one portion
of pivotal movement relative to said element locking the
position of said second jaw with respect to said first jaw
with an object clampingly engaged therebetween, the posi-
tion of said first wedge in said pocket determining the
amount of opening between said jaws in the locked posi-
tion thereof, and means for manually sliding said second
wedge rearwardly and into wedging engagement with said
first wedge.
2. A tool as set forth in claim 1 in which resilient means
are provided normally urging said second wedge forward-
ly and out of wedging relationship with said first wedge.
3. A tool as set forth in claim 1 in which said handle
is provided with a longitudinal slot, and said second
wedge is provided with a manually engageable button ex-
tending through said slot for facilitating sliding move-
ment of said second wedge.

4. A tool as set forth in claim 1 in which each of said
wedges converges towards the rear end thereof.

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