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[56] **References Cited**
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[54] **JAW MOUNTED ADJUSTING MEANS FOR CUTTING TOOL**
5 Claims, 2 Drawing Figs.

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191, 192, 193

ABSTRACT: A toggle handle-actuated compression tool provided with means mounted on the jaw portion for adjusting the setting of the closed position of the working portions of the jaw.

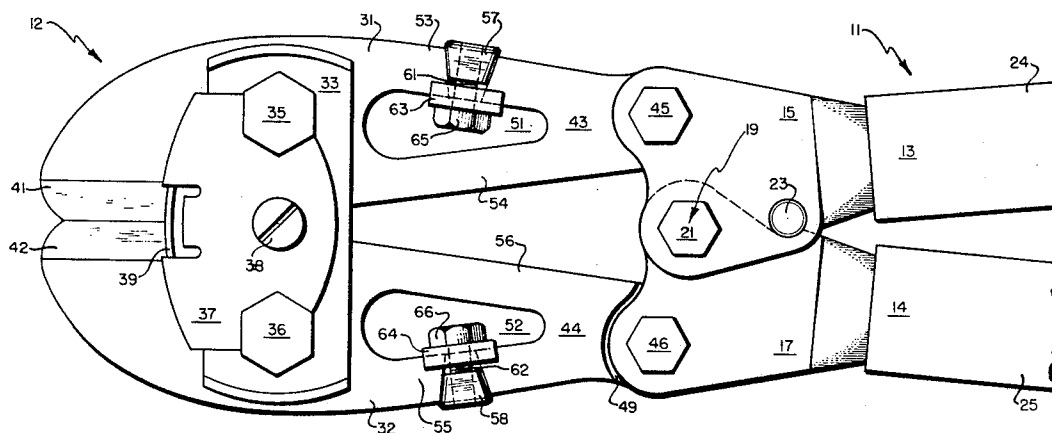


FIG. 1

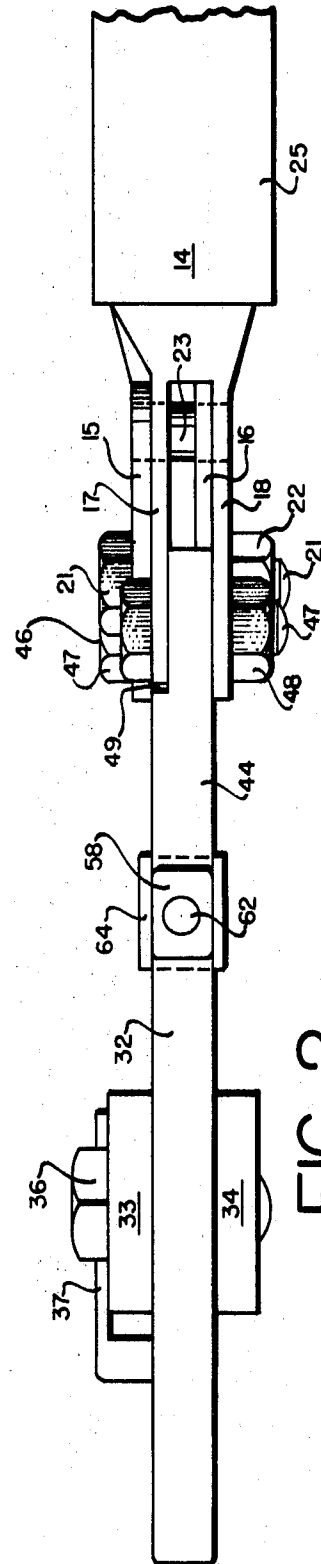
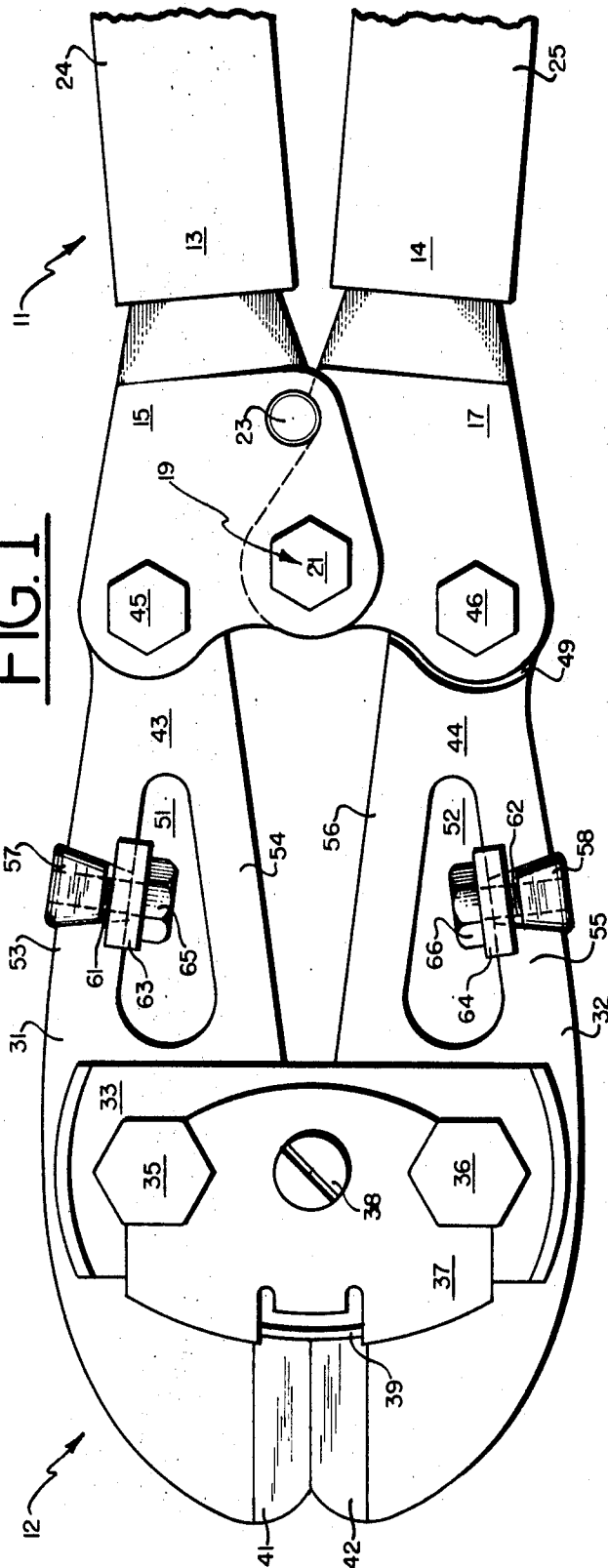


FIG. 2

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JAW MOUNTED ADJUSTING MEANS FOR CUTTING TOOL

BASIC SUMMARY OF THE INVENTION

Toggle handle tools are commonly used for heavy-duty compression tool such as heavy-duty wire or bolt cutters and heavy-duty crimping tool such as those used to crimp tubular connectors onto electrical wires because of the force multiplication inherent therein. Compression forces of many thousands of pounds can be developed between the operative mating surfaces of such tools by means of a reasonable exertion of force on the handles. To withstand the forces that are developed the jaw members of such toggle-handled tools are normally made of hardened steel forgings and stop means are provided on the handle portion to limit the amount to which the handles can be closed, thereby preventing over pressures from developing by direct contact between the mating surfaces themselves. In the case of cutting tools best results are normally obtained if, when the handles are fully closed, the cutting edges just touch without leaving any gaps therebetween or without pressing substantially against each other. In the case of crimping tools, depending on the design of the crimping dies, it may be desirable to move the opposing flat faces of the jaws either to just touch or clear each other by a predetermined distance.

But because of the variations and tolerances inherent in the manufacturing process which for the jaws may include forging, sharpening and hardening, it is for practical purposes impossible to insure when the tool is assembled and the handle portions are fully closed against the stop that the mating edges will close precisely to the desired degree. Means for adjusting the relative position of the mating edges after the tool has been assembled normally are provided. In addition such means are also useful to compensate for wear on the cutting edges due to material loss by resharpening and wear, in the case of cutting tools or to adjust the clearances between the dies in a crimping tool.

Heretofore such adjusting means have conventionally been provided by providing means in the toggle handle portion of the tool to adjust the relative positions of the three pivot points provided in the handle portions. Of the various schemes for accomplishing this that have been suggested and used the most satisfactory has been the arrangement shown in Klein U.S. Pat. No. 2,910,900 where the distance between one of the jaw pivots and the toggle pivot may be varied. The advantage of this specific arrangement is its simplicity. However, since adjustment is made only as to one of the jaw pivots there is an inherent tendency for the centerline of the jaw portion to cant relative to the centerline of the handle portion upon adjustment. While certain suggestions have been made for providing for adjustment of both jaw pivots of the handle portion relative to the toggle pivot, these tend to be relatively complicated and thus expensive. The major disadvantage of any of the handle mounted adjusting means is that such adjusting means necessarily occupy a substantial longitudinal distance along the handle in the region of the toggle link, thereby limiting the length of the insulating sleeve customarily provided when the compression tool is intended for use on and around high voltage electrical circuits. Since the handle portions must be spread wide apart in order to permit the wire that is to be worked or to be placed between the cutting edges, any such uninsulated portion of the handles greatly increases the possibility that other wires may be contacted thereby causing a short circuit.

It is the purpose of this invention to provide simple, compact means mounted on the jaw portion of a toggle handle-actuated tool such as a bolt or wire cutter or a crimping tool, whereby the closed position of the working portions of the jaw may be easily and accurately adjusted. By moving the adjusting means from the handle portion to the jaw portion it is possible to provide an insulating sleeve along the entire handle right up to the toggle joint. This greatly reduces the possibility that the uninsulated portion of the tool may come

into contact with two wires simultaneously. It is further contemplated that in the preferred embodiment such simple adjusting means will be placed on both jaw members so that the linearity of the parts of the tool may be maintained in spite of the degree of adjustment that may prove to be necessary either because of the inherent inaccuracies in the manufacturing process, or because of wear in the use of the tool.

DESCRIPTION OF THE DRAWING

These and other objects of the invention will be better understood from the detailed description which follows, and from the drawing, in which:

FIG. 1 is a plan view of a cutting tool embodying the present invention;

FIG. 2 is a side view of FIG. 1.

DETAILED DESCRIPTION

Referring particularly to the drawing a toggle handle-cutting tool embodying the present invention consists generally of a handle portion 11 and a jaw portion 12. Handle portion 11 (which is quite conventional and for that reason is not shown in complete detail) consists of two handles 13 and 14 each provided at one end with a pair of inwardly extending and mutually overlapping tab portions indicated at 15 and 16 with respect to handle 13 and at 17 and 18 with respect to handle 14. The two handles 13 and 14 are joined by toggle pivot 19 which as illustrated is a bolt 21 passing through mating holes provided in tab portions 15, 16, 17 and 18 and is secured by nut 22. A stop means to limit the approach of handles 13 and 14 toward each other is provided by rivet 23 which passes through mating holes provided in tab portions 15 and 16 of handle 13 near the inner edges thereof and positioned to contact the inner edges of tab portions 17 and 18 of handle 14. As shown handles 13 and 14 are both provided with an insulating sleeve 24 and 25 respectively formed of an insulating material such as a glass reinforced plastic which sleeve in each case extends the length of the respective handles right up to the beginning of the respective tab portions.

Jaw portion 12 includes two jaw members 31 and 32 joined at an intermediate portion by means of upper and lower straps 33 and 34 respectively in the conventional manner. The strap pivot associated with jaw member 31 is indicated as jaw bolt 35 and the strap pivot associated with jaw member 32 is indicated as jaw bolt 36. Upper strap 33 is provided with a lock plate 37 which is fastened thereto by lock plate screw 38. Lock plate 37 is provided at its forward edge with throat spring 39. Lock plate 37 serves a dual purpose of locking jaw bolts 35 and 36 and of providing a guard preventing the object intended to be severed from passing beyond the limit of the cutting edges. The inner edges of jaw members 31 and 32 are provided in the conventional manner in the region beneath strap 33 (and therefore not shown) with mating gear segments designed to keep the jaw members in alignment while permitting each to rotate freely about its respective strap pivot. The inner edge of each jaw member 31 and 32 forward of straps 33 and 34 is provided with a mating cutting edge indicated at 41 and 42 respectively.

The lever portions of jaw members 31 and 32 are indicated at 43 and 44 respectively. Lever portion 43 extends from strap pivot 35 to jaw pivot 45 associated with handle 13. Lever portion 44 extends from strap pivot 36 to jaw pivot 46, associated with handle 14. Jaw pivots 45 and 46 each comprise a bolt secured by a nut indicated with respect to jaw pivot 46 by bolt 47 and nut 48. A recessed portion indicated at 49 with respect to jaw pivot 32 is provided in the lever portion of each jaw portion to permit the parallel alignment of the two jaw portions and the interfitting with the tab portions of handles 13 and 14.

The two lever portions 43 and 44 are each provided at an intermediate portion with an extended aperture indicated at 51 and 52 respectively. Aperture 51 divides lever portion 43

into a compression arm 53 and a tension arm 54 so named with respect to the forces imposed thereupon during a cutting operation. Generally aperture 52 divides lever portion 44 into compression arm 55 and tension arm 56. Each compression arm 53 and 55 is provided at an intermediate portion with a tapered slot which is substantially wider at its outer edge (away from aperture 51 and 52 respectively) than at its inner edge (adjacent apertures 51 and 52 respectively) and each such slot is provided with a mating but slightly oversized wedge indicated at 57 and 58 respectively. Each wedge 57 and 58 is provided with an internally tapped hole in which is engaged bolt 61 and 62 respectively. A U-shaped supporting member 63 and 64 respectively is provided adjacent the inner edge of compression arms 53 and 55 respectively. Each U-shaped supporting member 63 and 64 is proportioned to span the inner edge of the respective tapered slot and to engage the upper and lower faces of compression arms 53 and 55 respectively. The U-shaped supporting members are each provided with an aperture permitting passage of bolts 61 and 62 respectively thereto and act as a bearing means for head 65 of bolt 61 and head 66 of bolt 62 respectively.

The tool is assembled in the normal manner, care being taken during the manufacture to insure that the cutting edges 41 and 42 will be slightly spread apart when the handles 13 and 14 are fully closed against stop 23. Wedges 57 and 58 are inserted in their respective tapered slots and are drawn into contact with the respective slots by means of bolts 61 and 62 respectively. The tightening of bolts 61 and 62 draws wedges 57 and 58 into the respective slots thereby increasing the length of compression arms 53 and 55 respectively bringing cutting edges 41 and 42 into mating contact. Readjustment can be made at any time merely by adjusting bolts 61 and 62.

While the detailed description of the invention has been solely in terms of a cutting tool it is to be understood that the jaw adjusting means of the present invention are equally applicable to other kinds of compression tools such as a crimping tool where precise adjustment of the closed position of the working portion of the jaws is either desirable or

necessary.

I claim:

1. In a compression tool of the type having a handle portion and a jaw portion wherein said handle portion comprises two handle members pivotally joined at a toggle link, wherein said jaw portion comprises two jaw members each pivotally joined to a pair of cross straps located at an intermediate portion thereof and each having a working portion thereon, and wherein each said jaw member is pivotally joined at one end thereof to the corresponding handle member, adjusting means mounted in said jaw portion intermediate the end of the jaw member connected to the handle member and the cross strap for adjusting the setting of the working portion of said jaw portion.

2. A compression tool as defined in claim 1 wherein at least one said jaw member is provided in an intermediate portion between the junction of said jaw member with said cross straps and the junction of said jaw member with the corresponding said handle member with an elongated aperture dividing that portion of said jaw member into a tension arm and a compression arm, and wherein the said adjusting means comprises means mounted in said compression arm to vary the length of said compression arm relative to the length of the said tension arm.

3. A compression tool as defined in claim 2 wherein said adjusting means mounted in said compression arm comprises a tapered slot provided with a mating but somewhat oversized tapered wedge.

4. A compression tool as defined in claim 3 wherein screw means are provided to adjust the position of said tapered wedge relative to said tapered slot, said screw means being operable from the narrow end of said wedge and wherein mounting means are provided for said screw means, said mounting means cooperating with one edge of said compression arm.

5. A compression tool as defined in any one of claims 2, 3, or 4 wherein said adjusting means is provided in both said jaw members of said jaw portion.