March 5, 1957 H. W. SEHER 2,783,483

WIRE CRIMPING AND CUTTING PLIERS

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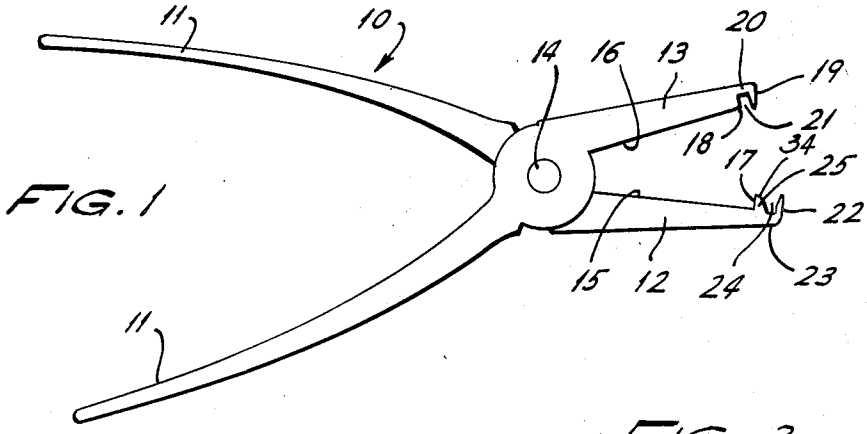
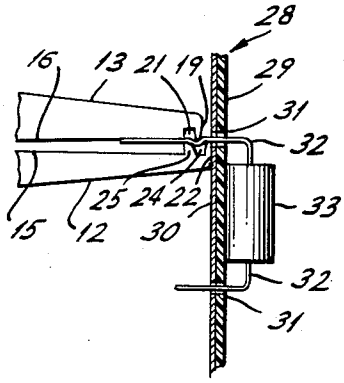
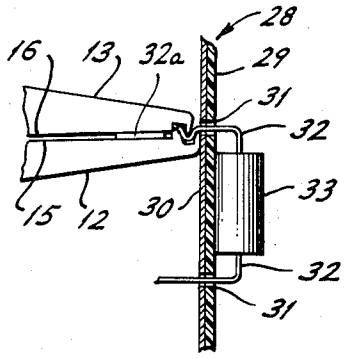


FIG. 1

FIG. 3.

FIG. 2.





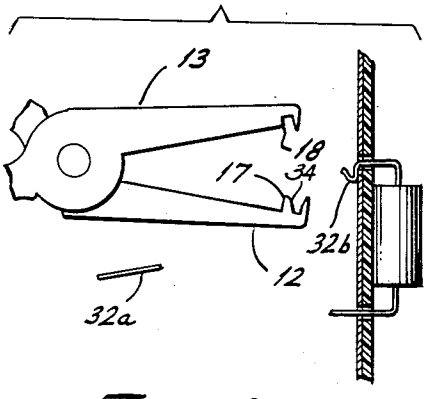


FIG. 4.

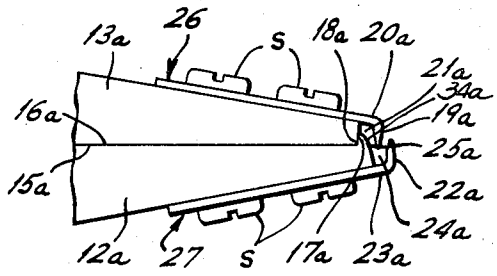


FIG. 5.

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WIRE CRIMPING AND CUTTING PLIERS

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2 Claims. (Cl. 7—5.6)

This invention relates to metal forming and shearing tools and has as its general objective the provision of pliers, or similar devices, having cooperating jaw means provided with both wire bending and cutting elements. While of broader utility, pliers embodying the principles of my invention are especially adapted for use in the field of so called "printed" wiring.

In the art of printed wiring it is frequently the practice to attach components to panels, through the agency of the component lead wires. In attaching a component by this method its lead wires are first inserted through apertures that pierce both the insulating panel and the conductive strips which define the printed wire circuit. The wires are then cut to desired lengths and bent toward the printed wire circuit carried by the panel. Following this operation, and in order permanently to attach the component, the lead wires are soldered, by known means, to the printed wiring. In order to obtain optimum solder connections, particularly when dip soldering, it is common, prior to soldering, to form secondary bends in the lead wires. Secondary, or reverse, bending of a wire lead in conjunction with the first bend as described, results in a configuration characterized by a generally U-shaped tail of wire having one leg adjacent, and its other leg extending away from, the printed wire panel. It is an object of this invention to provide a simple hand tool that will form component lead wires adapted for attachment by this method.

It is another object of this invention to provide a pliers which will both crimp and cut a wire in a single movement of its jaws.

In the accomplishment of these objectives, the present invention contemplates the provision of plier jaws that will engage a wire, for example a wire extending through an aperture of a printed wire panel, sever an end portion of the wire, bend a first portion of the remaining wire toward the panel, and bend an adjacent second portion of the wire away from the panel and at an angle to the first bent portion.

The manner in which the objects and advantages of the invention may best be achieved will be clearly understood from a consideration of the following description, taken in conjunction with the accompanying drawing in which:

Figure 1 is a plan view of a plier tool having jaw means that include an embodiment of my invention;

Figure 2 is a fragmentary view illustrating the way in which the plier jaws engage a wire lead of a component to be mounted upon a printed wire panel;

Figure 3 is similar to Figure 2, and shows the condition after closing of the jaws upon the wire;

Figure 4 is similar to Figure 3, but illustrating release of the jaws from the wire; and

Figure 5 illustrates a modified embodiment of the plier jaw means.

Now making more detailed reference to the drawing, and particularly to Figure 1 thereof, there is illustrated, by way of example, a plier tool **10** having handles **11** integral with jaws or head members **12** and **13**. Handles **11**, with their respective jaws **12** and **13**, are swiveled upon pivot pin **14** thereby providing for movement of the jaws toward and away from each other. The jaws further include cooperating gripping surfaces **15** and **16**, and, disposed adjacent the gripping surfaces and transverse the outer ends of the jaws, are complementary cutting edges shown at **17** and **18**. Edge **17** overlies its complementary cutting edge **18**, and forms a portion of an upstanding flange **25** which also lies transverse jaw **12**. Upstanding flange **25** further includes a rounded edge portion, or surface, **34** which extends downwardly from cutting edge **17** in the direction of the free end portion of jaw **12**. The outer end of jaw **13** includes a web-like section **20** adjacent cutting edge **18**, and a flange **19** is carried at the outer end of the jaw by the web. Flange **19**, web **20**, and edge **18**, form a channel-like groove **21** extending transversely of the jaw **13**. This groove **21** is presented toward the opposite jaw **12**. Similarly the outer end of jaw **12**, includes outer flange **22** and web **23**, both of which, along with flange **25**, form a channel-like groove **24** which lies transverse jaw **12**. The open side of groove **24** faces in the direction of its complementary groove **21**, and with the jaws in closed wire engaging position (Figure 3) it can be seen that flange **22** advantageously overlies flange **19**, for reasons to be hereinafter more fully explained.

In a modified embodiment of my invention (Figure 5) there are shown plier jaws **12***a* and **13***a* having complementary cutting edges **17***a* and **18***a* formed integrally with their respective jaws. These cutting edges, **17***a* and **18***a*, are adjacent respective inner gripping faces **15***a* and **16***a*, and cutting edge **18***a* forms a portion of flange **25***a*. Upstanding flange **25***a* further includes a rounded edge portion, or surface, **34***a* which extends downwardly from cutting edge **17** in the direction of the free end portion of jaw **12***a*. Attached to the outer face of jaw **13***a* is an angle member **26** which includes a mounting portion **20***a* through which pass screws S, and a leg portion **19***a* which forms the outer flange of jaw **13***a*. Similarly, angle member **27** is attached to an outer face of jaw **12***a* by means of screws S passing through a mounting portion **23***a*. A leg **22***a* forms the outer flange of jaw **12***a* and overlies flange **19***a* of jaw **13***a*. Grooves **21***a* and **24***a* are formed by the cooperating cutting edges and flange members.

In performance of the wire bending operation, and considering the pliers of the invention as being used in the fabrication of printed circuitry, it will now be understood that there is provided a printed wire panel **28** (Figure 2), including an insulating sheet **29** and printed circuit portions **30**. Apertures **31** are provided in the panel **28** through which leads **32** of a component **33** have been passed. (Inasmuch as both leads are to be cut and bent in an identical manner, the ensuing description is concerned with but a single wire lead.) In mounting component **33** to panel **28**, the plier jaws are opened and flanged portion **22** (Figure 2) of plier jaw **12** is brought to bear against panel **28**, in the region of printed circuit **30** and adjacent a wire lead **32**, in a manner causing the extended wire lead **32** to be disposed transverse the grooves **21** and **24** and between the gripping faces **15** and **16**. The plier jaws are then closed upon the wire **32**, whereupon flange **19**, by virtue of its being spaced inwardly from overlying lip **22**, is urged against the wire lead. Further pressure upon the wire—as results from further closure of the jaws upon the wire—by flange **19** (Figure 2) causes an initial bend of the wire **32** to take place about anvil-like flanges **22** and **25** of jaw **12**. The initial bending is closely followed by engaging of an end portion of the wire by the cutting edges **17** and **18**. A

final exertion of pressure (Figure 3) upon wire **32**, severs an end portion **32***a* of the wire through the agency of cutting edges **17** and **18**.

A portion of the remaining lead wire is bent in a lever-like action, by flange **19**, about flange **22** as a fulcrum. Simultaneously with the foregoing bend, the hairpin **32***b*, or reverse bend desired, is formed by a lever-like wiping action of the rounded edge portion **34**, carried by flange **25**, against the end portion of the wire **32** which moves about flange **19** as a fulcrum. The severed wire **32***a* is then gripped by the jaws and the travel of the jaws is thus advantageously limited. Additional pressure upon the bent wire, which may damage this portion of the wire, is thereby prevented.

As can now be seen (Figure 3) from the foregoing description the plier jaws have advantageously severed the excess portion of the lead wire, and a flange of one jaw has forced the remaining wire into a grooved portion of another jaw to form the desired reverse bend, or crimp.

To complete the bending operation the plier jaws are opened (Figure 4) thereby permitting the severed wire to fall from the jaws, and releasing the bending elements of the jaws from the bent wire leads.

In the bending operation using the embodiment illustrated in Figure 5, which is identical with the bending operation already described, flange **22***a* is placed against the panel adjacent the wire to be crimped, whereupon the plier jaws are closed upon the wrie causing an end portion to be severed by cooperating cutting edges **17***a* and **18***a*. Bending of the remaining portion of the wire is effected by forcing the wire into transverse groove **24***a* by the flange **19***a*.

From the foregoing description it will be understood that this invention provides a novel plier tool for both cutting and crimping metal. It should be further understood that the tool of this invention need not be limited to cutting and crimping cylindrically formed metal wire, but may advantageously be utilized in cutting and crimping of metal having other cross sectional configurations, such as, for example, rectangular or oval sections.

I claim:

1. A plier type wire cutting and forming tool, comprising a pair of levers pivoted intermediate their ends to form confronting jaws and a pair of opposed jaw-operating handles, the free end portions of said jaws being provided with wire cutting and forming means including: knife means having a pair of cutting edges and structure defining a curved surface extending from the region of one of said cutting edges toward the free end portion of one of said jaws, said knife means being operable, in response to closing of said jaws, to sever a wire extending in the direction of the length of said jaws; and wire bending means comprised in part of the structure defining said curved surface and having portions disposed on each said jaw at a location more remote from said pivot than the location of said knife means, said bending means being operable, as said jaws are closing and continuing to operate after the completion of the severing action, and being so spaced along the axis of the wire, as to form a generally U-shaped bend in said wire adjacent the region of wire severance.

2. For use in the manufacture of printed wiring panels or the like, a plier type cutting and forming tool for severing and crimping a component lead-support wire extending through an aperture formed in a printed wiring panel, said tool comprising: a pair of levers pivoted intermediate their ends to form handles on one side of the pivot and a pair of elongated opposed jaws disposed on the opposite side of said pivot and mounted for movement toward and away from one another; means defining cooperating wire cutting elements extending transverse said jaws, the element carried by one of said jaws being of blade-like configuration and having cutting means disposed along one edge portion and a rounded surface portion disposed adjacent said cutting means and adjoining said edge portion; web sections disposed adjacent and extending away from said cutting elements; the free ends of said jaws having flange portions carried by and extending transverse said web sections, one of said flange portions and its web section in combination with said blade-like cutting element forming a channel-like groove in one of said jaws, said groove being presented toward the other of said flange portions, and said other flange portion being adapted for movement into said groove, said one flange portion being adapted for placement against the printed wiring panel adjacent the said component lead-support wire extending through said panel in such manner that said wire extends transversely of said flange portions and said cutting elements, whereby closing of the jaws severs an end portion of the wire and effects bending of the remaining portion by said other flange portion moving into said groove.

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