Feb. 11, 1964 H. H. ESSER 3,120,773

CRIMP TOOL AND DIES

Filed May 29, 1961

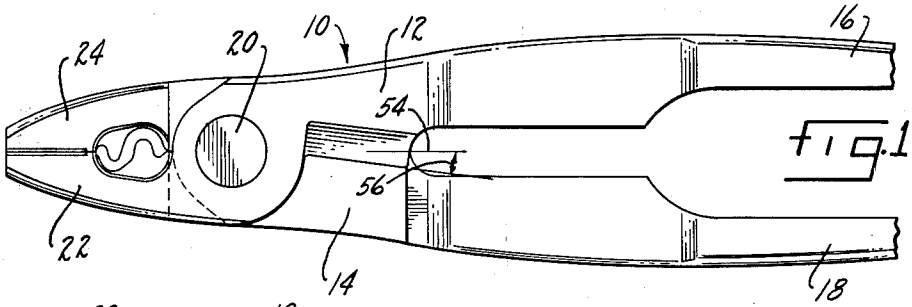

Fig. 1.

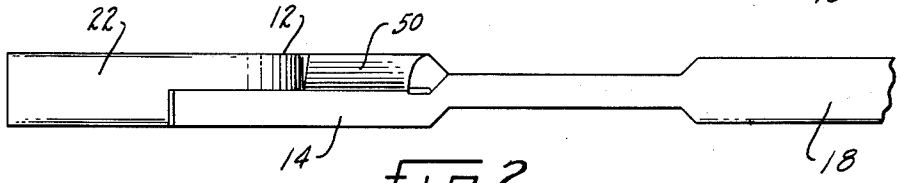

Fig. 2.

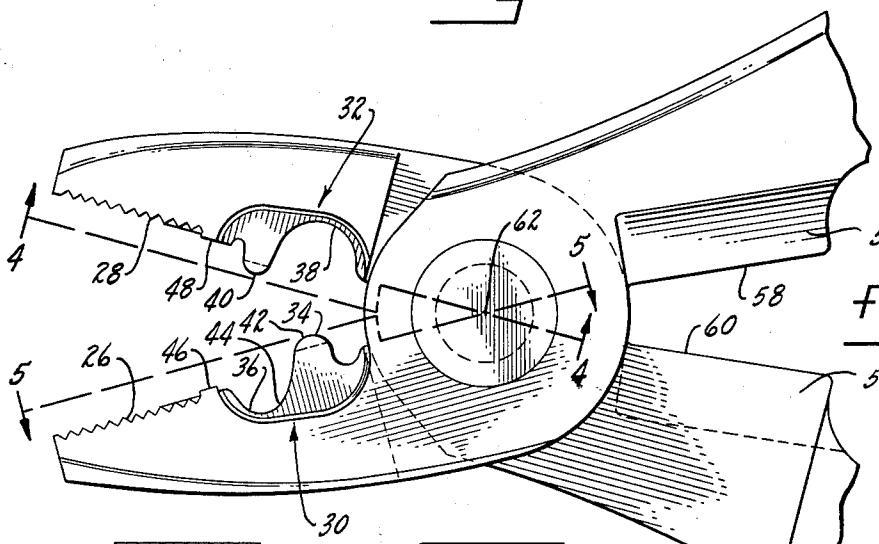

Fig. 3.

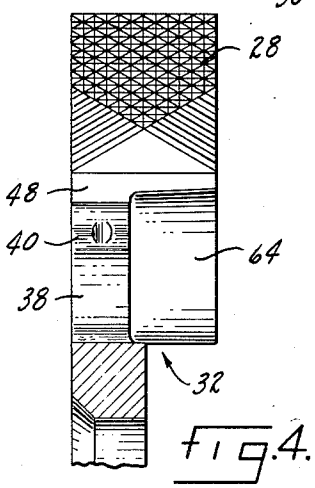

Fig. 4.

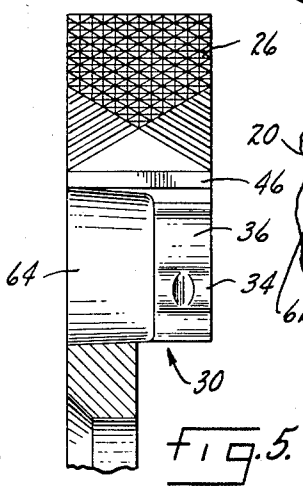

Fig. 5.

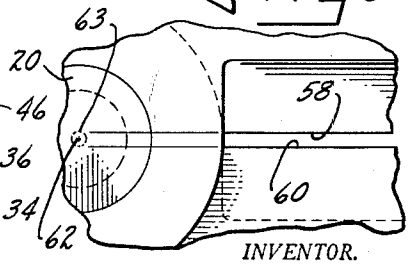

Fig. 6.

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CRIMP TOOL AND DIES

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This invention is in the field of electrician's pliers and is concerned with a tool for crimping electrical connections as well as other conventional functions normally associated with electrician's pliers.

A primary object of my invention is electrician's pliers having crimping dies arranged for increased mechanical advantage so that the pliers may be used with a larger number of crimp sleeve sizes.

Another object is electrician's pliers which have double crimping dies, one the reverse of the other, with the recess of one cooperating with the crown of the other.

Another object is electrician's pliers of the above type where a part of the crown of one crimp is a part of the recess of the other.

Another object is electrician's pliers of the above type constructed to accurately determine maximum penetration of the crimping dies.

Another object is electrician's pliers with crimping dies arranged so that standard wrench handles will apply sufficient leverage.

Other objects will appear from time to time in the ensuing specification and drawings in which:

FIGURE 1 is a side view of electrician's pliers embodying my invention;

FIGURE 2 is a top view of FIGURE 1;

FIGURE 3 is a side view, on an enlarged scale, of the head portion of the pliers;

FIGURE 4 is a section along line 4—4 of FIGURE 3;

FIGURE 5 is a section along line 5—5 of FIGURE 3; and

FIGURE 6 is an enlarged view of the pivot and knife edges.

In FIGURE 1, electrician's pliers have been indicated generally at **10** and include two main levers **12** and **14** each of which has handles **16** and **18** on one side of a pivot **20** and jaws **22** and **24** on the other in a conventional manner. The pivot **20** may be of any suitable pivot structure and I have not shown it in detail. The lever structure around the pivot and each side thereof may be of the usual overlapping type and the details of the handles themselves are not important, except as mentioned hereinafter.

Forward of the jaws, I position gripping surfaces **26** and **28** which may be of the usual serrated type, note FIGURES 4 and 5.

Just behind the gripping surfaces but ahead of the pivot, I position crimping dies, **30** on the lower jaw and **32** on the upper jaw. The dies themselves are adapted to crimp a ferrule or sleeve, terminal or otherwise, on the stripped ends of electric wires. Such a crimp connection is old and well known and, basically, involves positioning the stripped ends of two or more electric wires inside of a ferrule or sleeve and then crimping the sleeve down on the wire ends. Reference is made to U.S. Patent No. 2,810,897, issued October 22, 1957.

I construct the crimping jaws with two crimps, each including a projecting crown which sockets into a concave recess, but one is the reverse of the other. For example, in FIGURE 3 I position a crown **34** on one jaw somewhat closer to the pivot than a concave or recess **36** next to it. On the other jaw, the recess **38** is somewhat closer to the pivot than the projecting crown **40** next to it. It will be noted that the crown **34** on the lower jaw cooperates with the recess **38**, these being

closest to the pivot and somewhat larger than the crown **40** which cooperates with the recess **36**. I thus position the crown and recess which require the greatest force next to the pivot, whereas the somewhat smaller crown and recess are more remote and have a somewhat longer lever arm. It will be noted that by making one the opposite of the other, the surface of one flows smoothly into the surface of the other.

For example, considering the lower dies **30** in FIGURE 3, the arcuate crown surface **42** flows smoothly and uninterruptedly into the recessed surface **44** of the concave. When the jaws are closed, as shown in FIGURE 1, the opening defined between the jaws takes on a figure **S** appearance. The advantage of reversing the dies instead of putting both crowns on one jaw and both recesses on the other is that the dies can be much closer together. Therefore, dies **36** and **40** can be closer to the pivot, thereby having a greater mechanical advantage.

I specifically construct or proportion the dies so that the inner set **34** and **38** handles a certain range of sleeves, the larger sizes, while the outer set **36** and **40** handles a second range, the smaller sleeves.

I provide abutting or flat surfaces **46** and **48** between the die sets and the gripping surfaces which contact, when the jaws are closed, as shown in FIGURE 1, to determine the maximum excursion of each crown into its opposed recess. Thus, I insure accurate crimping of the sleeves and the degree of penetration is not left to mere chance.

On the other side of the pivot **20** I may position two shear type cutting edges **50** and **52** which are offset from the center plane **54** by a certain angle, designated at **56**, the angle being such that the knife edges **58** and **60**, when extended toward the center **62** of the pivot, would be tangent to an imaginary circle **63**. In effect, each knife edge, when extended, would pass behind the pivot center. The imaginary circle **63** would have a diameter equal to the diameter of the maximum intended wire size. Thus, when the maximum wire size was to be cut, the knife edges **58** and **60** would be approximately par allel when they first contacted the wire. When cutting smaller wires, the edges **58** and **60** would be at a small angle opening inwardly toward the pivot center so that any extruding effect would be inward instead of outward.

It will be noted in FIGURES 4 and 5 that the sides of the jaw surfaces, laterally opposite the crowns and recesses, are recessed or relieved, as at **64**, so that the ends of solid or stranded wires are allowed to flare. Also, the ends of the crimping sleeves may flare into this recessed area ,as set forth in U.S. Patent 2,731,862, issued January 24, 1956.

The use, operation and function of my invention are as follows:

I provide crimping dies on conventional electrician's pliers with the dies being constructed to accommodate a wide range of sleeve sizes. I position the dies reversed or back to back so that one pair is the opposite of the other. Thus, the surface of each crown flows smoothly into the surface of its adjacent recess. This allows the dies to be positioned closer together, and both are that much closer to the pivot. This is particularly important for the outer dies, shown in this case as the smaller set **36** and **40**, since they would otherwise be several hundredths of an inch farther away from the pivot and with just that much less mechanical advantage. This would reduce the number of sleeve sizes the dies would accommodate. But by turning one set around so that together they define an **S** shape between them, both are closer to the pivot, the mechanical advantage is increased, and the range of sleeve sizes is increased.

The knife edge shearing blades have the advantage that wire will not be extruded or forced outwardly from be-

tween them, since they come together, when contacting a wire, on a plane more or less normal to the wire, or possibly with a small amount of reverse rake.

While I have shown and described the preferred form of my invention, it should be understood that suitable additional modifications, changes, alterations and substitutions may be made. For example, I have shown the crimping dies on the jaw side of the pivot and the shear or cutting blades on the handle side. But it should be understood that in certain circumstances they may be reversed. With these and other modifications in mind, I wish that my invention be unrestricted, except as by the appended claims.

I claim:

1. In a pair of electrician's pliers,

two members connected near one end by an axially fixed pivot with jaw portions on one side of the pivot and elongated handle portions on the other side of the pivot,

opposed die surfaces adjacent the pivot adapted to coact with one another on manipulation of the handle portions to effect a crimping action when a member to be crimped is positioned between them,

each die surface including a crown projecting somewhat from the surface next to a concave recess in the surface,

the crown and recess on each die surface being longitudinally next to each other with one flowing into the other,

the recess on one jaw portion being of a different size from the recess on the other jaw position,

each crown being appropriately contoured to cooperate with its associated recess,

the crown and recess on one jaw portion being reversed relative to the crown and recess on the other jaw portion so that the crown on one jaw portion is opposite the recess on the other jaw portion, and vice versa.

2. The structture of claim 1 further characterized by and including abutting surfaces on at least one side of the die surfaces longitudinally thereof adapted to contact to determine the maximum penetration of the recesses when the jaws are fully closed .

3. The structure of claim 1 further characterized by and including a lateral recess adjacent each of the projecting crowns to allow for flaring of the ends of electric wires and the crimped member during the latter portion of the crimping operation.

References Cited in the file of this patent

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