

[54] **CRIMPING DIES FOR TERMINATING  
FOIL CONDUCTOR IN A FOIL  
CONDUCTOR TERMINATION AND  
FOIL LOCATOR AND HOLDER  
THEREFOR**

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29/630 A, 29/629, 72/411, 140/106  
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29/243.51, 203 CT, 203 H, 203 HC, 203 D;  
72/410, 411; 227/108; 140/105, 106

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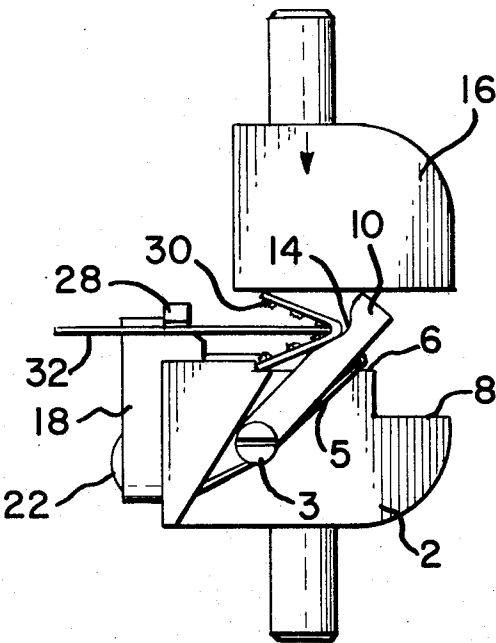
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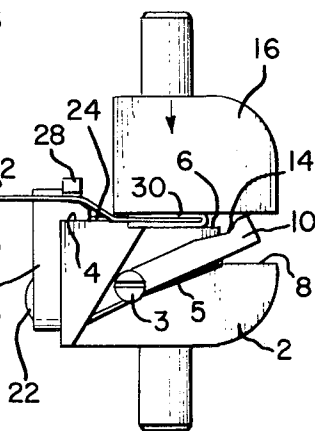
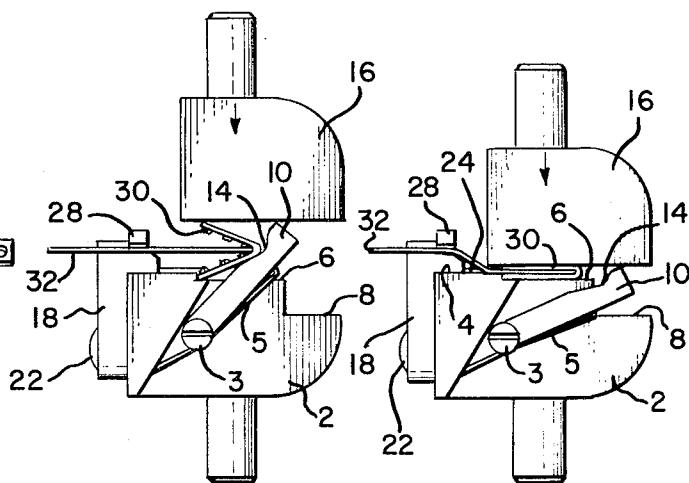
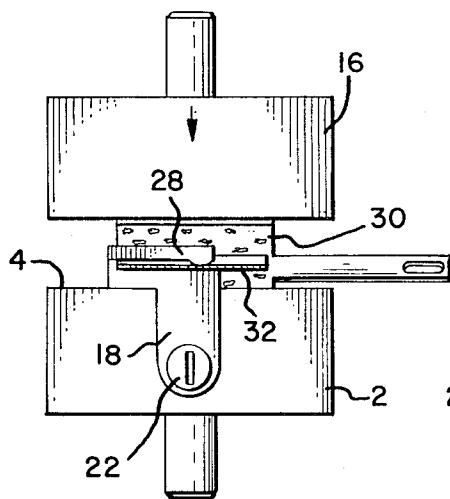
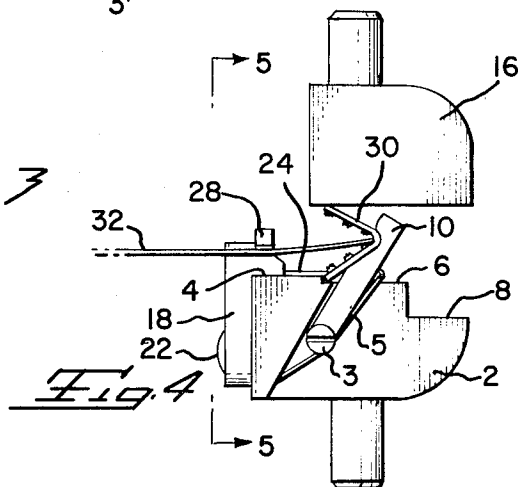
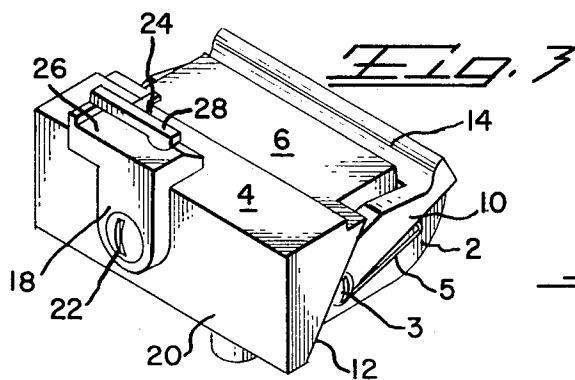
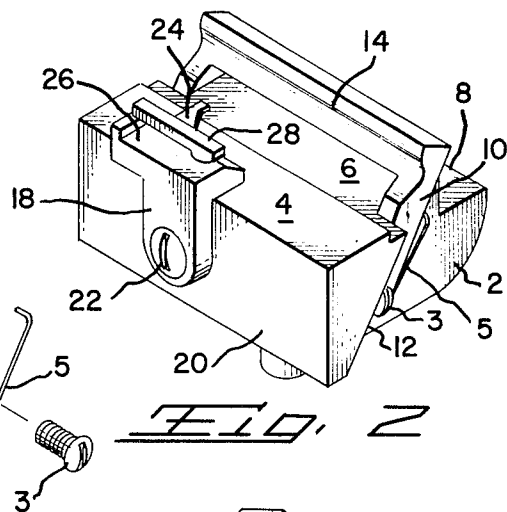
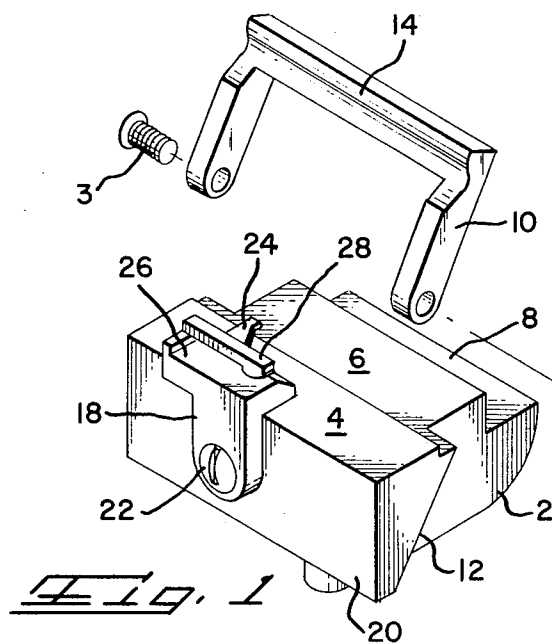
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[57] **ABSTRACT**

The disclosure relates to crimping dies for crimping an electrical connector to a foil conductor and a foil locator and holder therefore and, more specifically, to crimping dies for use in termination of foil conductors to foil conductor termination and a locator and holder for the foil which is attachable to the crimping die.

**2 Claims, 7 Drawing Figures**





# CRIMPING DIES FOR TERMINATING FOIL CONDUCTOR IN A FOIL CONDUCTOR TERMINATION AND FOIL LOCATOR AND HOLDER THEREFOR

The use of conductive foil and very thin sheets of metal as electrical conductors has become extensive in electronic circuitry as well as in miniaturized circuitry. With the advent and increased use of such conductors, the prior art proceeded to provide electrical connectors for such conductors, one such typical connector being exemplified by the patent to Weimer, U.S. Pat. No. 3,138,658. Connectors as described in the above cited patent are terminated with foil conductors and the like by crimping or otherwise compressing one of the opposing sides of the connector against the other side thereof. However, it has been relatively difficult to compress or crimp the opposing sides of these connectors so that all crimps made by a die set from connector to connector are substantially identical.

In accordance with the present invention, there are provided crimping dies for terminating an electrical connector to a foil conductor and a foil locator and holder for use therewith which is capable of properly locating a conductive foil conductor within the crimping dies relative to the connector to which termination is to take place. In addition, crimps made by the crimping dies of the present invention are substantially identical, thereby providing the advantages ensuing therefrom. Briefly, in accordance with the present invention, there is provided a locator which is attached to a lower die set and which secures a foil conductor therein in proper position. The die itself includes top and bottom portions, the upper die member having a flattened bottom surface of normal design, the lower die set member including a plurality of planar steps on its upper surface and an upwardly biased arm attachment with a groove therein whereby a connector of the type disclosed in U.S. Pat. No. 3,138,658 or the like is positioned between the upper and lower die members, the connector being secured between the die members by resting against the step formed by the two upper levels of the lower die set, the bend between the opposing faces of the connector resting in the groove in the upwardly biased attachment which is secured to the lower die set. During operation, the upper die is moved downwardly to compress the connector over the foil conductor, the attachment being moved rearwardly against the bias thereon and onto the lowermost step of the lower die. In this manner, both of the opposing faces of the connector are made to move at the same time, thereby providing a crimp having the desirable properties mentioned above.

It is therefore an object of this invention to provide crimping dies for use with connectors for foil conductors which bends both opposing faces of the connector at the same time.

It is a further object of this invention to provide crimping dies for terminating a foil conductor to a connector by crimping of the connector wherein the crimps made from connector to connector are substantially identical.

The above objects and still further objects of the invention will immediately become apparent to those skilled in the art after consideration of the following preferred embodiment of the invention which is provided by way of example and not by way of limitation wherein:

FIG. 1 is an exploded view of the overall configuration of the lower die set and the foil locator and holder in accordance with the present invention;

FIG. 2 is a perspective view of the lower die set in accordance with the present invention with attached foil locator and holder in relaxed position;

FIG. 3 is a view similar to FIG. 2 showing the position of the lower die after compression by an upper die;

FIGS. 4 to 7 are sequential views showing a connector being crimped.

Referring now to FIGS. 1 to 3, there is shown a lower die member which includes a block 2 with planar surfaces 4, 6 and 8 forming steps in the upper surface of the block 2. An arm attachment 10 is secured to the block 2 by means of screws 3 and includes a spring 5 whereby the attachment 10 is biased against the ledge 12 of the block in its upper position as shown in FIG. 2. The attachment 10 has a groove 14 therein extending the entire length thereof into which the hinge portion of a connector 30 will be positioned during a crimping operation as will be explained in greater detail hereinbelow.

The foil locator and holder attachment 18 is secured to the front surface 20 of the block 2 by means of a bolt 22. The foil locator and holder attachment 18 includes a ridge 26 for guiding and locating a foil conductor and positioning same properly and a downwardly extending arm portion 28 which has a downward bias against a foil conductor placed therein to secure the foil conductor in position during the crimping operation. The attachment 18 also includes a terminal stop 24.

In use, with reference to FIGS. 4 to 7, a connector 30 is disposed with one of its edges in the lower die set abutting the side of step 4 and positioned on step 6 as shown. The hinge of the connector 30 is disposed in the groove 14 of the attachment 10 which has been spring loaded as previously stated. The foil conductor 32 is then positioned beneath the arm 28 of the foil locator and holder attachment 18 and the upper die 16 is then moved downwardly in the direction of the arrow to crimp the connector 30 over the foil 32. With reference now to FIG. 6, it can be seen that as the die member 16 moves downwardly, the attachment or spring loaded arm 10 will be moved to the right and against the spring bias thereon, thereby allowing the hinged portion of the connector 30 to move in a downward and rearwardly direction to allow the opposed faces of the connector to bend at the same time. Referring now to FIG. 7, it can be seen that the upper die member 16 has moved fully onto the connector 30 to fully crimp same over the foil conductor 32. The arm 10 has moved entirely to the right onto the step 8. It should also be noted that the width of the connector 30 with the foil 32 therein is greater than the distance between step 6 and step 4 in order to allow a tight crimping action.

As is well known to those skilled in the art, the upper and lower die members presented herein are used in either a manually or machine operated crimping tool such as disclosed in U.S. Pat. No. 3,029,670, or in U.S. Pat. No. 3,030,838. With the tool open and the aforementioned dies separated, the operator inserts an elongated connector, apex first, between the dies. Alignment of the connector is automatically provided via arm attachment 10, groove 14 and the step formed by the intersection of steps 4 and 6. Following this, one end of the foil conductor is abutted against the inner

portion of the apex of connector 30, being guided and held herein by the guide assembly which includes ridge 26 and portion 28. The upper die member is then moved against the lower die member, crimping connector 30 onto foil conductor 32 in the manner described above. After the crimp has been made, the tool is relaxed allowing the parting of the die members and the foil conductor, complete with a suitable connector, is now ready for use in a printed circle board or like application.

It can be seen that, in accordance with the present invention, a foil conductor can be accurately disposed and held within a connector member prior to crimping and that the crimping can take place with both opposing faces of the connector being moved during the crimping operation to provide a uniform crimp from connector to connector.

Though the invention has been described with respect to a specific preferred embodiment thereof, many variations and modifications thereof will immediately become apparent to those skilled in the art. It is therefore the intention that the appended claims be interpreted as broadly as possible in view of the prior art to include all such variations and modifications.

I claim:

1. Crimping dies for use in a crimping tool and operable to crimp generally V-shaped connectors having opposed faces onto each side of foil conductors, which comprises:

- a. a lower die member having a flat work surface bounded on its front side by a rearwardly facing step, said step adapted to receive one edge of said V-shaped connector;

- b. a yoke-like arm assembling having a pair of legs each pivotally mounted on either side of said lower die member and extending above said flat working surface and further having a grooved member attached to and extending between said legs thereby transversely spanning said lower die member, said grooved member adapted to receive the apex of said V-shaped connector;
  - c. spring means for urging said arm assembly forwardly toward said step;
  - d. guide means attached to said lower die member for guiding and holding said foil conductor in a plane parallel to said flat work surface whereby said foil conductor may be positioned between said opposing faces of said V-shaped connector when said connector is positioned between said lower die member and said arm assembly; and
  - e. an upper die member having a flat working surface parallel to said flat working surface on said lower die member, said upper die member operable to be moved toward said lower die member whereby a said V-shaped connector, being positioned between said lower die member and said arm assembly is crimped onto said foil conductor with said yoke-like arm assembly being urged away from said step.
2. Crimping dies according to claim 1 wherein said guide means includes:
- a. a foil conductor positioning ridge mounted perpendicular to said grooved arm; and
  - b. a foil conductor holder arm transversing said foil conductor and biased downwardly thereon.

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