

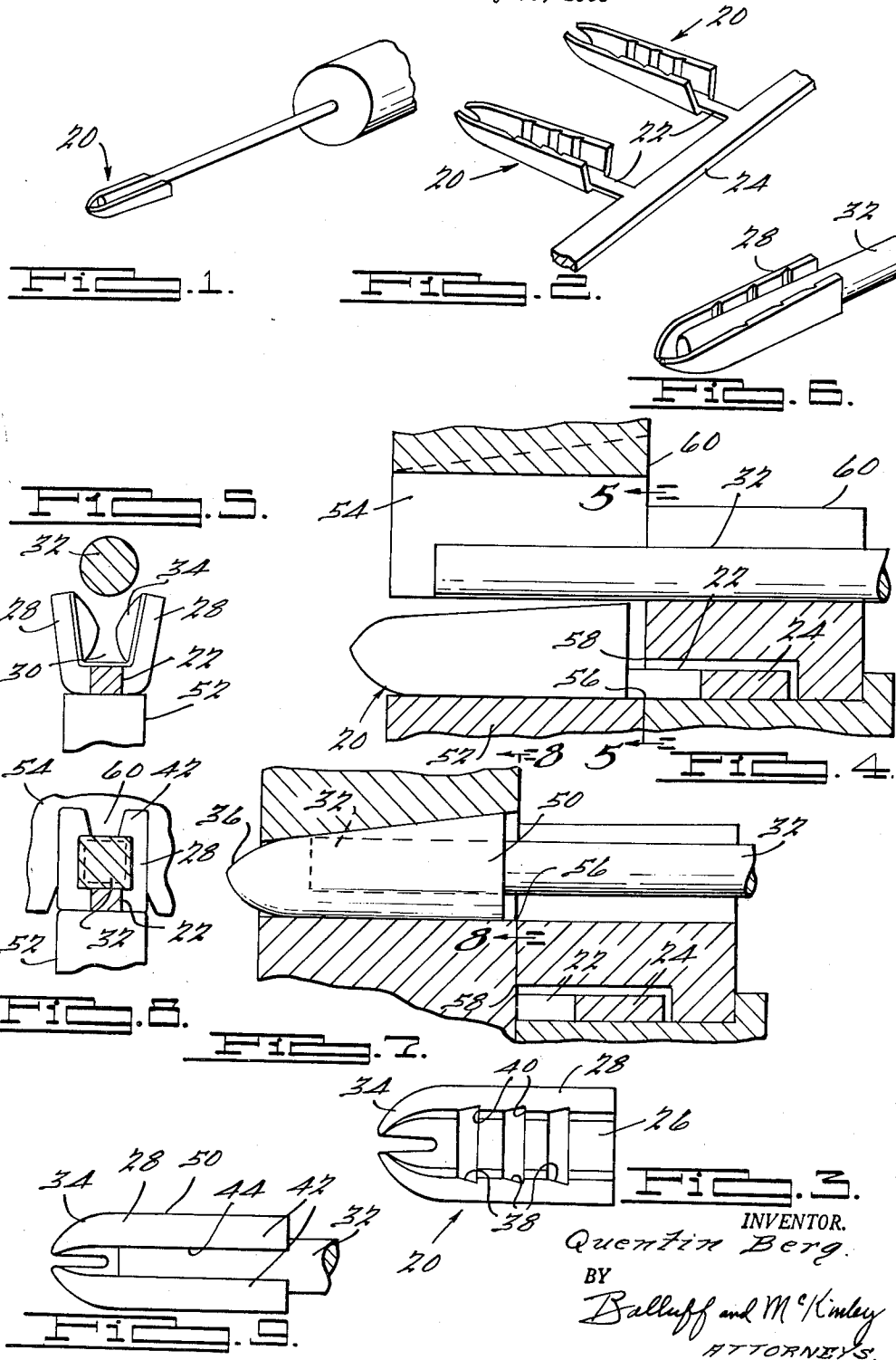
Feb. 6, 1962

Q. BERG

3,020,520

TERMINAL FOR MAKING ELECTRICAL CONNECTIONS

Filed July 30, 1959



1

3,020,520

TERMINAL FOR MAKING ELECTRICAL CONNECTIONS

Quentin Berg, % Berg Manufacturing Corporation,
142 Reno St., New Cumberland, Pa.
Filed July 30, 1959, Ser. No. 830,549
4 Claims. (Cl. 339-273)

This invention relates to a terminal for making electrical connections and has particular reference to a terminal adapted for connecting an electrical component to a printed circuit board, and the electrical connection made when such terminal is crimped around a lead of such component.

In integrating electrical components with printed circuit boards, it is the practice to affix a terminal to the lead of an electrical component and then insert the terminal in a socket in such a board and solder the same thereto. Since the terminal forms an electrical connection between the circuitry on such a board and the component, the quality of the electrical connection is important. Of equal importance is the requirement that the terminals must be accurately and uniformly made since they are applied and soldered on automatic machines. The terminal herein disclosed and claimed is particularly adapted for insertion in a socket in a printed circuit board and has been found in use to provide uniformly good high quality connections between such a board and the electrical component to the lead of which such terminal is crimped.

A principal object of the invention is to provide a new and improved terminal.

Another object of the invention is to provide a wrap around type of terminal which is adapted to make a high quality electrical connection between a printed circuit board and an electrical component assembled therewith.

Another object of the invention is to provide a novel, efficient, high quality electrical connection employing a wrap around type of terminal as herein before referred to.

Other and further objects of the invention will be apparent from the following description and claims and may be understood by reference to the accompanying drawings, of which there is one sheet, which by way of illustration show preferred embodiments of the invention and what I now consider to be the best mode of applying the principles thereof. Other embodiments of the invention may be used without departing from the scope of the present invention as set forth in the appended claims.

In the drawings:

FIGURE 1 is a perspective view of an electrical component having a terminal embodying the invention applied to one lead thereof;

FIGURE 2 is a perspective view of a strip of terminals embodying the invention before having the electrical conductor applied thereto;

FIGURE 3 is an enlarged plan view of one of the terminals;

FIGURE 4 is a fragmentary schematic sectional view through a crimping die in its open position and illustrating a step in the method of crimping the terminal on a conductor;

FIGURE 5 is an elevational view of the terminal and conductor before insertion of the conductor into the terminal and as would appear along the line 5-5 of FIGURE 4;

FIGURE 6 is a perspective view showing the conductor seated in the terminal, but before the crimping operation;

FIGURE 7 is a fragmentary sectional view through the crimping die in its closed position and illustrating the final step in the method of applying the terminal to a conductor;

FIGURE 8 is a view of the terminal and conductor after the crimping operation and as the terminal and con-

2

ductor would appear in a view along the line 8-8 of FIGURE 7;

FIGURE 9 is a plan view of the terminal crimped around the end of a conductor.

This application is a continuation-in-part of my prior application Serial No. 582,993, filed May 7, 1956, for "Apparatus for Applying Terminals," now United States Patent No. 2,897,870.

As illustrated in the drawings a terminal embodying the invention comprises a U-shaped member 20 formed from an integral piece of thin sheet metal stock such as copper or brass. The terminal preferably is made in strip form as illustrated in FIGURE 2, wherein a series of terminals 20 are individually connected by portion 22 to a strip 24, whereby the terminals may be made out of strip stock and coiled in a reel for subsequent feeding to a machine for applying each terminal to an electrical conductor.

Each terminal is formed to provide a base 26 and tapered ears 28 upstanding from the sides of the base and defining a longitudinal channel 30. As clearly shown in FIGURES 4 and 7, the ears taper in height from the back toward the front end thereof, and at the front the ears project forwardly of the base 26 and of the end of the conductor 32 secured therein. The forwardly projecting ends 34 of the ears are deflected toward, but spaced from each other to form a tip 36 which tapers toward a point. Actually the tip of the terminal after being crimped on a wire has a bullet shaped nose.

As shown in FIGURE 3 transverse grooves 38 are formed in the walls of the terminal which define the channel 30 and after the terminal is crimped on the conductor 32, the shoulders 40 formed by such grooves are embedded in the conductor so as to resist axial separation of the wire from the terminal. As illustrated in FIGURE 8, the ears 28 are crimped around the wire 32 with the outer ends 42 of the ears folded over the wire, but terminating in spaced relation so as to define a longitudinal solder flow groove 44 between the outer ends of the ears and expose part of the conductor along the side of the terminal. In the crimping operation, the terminal 20 and the end of the wire 32 are subjected to sufficient metal deforming pressure so as to cold flow the terminal and the end of the wire and accurately form the terminal. Not only does the nose 36 provide a tapered end to facilitate insertion of the terminal in a socket in a printed circuit board, but at the same time the crimping operation shapes the terminal so that the opposite sides 50 taper in thickness from the rear toward the front end thereof as clearly indicated in FIGURE 7.

In applying the terminal to the end of a conductor, a strip of terminals 20 may be fed in a path leading to the anvil 52 so that the connecting strip 24 is disposed laterally of and passes to one side of the anvil and the lead terminal 20 is positioned on the anvil with the anvil backing up such lead terminal and with the open side of the terminal facing away from the anvil. The free end of the conductor 32 is disposed in overlapping transverse relation with respect to the connecting strip 24 and with the lead terminal 20 disposed between the anvil and the conductor 32 and with the open side of the terminal 20 facing and aligned with the free end of the conductor as illustrated in FIGURE 5. A crimping die 54 disposed opposite the anvil is cooperable therewith by movement toward the same for crimping the terminal on the free end of the conductor 32. The die 54 is engageable with the ears 28 of the terminal 20 for crimping the same around the end of the conductor 32 and a cut-off comprising co-operable edges 56 on the anvil 52 and 58 on the guide element 60 which locates the conductor 32 relative to the terminal 20 are brought together by downward movement of the crimping die 54 for severing the terminal from the

strip 22. The tongue 60 of the crimping die 54 engages the end of the conductor 32 and moves it downwardly until it is seated in the channel 30 and holds it in such position during the crimping operation while the dies 52 and 54 are deformed to the shape as shown in FIGURES 7 and 8.

While I have illustrated and described preferred embodiments of my invention, it is understood that these are capable of modification, and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A crimped electrical connection comprising a generally U-shaped terminal member formed from an integral piece of thin sheet metal and having a base and tapered ears upstanding from the sides thereof defining a longitudinal channel, a bared wire projecting into said channel through one end thereof, said ears at the other end projecting forwardly of the base and the end of the wire, said ears being tapered downwardly lengthwise of said channel from said one end thereof toward the other end thereof, the forwardly projecting ends of said ears converging toward each other to form a tip which tapers toward a point with a solder flow groove between such forwardly projecting ends, the ears being crimped around the wire throughout the length of the wire within said channel with the outer ends of said ears folded over the wire and toward but spaced from each other, said connection being characterized in that the terminal and the end of the wire are crimped together under metal-deforming pressure so as to integrate the same into a unitary mass, said terminal tapering from a greater to a lesser cross section from said one end toward the tip end thereof.

2. A crimped electrical connection comprising a generally U-shaped terminal member adapted to be formed in strip form from an integral piece of thin sheet metal and having a base and tapered ears upstanding from the sides thereof defining a longitudinal channel open along the side opposite the base, a bared wire projecting into said channel through one end, said ears at the other end projecting forwardly of the base and the end of the wire, said ears being tapered downwardly lengthwise of said channel from said one end thereof toward the other end thereof, the forwardly projecting ends of said ears converging toward each other to form a tip which tapers toward a point, transverse grooves in the channel forming internal shoulders embedded in the wire so as to resist axial separation of the wire from the terminal, the ears being crimped around the wire throughout the length of the wire within said channel with the outer ends of said ears folded over the wire but terminating in spaced relation so as to define a longitudinally extending solder flow groove between the outer ends of said ears and leave exposed part of said wire, said connection being characterized in that the terminal and the end of the wire are crimped together under metal-deforming pressure so as to integrate the same into a unitary mass.

3. A crimped terminal connection comprising a generally U-shaped member formed from an integral piece of thin sheet metal and having ears upstanding from the sides thereof defining a longitudinal channel, a bared wire projecting into said channel through one end thereof, said ears being crimped on the wire throughout the length of the wire within said channel with parts of said ears

folded over the wire and formed so as to leave a part of the wire throughout its length in the crimped terminal exposed along one side thereof, said connection being characterized in that the terminal and the end of the wire are crimped together under metal-deforming pressure so as to cold flow the terminal and the end of the wire and integrate the same into a unitary mass, the outer periphery of the crimped portion of said terminal being formed to provide an electric current conducting contact surface, said terminal tapering throughout its length from a greater to a lesser cross section from said one end toward the front thereof.

4. A crimped electrical connection comprising a generally U-shaped terminal member adapted to be formed in strip form from an integral piece of thin sheet metal so as to have a base and tapered ears upstanding from the sides thereof defining a longitudinal channel, as formed initially, open along the side opposite the base for receiving the bared end of a wire conductor movable laterally into said channel through the open side thereof, said ears tapering in height from one end toward the other end thereof, said ears at the other end projecting forwardly of the base, the forwardly projecting ends of said ears being deflected toward each other to form a tip which tapers toward a point, a bared wire projecting into said channel from said one end, said terminal member being crimped under metal deforming pressure on said wire conductor so that the ears extend around the wire conductor throughout the length of the wire conductor within the channel with the outer ends of said ears folded over the wire and toward each other but terminating in spaced relation so that the outer ends of said ears are cooperable with part of said wire conductor exposed therebetween to form a longitudinally extending solder flow channel, transverse grooves in the channel forming internal shoulders for embedding in the wire conductor when the terminal member is crimped thereon so as to resist axial separation of the wire conductor from the terminal member, said terminal member after such crimping tapering in thickness from a greater to a lesser cross section from said one end toward the other thereof with the surface of the wire receiving channel therein throughout the length of the wire in said channel in intimate metal to metal contact with said wire so as to provide a terminal on the end of the wire integrated therewith in a unitary mass.

References Cited in the file of this patent

UNITED STATES PATENTS

2,270,166	Heinsch et al. -----	Jan. 13, 1942
2,597,338	Kohring -----	May 20, 1952
2,718,627	Swenson -----	Sept. 20, 1955
2,723,384	Lang -----	Nov. 8, 1955
2,724,098	Bergan -----	Nov. 15, 1955
2,759,163	Ustin et al. -----	Aug. 14, 1956
2,816,275	Hammell -----	Dec. 10, 1957
2,816,276	Fuller et al. -----	Dec. 10, 1957
2,818,632	Hammeli -----	Jan. 17, 1958
2,974,400	Sowa -----	Mar. 14, 1961
2,978,667	Watts -----	Apr. 4, 1961
2,988,723	Archer -----	June 13, 1961

OTHER REFERENCES

AMP publication, "Universal Patchcord Programming Systems," published 1955, page 6.

Disclaimer

3,020,520.—*Quentin Berg*, New Cumberland, Pa. **TERMINAL FOR MAKING ELECTRICAL CONNECTIONS.** Patent dated Feb. 6, 1962. Disclaimer filed Jan. 14, 1963, by the inventor.

Hereby enters this disclaimer to claim 3 of said patent.

[*Official Gazette February 26, 1963.*]