

[54] **TERMINAL TAPE AND METHOD FOR MAKING THE SAME**

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[58] Field of Search **29/193.5, 203 D, 625, 626, 29/627, 628, 629, 630; 206/56 A, 56 AA, 56 AB, 56 AC; 339/223, 276 SF**

[56] **References Cited**

UNITED STATES PATENTS

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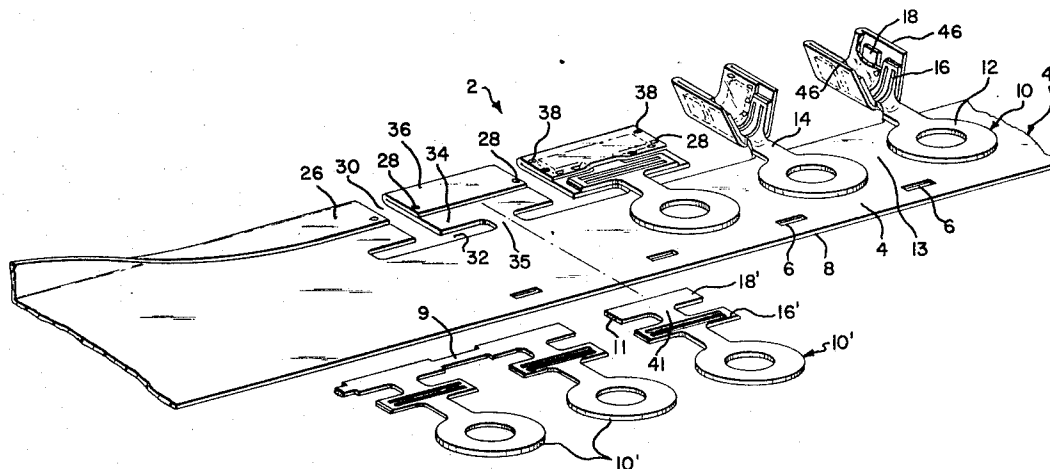
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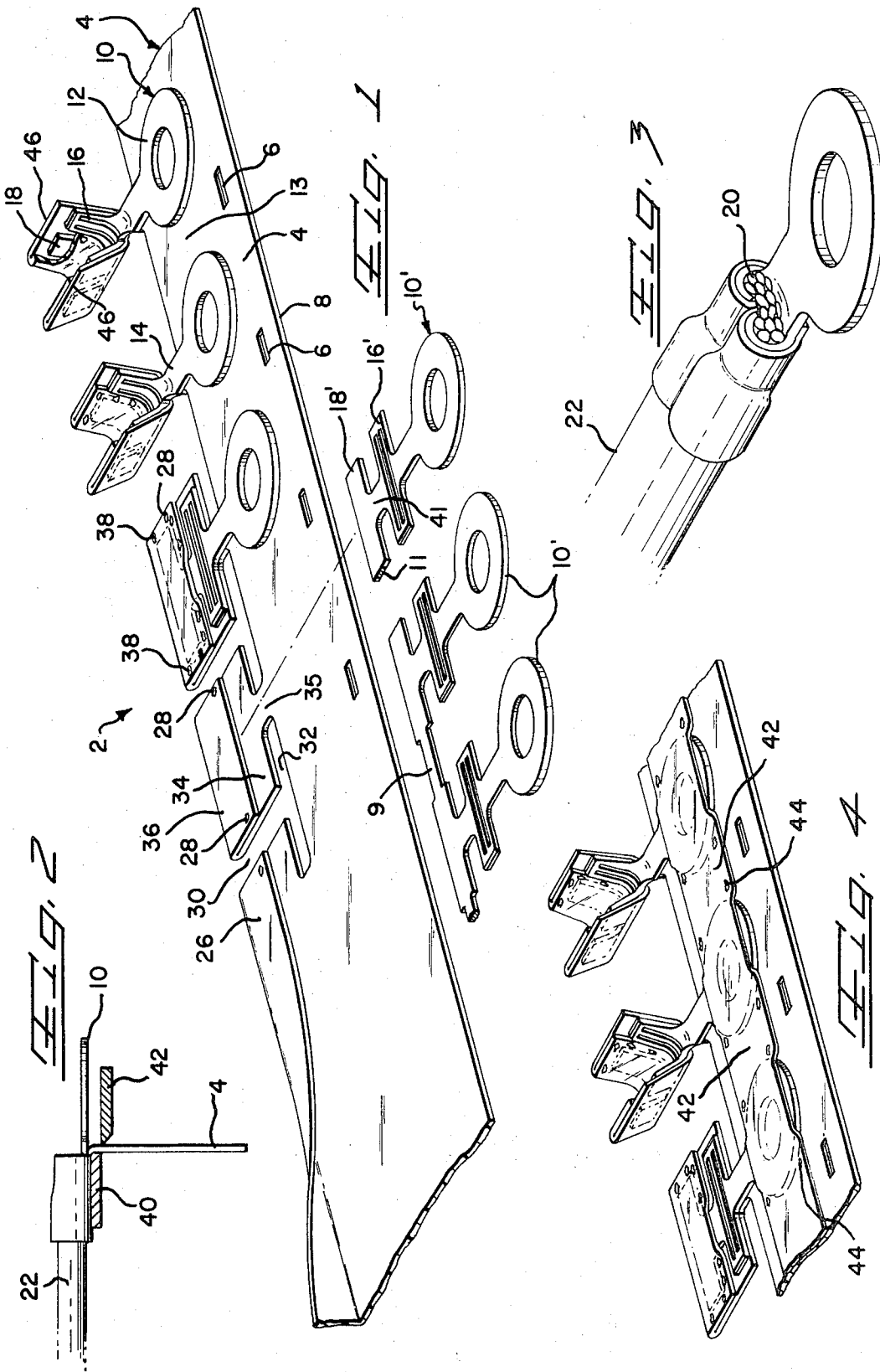
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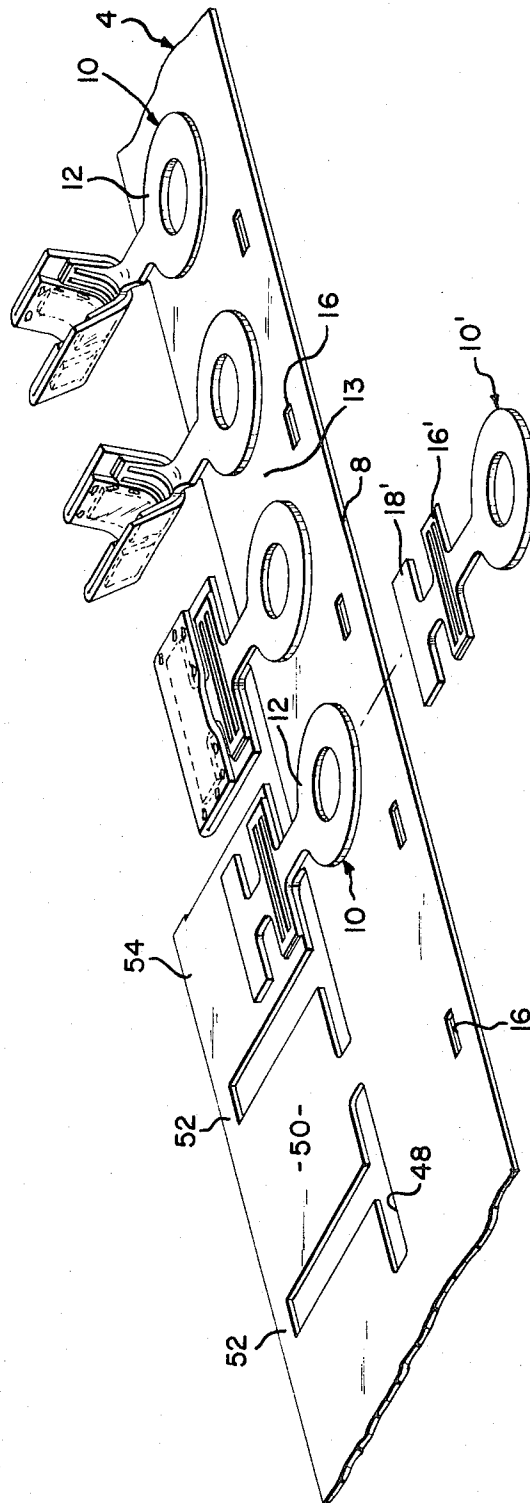
[57] **ABSTRACT**

Electrical terminal tape comprises a continuous carrier tape having pockets at spaced-apart intervals along one of its sides. Open barrel terminals, having contact portions, wire barrel portions, and insulation barrel portions, are carried by the tape. Insulation barrel portions are received in pockets and wire barrel portions and contact portions are supported on adjacent sections of tape. Upon crimping, the tape portions covering the wire and insulation barrel portions of the terminals are utilized to insulate the crimped connections.

11 Claims, 5 Drawing Figures







5. 6. 7.

TERMINAL TAPE AND METHOD FOR MAKING THE SAME

BACKGROUND OF THE INVENTION

It is common practice in the electrical terminal art to mount loose piece electrical terminals on a continuous plastic tape and to apply the terminal to wire ends by means of terminal applicators having feeding means, such as a sprocket wheel or a reciprocable shuttle, which engages perforations in the tape and feeds the tape towards the crimping zone of the applicator. Suitable applicators for terminals affixed to continuous tape are shown in U.S. Pat. No. 3,075,198 and in application Ser. No. 738,326 now U.S. Pat. No. 3,553,814 filed June 19, 1968 by George W. Rider.

One advantage of this system of feeding terminals to a terminal applicator is that a standard feeding mechanism can be used for a wide variety of terminal types by reason of the fact that tape having standard dimensions is used for many types and sizes of terminals. When it is desired to apply a different type of terminal with a given applicator than the terminal which was previously being applied, it is merely necessary to change the terminal supply reel but it is not necessary to change the terminal feeding means as is required where the terminals are in a continuous strip form and attached to each other. The tape, in accordance with known techniques, is discarded after the terminals have been applied to wire ends and constitutes a scrap loss of considerable proportions.

The present invention is directed to a terminal tape in which the plastic material of the tape functions not only as a carrier for terminals but also as an insulating means for the wire barrel and insulation barrel portions of the terminals carried.

It is an object of the invention to provide an improved form of terminal tape. A further object is to provide a terminal tape in which the carrier tape is utilized as an insulating film for the terminals carried by the tape. A further object is to provide an improved preinsulated open U-type electrical terminal. A still further object is to provide an improved method of applying insulation to electrical terminals and an improved manufacturing method for electrical terminals.

These and other objects of the invention are achieved in a preferred embodiment thereof which is briefly described in the foregoing abstract, which is described in detail in the specification which follows, and which is shown in the accompanying drawing in which:

FIG. 1 is a perspective view of a section of terminal tape in accordance with the invention illustrating the manner in which the tape is formed and the manner in which the terminals are assembled to the tape.

FIG. 2 is a side view illustrating the manner in which the carrier portion of the tape is severed from a crimped electrical terminal carried by the tape.

FIG. 3 is a perspective view of a terminal in accordance with the invention crimped onto the end of a wire.

FIG. 4 is a perspective view of a section of terminal tape in accordance with an alternative embodiment of the invention.

FIG. 5 is a perspective view of a section of terminal tape in accordance with a further alternative embodiment.

A terminal tape 2 in accordance with the invention comprises a continuous plastic carrier tape 4 which may be of Mylar (polyethyleneterephthalate) or other insulating film having spaced-apart perforations 6 along one of its edges 8. The perforations 6 are adapted to be engaged by the teeth of a belt-type feed mechanism as shown in application Ser. No. 738,326 or the teeth of a sprocket wheel as taught by U.S. Pat. No. 3,075,198. Terminals 10 are mounted on the tape in spaced-apart, parallel side-by-side relationship, the disclosed terminals having a ring-tongue contact portion 12 which rests on a carrier portion or supporting portion 13 of the tape, a neck 14, which connects contact portion 12 with a U-shaped wire barrel portion 16 and a U-shaped insulation barrel portion 18. When an individual terminal is crimped onto a wire 22 (FIG. 3), the wire barrel portion 16 will be crimped onto the strands 20 of the wire and the insulation barrel 18 will be crimped around the insulation of the wire adjacent to the wire barrel crimp.

Terminal tape in accordance with the invention can be manufactured from a continuous flat tape by folding over the left hand edge 24 of the tape as viewed in FIG. 1 until a double fold is provided as indicated at 26. This double fold may be secured by ultrasonic spot welds 28 or by any other suitable bonding method, to prevent the folded portion from springing back to its original position. Subsequent to the folding operation, T-shaped sections of the tape are punched out at spaced-apart intervals as shown at 30 and 32. This punching operation results in the formation of a plurality of side-by-side sections of film 34 which are connected by narrow neck sections 35 with the supporting portion 13 of the tape. The folded edge of the tape provides pockets 36 adjacent to the left hand side of the tape.

The terminal blanks 10', prior to U-ing of the wire barrel portions 16 and insulation barrel portions 18 thereof, are inserted into the pockets at a suitable assembly station as indicated in FIG. 1 and additional ultra-sonic welds 38 are made to securely lock each terminal in its pocket. To this end, the pockets are welded between the wire barrel and insulation barrel portions of the terminals as indicated so that the neck portions 41 of the terminals extend through the narrow opening between these welds. After this final welding step has been carried out, the wire barrel portions and the insulation barrel portions of the terminals are U-ed and the manufacture of the strip is complete. In the embodiment of FIG. 1, the terminals are thus held on the strip by welds between the opposed surfaces of the layers of the pockets 36 and the portions of insulations which surround the external surfaces of the wire barrel portions 16 of the terminals are held in position by reason of the fact that these portions of the film follow the pockets during the U-ing.

In accordance with the embodiment of FIG. 1, the terminals are manufactured as a continuous trip with each terminal connected to its neighbors by connecting slugs, 9. It is common practice to electroplate tin or other corrosion resistant metal on strip terminals so that after the terminals of the strip are severed from each other, unplated surfaces 11 on the edges of the wire barrels will be produced. After insertion of the terminals into the pockets, however, these unplated edges will be combined in the pockets so that all exposed surface portions of the terminals will be plated.

Terminal tape in accordance with the invention can be utilized in terminal applicators of the type previously identified and it is only necessary to sever the carrier portion 13 of the tape from the insulation portion of the tape subsequent to, or during, the crimping operation. As shown in FIG. 2, the severing operation can be carried out with suitable severing or shearing blades 40, 42 which may be mounted on the applicator adjacent to the crimping dies.

Upon crimping a terminal mounted on the tape onto a wire, the marginal portions 46 of the tape, which extend beyond the edges of the wire barrel 16 and beyond the insulation barrel 18 of the terminal, will be clamped between the opposed sidewalls of the wire and insulation barrel portions. The surface portions of the tape which extend over the external surfaces of the wire barrel and the insulation barrel will thus be held firmly in place on the terminal and the terminal will be insulated from its neck portion 14 to a point extending beyond the rearward end of the insulation barrel 18.

Under some circumstances, it may be desirable to provide a narrow retaining tape 42 on the carrier tape over the contact portions 12 of the terminals to hold the terminals firmly on the tape. The retaining tape 42 is bonded by welding or by an adhesive to the carrier tape on each side of the contact portion of each terminal as indicated at 44. The necessity for or desirability of, a retaining tape will depend in a large measure on size of the terminals being assembled to the tape and/or the configuration of the contact portions of the terminals.

It will be apparent that the practice of the invention results in substantial economies in the manufacture of tape terminals and the preinsulation of open U-type terminals. The tape serves not only as a carrier for the terminals but also serves as

an insulating means for the terminals which are carried by the tape. Furthermore, the manufacturing steps of providing insulation on the terminals are combined with the manufacturing steps of assembling the terminals to the carrier tape so that several manufacturing steps can be eliminated as compared with previously known methods of pre-insulating open U-type terminals and mounting such terminals on carrier tape.

FIG. 5 shows an alternative embodiment of the invention in which T-shaped sections 48 are punched out of the tape at spaced intervals to define spaced-apart tape sections 50 on which the wire barrel and insulations barrel portions of the terminal are positioned prior to folding. Under some circumstances it may prove desirable to bend the external surfaces of the wire barrel and insulation barrel to the tape section 50 to retain them in place. The connecting tape sections 52 between adjacent tape sections 50 are subsequently removed by a punching operation and the portion of the 54 of each tape section 50 is folded inwardly until it covers the upwardly facing surface of the wire barrel section 18' of the terminal mounted thereon. Thereafter, the opposed surfaces of the tape are bonded as by ultrasonic welding or by the use of a suitable adhesive as previously explained.

As noted previously, a wide variety of types and sizes of open-barreled terminals can be pre-insulated by the practice of the invention. The assembly method chosen will depend, to some extent at least, upon the shape and size of the terminal; one method, or the other, may offer particular advantages for a particular terminal.

Under some circumstances, the use of composite tape materials, comprising a carrier portion and an insulating portion, may be desirable. The carrier portion may be of an inexpensive and strong material, such as a good grade of paper or flexible cardboard, and the insulating portion of a suitable insulating film. The composite tape can be formed by simply bonding a strip of the insulating film to a strip of the carrier, the width of the insulating film being sufficient to provide material to form the pockets. The use of such composite tapes would further reduce the loss of insulating film.

While the disclosed embodiment of the invention comprises a terminal tape in which the terminals are in parallel side-by-side relationship, it will be apparent that the principles of the invention can be employed to produce a terminal tape in which the terminals are in end-to-end form, that is, in axial alignment with each other. This alternative embodiment of the invention can be achieved by mounting the terminals centrally between the edges of the tape in end-to-end form and forming pockets for the insulation barrel portions of the terminals midway between the edges of the tape by cutting the tape and folding one section in the direction of the length of the tape.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only.

I claim:

1. A continuous carrier tape having open U-type terminals thereon, each of said terminals comprising a contact portion, a wire barrel portion adapted to be crimped onto the conducting core of an insulated wire, and an insulation barrel portion adapted to be crimped onto the insulation of said wire, said carrier tape being folded over upon itself to form pockets, said insulation barrel portions of said terminals being received in said pockets, portions of said carrier tape adjacent to said pockets covering the external surface portions of said wire barrel portions of said terminals and constituting wire barrel insula-

tion portions of said tape, and portions of said carrier tape adjacent to said wire barrel portions of said terminals supporting said contact portions of said terminals and constituting terminal supporting portions of said tape, said insulation barrel and wire barrel portions of said terminals being crimpable onto the insulation and conducting cores respectively of wires whereby upon severing said terminal supporting portions of said tape from said wire barrel insulation portions of said tape, insulated crimped connections between said wires and said terminals are produced.

2. A continuous tape as set forth in claim 1 wherein said terminals are in side-by-side relationship to each other.

3. A continuous tape as set forth in claim 1 wherein said terminals are in side-by-side relationship with respect to each other, edge portions of said tape being folded inwardly to form said pockets.

4. A continuous tape as set forth in claim 1 wherein said terminals are in side-by-side relationship with respect to each other, edge portions of said tape being folded inwardly to form said pockets, said tape being transversely severed between adjacent ones of said pockets and said wire barrel portions of said terminals.

5. A tape as set forth in claim 1 including a retaining tape strip bonded to said terminal supporting portions of said tape, said contact portions of said terminals being held between said retaining tape and said carrier tape.

6. A method of preinsulating electrical terminals and mounting said terminals on a carrier tape, said terminals each having an insulation barrel portion, a wire barrel portion, and a contact portion, said method comprising the steps of:

positioning said terminals on said tape at spaced-apart intervals with said insulation barrel portions received in pockets formed by folding portions of said tape upon itself, and

bonding opposed surface portions of ends of said pockets to each other to captivate said terminals whereby, upon crimping said terminals onto wires, the portions of said tape extending over external surface portions of said wire and insulation barrel portions of said terminals covers said barrel portions and insulates the crimped connections between said wires and said terminals.

7. A method as set forth in claim 6 wherein said pockets are formed along one of the longitudinal edges of said tape and said terminals are mounted on said tape in side-by-side relationship.

8. A method as set forth in claim 6 wherein said pockets are formed by folding one edge of said tape inwardly upon itself to form a double layer of tape extending along said one edge and severing said tape inwardly from said one edge partially across the width thereof.

9. A method as set forth in claim 6 wherein said pockets are formed by folding one edge of said tape inwardly upon itself to form a double layer of tape extending along said one edge, severing said tape inwardly from said one edge partially across the width thereof, and bonding opposed internal surface portions of said pockets.

10. A method as set forth in claim 6 wherein flat terminal blanks of said terminals are positioned on said tape at spaced-apart intervals and said pockets are formed by folding portions of said tape over the insulation barrel portions of said terminals.

11. A method as set forth in claim 10 wherein said terminals are positioned on said tape transversely of the axis thereof and edge portions of said tape are folded over said wire barrel portions of said terminals to form said pockets.

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