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TOOL FOR APPLYING HEAT SEALABLE CABLE BANDS

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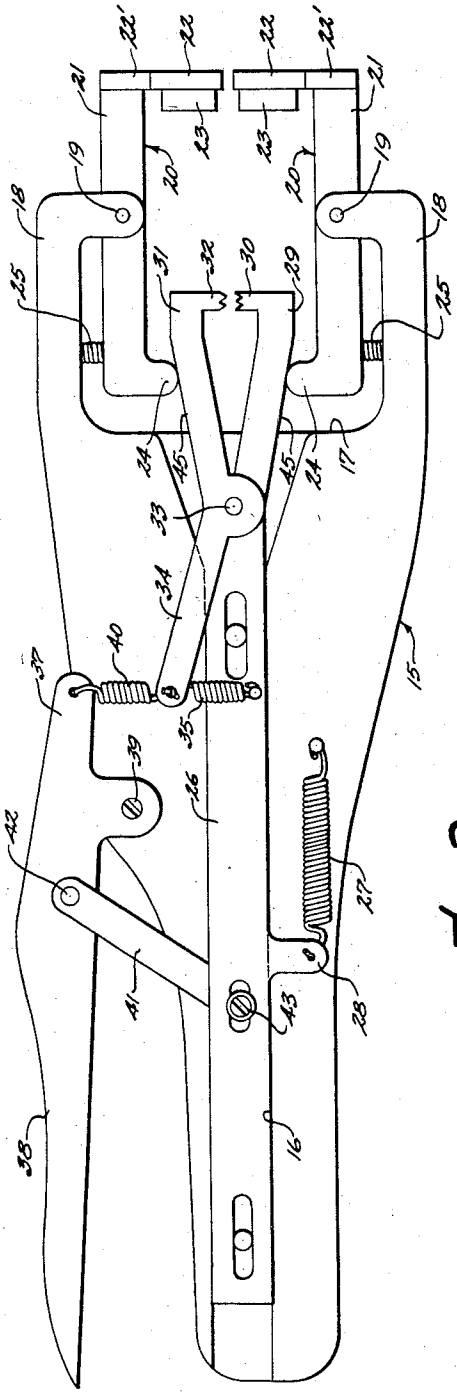


FIG. 2.

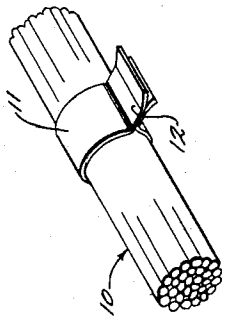


FIG. 1.

INVENTOR.
HARRY K. McLAREN

BY HIS ATTORNEYS.
HARRIS, KIECH, FOSTER & HARRIS

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TOOL FOR APPLYING HEAT SEALABLE CABLE BANDS

Harry K. McLaren, Playa Del Rey, Calif., assignor to Cal-Tronics Corporation, Los Angeles, Calif., a corporation of Nevada

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5 Claims. (Cl. 53—198)

The present invention relates to the formation of a bundle of a plurality of wires and, more particularly to a tool to be used in the formation of such a bundle.

The term "bundle of wires" as used herein designates a plurality of individual wires, such as, for example, small electrical conductors utilized in electronic work which are secured together in order that these wires may be easily and conveniently grouped and passed from one location to another. Such bundles of wires are frequently employed in aircraft, electronic and other industries in connecting controls with various operative mechanisms, such as, for example, servomotors. In all of these uses, it is frequently desired to detach one or more conductors at various locations where they lead to individual components.

Bundles of wire of the broad category described have been created in prior art in very diverse ways. Frequently, individual wires have been tied in a group at periodic intervals by means of string. This procedure suffers from a number of disadvantages, not the least of which is the labor involved and the tendency of string to give way under certain circumstances. It has also been proposed to pass individual wires forming a bundle through various types of conduits, such as, for example, fabric or extruded resin. Such procedures are inherently quite expensive and they also suffer from the disadvantage that it is difficult to select on the job a precise wire to be removed from the bundle in any given location.

It is a broad object of the instant invention to produce wire bundles which mark a substantial improvement over the prior constructions broadly indicated in the preceding paragraph. A further and related object is to provide a tool for creating new bundle constructions of the instant invention which tool is comparatively simple, and which is inexpensive and yet very effective. Still further objects of the invention will be apparent from the balance of this specification, the appended claims and the accompanying drawings, in which:

Fig. 1 shows a view of a wire bundle secured in accordance with this disclosure; and

Fig. 2 illustrates a device for use in creating wire bundles as described.

Briefly, it may be stated that the broad objects of the invention are achieved by providing a tool for holding a plurality of wires together in a bundle with the aid of spaced heat sealable bands, each band being sealed at its ends immediately adjacent to this bundle by the tool. Since, with this construction, the individual wires are tightly held and since, as broadly described herein, a plurality of spaced bands are used in order to keep the individual wires together, certain of these wires may be selected and removed from the bundle for attachment to appropriate components as desired. Obviously the invention can be employed to secure a plurality of bundles of wire, each of which has been fastened by a number of spaced bands as indicated, into a larger, composite wire bundle.

The tool of this invention is capable of forming wire bundles by grouping a plurality of wires together into a bundle, holding these wires tightly in position for positioning a heat sealable, e.g., thermoplastic resin, strip around said wires, and sealing this strip closely adjacent to said wires so as to form a permanently held wire bundle. More specifically, the present invention provides a device which comprises means for holding two adjacent ends of a strip of thermoplastic material, means for tightening said strip around the bundle of wires, and means for sealing the adjacent ends of said strip adjacent to said bundle of wires while said strip is being held tightly around said bundle so as to permanently form a bundle of wires.

Further objects of the invention are to achieve constructions as described in the foregoing brief summary of the invention.

Perhaps the broad details of the invention will be best apparent with reference to Fig. 1 in which there is shown a plurality of individual wires **10** held together so as to form a bundle by means of a thermoplastic resin strip **11** surrounding these wires, and holding them in fixed relation to one another by means of a sealed area **12**. This sealed area **12** can frequently be used to an advantage in securing the wires **10** to a supporting surface such as a wall by nailing or otherwise fastening this area **12** to such a surface. A large number of thermoplastic resins may be employed for this purpose within the broad scope of the instant disclosure, but particularly suitable thermoplastic resins are those such as polyvinyl chloride, polyvinyl acetate, polyvinyl butyrate, and polyethylene. These resins are flexible, in strip form, and may be readily sealed at a comparatively low temperature so as to form a substantially permanent seal with a minimum of difficulty. Other thermoplastic resins besides those specifically named can, however, be employed with the invention.

The apparatus used in forming a thermoplastic resin band sealed about a plurality of wires so as to form a permanent wire bundle is shown in Fig. 2 of the drawings as consisting of a central body member **15** of generally elongated shape, having along its major direction a slot **16** leading to a cavity **17** formed between projecting pivot supports **18** having opposed pivots **19** carrying jaws **20** consisting of arms **21**, the ends of which removed from the body member **15** carry electrodes or sealing jaws **22** insulated from the balance of the construction by insulators **22'** and cutting means **23**, the ends of the arms **21** within the cavity **17** being provided with opposed projections **24** normally biased towards one another by means of springs **25**.

Disposed within the slot **16** is a sliding member **26** which is normally urged towards the cavity **17** by means of a spring **27** attached to a projection **28** of this member **26** and to the body member **15**, as shown. This sliding member **26** terminates in a lower jaw **29** having an upstanding clamp **30** and a pivoted upper jaw **31** having a clamp **32** opposing the clamp **30**. It is seen from a detailed examination of Fig. 2 of the drawings that both of these jaws **29** and **31** bear against the projections **24**. The upper jaw **31** is pivoted upon the sliding member **26** by means of a pivot **33** positioned as shown, and possesses an arm **34** on the side of the pivot **33** removed from the cavity **17**. The arm **34** is normally connected to the main body of the sliding member **26** by means of a spring **35** and is connected by a spring **40** to an arm **37** of a handle **38** which is pivotally mounted on the body member **15** by means of a pivot **39**. On the handle **38** on the side of the pivot **39** removed from the arm **37**, there is a link **41** which is mounted on the handle **38** by means of a pivot **42** and

is connected to the sliding member 26 by means of another pivot 43.

Appropriate means (not shown) are provided to electrically connect the sealing jaws 22 to a source of current. These jaws 22 may either consist of heating means or may simply be conductive bars which can be connected to a dielectric heating apparatus.

In utilizing the device shown in Fig. 2 of the drawings, a group of individual wires such as the group 10 shown in Fig. 1 of the drawings is loosely held together in the shape of a bundle and a strip of thermoplastic resinous material as indicated is placed around this bundle with its ends passing between the sealing jaws 22 and between the clamps 30 and 32. When this has been accomplished, the handle 38 is pressed towards the body member 15, closing the clamps 30 and 32 so as to grasp the ends of the thermoplastic resin strip. Simultaneously, the sliding member 26 is moved back from the cavity 17 forcing the projections 24 apart by virtue of the fact that these projections slide against sloping surfaces 45 of the jaws 29 and 31. This action causes the arms 21 to rotate about the pivots 19 until the sealing jaws 22 are forced against the strip of thermoplastic resinous material. During the motion of the handle 38 before this occurs, this strip is gradually being pulled between the sealing jaws 22, tightening the strip around the bundle of individual wires. After these electrodes have been forced together, an appropriate current is passed to the sealing jaws 22 in order to seal the adjacent portions of the themoplastic resin strip. Simultaneously, the parts of this strip passing through the cutters 23 are severed, removing any tabs from the fastening strips.

Those skilled in the art will realize that the herein described invention is capable of wide modifications within the scope of the instant disclosure. Such modifications are to be considered as part of the inventive concept insofar as they are defined by the appended claims.

I claim as my invention:

1. A device of the class described, which comprises: spaced sealing jaws; jaw means for holding two adjacent ends of a strip of thermoplastic material positioned adjacent to said sealing jaws; means for clamping said jaw means against one another; means for moving said jaw means away from said sealing jaws so as to pull a strip of thermoplastic material through said sealing jaws; and means for urging said sealing jaws against one another so as to seal a strip of thermoplastic material when said jaw means are removed from their initial position adjacent to said sealing jaws.

2. A device as defined in claim 1, wherein cutter means are attached to said sealing jaws and wherein said cutter means are actuated when said sealing jaws are urged against one another.

3. In combination: two sealing jaws at least one of which is movable toward and away from the other; two clamping jaws at least one of which is movable toward and away from the other; means for moving said one clamping jaw toward the other; means for producing relative movement of said clamping jaws toward and away from said sealing jaws; and means responsive to relative movement of said clamping jaws away from said sealing jaws for moving said one sealing jaw toward the other.

4. In combination: two sealing jaws at least one of which is movable toward and away from the other; two clamping jaws at least one of which is movable toward and away from the other; means for moving said one clamping jaw toward the other; means for producing relative movement of said clamping jaw toward and away from said sealing jaws; and means interconnecting one of said clamping jaws and said one sealing jaw and responsive to relative movement of said clamping jaws away from said sealing jaws for moving said one sealing jaw toward the other.

5. In combination: two sealing jaws at least one of which is movable toward and away from the other; two clamping jaws at least one of which is movable toward and away from the other; means for moving said one clamping jaw toward the other; means for producing relative movement of said clamping jaws toward and away from said sealing jaws; and means responsive to relative movement of said clamping jaws away from said sealing jaws for moving said one sealing jaw toward the other, including a cam on one of said clamping jaws and including a lever engageable with said cam and carrying said one sealing jaw.

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