The invention relates to connectors suitable for use in making connections to conductors of the type known as tape conductors which comprise a metallic tape or tapes sandwiched between tapes of insulating plastic material.

Normally when a connection is made to an insulated cable the cable has to be terminated. The connection is then effected by stripping an end portion of the cable of its insulation and soldering, welding or crimping a connector on to the cable. With tape conductors, however, the metallic tapes often lie less than 0.1 inch apart and are not readily mating portions of the second mating member insulator. Therefore, the above-mentioned method of effecting connections is difficult.

One method of facilitating connections to tape conductors has been proposed which involves the use of needles which are pushed one into each metallic tape to effect the connection. In this case, the tape conductor does not have to be terminated or stripped. If these connections are used for some length of time, however, the holes made by the needles may tend to become enlarged, especially if the conductor is disturbed, and the connections tend to become faulty.

According to the present invention, there is provided a connector for making electrical connections to a tape conductor of the type comprising a metallic tape or tapes sandwiched or embedded in a plastic insulating medium and including a first mating member and a second mating member each having a clamping portion for gripping the strip conductor therebetween, at least one conductor in the clamping portion of the first mating member, at least one metallic tooth formed in each conductor and clamping means for clamping the mating members together, the shape of the mating members being such that tightening of the clamping means pulls the tape conductor across each metallic tooth so that it ploughs through the insulating medium to establish electrical contact with a metallic tape.

According to a feature of the invention the said clamping portion of the first mating member has a plurality of contacts each having at least one metallic tooth, each contactor being arranged for electrical contact with a different metallic tape of the tape conductor. The contacts may be insulated from each other and have terminals for electrical connections to be made thereto.

According to another feature of the invention the clamping portion of the second mating member is faced with a resilient material or a soft metal. Preferably, however, the second mating member is faced with a spring or a plurality of springs. The spring may consist of a single plate touching the tape conductor throughout its whole width. Alternatively, the plurality of springs may be positioned one opposite to each contactor of the clamping portion of the first mating member.

According to a further feature of the invention each contactor has a row of three metallic teeth. Each tooth is preferably shaped with a chisel edge so as to act on the insulating medium in a manner similar to the plane iron of a carpenter's plough plane.

According to an even further feature of the invention the second mating member includes a second clamping portion having a clamp plate, the clamp plate being adapted to clamp the tape conductor to the second mating member.

In one embodiment of the invention, the first mating member is recessed opposite the clamping plate in the second, and between the recess and the toothed clamping portion there is a projection. This projection corresponds with a depression in the second mating member and acts as a tensioner of the tape conductor between the clamp plate and the toothed clamping portion. Thus when the two mating portions are clamped together the tap conductor is pulled past the teeth while being pressed against them by the spring, so that the teeth plough into the local insulation of the tape conductor to contact the metallic tapes.

A connector in accordance with the invention will now be described by way of example, with reference to the accompanying drawings of which:

FIGURE 1 is a isometric view of a connector, for making separate connections to nineteen metallic tapes embedded side by side across a tape conductor.

FIGURE 2 is a cross sectional view of the connector shown in FIGURE 1 in an open configuration, and FIGURE 3 is a cross sectional view of the connector shown in FIGURE 1, in a closed configuration.

As shown in the drawings the connector has two mating members. These are a first mating member in the form of a top plate 1 having a lower mating surface 1a, and a second mating member in the form of a bottom plate 2 having an upper mating surface 2a. The bottom plate 2 is formed with a longitudinal channel 3 to guide and position a tape conductor. The top plate 1 has a raised face 4 which mates in the channel 3 of the bottom plate 2. A clamp plate 5 fits onto the bottom plate 2, near one end, to clamp the conductor in position. The top plate 1 has, in its mating surface 1a, a recess 6 which is shaped and positioned so that the clamp plate 5 will lie in the recess 6 when the two plates are mated. Near to the other end of the top plate 1 there is a clamping portion fitted with an insulating block 7 carrying nineteen metallic contactors 8, insulated from each other and from the top plate 1 in lateral spacing corresponding to that of the metallic tapes in the tape conductor to be used. The contactors 8 protrude from the face 4 of the top plate 1 and the lower edge of each is formed into three sharp teeth 9. The teeth 9 are shaped and inclined so as to be able to plough into the conductor if it is moved longitudinally from the end of the plate at which the teeth 9 are situated towards the recess 6. A recess 10 is cut in the mating surface 2a of the bottom plate 2 in a clamping portion opposite to that of the top plate 1. The recess 10 accommodates a spring plate 11 having nineteen spring projections 12 in lateral positions opposite to the teeth 9 when the two plates 1 and 2 are mated. The connector has tensioning means in the form of a projection 13 situated on the mating surface 1a of the top plate 1 between the insulating block 7 and the groove 6, and a mating tensioning depression 14 in a corresponding position in the mating surface 2a of the bottom plate 2. Clamping means in the form of four bolts 15 are used to clamp the two plates 1 and 2 together.

The particular embodiment of the invention described with reference to the drawings is for use with a tape conductor having nineteen longitudinal metal tapes, as shown at 16. The method of use of the embodiment will now be described. The tape conductor is laid in the channel 3 of the bottom plate 2 so that the portion of conductor 16 at which the connections are to be made is close to the spring projections 12. The clamp plate 5 is lowered and bolted down onto the bottom plate 2 to clamp the conductor 16. The top plate 1 is then laid over the bottom plate 2. The configuration of the parts is now as shown in FIGURE 2. When the two plates 1 and 2 are urged closer by tightening the bolts
A connector as claimed in claim 1 and wherein the clamping portion of the first mating member has a plurality of conductors each having at least one metallic tooth, each contactor being arranged for electrical contact with a different metallic tape of the tape conductor.

3. A connector as claimed in claim 2 and wherein the contactors are insulated from each other, and have terminals for electrical connections to be made thereto.

4. A connector as claimed in claim 1 and wherein each contactor has a row of three metallic teeth.

5. A connector as claimed in claim 1 and including a resilient facing on the clamping portion of the second mating member.

6. A connector as claimed in claim 5 and wherein the facing on the clamping portion of the second mating member comprises a separate spring located opposite each contactor of the clamping portion of the first mating member.

7. A connector as claimed in claim 1 and wherein said first clamping means is a clamp plate which is adapted to clamp the conductor to the second mating member.

8. A connector as claimed in claim 1 and the wherein said clamping portion comprises a projection from one mating member arranged to protrude into a depression in the other mating member.

9. A connector as claimed in claim 1 and comprising a first mating member and a second mating member, a clamping portion of the first mating member; a plurality of contactors insulated from each other in said clamping portion and arranged for electrical contact with a different tape of the conductor; a plurality of metallic teeth formed on each contactor; a clamping portion of the second mating member located in a position such that when the two mating members are urged together the conductor is gripped between the two clamping portions; a plurality of springs on said clamping portion of the second mating member, each spring facing the teeth of a contactor; a clamp plate for clamping the conductor to the second mating member; a projection from said first mating member arranged to protrude into a depression in said second mating member between said clamping portions and said clamp plate; each metallic tooth having a cutting edge facing in a direction at least partially away from said projection so that as the conductor is drawn past the teeth they plough through the insulating medium to make contact with the metallic tapes; and clamping means for clamping the two mating members together.

10. A connector as claimed in claim 1 and wherein the first mating member and the second mating member are extended, and their parts are duplicated so as to form a substantially symmetrical double connector.

11. A connector as claimed in claim 10 and wherein each contactor in one clamping portion of the first mating member is connected electrically to a corresponding contactor on the other clamping portion of the first mating member.

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