

June 30, 1964

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3,139,314

TERMINAL

Filed April 17, 1961

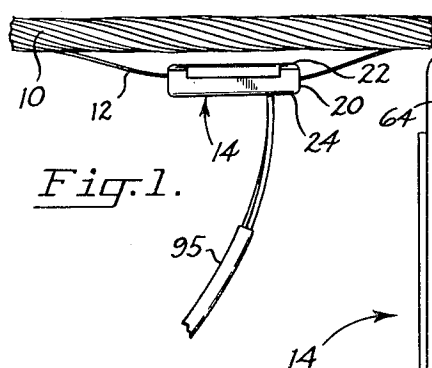


Fig. 1.

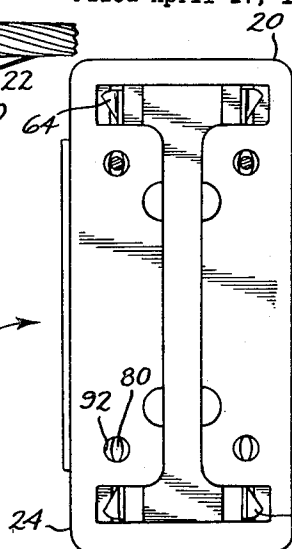


Fig. 3.

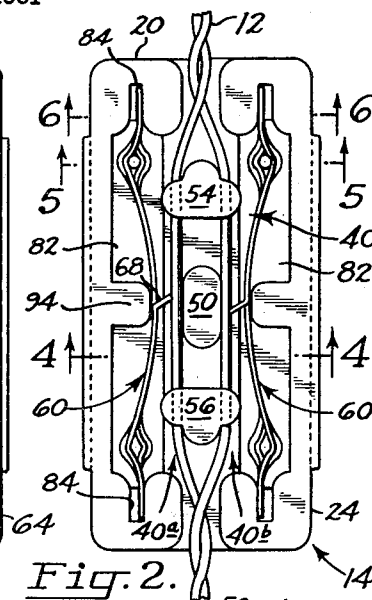


Fig. 2.

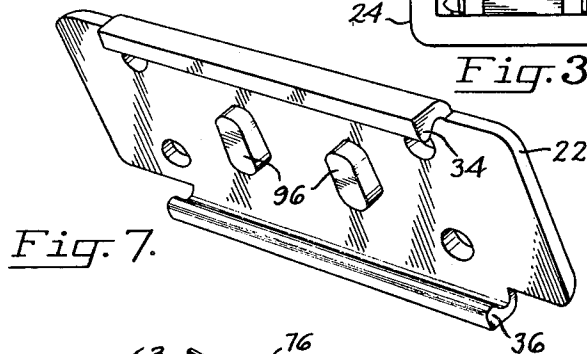


Fig. 7.

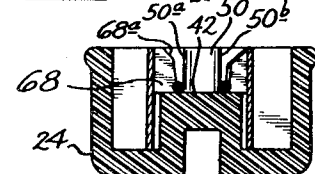


Fig. 4.

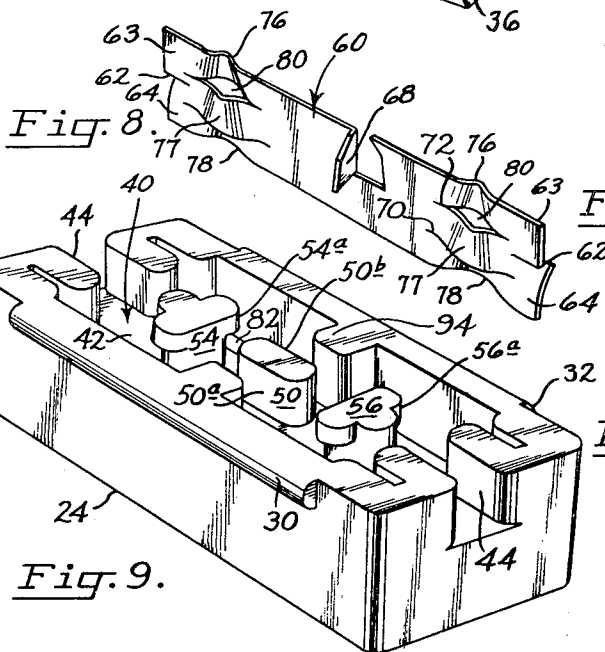


Fig. 9.

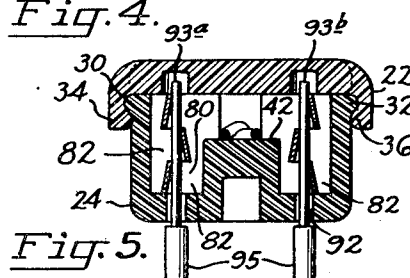


Fig. 5.

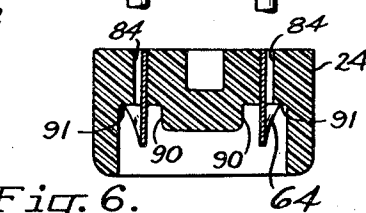


Fig. 6.

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TERMINAL

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Filed Apr. 17, 1961, Ser. No. 113,580
4 Claims. (Cl. 339-97)

This invention relates to terminals, and more particularly to an improved terminal with means facilitating the making of electrical connections with conductors. A feature, and part of the invention, is the provision of a novel connector, in the form of a strip or clip, for completing an electrical circuit between a pair of conductors connected to the terminal.

The terminal of the invention has obvious utility in a number of different applications. By way of example, it may be employed advantageously in the telephone industry, in making suitable electrical connections with the usual "cable pairs" that are bundled together in the ordinary telephone cable. Such connections are made, for instance, in connecting the "drop wire" of a telephone subscriber to a cable pair in the telephone cable. Similarly, the terminal can be used to connect a "load coil" with a cable pair, or a "carbon," or other electrical devices.

A general object of the invention is to provide a relatively simple form of terminal, capable of production at low unit cost, that performs in a highly practical and satisfactory manner.

Another general object is to provide an improved lightweight terminal, that, because of its small mass and compactness, may be connected to a cable pair in a telephone cable and left in operative position suspended by the pair.

It is another object of the invention to provide an improved terminal for tapping a continuous conductor between its ends, where an electrical connection with the conductor is produced by the conductor engaging a cutting edge in a novel connector in the terminal.

Yet another object of the invention is to provide a novel terminal, where electrical connection between two conductors is made through a unitary, electrically conductive and somewhat resilient connector, such connector having an edge for engaging one conductor between its ends to produce electrical contact, and a socket portion that may be used to clamp onto the end of another conductor, the resilient and conductive nature of the connector resulting in the completion of a good electrical circuit between the conductors.

Yet another object is to provide an improved connector for a terminal, that is readily mounted in the terminal, easily replaced if need be, and has provision for making electrical connections with at least a pair of conductors.

A further object is to provide an improved construction for a terminal housing, and an improved mounting for a connector in the housing.

Other objects and novel features of the invention will become more fully apparent, as the following description is read in conjunction with the accompanying drawings, wherein:

FIG. 1 illustrates a portion of a telephone cable, such containing a bundle of cable pairs, and with one of the pairs separated from the rest and the terminal of the invention suspended thereon;

FIG. 2 is a top, enlarged view of the terminal, with its cap removed, and showing parts within the terminal;

FIG. 3 is a view looking at the bottom of the terminal illustrated in FIG. 2;

FIGS. 4, 5, and 6 are cross sectional views, taken along the lines 4-4, 5-5, and 6-6, respectively, in FIG. 2; and

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FIGS. 7, 8, and 9 are perspective views illustrating a cap that is part of the terminal housing, a connector used within the terminal, and a bottom section of the terminal housing, respectively.

Referring now to the drawings, for a description of an embodiment of the invention, in FIG. 1 a telephone cable is indicated at 10. This comprises a bundle of paired conductors or strands, commonly referred to as "cable pairs." Each cable pair in the usual telephone cable includes one insulated wire that is grounded, and referred to as the "tip side" of the pair) and another insulated wire that is charged (and referred to as the "ring side" of the pair). In cable 10, a cable pair 12 has been pulled out of the bundle, and a portion of it lies to one side of the remainder of the cable, so as to be accessible for the detachment of a terminal thereto. A terminal is indicated at 14. It will be noted that the terminal is held suspended by cable pair 12, and thus it should be light and not excessively bulky.

Considering more specifically the construction of terminal 14, and with reference now to FIGS. 2-9, the terminal comprises an elongated, split housing 20, made up of separable housing sections 22, 24. The housing has a substantially rectangular box-like shape in the embodiment of the invention illustrated. Housing section 22 is the top or cap section of the housing, whereas section 24 is the bottom or body portion of the housing.

The housing sections are made of a dielectric material, preferably a plastic material that can be molded (such being light in weight, and having some resiliency although also having suitable rigidity). Integral with bottom section 24 and along its sides and adjacent its top are ribs 30, 32. Elongated lips 34, 36 integral with the cap section snap over the ribs, with the top and bottom sections assembled together as in FIG. 5, to provide a detachable connection between the two sections. When assembled together, the top or cap section, which is imperforate, effectively closes off the top of the housing from water. (In FIG. 7, the apparent recesses in the cap result from the molding process, and do not extend through the cap.)

Referring to FIG. 9, extending through the housing, between its ends, is an elongated passage means 40. The base of passage means 40 is defined by an elongated table surface 42 extending the length of section 24. At the ends of the housing are opening 44. Bounding the top of passage means 40 with the housing sections together is the underside of housing section 22. With the top section removed passage means 40 is open along its length, thus to accommodate the insertion of a continuous cable pair in the passage means without severing the pair.

Projecting up from the table surface 42, at approximately the middle of bottom section 24, is a lug or fence 50. This is bounded on opposite sides by upright, smooth walls 50a, 50b. The walls are used in wedging conductors against contacting portions of connectors in the terminal, as will later be described. On either side of lug 50, and projecting up from the table surface 42, are columns 54, 56. Column 54 is provided adjacent its top with overhanging flanges 54a, extending to either side, and column 56 has similar overhanging flanges 56a.

As can be seen in FIG. 2, when the two conductors of a cable pair are mounted in the terminal, they are first unraveled and then spread apart. The columns and lug 50 divide passage means 40 between its ends into a pair of channels (indicated at 40a, 40b), with one on one side and one on the other side of the housing. Each channel receives one conductor. A conductor is mounted in place by fitting it underneath a set of overhanging flanges 54a, 56a. Thus, when the terminal is dependently supported, it is these flanges that by contacting the

top sides of the conductors support the weight of the terminal.

Elongated metallic clips or connectors are indicated at 60 (see FIG. 8). In the embodiment illustrated, a pair of these are provided, and these extend longitudinally of the housing, one adjacent channel 40a and the other adjacent channel 40b. The connectors are of one piece, electrically conductive, and somewhat resilient. Preferably they should be able to withstand high heats, should lightning, for instance, strike the cable producing surges of high current therein. Beryllium and copper alloys, or nickel and steel alloys may be employed satisfactorily as the material for the connectors.

Each connector has extending inwardly from each end a cut 62. Cut 62 thus defines at each end a pair of flaps 63, 64. These flaps are employed in mounting a connector in the housing. Intermediate the ends of a connector is a flap 68 partially disconnected from the body of the connector, which constitutes a contacting portion in the connector. Between flap 68 and each end of a connector are a pair of cuts or slots 70, 72. Each pair of slots 70, 72 defines side-by-side band or clamping web portions, indicated at 76, 77, 78. Successive ones of these band portions diverge from each other whereby a passage 80 is formed that extends transversely of the band portions and is interlaced with them.

Considering again the construction of the housing, on either side of table surface 42 is an elongated well 32. These wells receive the connectors, with each connector adjacent a channel as already mentioned. At the ends of wells 32 are slots 84 in the housing, that receive the ends of the connectors.

At the base of each slot 84, is a shelf 91 provided by the bottom of a recess 90 (see FIG. 6). Recesses 90 communicate with slots 84 and when a connector is mounted in place, each of its ends fit partially in a slot and partially in a recess 90. The bottom edge of a mounted strip rests on the floor of the well 32 it is within. Flaps 64 are permanently deformed, by bending them to one side, to lock a connector in place with the flaps engaging shelves 91.

Passages 80 formed by the band portions of a connector are aligned with apertures 92 provided in the bottom housing section. The ends of conductors, such as conductors 93a, 93b of drop wire 95, are connected to a connector by inserting them through the apertures and into passages 80. The band portions clamp snugly on the ends of the conductors to hold them in place. Preferably each aperture is of such a size that any conductor within it is guided directly to the passage 80 behind it. Important in the invention is that middle portions of band portions 76, 77, 78 slope inwardly progressing in a direction away from an aperture 92 in front of them, as shown in FIG. 5. This produces a funneling action as a conductor is inserted into place, and also places edges of the band portions so that they bite onto a conductor in such a manner as to resist its withdrawal.

Behind each connector or strip 60 adjacent its flap 68 is a backing lug 94. Lug 94 supports intermediate portions of a strip, and limits the yieldability of a flap 68 away from lug 50. It should be noted, however, that each flap 68 is slightly inclined with respect to lug 50, which enables it resiliently to swing away from lug 50 when a conductor is wedged into the space between it and the lug. To connect the conductors of cable pair 12 to the connectors, the conductors are separated, and each is forced sidewise into the space between a flap and lug 50. Edge 68a of a flap (its cutting edge) slopes toward the side of lug 50, and a slicing action results when a conductor is wedged into place that produces good electrical contact.

As can be seen in FIG. 7, buttons or push means 96 are provided on the underside of cap 22. The bottom surfaces of these buttons constitute push surfaces, that position themselves on either side of lug 50 and between

columns 54, 56 when the cap is in place on section 24. The buttons, when assembling the housing, push down on the conductors of a cable pair on either side of lug 50, and help in making electrical contact between flaps 68 and the conductors of a pair. As already indicated, when the terminal is suspended as in FIG. 1, flanges 54a, 56a rest on the conductors of a cable pair, preventing the conductors from pulling out of contact with the flaps. Buttons 96 also aid in preventing this sort of disconnection from occurring.

When using the terminal, it is a relatively simple matter to connect the drop wire of a subscriber to the conductors of a cable pair. An installer can, in a very short time, properly place the wires of a pair in position, and snap the housing sections together. Absent are any screws or like fasteners. To connect the conductors of a drop wire, all that need be done is strip the ends of the conductors, and using these ends as pins insert them into the pack-type sockets provided by sets of band portions 76, 77, 78.

It should be obvious that the terminal is suitable for other uses than just the connection of a drop wire. For instance, a load coil could be connected to a cable pair using the terminal described, and so also could a carbon. Also, while the terminal is shown in an embodiment where connections are made with just a pair of conductors in a cable pair, obviously plural pairs could be connected to connectors as described, in modified forms of the invention. The connectors are shown as each having two jack-type sockets, however, this number may be varied depending upon the use of the terminal.

A specific embodiment of the invention has been described in detail, such being for the purpose of clearly illustrating the invention, and not with a view toward limiting the invention. It is intended to cover all modifications and variations of the invention that would be apparent to one skilled in the art, and that come within the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. A terminal comprising a split housing with separable housing sections, a passage for receiving a conductor in one of said housing sections extending between opposite sides of said one section and open along its length with the housing sections separated, and an elongated metallic strip forming a connector in the terminal mounted in said one housing section beside said passage, said connector having a resilient flap extending to one side thereof and into said passage, said flap terminating in a cutting edge for making contact with a conductor, said one housing section including a wall disposed opposite said cutting edge and inclined relative to said flap, said wall operating to hold a conductor against said cutting edge with such conductor wedged between said wall and cutting edge, the resiliency of said flap enabling said cutting edge to give relative to said wall.

2. A terminal comprising a split housing with separable housing sections, passage means for receiving a pair of conductors in one of said housing sections extending between opposite sides of said one section and open along its length with the sections separated, said passage means including a pair of laterally spaced channels separated by a fence with each channel adapted to receive a separate conductor, and a pair of electrically conductive connectors mounted in said one section, with one adjacent one channel and the other adjacent the other channel and on either side of said fence, each of said connectors having a contacting portion with a sharpened edge projecting toward said fence and operable to make contact with a conductor when the conductor is forced thereagainst, each of said contacting portions together with its sharpened edge being resiliently yieldable away from said fence, said fence having a smooth wall opposite each contacting portion for supporting a conductor when the same is against the sharpened edge of the contacting portion, said smooth walls enabling conductors

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to be wedged into position by sliding them down the walls.

3. A terminal comprising a housing having a passage extending entirely through it with ends on opposite sides of the housing, and an elongated metallic connector mounted within the housing and approximately paralleling said passage, said connector having intermediate its ends a yieldable and resilient flap projecting into said passage in a transverse direction, said flap having a cutting edge for making contact with a conductor placed in said passage and moved against said cutting edge, said housing including a wall to one side of said passage and opposite said cutting edge for supporting a side of such a conductor, said flap being inclined relative to said wall and said cutting edge being yieldable away from said wall by reason of the inclined position resiliency of said flap.

4. A terminal comprising a housing including first and second oppositely disposed separable and mating housing section, and a flexible and resilient unitary body of conductive material forming a connector in said terminal mounted in said housing, said first housing section having a channel recessed therein detachably receiving said connector which is opened up along one side upon separation of said second housing section from said first housing section, said connector including resilient locking flap means for mounting the connector, said channel including pocket means receiving said locking flap means

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said locking flap means and pocket means being constructed to hold said connector with the same prevented from separating from said first housing section by movement outwardly to said one side of said channel, said connector also including a resilient contact-making flap with a cutting edge extending transversely of said one side of said first housing section for making contact with a conductor, said first housing section having a wall disposed opposite said cutting edge and spaced therefrom with the said wall operable to hold a conductor against said cutting edge with such conductor wedged between the wall and the cutting edge.

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