Sept. 5, 1967 C. R. KENNEDY 3,340,496

ELECTRICAL CONNECTOR ELEMENT

Filed April 13, 1965

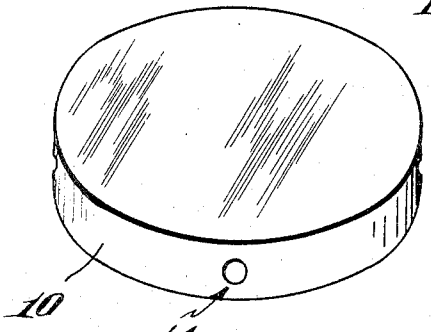


Fig. 1

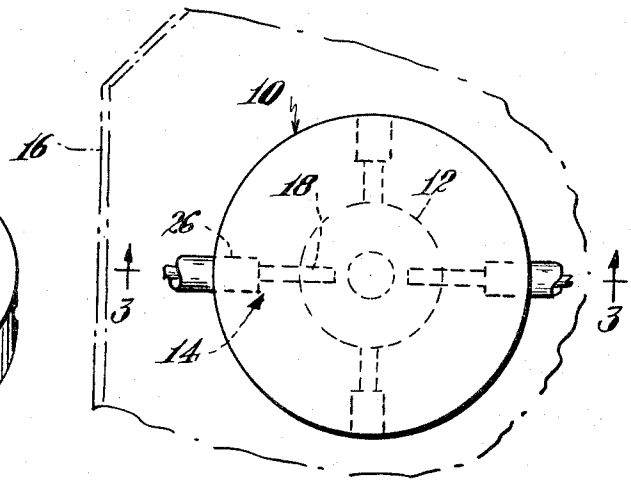


Fig. 2

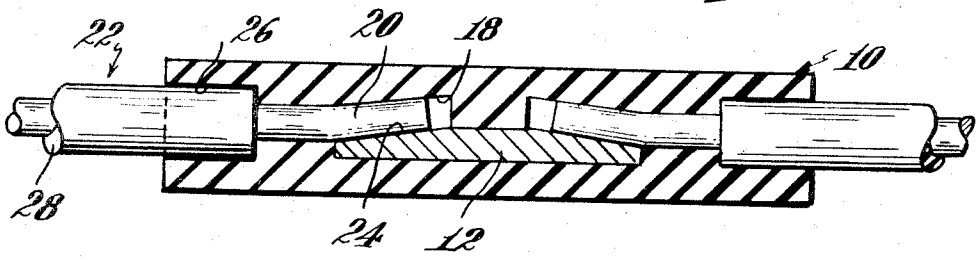


Fig. 3

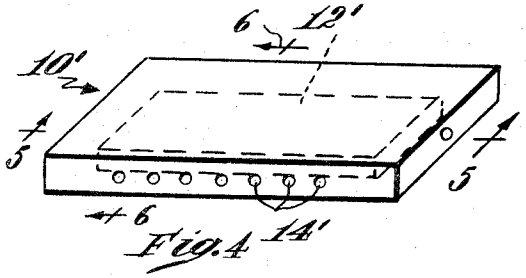


Fig. 4

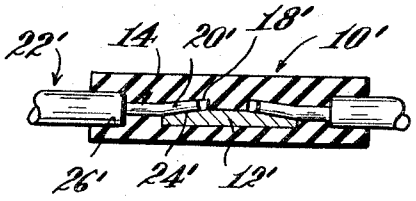


Fig. 6

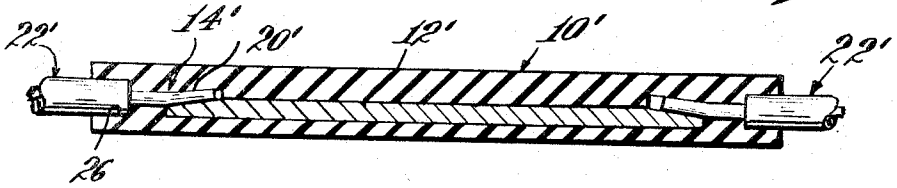


Fig. 5

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United States Patent Office

3,340,496

Patented Sept. 5, 1967

3,340,496

ELECTRICAL CONNECTOR ELEMENT

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Filed Apr. 13, 1965, Ser. No. 447,802
9 Claims. (Cl. 339—204)

ABSTRACT OF THE DISCLOSURE

A plastic connector comprising a receptacle containing an embedded metal plate and one or more passages which extend into the receptacle into which conductor wires can be thrust to make an electrical contact with the metal plate.

It is customary to join the ends of wires in junction boxes by placing the ends parallel to each other and then applying an internally threaded cap comprised of a non-conductive material to the ends and by rotation binding the ends to each other. When there are several wires and where several connections are to be made which require several caps, lack of sufficient space in the junction box makes it difficult to make the connections.

The objects of this invention are principally to provide a connector element which may be placed in a junction box for joining a plurality of wires running to the box; to provide a connector element which will enable inserting the wires individually, that is, without twisting two or more wires together; to provide a connector which enables removing the wires, if desired, without destruction of the connector and of reusing it; to provide a connector which is adapted to be made in such shape as to fit into junction boxes of circular or polygonal shape; and to provide a connector which is inexpensive to manufacture and entirely safe. Other objects are to provide a connector which can be used to join breaks in wires instead of by means of friction tape, soldering, crimping, or the like; to provide a connector which enables visual detection of the fact that the connection has been properly made; and to provide a connector which is relatively small and hence not unsightly.

As herein illustrated, the connector comprises a non-conductive block, a conductor plate embedded in the block and two or more passages in the block in communication with the conductor plate. Each passage extends inwardly from the edge of the block across an edge of the conductor plate and is adapted to receive and frictionally hold the bare end of a conductor wire, thrust into the passage, tightly engaged with the conductor plate. The outer end of each passage is enlarged to receive a portion of the insulation. The block is comprised of a non-conductive material such as transparent plastic, the conductor plate is preferably copper and the passages are inclined at their inner ends so as to extend across one face of the plate thereby to bend the wire and thus to lock it in place. The face of the conductor plate may be beveled near the edge to facilitate thrusting the wire into place. The block may be circular or polygonal and of a dimension to fit into a conventional junction box and may contain two or more passages depending upon the junction box with which it is to be used.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. 1 is a perspective of a circular connector;

FIG. 2 is a plan view of a connector situated in a junction box showing portions of two wires connected to each other through the connector;

FIG. 3 is a diametrical section, to much larger scale, taken on the line 3—3 of FIG. 2;

FIG. 4 is a perspective of a connector of rectangular configuration;

FIG. 5 is a transverse section, to much larger scale, taken on the line 5—5 of FIG. 4; and

FIG. 6 is a longitudinal section, to much larger scale, taken on the line 6—6 of FIG. 4.

The connector, as herein illustrated, comprises a rigid block 10 of non-conductive material within which is embedded a conductor plate 12 and containing two or more passages 14 which extend from the edge inwardly over an edge of the conductor plate. The block is circular and of a size adapted to be easily inserted into an electric junction box of conventional kind, such as shown at 16 (FIG. 2). To assist in making a good connection the block is comprised of transparent plastic so that the conductor plate 12 is visible and the inner end portions of the passages are inclined upwardly relative to their axes to provide bent end portions 18, so that the bared portions 20 of the conductor wires 22 thrust into the passages will be bent upwardly into engagement with the upper face of the conductor plate. The margin of the upper face of the conductor plate may be beveled to provide an inclined surface 24 substantially parallel to the axes of the bent end portions 18 of the passages. The bent ends 20 of the conductor wires resist withdrawal of the conductor wires from the passages.

The conductor plate is copper to provide good electrical conductance and also is sufficiently soft so that when the bared portions of the wires are thrust into contact therewith they will scratch the surface sufficiently to remove any oxide and thus provide a clean metal surface for contact with the wires.

The passages 14 enter the block substantially midway between the top and bottom surfaces thereof and the conductor plate is embedded in the block so that its upper surface coincides substantially with the axes of the passages. The outer ends of the passages 14 are counterbored to provide portions 26 of larger diameter to receive portions of the insulation 28 of the conductor wires.

In using the connector the ends of the conductor wires to be joined are trimmed to remove enough insulation so that when the conductor wires are thrust into the passages far enough to engage the trimmed ends of the insulation with the bottoms of the counterbored portions 26 of the passages, the bared portions of the wires will engage the beveled face of the conductor plate. Prior to inserting the conductor wires an adhesive of a suitable kind is applied to the surfaces of the insulation. The frictional engagement of the bared and covered portions of the conductor wires will ordinarily suffice to hold the wires in place. However, when there is a possibility that the conductor wires will be subjected to stress outside of the junction box, the use of adhesive is desirable to prevent separation from the connector.

The conductor wires may be removed to break a connection or to make a different connection by cutting through the insulation 28 next to the edge of the block and then pulling the wires through the insulation to free them. The insulation left in the connector may now be easily removed with the end of a knife, screw driver, or similar implement.

As illustrated in FIGS. 4, 5 and 6, the connector may comprise a rectangular block 10', a rectangular conductor plate 12' and a plurality of passages 14' extending from the sides and ends of the block into and across the edges of the conductor plate 12'. The only advantage achieved by making the connector element rectangular is that it will fit into a rectangular junction box.

The conductors, as illustrated, are adapted not only for joining wires led into junction boxes but also for connecting breaks in wires or to join the ends of two wires without having to employ friction tape which usually makes a rather unsightly joint and which ends to become

unwrapped over prolonged periods because the tape dries out.

The block of which the connector is made is comprised of polyethylene and is formed in suitable fashion by molding as a unit or in parts welded together, it being understood however that any equivalent rigid, transparent plastic material may be employed. The size and thickness of the copper conductor plate will depend upon the current intended to be carried. The diameter of the passages will be formed either during molding or by drilling following molding, will be made in sizes corresponding to conventional wire sizes, and may be of the same or different size in each individual connector.

As thus described and illustrated, the connector provides the advantages that connections between conductor wires may be made easily within the comparatively limited space available in junction boxes, that the connections can be made without need for solder, friction tape and/or crimping sleeves and crimping tools, that several connectors can be stacked in the junction box without difficulty, that the connectors are inexpensive to manufacture, durable and can be used repeatedly.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. A connector for conductor wires comprising a non-conductive block, a conductor plate embedded in the block and two or more passages in the block in communication with the conductor plate, each passage extending inwardly from an edge of the block across an edge of the conductor plate for receiving and holding the bare end of a conductor wire against a face of said plate, characterized in that the part of the passage crossing the edge of the conductor plate is inclined relative to the axis of the passage outwardly of the conductor plate so as to cause deflection of the portion of the bare wire which has contact with the conductor plate.

2. A connector according to claim 1, wherein a portion of each passage has adjacent the edge of the block a part of larger diameter adapted frictionally to receive a portion of the insulation of the conductor wire.

3. A connector according to claim 1, characterized in that the face of the conductor plate with which the conductor wire has contact is beveled at its edge and the part of the passage crossing the beveled edge of the conductor plate is inclined at a corresponding angle so that the part of the bare wire having contact with the conductor plate is deflected sufficiently to yieldingly resist withdrawal.

4. A connector according to claim 1, characterized in that the block is a transparent disc, the conductor plate is a copper disc embedded concentrically in the transparent disc, and the passages extend radially inwardly from the edge of the transparent disc into and across the edge of the copper disc.

5. A connector according to claim 1, characterized in that the block is rectangular, the conductor plate is a rectangular copper plate embedded concentrically in the block, and the passages extending from the ends and edges of the block inwardly at right angles to the edges of the conductor plate and have inclined portions crossing the edge on one face of the plate.

6. A connector element adapted to be placed in an electric junction box having openings through which electric wires are adapted to be inserted for electrically joining the wires within the junction box, said connector element comprising a rigid non-conductive block dimensioned to fit into the junction box, a conductor plate embedded in the block, said conductor element having a beveled edge which provides an inclined face and passages corresponding in number to the openings in the junction box in the block, said passages extending from the edge of the block inwardly to the conductor plate, said passages having portions of two diameters, an inclined inner portion substantially parallel to said inclined face of the conductor plate which corresponds to the diameter of the bare wire through which the bare wire is thrust into engagement with the copper plate, and an outer portion corresponding to the diameter of the covered wire into which a portion of the covered wire is adapted to be inserted and cemented.

7. A connector element adapted to be placed in an electric junction box having openings through which electric wires are adapted to be inserted for electrically joining the wires within the junction box, said connector element comprising a rigid non-conductive block dimensioned to fit into the junction box, a conductor plate embedded in the block and passages corresponding in number to the openings in the junction box in the block, each passage comprising an entering portion corresponding in diameter to the diameter of the covered wire for receiving a portion of the covered wire, a portion corresponding in diameter to the diameter of the bare wire extending therefrom inwardly to the edge of the conductor plate, and an inclined portion of corresponding diameter extending therefrom across the edge of the conductor plate onto one face thereof.

8. A connection between electric conductors of the kind comprising a wire covered with an insulation, comprising a block of non-conductive material, a conductor plate embedded in the block, passages in the block extending from the edges to the conductor plate, said passages having inner portions which correspond in diameter to the bared wires with bent ends at one face of the conductor plate and outer portions corresponding in diameter to the cover, and conductor wires in said passages with the bared portions extending through the inner portions into frictional engagement with the conductor plate and with the insulation cemented in the outer portions.

9. A connector for connecting two electric conductors comprising a non-conductive block containing therein one of the conductors, a passage in the block in communication with said one conductor, said passage extending from an edge of the block across said one conductor and the portion of the passage crossing said one conductor being bent relative to the portion outwardly thereof, said other conductor being a wire having a bared portion, and said relatively bent portions of the passage bending the bared portion of the wire so that the portion of the wire has frictional contact with said one conductor and resists withdrawal of the wire from the connector.

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