May 10, 1949. E. S. CHILD 2,469,495

CONNECTOR

Filed March 20, 1946

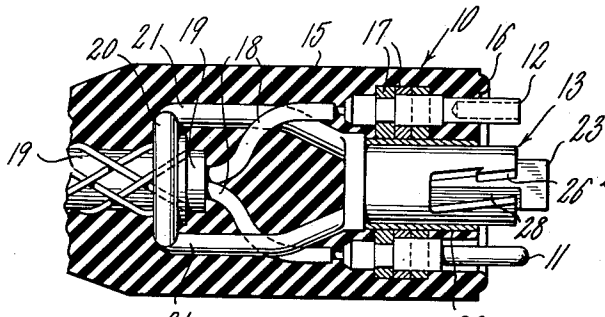

Fig. 1

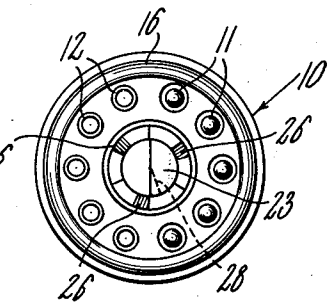

Fig. 2

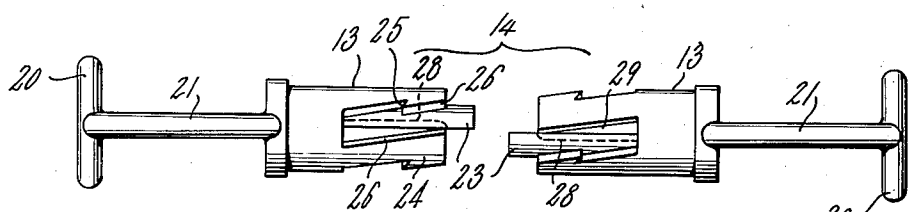

Fig. 3

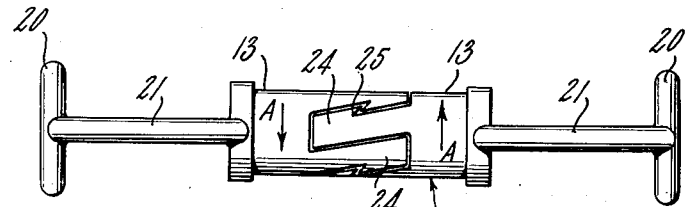

Fig. 4

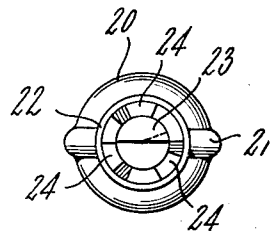

Fig. 5

Fig. 6

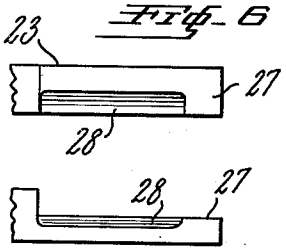

Fig. 7

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2,469,495

CONNECTOR

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2 Claims. (Cl. 287—76)

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This invention relates to an improved locking connection comprising like parts, and it relates particularly to an electrical terminal of a cable having one part of the locking connection embodied therein and adapted to be enclosed by two of the connected terminals.

The locking connection is useful for preventing electrical cable terminals from becoming separated and also for retaining them in tight engagement to form a fluid tight seal for the completely enclosed electrical contacts and locking member. Electrical terminals having the above characteristics are particularly useful for connecting power lines and communication cables which are subjected to outdoor weather conditions, and to being pulled over the ground or other rough handling. Such conditions require the electrical contacts to be sealed against water and dirt, and that all external projections be eliminated to prevent the connection from catching fixed objects.

Among the objects of this invention is to provide a locking connection between separable lengths of an electrical cable which has a smooth outline, and a waterproof enclosure for the locking mechanism and electrical contacts.

A further object is to make the connected parts alike so that each interlocks with the other.

A still further object is to provide a construction that can be readily coupled and uncoupled without the use of tools.

The foregoing and other objects of this invention will be more clearly understood by referring to the following description, and the accompanying drawings, in which:

Fig. 1 is a cross sectional view of an electrical terminal comprising one part of the connection embodying this invention;

Fig. 2 is an end view of the terminal shown in Fig. 1;

Fig. 3 is a view of the disconnected locking connection, showing the two like parts, one of which is incorporated in each of the terminals;

Fig. 4 is a view of the parts shown in Fig. 3 after being connected;

Fig. 5 is an end view of one part of the locking connection shown in Fig. 3;

Fig. 6 is an elevational view of the guiding and aligning member of the locking connection; and

Fig. 7 is a view of the member shown in Fig. 6, but turned through an angle of 90°.

A specific embodiment of the invention is shown in the drawings as a connection between two like electrical cable terminals. As both of the terminals are alike only one complete terminal is illustrated and described. Referring particularly to Figs. 1 and 2, the terminal 10 is provided with male and female contact members 11 and 12, respectively, which are arranged in a circle around one part 13 of a locking connection 14. When two of the terminals 10 are connected together, the male contact members 11 of one terminal telescope within the female contact members 12 of the other terminal, while the like parts 13 of the locking connection engage one another, as shown in Fig. 4, and thereby secure the terminals 10 together. The contact terminals 11 and 12 and the parts 13 of the locking connection are enclosed in a resilient water-proof casing 15, which may be made of a rubber composition. An annular ridge 16 is formed on the end face of each of the terminals. The resilient ridge 16 on one terminal abuts against the ridge on the other terminal 10 when they are connected, and form a water-proof seal around the contact members and the locking connection 14.

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The contact members 11 and 12 are supported in hard pressed fiber discs 17, and a conductor 18 extending from a cable 19 is connected to each contact member. The cable 19 containing a plurality of the conductors 18 passes through and is anchored to a base ring 20, which supports the locking connection parts 13 by means of a yoke 21 extending upwardly from the ring 20. A brass sleeve 22 extends around the outer end of part 13 from the end of the yoke 21 to the end of the rubber casing 15. The water-proof rubber casing 15 is molded around and encloses the bases of the contact members 11 and 12, the sleeve 22, the end of the cable 19, and the rigid supports therefor.

The separated parts 13 of the locking connection 14 are shown in Fig. 3 in their relative positions prior to their engagement with one another. Each of the parts 13 is provided with an aligning and guiding member 23 around which is located three projections 24 provided with locking hooks 25. The radial faces 26 of the projections 24 are inclined to the axis of the circle about which they are arranged. The inclination is in the nature of a spiral and as shown herein it has a left hand twist. The outer end of the aligning and guiding member 23 has a semi-cylindrical shape. The flat end surface 27 on the diametrical side of the member 23 of one terminal, or connector part, is adapted to be placed on the corresponding end surface of the other connector part to align the locking projections on one connector part with the spaces between the locking projec-

tions on the other part when it is desired to connect the parts. The diametrical side of the aligning and guiding member 23 is provided with a recess 28 which extends inwardly from the flat end 27, and has the transverse cross sectional shape of a sector. Since the connector parts are moved axially and rotatively in respect to each other while they are being connected and disconnected, the sector shaped recesses 28 are provided to form clearance spaces for the overlapping flat surfaces 27 to rotate into during the connecting and disconnecting operations. The arc of the sector of the recesses 28 should be as large as the arc of rotation of one connector part in respect to the other in order to provide the necessary clearance space.

In order to connect two of the terminals 10 together, the faces of the terminals are brought towards each other with the flat ends 27 of the guiding and aligning members 23 in sliding contact. When the terminals are so oriented by the flat ends 27, the male contact members 11 are axially aligned with and arranged in position to extend into the female members 12. It will be noted that since the ends of the male members 11 extend outwardly beyond the ends of the locking projections 13 and female members 12 (which latter ends are at the same level), the telescoping action of the male and female contact members will begin before the ends of the locking projections 24 on the respective terminals begin to mesh with one another. Upon pushing the faces of the terminals closer together, the locking projections 24 on one terminal extend between and mesh with those of the other.

The longitudinal axes of the male and female contact members are parallel to the axis of the terminal, whereas the radial faces 26 of the locking projections 24 are arranged at an angle to the axis of the terminal. Due to the angular arrangement of the faces 26 in respect to the axes of the contact members 11 and 12, and the sliding movement of the opposing faces 26 of the projections 24 on one another, as the terminals 10 are pushed together, torsional strains are set up between the locking members 23 and the contact members in the terminals. The contact members 11 and 12 being embedded in resilient rubber, they are permitted to move through the radial angle required for the hooks 25 on the projections 24 of each terminal to extend axially inwardly beyond one another. When the hooks 25 are opposite each other the resilient action of the rubber casing 15 forces the overhanging faces of the hooks into locking engagement as shown in Fig. 4 by rotating the parts relatively to each other as indicated by the arrows A. The sealing ridges 16 are then pressed into tight engagement with each other and they form a fluid proof seal between the faces of the terminals. The seal extends completely around their outer margin.

The torsional strains in the rubber casing 15 maintain the locked connection, until some outside force or forces turn one terminal in respect to the other in the direction opposite to the arrows A, in Fig. 4, so as to overcome the resilient action of the rubber body 15, and at the same time pull the terminals away from one another. This may be done by grasping the terminals, one with each hand, and rotating and pulling the terminals apart as indicated.

When the locking connections 14 are being pushed together, the rotation of one with respect

to the other takes place in the opposite direction of the arrows A after the flat ends 27 pass over one another, and then one half of each end 27 rotates into the angular recess 28, on the guiding and aligning members 23. When the terminals 10 are being pulled apart after the hooks 25 have been disengaged, the rotation of the aligning and guiding members 23 in the direction of the arrows A ceases when the flat ends 27 of the respective terminals 10 begin to engage one another, and in that position the ends 27 are again parallel.

While the preferred embodiment of this invention has been disclosed herein, it will be understood that the details of its construction may be changed without departing from the spirit of the invention and the scope of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A locking connection comprising two like parts, each of said parts having a plurality of locking projections spaced from each other on a circle at intervals sufficient to permit alternate projections on one part to slide axially between the corresponding projections on the other part, said projections on one part having hooks adapted to engage the corresponding hooks on the projections on the other part, an aligning and guiding member on each part adapted to align and guide the locking projections on one part with and into the spaces between the locking projections on the other part, and said aligning and guiding member extending beyond the ends of said locking projections and positioned within the circle of said locking projections.

2. A locking connection comprising two like parts, each of said parts having a plurality of locking projections spaced from each other on a circle at intervals sufficient to permit alternate projections on one part to slide axially between the corresponding projections on the other part, said projections on one part having hooks adapted to engage the corresponding hooks on the projections of the other part, an aligning and guiding member on each part having a generally flat end face located on the diameter of said circle and adapted to align and guide the locking projections on one part with and into the spaces between the locking projections on the other part, said aligning and guiding member on each part having a recess in an inward extension of its end face adapted to receive a portion of the flat end face on the other part and said flat end face of said aligning and guiding members extending beyond the ends of said locking projections and positioned within the circle of said locking projections.

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