July 17, 1934. J. L. GARY 1,967,021

SAFETY ELECTRICAL CONNECTER

Filed July 7, 1931

Fig. 1,

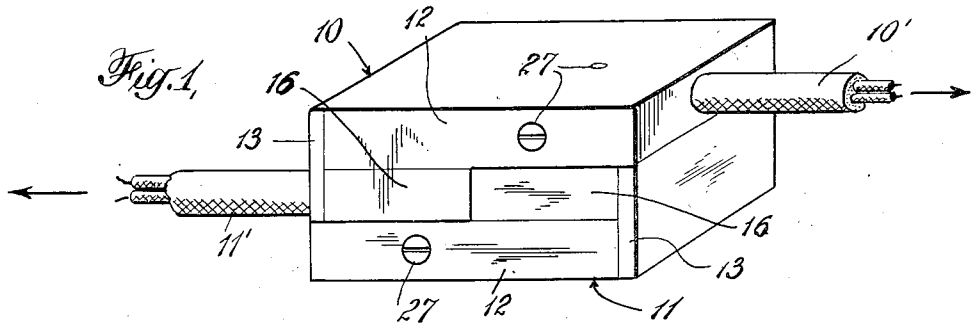


Fig. 2,

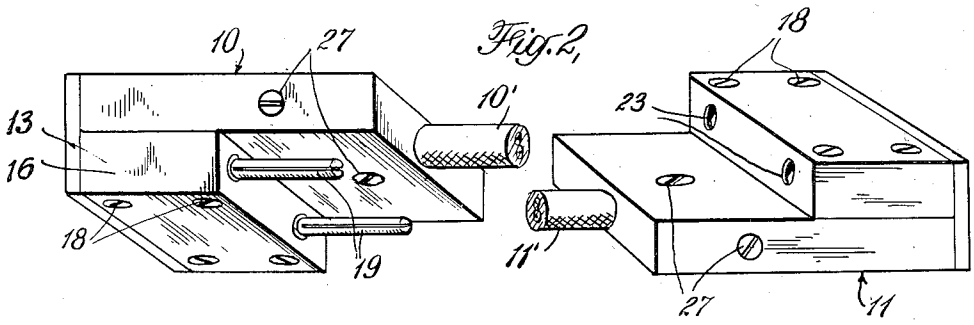


Fig. 3,

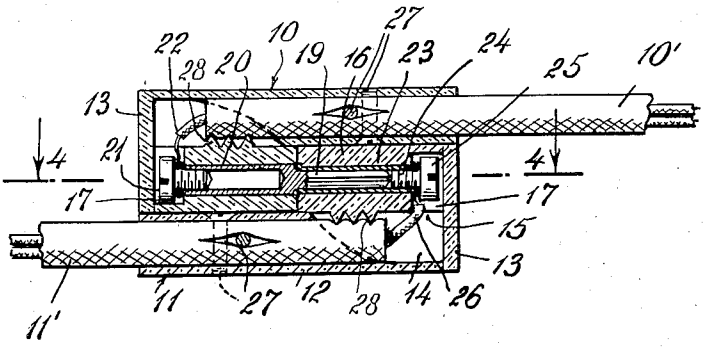
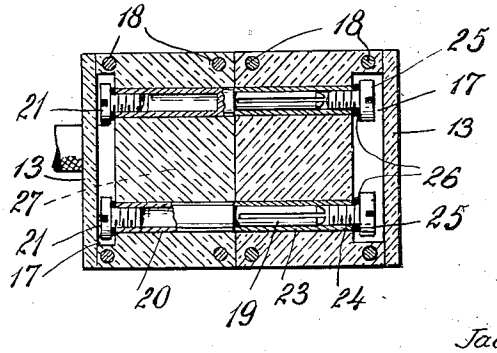


Fig. 4,



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SAFETY ELECTRICAL CONNECTER

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8 Claims. (Cl. 173—328)

This invention relates to electrical connecters and has particular reference to separable connecters which may be locked together against accidental disconnection and can only be disconnected intentionally.

In operating lights in theatres or for advertising purposes, in operating electric tools and the like, the wire or cable leading to the electrical equipment is frequently laid along the floor and the equipment or its cable or wire is usually provided with a separable connecter whereby it may be attached to and detached from a source of electric power at will. The wire or cable lying on the floor is subject to displacement by persons walking over it or objects dragged along the floor and frequently the cable is pulled with sufficient tension to disconnect the electrical connecter, with the result that the operation of the electrical equipment immediately stops. Frequently, in machine tools, their sudden cessation of operation because of such accidental disconnection of the electric power cable causes breakage of certain parts of the equipment, such as drills, saws and the like and is liable to cause injury to the operator. It is for this reason that legislation has been passed which prohibits the use of all electric equipment unless it is safeguarded against accidental disconnection due to ordinary causes.

Many attempts have been made to solve this problem and various kinds of safety electrical connecters have appeared on the market, but so far as I am aware each of these is more or less complicated, expensive and not altogether satisfactory in operation. For example, there are certain kinds of safety electric connecters which require a special operation in addition to the act of making the electrical connection, in order to lock together mechanically the two elements of the connecter against accidental displacement. Frequently, this special operation is not attended to and the electrical connecter accordingly is no more effective than the old separable connecter, which may be disconnected simply by pulling apart the two elements thereof or when tension is exerted on the wire or cable.

In the present invention the two parts of the electrical connecter are so constructed and arranged that no special act or operation other than the mere act of making the electrical connection is necessary in order to secure the completely locked mechanical and electrical connection of the two elements of the new connecter. This single-action mechanical and electrical connection is made by manipulating the two elements of the connecter in a manner opposite to the usual manipulation of the old type of separable connection, i. e., the two elements are simply drawn together by a tensional movement instead of being pushed together by a compressional movement in the usual way. No movements or twists of the wrist other than this simple drawing together of the two elements is necessary in order to mechanically and electrically connect together the two elements of the new connecter, whereby they are locked securely together against any accidental displacement by the usual causes such as exerting tension on the wire or cable for any reason. The connecter may be as readily separated simply by reversing the connecting process.

More particularly, the safety electrical connecter of this invention consists of two elements which are generally L- or hook-shaped in configuration and are arranged to automatically lock together mechanically when their electrical connection is made. This L- or hook-shape is procured by forming an abutment on opposite ends of the two elements, these abutments being adapted to interlock each other against tension exerted in opposite directions on either or both of the elements or the wires or cables connected thereto. The contacts of the connecter are reversely turned, i. e., they are turned backwardly alongside of the wire or cable and are preferably seated in the corresponding abutments. Accordingly, on one of the elements of the new connecter one or more prong contacts extend parallel to the base of the element and are directed in the direction of the corresponding cable, while on the other element the socket contacts adapted to receive the prong contacts of the other element are similarly seated in the corresponding abutment. It will be seen, therefore, that when the prong contacts of the one element are inserted into the socket contacts of the other element and the two elements are drawn together, the contacts not only interlock but the abutments engage each other and prevent their disconnection for any reason except intended disconnection of the separable element.

For a better understanding of the invention reference is made to the accompanying drawing in which

Figure 1 is a perspective view of the electrical connecter of this invention showing the device in closed or engaged position;

Fig. 2 illustrates the manner of joining the two elements of the connecter and illustrates each element in perspective;

Fig. 3 is a vertical longitudinal section through the new connecter, showing the relation of the wire or cable and the contacts to which it is connected, and

Fig. 4 is a transverse section of the connecter as seen along the line 4—4 of Fig. 3, and illustrates the arrangement of the contacts.

In the drawing numerals 10 and 11 designate generally the two elements of the separable connecter, these two elements being shown separately in Fig. 2.

Each of these elements 10 and 11 is made of suitable insulating material and comprises a base plate 12 having the end plate 13 secured to one end and projecting upwardly therefrom. A passage 14, having an opening in that end of the base plate 12 which is opposite to the end plate 13, is turned upwardly at its inner end to form an opening 15 in the top surface of base plate 12 adjacent the end plate 13, as illustrated especially in Fig. 3. The wires or cables 10' and 11' are adapted to be inserted in the passages 14 of the base plates 12 of the respective connecter elements 10 and 11.

Removably secured to the top surface of base plate 12 by means of screws 18 over the inner opening 15 of passage 14 and in abutment with end plate 13 is a block 16, also made of insulating material. That end of block 16 which abuts end plate 13 is provided with a recess 17, which forms with end plate 13 a connection chamber 17, the purpose of which will be described later.

Molded or otherwise secured in the block 16 of electrical connecter element 10 are two parallel prong contacts 19, the projecting outer ends of these contacts being sawn or split lengthwise to render them resilient so as to provide greater frictional engagement with the corresponding contact. The hollow inner ends 20 of prong contacts 19 extend into the corresponding connection chamber 17 of block 16 and a screw 21 is threaded into the open end thereof, so that end 20 and screw 21 constitute a binding post. The stripped ends of each of the two wires 22 of cable 10' may be electrically connected to the corresponding prong contacts 19 simply by removing the corresponding block 16 after loosening screws 18, passing the cable 10' through the passage 14 in base plate 12, and securing the corresponding wires 22 to the contact prongs 19 by means of binding screws 21, as shown especially in Figs. 3 and 4. Then, by replacing the corresponding block 16 and tightening screws 18, the electrical connection and all bare wires and contacts except the contact prongs 19 are sealed in connection chamber 17 and passage 14 and so are protected against short-circuiting, dirt and other sources of damage.

The other conecter element 11 is similarly arranged except that the contacts 23 embedded in coresponding block 16 are socket contacts consisting of tubes whose inner diameters are substantially the same as the diameters of corresponding contact prongs 19, so that the latter may be received with a push fit in the interior of the former. The inner end 24 of each of these socket contacts 23 extends into the corresponding connection chamber 17 and is threaded for the reception of binding screw 25. In order to make the electrical connection with these socket contacts 23 it is only necessary to remove the corresponding block 16 from base plate 12, insert cable 11' into passage 14 and secure the stripped ends of the wires 26 to the corresponding binding posts 25. Then, upon replacing the block 16, the electrical connections and contacts are all sealed except that the socket contacts 19 open outwardly in the wall of the block 16 for the reception of the contact prongs 19.

In cases where the tension or strain on the cable is likely to be unusually severe so that the connections of the wires 22 or 26 with their respective binding posts are subject to injury because of the strain, it is desirable to provide an additional anchorage for the cables 10' and 11' on the respective elements 10 and 11 of the connecter. For this purpose either a vertical or a horizontal opening in each base plate 12 traversing the cable passage 14 is provided for the reception of a locking pin, which preferably consists of a fibre screw 27. In inserting this locking pin, the cable covering is slit before the cable is inserted into the passage 14, so that the screw 27 may be passed through the cable between the strands thereof after the electrical connection has been made and so anchor it in the connecter element, whereby the screw 27 takes all pulls on the cable and the electrical connections are protected against breakage or pulling apart. As a further precaution against injury to the electrical connections, teeth 28 are provided in the under surface of block 16 so as to project into cable or wire opening 15 in the top of base plate 12, whereby they catch and frictionally hold the cable or wire against withdrawal and protect the electrical connections against undue tension. Either the teeth 28 or a pin 27 or both may be employed as desired.

In employing the electrical connecter of this invention the wires or cables 10' and 11' may be connected to the respective prong contacts 19 and socket contacts 23 in the manner described. It will be observed in Figs. 2, 3 and 4 that the length of prong contacts 19 is less than the extension of the base plate 12 beyond the block 16, so that when the two elements 10 and 11 are placed together the upper surface of the base plate 12 of connecter element 10 serves as a guide upon which the inverted connecter 11 may be placed before the connecters are joined by pushing them together to insert prong contacts 19 into the socket contacts 23. Accordingly no especial care need be observed in joining the two elements of the connecter. The two elements 10 and 11 are then pushed toward each other until the abutments formed by the blocks 16 engage each other.

It will be seen that the prong contacts 19 and the socket contacts 23 are directed along their respective cables, i.e., they are reversely turned with respect to their cables, and wires 10' and 11' lie substantially parallel thereto. Accordingly, any pull on either of the cables 10' or 11', or both of them, only serves to more securely interlock the connecter elements 10 and 11 and force the contacts 19 and 23 and their abutments into more secure engagement. Inasmuch as virtually all accidental disconnections of current types of separable electrical connecters, which are separated by pulling them apart, are due to sudden jerks or pulls on the cable or wire in which the connecter is situated, it will be seen that the connecter of this invention cannot be disconnected for these reasons but, on the contrary, such jerks or pulls on the cable or wire are advantageous for the reasons mentioned. Accordingly the elements of the new connecter can only be separated intentionally by manual manipulation, simply by pulling them apart with a movement opposite to the pushing together movement of making the original connection between the two elements. No other special act, operation or twist of the wrist

is necessary to connect or disconnect the elements other than the simple act of pushing them together or pulling them apart to make or break the electrical connection, whereby both electrical and mechanical interlocking connections are made simultaneously with one simple movement.

Furthermore the device is extremely simple, inexpensive to manufacture and can be installed very quickly and readily without requiring especial skill, merely by removing the blocks 16, making the electrical connections between the wires or cables, and the contacts in the manner described, and replacing the blocks 16. All electrical parts except the contacts 19 and 23 are sealed and a smooth insulating surface is presented.

Although a two-pole connecter is illustrated and described herein, a connecter having one or three or more sets of contacts or poles may be employed with the same facility, for connecting single wires or multiple strand cables together by means of the safety separable connecter of this invention, which also may have any desirable form or shape and consist of any desirable material.

I claim:

1. In an electrical connecter, the combination of a member having a transverse abutment, an electrical prong contact on said abutment, a second complementary member having a transverse abutment, an electrical socket contact in said second abutment, said second abutment and contact engaging respectively the first-named abutment and contact, and terminal means on each of said members and spaced from the corresponding abutment for receiving a conductor, the said conductors extending from the corresponding members in a direction substantially parallel to the contacts and in the direction of movement necessary to couple the members whereby tension on the conductors draws the abutments and contacts into secure mechanical abutment.

2. In an electrical connecter, the combination of a member having a reversely turned contact and a transverse abutment and a second complementary member having a reversely turned contact and a transverse abutment, and conductors connected to the contacts and extending parallel thereto from the members at points opposite the corresponding abutments, said members being adapted to be drawn together in the direction of extension of their conductors to engage their contacts and abutments.

3. In an electrical connecter, the combination of two members each having a transverse abutment and a wire anchor spaced therefrom, an electrical contact extending in the direction of the corresponding wire on one member and substantially parallel thereto and a socket contact for receiving said prong contact in the other member, and means for connecting the wire to the corresponding contact of each member, said members being adapted to be drawn together in the direction of extension of the corresponding wires to respectively engage said contacts and abutments.

4. In an electrical connecter, the combination of two members, each having an abutment and an opening for a wire spaced therefrom, a prong contact extending in the direction of the wire and substantially parallel thereto on one of said members, and a socket contact on the other member extending in the direction of the corresponding wires and substantially parallel thereto for receiving the prong contact, and means communicating with the wire opening in each member for connecting the wire to the corresponding contact, said members being adapted to be drawn together in the direction of extension of the corresponding wires to respectively interengage said contact and abutments.

5. In an electrical connecter, the combination of two members, each having a guide for a connecting wire, a prong contact on one of said members extending in the direction of the corresponding wire and substantially parallel thereto and adapted to be connected thereto, and a socket contact in the other member extending in the direction of the corresponding wire and substantially parallel thereto and adapted to be connected thereto, said prong contact being adapted to be inserted in the socket contact and the members drawn together in the direction of extension of their corresponding wires.

6. In an electrical connecter, the combination of two blocks, each having an abutment and a wire passage spaced therefrom, a prong contact extending from the abutment of one of said blocks in the direction of and substantially parallel to the corresponding wire, and a socket contact in the abutment of the other block opening in the direction of the corresponding wire and lying substantially parallel thereto, and terminals on said contacts for making connections between them and the corresponding wires, said prong contacts being adapted to be pushed into said socket contact in the direction of extension of the corresponding wires until said abutments mutually engage.

7. In an electrical connecter, the combination of two member each having a wire passage and an abutment spaced therefrom, a contact in each abutment lying substantially parallel to the wire passage directed in the direction of the wire and substantially parallel thereto, and a binding post on each contact lying on a chamber communicating with the wire passage for connecting a wire to the corresponding contact, said members being adapted to be drawn together in the direction of extension of their corresponding wires to cooperate with their abutments and contacts respectively interengaging.

8. In an electrical connecter, the combination of a pair of members each having a wire passage longitudinally therethrough, a block removably secured to each member and having a recess communicating with the corresponding passage in the member, a contact prong contact extending from one of said blocks substantially parallel to the corresponding member, a socket contact in the other block lying substantially parallel to the corresponding member, and binding posts on the inner end of said contacts and lying in the recesses of the blocks for connection with the corresponding wire lying in the passages of the corresponding members, said contact prong and said socket contact extending in the direction of the corresponding wire, said prong contact being adapted to be pushed into said socket contact in the direction of extension of the corresponding wire until the blocks on the members lie in abutting relation.

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