

Jan. 10, 1961

J. F. HEALY

2,968,017

LOCKING CONNECTOR

Original Filed March 7, 1952

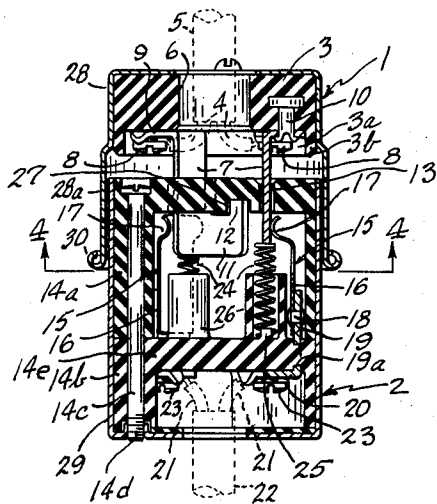


Fig. 1.

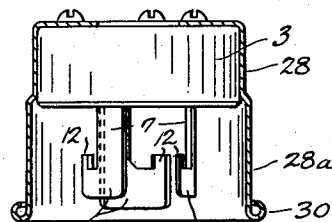


Fig. 2.

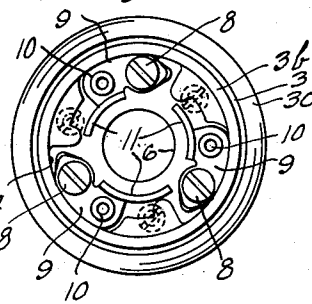


Fig. 3.

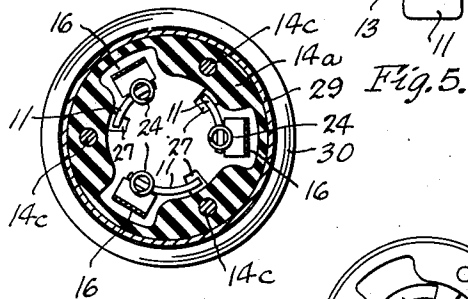


Fig. 4.

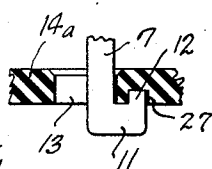


Fig. 5.

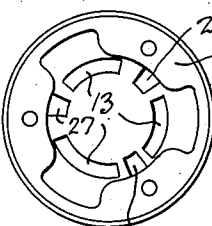


Fig. 6.

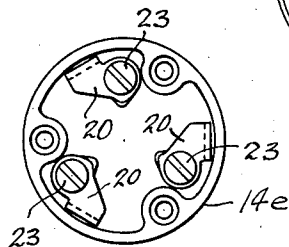


Fig. 7.

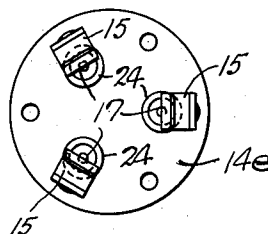


Fig. 8.

Fig. 9.

INVENTOR
Joseph F. Healy
BY
Wooten & Davis
ATTORNEYS

1

2,968,017

LOCKING CONNECTOR

Joseph F. Healy, Westport, Conn., assignor to Harvey Hubbell, Incorporated, Bridgeport, Conn., a corporation of Connecticut

Original application Mar. 7, 1952, Ser. No. 275,400, now Patent No. 2,871,456, dated Jan. 27, 1959. Divided and this application Apr. 29, 1958, Ser. No. 733,778

3 Claims. (Cl. 339—88)

This invention relates to an electrical connector comprising a plug member and a receptacle member which when joined may be locked together.

It has for an object to provide a cord connector which may be locked together in such a manner as to prevent inadvertent separation, which would thereby cause a break in the circuit.

It has for a further object to provide a means for making contact between the electrical contacts of the plug and receptacle when the plug is inserted into the receptacle without the plug and receptacle being necessarily locked together, and will maintain this contact when the plug and receptacle are locked. Thus the making and breaking of the circuit occurs when the plug is inserted into the receptacle and removed therefrom, and prevents objectionable arcing between the contacts, which would be damaging to the contacts.

With the foregoing and other objects in view, I have devised the construction illustrated in the accompanying drawing forming a part of this specification. It is, however, to be understood the invention is not limited to the specific details of construction and arrangement shown, but may embody various changes and modifications within the scope of the invention.

This application is a division of my prior application Serial No. 275,400, filed March 7, 1952, for Locking Connector, now Patent No. 2,871,456.

In the drawing:

Fig. 1 is a longitudinal section of the device showing the attachment plug or cap inserted in the receptacle;

Fig. 2 is a side view of the plug or cap portion with the cover in section to show detail;

Fig. 3 is a view looking toward the bottom of Fig. 2;

Fig. 4 is a cross section taken substantially on line 4—4 of Fig. 1;

Fig. 5 is a sectional view showing a plug contact in elevation as it is engaged by the body portion of the receptacle;

Fig. 6 is an end view of the receptacle showing the entrance slots for the contact blades of the plug;

Fig. 7 is a lower or inner end view of the upper member of the insulating body of the receptacle;

Fig. 8 is a view looking from the bottom of Fig. 1 with the metal shell or casing removed; and

Fig. 9 is a top plan view of the lower insulating body member of the receptacle portion, showing the receptacle contacts.

Referring to Figs. 1 to 9, the device shown therein comprises a plug or cap member 1 and a receptacle member 2. The plug or cap 1 comprises a substantially cylindrical body 3 composed of a molded plastic or other suitable insulating material. Lead wires 4 from the cable 5, which enters the body 3 through a hole 6 at substantially its center, are connected to contacts 7 by a suitable means, such, for example, as being clamped by the heads of the binding screw 8 to one leg or the base plate 9 of the contacts 7. The contacts 7 are held in an upright position to the body 3 by means of inserts such

2

as rivets 10 molded into the body 3 and the ends inserted into holes in the leg 9 of the contacts and turned over. The inner or lower end of the body is recessed, as shown at 3a in which bases 9 of the contacts are mounted, thus providing an insulating flange or rim 3b at the outer edges of these plates. The contacts 7 have widened free end portions 11 with an overhanging hook element 12, the portions 11 being curved, as shown in Fig. 3, with the axis of the plug as a center to enter the corresponding curved slots 13 in the face of the receptacle body 14. The receptacle body is made of two members of molded insulating material, the upper member 14a and the lower member 14b connected and held together by the screws 14c extending through longitudinal passages or openings in the body members and threaded into the end wall of shell 29, as shown at 14d. These screws therefore also retain the shell or casing on the body members. As the plug contacts 7 are inserted into the curved slots 13, they engage spring contacts 15 in the receptacle body which are in a position immediately below or inwardly of the slots 13. Contacts 15 comprise an upright leg 16 curved at the top, as at 17, to form spring contacts to engage the cap contacts 7 as they enter the receptacle body. They are connected by suitable means, such as rivets 18, to legs 19 which project from the binding plate 20. These members 19 extend through and are molded in the transverse wall 14e of the lower member 14b of the body 14, and are anchored therein by the material of the body entering transverse openings 19a in these members. Lead wires 21 from the connecting cable 22 are secured one to each of the binding plates 20 by means of being secured and clamped beneath the head of a binding screw 23 which is screwed into a tapped hole in the binding plate 20. Springs 24 which are placed over and grip nibs 25 in the connector body 14 and which are partially encased by a well portion 26, are in a position immediately below the curved openings 13 in the body 14. Thus, as the contacts 7 are inserted into the openings 13 they engage the contacts 15 and also engage and compress the springs 24. Then, as the cap or plug and the receptacle portions are relatively turned, the contacts 7, still maintaining contact with the contacts 15, are turned so that the hook elements 12 will come into alignment with recesses 27, and as the plug is released will enter and seat under action of springs 24 into recesses 27 in the upper surface of the body 14 at a position just beyond and spaced a short distance from the end of the slots 13, see Fig. 7. The springs 24 thus hold the contacts 7 in the locked position until such time as the cap 1 is pressed downwardly so that the hook portions 12 are released from the pockets 27 and the cap 1 may then be rotated in the opposite direction and the contacts 7 removed from the receptacle 2.

To provide a strong protective outer casing the bodies 3 and 14 are encased in shells 28 and 29 respectively, the shells 28 and 29 being composed of metal or other suitable material. The shell 28 is provided with a flange portion 28a with the lip 30 rolled over, as shown in Figs. 1 and 2, so that when the cap 1 is inserted into the receptacle 2, the flange 28a will encase the upper portion of the receptacle 2. The overlap or telescoping of the two shells is sufficient to allow for the needed longitudinal movements between the plug and body members and still maintain this overlap and prevent entrance of foreign particles. It is clear that with this construction the cap 1 and receptacle 2 are locked securely together and cannot be separated unless purposely done so by the operator. It is also clear that the contacts 7 and 15 are in electrical contact with one another as soon as the contacts 7 are inserted into the receptacle 2, and the electrical contact is maintained while the cap is being twisted and locked, as heretofore described. Thus this

device can be used as an ordinary connector without locking the plug and receptacle if desired, or they can be locked together by turning either the plug or receptacle relative to the other.

An important feature of the device is that the contact fingers or blade contacts of the plug or cap engage the contacts in the receptacle by the relatively longitudinal movement of the cap and receptacle as these contact fingers are inserted into the receptacle to thus close the electric circuit, and this engagement and the electrical connection is maintained in all subsequent relative movements between the cap and receptacle both in turning the cap to bring the lugs on the blades into alignment with the locking recesses in the receptacle and subsequent longitudinal movement to seat these lugs in the recesses. That is, the receptacle contacts are of sufficient width at their upper or free end portions to maintain this electrical contact and engagement during the relative turning movements. The same result is secured during the reverse movements to unlock and release the cap. Thus arcing in making and breaking the electrical connection is reduced to a minimum, as the circuit is not made or broken during the relative turning movements but is always made and broken on the relative longitudinal movements between the members, which are quicker movements and thus less liable to cause arcing.

Having thus set forth the nature of my invention, I claim:

1. An electrical connector comprising: an insulating receptacle body; a plurality of stationary contacts carried within said body; said receptacle body being provided with an end wall having a plurality of curved slots leading to said stationary contacts; a plurality of inwardly facing recesses formed in said wall and opening on the inner side thereof; each of said recesses being spaced laterally respectively from one end of one of said slots; a detachable cap body having a plurality of elongated contact fingers for selective insertion into and through said slots to engage said stationary contacts by relative longitudinal movement of said cap and receptacle bodies; said slots being of a length to permit movement of said contact fingers in said slots by relative turning movement of said cap and receptacle bodies; said contact fingers having their free end portions widened and being provided with laterally spaced projecting lugs which are arranged to extend outwardly relative to said receptacle body and seat in said recesses to lock said cap and receptacle bodies against relative turning movement and separation when said bodies are connected; and spring means disposed within said receptacle body comprising a plurality of individual springs that are disposed in said receptacle body to individually engage the free ends of said contact fingers and bias them and said cap body outwardly to seat said lugs in said recesses and retain them therein to lock said cap body against turning relative to said receptacle body; said lugs being movable to and from said recesses to lock and release said cap and receptacle bodies by relative longitudinal and turning movements; said stationary contacts and said contact fingers being of a width such that they are in engagement to maintain electrical connection between them throughout such movements.

2. An electrical receptacle comprising: an insulating body carrying a plurality of stationary contacts within it; said receptacle body including an end wall provided with a plurality of curved slots arranged to allow the entrance of a plurality of contact fingers of a detachable cap as a result of relative longitudinal movement between the cap and said receptacle body to permit the contact fingers to engage said stationary contacts; said end wall provided with a plurality of recesses opening on its inner side, each of which is spaced laterally respectively from one end of one of said slots; said recesses arranged to receive locking lugs on the contact fingers to lock the cap and said receptacle body against relative turning movement; spring means comprising a plurality of individual springs disposed in said receptacle body in alignment with said slots and arranged to individually engage the free ends of the contact fingers when the latter are inserted through said slots and to thereby bias them and the cap outwardly relative to said receptacle body to seat and retain the locking lugs in said recesses to thereby lock the cap and said receptacle body against relative turning movement.

3. An electrical connector comprising: an insulating receptacle body; a plurality of stationary contacts carried within said receptacle body; said receptacle body being provided with an end wall having a plurality of curved slots leading to said stationary contacts; at least one recess formed in said end wall opening on the inner side thereof and spaced laterally from one end of one of said slots; a detachable cap body having a plurality of elongated transversely curved contact fingers adapted to be inserted into and through said slots to engage said stationary contacts by longitudinal movement of said cap body relative to said receptacle body; said slots being of a length to permit movement of said contact fingers therein by relative turning movement of said cap and receptacle bodies; said contact fingers provided with widened free end portions; at least one of said contact fingers having a laterally spaced projecting lug which extends outwardly relative to said receptacle body and seats in said recess to lock said cap and receptacle bodies against relative turning movement and separation when they are connected; and spring means comprising a plurality of individual springs disposed in said receptacle body in alignment with said slots and arranged to individually engage the free ends of said contact fingers when the latter are inserted through said slots to thereby bias them and said cap body outwardly relative to said receptacle body to seat and retain said locking lug in said recess to thereby lock said cap and receptacle bodies against relative turning movement.

References Cited in the file of this patent

UNITED STATES PATENTS

1,669,549	Benjamin	May 15, 1928
2,027,730	Hirrmann	Jan. 14, 1936
2,069,238	Fraser	Feb. 2, 1937
2,102,625	Hubbell	Dec. 21, 1937
2,451,982	Scot	Oct. 19, 1948
2,871,456	Healy	Jan. 27, 1959