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H. HUBBELL, JR

1,965,594

RUBBER CORD CONNECTER

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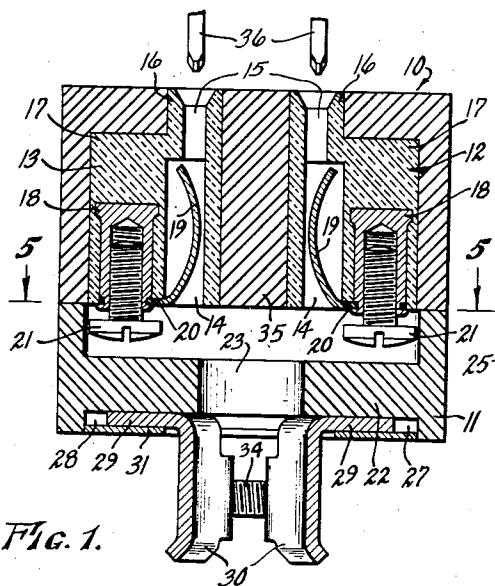


FIG. 1.

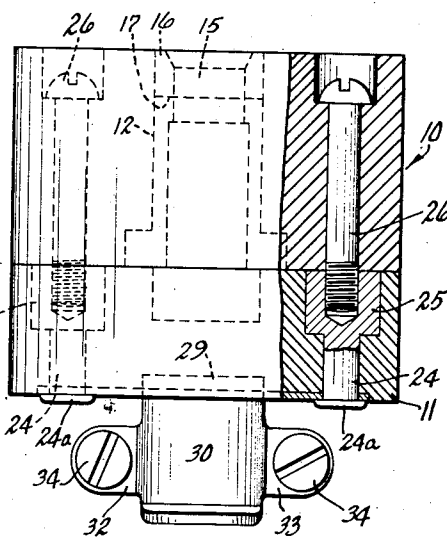


FIG. 2.

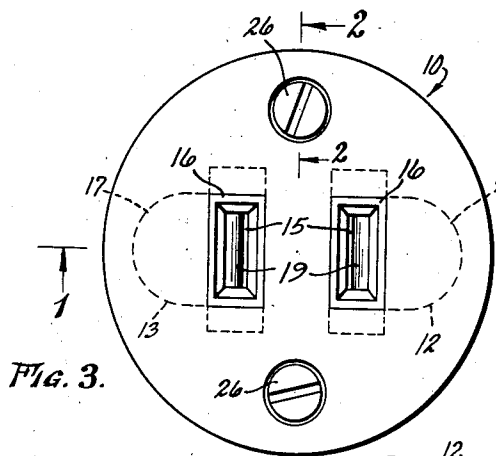


FIG. 3.

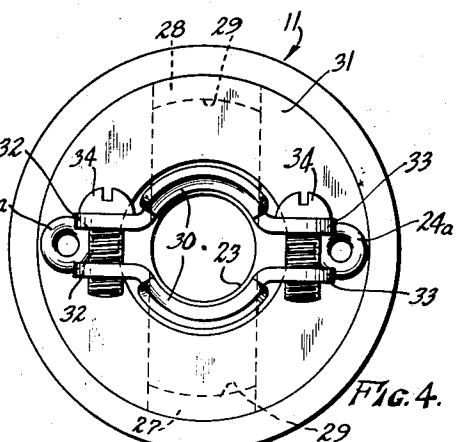


FIG. 4.

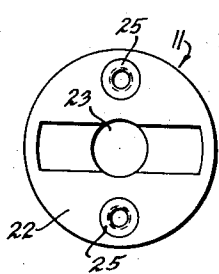


FIG. 5.

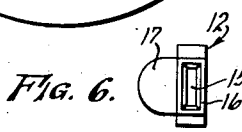


FIG. 6.

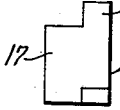


FIG. 7.

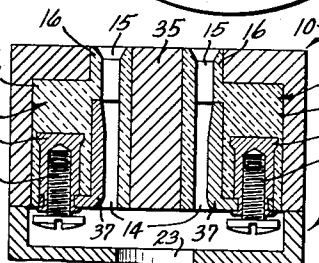


FIG. 8.

By

Harvey Hubbell Jr.  
Wooster & Davis  
Attorneys

## UNITED STATES PATENT OFFICE

1,965,594

## RUBBER CORD CONNECTER

Harvey Hubbell, Jr., Bridgeport, Conn.

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9 Claims. (Cl. 173—332)

This invention relates to new and useful improvements in electrical connectors.

An object of the invention is to provide a connector comprising a body of live rubber or other resilient material and including inserts of "bakelite" or other phenolic condensation product, or of other relatively hard and heat resisting electrical insulating material, and each of which inserts carries a contact and is independent of the other insert or inserts and is adapted for independent movement relative to the other insert or inserts within the limit of resiliency of the material of the body.

A further object of the invention is to provide a connector including a body of rubber or other resilient material and having inserts of relatively hard insulating material each carrying a rigid contact adapted to be engaged by a blade of a plug or cap and to be held in tight engagement with said blade due to the resiliency of the body of the connector.

Additional objects and advantages will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawing wherein satisfactory embodiments of the invention are shown. However, it will be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims to which claims reference should be had for a definition of the invention.

In the drawing:

Fig. 1 is a vertical sectional view substantially along the line 1—1 of Fig. 3;

Fig. 2 is a view partly in side elevation and partly in section, the figure being sectioned substantially as indicated by the line 2—2 of Fig. 3;

Fig. 3 is an elevational view looking at the entrance end of the connector;

Fig. 4 is a similar view looking at the opposite end of the connector;

Fig. 5 is a plan view on a reduced scale of the closure or cover member alone, the view being substantially along the line 5—5 of Fig. 1;

Fig. 6 is an end view on a reduced scale of an insert used;

Fig. 7 is a side view of the insert shown in Fig. 6; and

Fig. 8 is a vertical central sectional view showing a modified form of the invention.

Referring in detail to the drawing the connector as shown includes a body 10 of live rubber or other resilient material and secured to the body in a manner to be described is a cover or

closure member 11 also of resilient material as live rubber. Moulded or otherwise secured in the body 10 are a pair of inserts 12 and 13. These inserts are identical in construction and a detailed description of one will, it is believed, suffice for both. The inserts are formed of relatively hard or stiff insulating material whereby they will not yield independent of the body and whereby they form a substantial mounting for contacts as will later appear. Preferably these inserts are formed of "bakelite" or other mouldable phenolic condensation product.

Inserts 12 and 13 each include an open ended passage 14 restricted as at 15 where it extends through a neck-like portion 16 of the insert. To one side of the passage 14 each insert is thickened or enlarged as at 17 and a hollow metal insert or rivet 18 is moulded into one end of this thickened portion. Each insert carries a contact 19 which may or may not be a spring contact, that shown in Fig. 1 being a spring contact, disposed in the inner or enlarged portion of the passage 14, and these contacts are mounted on the inserts 18 by rolling the end portions of the hollow metal inserts or rivets 18 over onto end portions 20 of the contacts as clearly shown in Fig. 1.

The hollow metal inserts 18 are internally screw threaded to receive binding screws or posts 21 and it will be appreciated that the contacts 19 are securely mounted and are not likely to be pulled loose from the connector as might occur were the contacts mounted directly in rubber or other resilient or yielding material. The inserts are relatively large and may therefore be securely anchored in the rubber body and in turn provide a secure anchoring or mounting for the contacts. Further, it will be appreciated that within the limits of the resiliency or elasticity of the body the inserts are adapted for independent side and twisting movements.

Therefore, the connector readily compensates for bent or twisted blades of a plug or cap adapted to be plugged into the connector. In addition to providing secure anchoring for the contacts 19 the inserts 12 and 13 also serve to prevent any tendency to melt or soften the rubber of the body due to the creation of arcs between the contacts of the connector and the blade contacts of a plug or cap when the device is being used in connection with high amperages. In this connection it will be noted that the neck or throat-like portion 16 of each insert extends through the body 10 and is preferably flush with the outer surface of one end thereof.

As before suggested, the cover or closure member 11 is secured to the body. It will be noted that this cover member is at the inner or open end of the body and is hollow and closes the end of the body and also accommodates the binding screws or posts 21. Through the wall 22 of the cover there is provided an opening 23 for the passage of a heavy rubber covered cable or the like, the wires of which may be connected with the binding screws 21. Spaced metal inserts 24 may be moulded into the cover member 11 and these members 24 each have enlarged hollow internally screw threaded portions 25 adapted to have screws 26 threaded into them. Screws 26 pass through the body as clearly shown in Fig. 2 and when the screws are threaded into the portions 25 of the inserts 24 the cover and body are, of course, secured together and may be drawn into tight relationship on tightening of the screws.

If desired, the connector may be equipped with a cable clamp as shown, or the end can be left plain and the clamp omitted if preferred. To this end the wall 22 of the cover 11 is provided with grooves 27 and 28 extending radially and in opposite directions with relation to the opening 23 and adapted to receive the foot portions 29 of the cable clamps 30 whereby the clamps may be slid toward and from each other. A metal plate 31 may be secured to the cover over the portions 29 of the cable clamps whereby to anchor the clamps to the cover. For this purpose the smaller ends of the inserts 24 may be passed through openings in the plate and riveted over as shown at 24a. Each cable clamp is provided with laterally extending ears 32 and 33 through which extend screws 34 adapted to be adjusted to tighten the clamps on a cable, and securely hold it to thus remove the strain from the connection of the leads to the binding screws 21. It will of course be understood that for connectors which are not to be subjected to heavy strains or if for any other reason it is not desirable to use these clamps they may be omitted.

Owing to the employment of the body 10 and cover 11 of rubber or other resilient material it will be appreciated that the connector disclosed is adapted to withstand rough usage. It may be dropped or kicked about hard floors without damage, the shock being taken up in the rubber body. Further, owing to the fact that the inserts 12 and 13 are independent of one another and may move independently within the body and are separated by the resilient portion 35 of the body the body itself tends to maintain the contacts 19 in good electrical engagement with the contact blades, as for example the contact blades 36, of a plug or cap not shown.

The connector shown in Fig. 8 is in many respects identical with the connector shown in the other figures and just described, and where the parts of the connector of Fig. 8 are the same as the parts of the connector shown in the other figures the same letters of reference are applied. Essentially the difference between the connector of Fig. 8 and the connector of the other figures resides in the fact that in Fig. 8 the contacts are not in the form of springs, and the contacts while carried by the inserts 12 and 13 as before are rigid with said inserts and the resiliency of the material of the body is depended on to maintain a good electrical engagement between the contacts of the connector and the contacts of a plug or cap.

According to this form of the invention as disclosed in Fig. 8 contacts 37 are secured to the

metal inserts 18 as in the case of the contacts above described but the contacts 37 are also disposed against the outer walls of the passages 14 of the respective inserts. Therefore, the contacts in and of themselves do not have the quality of springs. However, in this form of the invention the inserts 12 and 13 are disposed somewhat closer together than usual whereby as the contact blades of a plug are pressed through the entrances or throats 15 they will engage the contacts 37 and tend to force such contacts apart. Any tendency to move the contacts 37 apart is of course resisted by the resilient body and owing to the resiliency of the body the contacts 37 will be maintained in firm engagement as with the contact blades 36 of a plug or cap.

If desired the contacts 37 might be disposed a bit farther apart than is usual and in such event they would be arranged at opposite sides of the portion 35 of the body whereby as the contact blades 36 are forced into the connector they will force the contacts 37 toward one another compressing portion 35 of the body. Of course, since this portion is resilient it will have a natural tendency to return to its normal condition and will maintain the contacts in engagement.

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

1. In an electrical connector, a body of resilient material, a pair of independent inserts in said body, each of said inserts having an entrance opening through a wall of the body, a contact for each of said inserts and said contacts arranged to be engaged by contact blades inserted through said entrances, and said inserts formed of relatively hard electrical insulating material and adapted to be twisted and moved relatively in said body within the limits of the resiliency of the material of the body.

2. In an electrical connector, a body of resilient material, a pair of independent hollow inserts in said body, each of said inserts having an entrance comprising a hollow neck like portion extending through a wall of the body and terminating flush with the outer surface of said wall, a contact in each of said inserts for engagement by contact blades inserted through the open ends of said inserts, and said inserts formed of relatively hard electrical insulating material and adapted to be moved relatively in said body within the limits of the resiliency of the material of the body.

3. In an electrical connector, a body of resilient material, a pair of inserts in said body, said inserts having entrance openings at one end of the body, contacts in said inserts for engagement by blades inserted through said openings, binding posts electrically connected with said contacts and arranged at the other end of the body, a hollow resilient cover on the said other end of the body, means securing the cover to the body, and said cover having an opening for the passage of a cable to the binding post.

4. In an electrical connector, a body of resilient material, a pair of inserts in said body, said inserts formed of relatively stiff insulating material, said inserts having entrance openings at one end of the body, a hollow internally threaded plug moulded into each of said inserts, a spring contact secured to each of said plugs for engagement by blades inserted through the respective openings, a binding screw threaded into each of said plugs and arranged at the end of the body opposite the entrance openings, a hollow resilient cover secured to the body in po-

sition to enclose said binding screws, and said cover having an opening for the passage of a cable to the binding screws.

5 In an electrical connector, a body of resilient material, a pair of inserts in said body, said inserts formed of relatively stiff insulating material, said inserts having entrance openings at one end of the body, a contact carried by each of said inserts and each contact arranged  
10 for engagement by a contact blade inserted through said entrance openings, and said inserts so arranged relatively in said body that on the insertion of the contact blades of a plug through the entrance openings to engage the  
15 contacts carried by the inserts the inserts are shifted against the action of the material of the body whereby owing to the resiliency of the material of the body the inserted contacts and the contacts carried by the inserts are held in  
20 electrical engagement.

6. In an electrical connector, a body of resilient material, a pair of hollow inserts in said body, said inserts formed of relatively stiff insulating material, said inserts having entrance  
25 openings at one end of the body, contacts in said inserts and disposed against the walls thereof, and said inserts so arranged relatively in said body as to be shifted against the action of the resilient body on the insertion of contact blades  
30 into the entrance openings whereby the contacts in the inserts are resiliently held in engagement with the contact blades due to the resiliency of the body.

7. In an electrical connector, a body of yieldable resilient material, contacts spaced apart

within and carried by said body to engage the blade contacts of an attachment plug cap, said body having entrance openings for the insertion of blade contacts into engagement with the body carried contacts, the portions of said body carried  
80 contacts last engaged by the blade contacts on withdrawal of the blade contacts from the body constituting points of separation of the body carried and blade contacts, and inserts of heat resistant electrical insulating material surrounding said body carried contacts at the point  
85 of separation of said body carried contacts and the blade contacts.

8. In an electrical connector, a body of resilient material, a pair of inserts in said body, said inserts formed of relative stiff insulating material, said inserts having entrance openings at one end of the body, contacts in said inserts for engagement by blades inserted through said  
90 openings, and binding posts electrically connected with said contacts and arranged at the other end of the body.

9. In an electrical connector, a body of resilient material, a pair of inserts in said body, said inserts formed of relatively stiff insulating material, said inserts having entrance openings at one end of the body, a hollow internally threaded plug moulded into each of said inserts, a contact secured to each of said plugs and arranged to be engaged by blades inserted through  
100 the respective openings, a binding screw threaded into each of said plugs and arranged at the end of the body opposite the entrance openings.

HARVEY HUBBELL, JR. 110

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