

March 1, 1949.

E. V. SORENY
SEPARABLE CONNECTOR

2,462,914

Filed Aug. 20, 1943

2 Sheets-Sheet 1

Fig. 1.

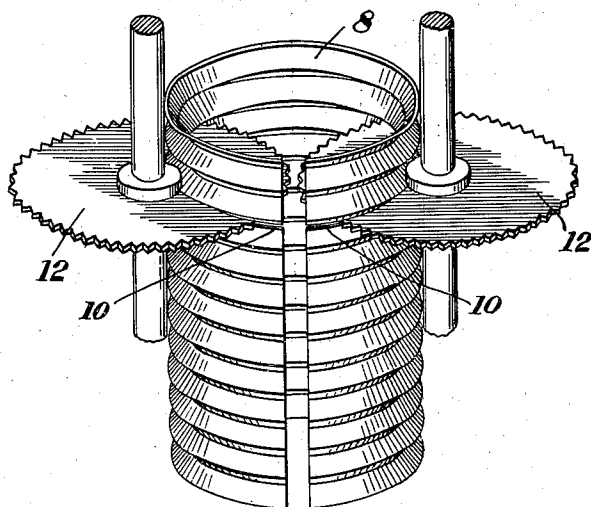


Fig. 2.

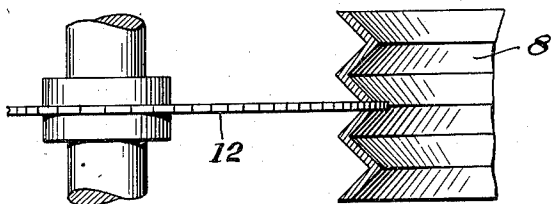
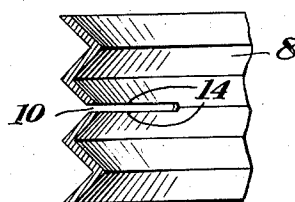


Fig. 3.



INVENTOR.
ERNEST V. SORENY

BY

Ernest V. Soreny
ATTORNEY

March 1, 1949.

E. V. SORENY
SEPARABLE CONNECTOR

2,462,914

Filed Aug. 20, 1943

2 Sheets-Sheet 2

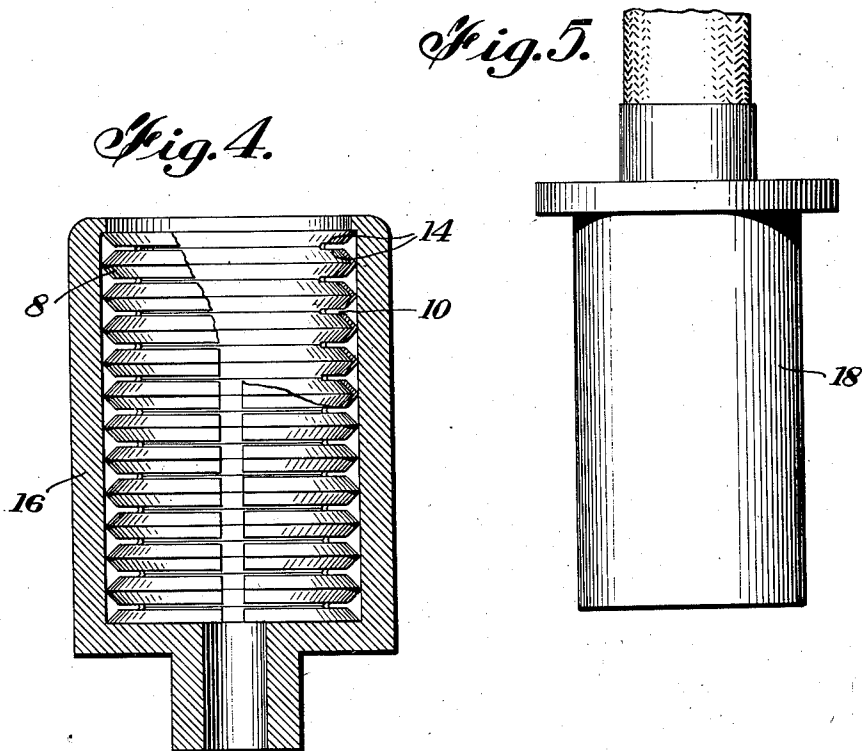
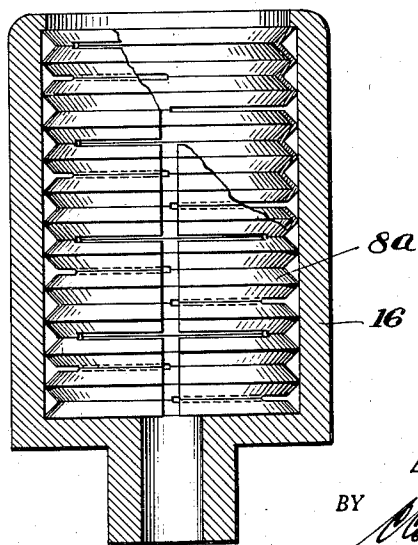


Fig. 6.



INVENTOR.
ERNEST V. SORENY
BY *Monell Ramsey*
ATTORNEY

UNITED STATES PATENT OFFICE

2,462,914

SEPARABLE CONNECTOR

Ernest V. Soreny, New York, N. Y., assignor to
Federal Telephone and Radio Corporation,
Newark, N. J., a corporation of Delaware

Application August 20, 1943, Serial No. 499,333

12 Claims. (Cl. 173—363)

1

The present invention relates to a plug and socket assembly for connecting electrical circuits, and to a method of making the same.

In a copending application Serial Number 498,452 filed August 13, 1943, issued as Patent 2,436,832 on March 2, 1948, I disclose a connector device comprising a socket containing a pair of irregularly shaped coiled springs, these springs being interspersed so that insertion of a plug in the socket results in a plurality of high-pressure points of contact being created between the springs and both the plug and the socket wall.

Under certain conditions, however, the required apparatus for shaping and interspersing these coiled springs may not be available. To meet these conditions the present disclosure proposes to retain the desirable features of the above construction while eliminating the necessity for employing coiled springs in the connector assembly.

One object of the invention, therefore, is to provide a plug and socket assembly possessing a plurality of high-pressure points of contact between the conducting elements, thus reducing the tendency to overheating while raising the current-carrying capacity of the connector.

A further object of the invention is to provide a tubular insert for a socket, the insert being corrugated and then selectively cut along the corrugations to form a series of rough edges on the inner surface thereof.

A still further object of the invention is to provide a method of making an insert for an electrical connector by corrugating a sheet of conducting material, forming it into a hollow cylinder, and then cutting slots at selected intervals in the surface thereof.

Other objects and advantages will be apparent from the following description of a preferred form of the invention and from the drawings, in which:

Fig. 1 is a partly diagrammatic perspective view of one form of apparatus that may be employed in carrying out the method of the present invention;

Fig. 2 is an enlarged sectional view of a portion of Fig. 1, showing the positioning of the cutting disc in relation to the corrugated surface of the insert;

2

Fig. 3 is a view of Fig. 2, showing the surface configuration of the insert after cutting;

Fig. 4 is a side view, partly in section, of a socket containing an insert made according to the method of the present invention;

Fig. 5 is a side view of a plug designed for use with the socket of Fig. 4;

Fig. 6 is a side view, partly in section, of a modification of Fig. 4 showing another type of insert.

In carrying out the method of the present case, a sheet of conductive material such as beryllium copper is corrugated in any desired manner such as by stamping or rolling. The sheet is then cut to a predetermined size and formed into the hollow cylinder 8 of Fig. 1.

Into the surface of the hollow cylinder 8 are cut a plurality of slots 10. These slots may be cut in any suitable manner such as by the circular saws 12, the means for driving which are not shown since any conventional power source may be utilized. Furthermore, although two saws have been illustrated, any number may be employed, and they may be interconnected if desired in any known manner.

These cuts in the hollow cylinder 8 are made at the apex of the inwardly-projecting surface portions, as best shown in Fig. 2. Fig. 3 illustrates the resulting configuration of one slot. The relative size of the slots to the corrugation has been exaggerated in the drawing to show the details. Actually the cuts will be made as thin as is practicable in order to retain the original internal diameter of the hollow cylinder 8.

If two adjacent coplanar cuts are made in each of the inwardly-projecting corrugations of the cylinder, and if each of these two cuts covers an angle of approximately 120° of the cylinder surface, then the appearance of the cylinder after cutting will be as shown in Fig. 4. In this figure the slots are illustrated as beginning at the opening between the edges of the rolled sheet, and as extending in each direction for a distance equal to approximately a third of the circumference of the cylinder. The rear third of the cylinder (viewed as in Fig. 4) remains uncut.

The cutting operation may be performed, if desired, by stamping or other known means instead of sawing. In any event, each slot will have two sharp edges 14 (Fig. 3) projecting inwardly

3

from the inner surface of the hollow cylinder. It is not necessary to smooth over the edges 14—in fact, the current-conducting effectiveness of the assembly depends on their being rough or jagged.

When the cutting operation has been completed, the cylinder 8 is placed in a conducting socket 16 of the type described in my aforementioned copending application Serial Number 498,452, and the top lip of the socket spun or peened over or any other suitable means used to hold the cylinder in place.

A plug 18, shown in Fig. 5, is designed to be received in the socket 16. Upon insertion of the plug, the latter, being oversized in diameter with respect to the inner diameter of the hollow cylinder 8, will press such cylinder outwardly. The smooth sides of plug 18, passing by the sharp inner edges 14 of the corrugated cylinder 8, will produce a "scraping fit" with such edges. The combination of increased pressure between the conducting elements added to the sharp abrasive fit of the plug and cylinder produces the results desired—namely, high current conductivity and low resistance.

In Fig. 6 is shown a hollow cylinder 8a similar to the cylinder 8 of Fig. 4, except that the spacing between the slots is altered. In this modification each inwardly-projecting corrugation has cut thereinto one slot of approximately 120°. However the slots are disposed in spiral fashion along the axis of the cylinder so that no two successive slots lie one above the other. This "staggered" arrangement of the slots helps to center the plug in the socket and to produce a contacting relation between the socket and plug over substantially the entire circumference of the latter.

It should be emphasized that the novel method herein described and claimed is not limited to any particular form of apparatus. Many machines are known in the art for cutting slots into cylindrical objects, and it is contemplated that any suitable mechanism of that type which is capable of carrying out the method may be utilized.

While I have described above the principles of my invention in connection with specific apparatus, and particular modifications thereof, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of my invention as set forth in the objects of my invention and the accompanying claims.

I claim:

1. In the manufacture of electrical contacts, the method which comprises corrugating a sheet of conducting material so that the cross section of the corrugations includes apices, forming the corrugated sheet into a hollow cylinder so that the corrugations lie in planes perpendicular to the axis of the cylinder, and then cutting the cylinder from the exterior thereof at the apex of and parallel with a selected number of the inwardly-projecting corrugations whereby the cutting operation produces sharp biting edges on said selected corrugations.

2. The method of making an electrical contact which comprises cutting a number of parallel slots at the apex of selected corrugations of a hollow cylinder substantially perpendicular to the axis thereof, so as to reduce the internal diameter of the cylinder, the inwardly projecting corrugations each having a relatively sharp apex so that sharp biting edges result on the interior

4

of said hollow corrugated cylinder from said cutting operation.

3. The method of making an electrical contact which comprises forming a slit in the surface of a hollow corrugated cylinder the cross section of said corrugations including apices along a line midway between any two adjacent outwardly-projecting corrugations, said surface being shaped to provide sloping wall portions so that said slit produces sharp biting edges on the interior of said hollow corrugated cylinder.

4. As an article of manufacture, a hollow corrugated cylinder of conductive material having a plurality of parallel slots cut into the surface thereof in a plane perpendicular to the axis of said cylinder, the slots being cut at the apex of the inwardly extending corrugations so that the smallest internal diameter of the cylinder at such corrugations is increased.

5. An insert, for a plug and socket device of the type wherein a plug is received by a socket having a conducting insert of smaller internal diameter than the plug, consisting of a corrugated tube, the corrugations of which have, in cross section, angular wall portions with the inner parts thereof removed so as to present a series of sharp edges to the surface of the plug upon insertion of the latter in the socket.

6. In a connector, a cylindrical socket composed of conducting material, and a conducting insert received by said socket, said insert being shaped in the form of a hollow cylinder having an inner ridged surface, a portion of said ridges being cut away to form sharp biting edges.

7. Connecting apparatus comprising a plug, a cylindrical socket composed of conducting material, and an insert for the socket, said insert being in the form of a hollow cylinder having an inner ridged surface, the internal diameter of which is smaller than the greatest transverse dimension of such plug, a portion of said ridges being cut away to form sharp biting edges, whereby insertion of said plug in said socket will produce a frictional engagement between the surface of said plug and the sharp edges of said insert, resulting in a compression of said insert outwardly against the inner wall of said socket.

8. As an article of manufacture, a hollow cylinder of conducting material having a plurality of annular ridges on the inner surface thereof and perpendicular to the axis of the cylinder, a selected number of said ridges being cut away to form sharp biting edges on the interior of said hollow cylinder.

9. The article of claim 8 in which each of said ridges is cut over an angle of approximately 240°.

10. The article of claim 8 in which each of said ridges is cut over an angle of approximately 120°, the edge portions of adjoining ridges being offset with respect to one another so that the entire series of cut ridge portions will present a generally spiral configuration along the axis of the cylinder.

11. In the manufacture of electrical contacts, the method which comprises corrugating a sheet of conducting material to form corrugations with substantially V-shaped cross-sections, forming the corrugated sheet into a hollow cylinder so that the corrugations lie in planes perpendicular to the axis of the cylinder, and then removing a portion of the edge from a selected number of inwardly projecting corrugations, said removal operation being carried out by piercing said corrugations from the exterior of said cylinder in planes substantially perpendicular to the axis

5

of said cylinder whereby sharp biting edges result on said selected corrugations in the interior of said cylinder.

12. The method of making an electrical contact which comprises removing a portion of the inner edge from a selected number of inwardly projecting corrugations of a hollow cylinder, said removal operation being carried out by piercing said corrugations from the exterior of said cylinder forming two parallel extending faces in planes substantially perpendicular to the axis of said cylinder in each of said selected corrugations, the inner edges of said selected corrugations being shaped with relatively sharp apices in cross-section in the interior of said cylinder.

ERNEST V. SORENY.

6

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
947,229	Fulton	Jan. 25, 1910
2,358,707	Haas	Sept. 19, 1944

FOREIGN PATENTS

Number	Country	Date
248,692	Great Britain	Mar. 4, 1926
429,869	Germany	June 4, 1926
487,606	Germany	Dec. 14, 1929