

March 11, 1941.

S. SUTTER
CONNECTOR DEVICE
Filed Aug. 14, 1937

2,234,659

2 Sheets-Sheet 1

Fig. 1.

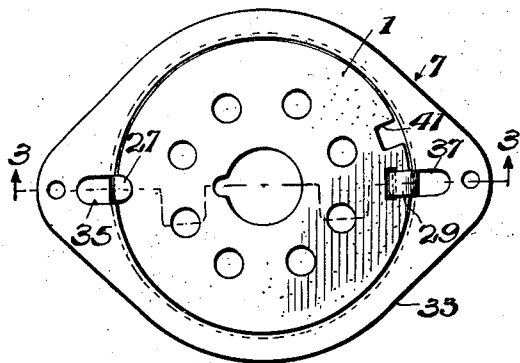


Fig. 2.

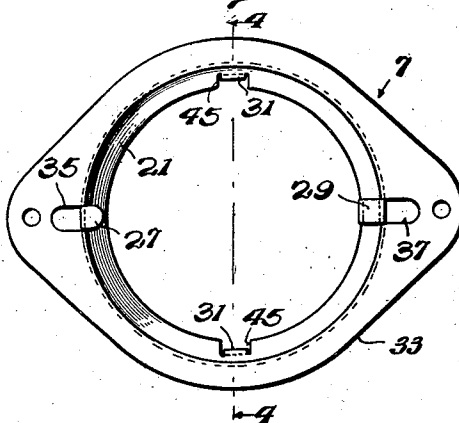


Fig. 3.

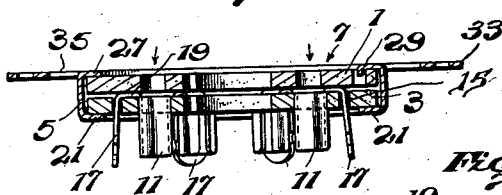


Fig. 4.

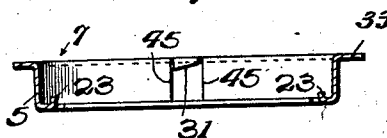


Fig. 5.

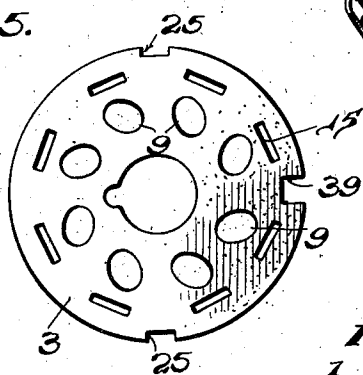


Fig. 6.



Fig. 6.

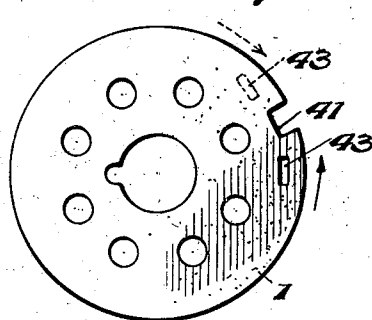
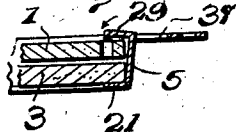


Fig. 7.



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Fig. 9.

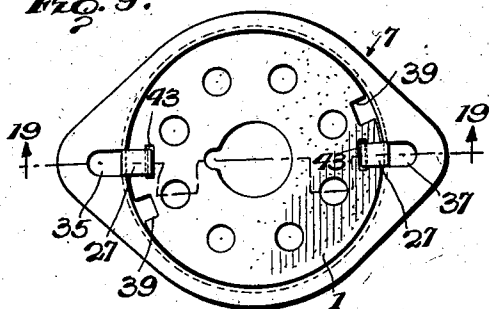


Fig. 10.

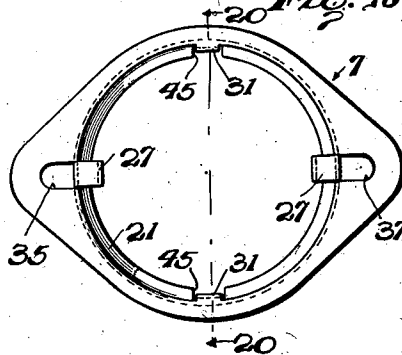


Fig. 11.

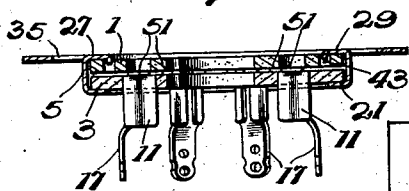


Fig. 12.

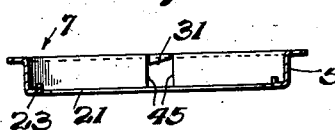


Fig. 13.

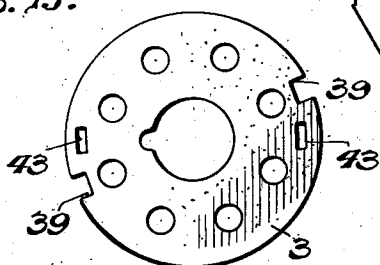


Fig. 23.

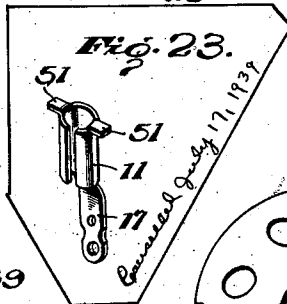


Fig. 14.

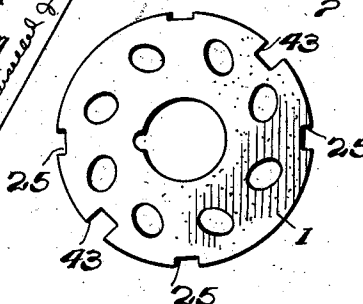
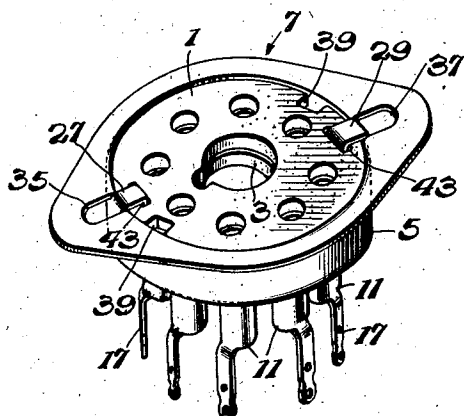


Fig. 15.



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UNITED STATES PATENT OFFICE

2,234,659

CONNECTOR DEVICE

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of Pennsylvania

Application August 14, 1937, Serial No. 159,174

7 Claims. (Cl. 173-328)

My invention relates to connector devices such as sockets of the type commonly utilized in connection with radio tubes and the like, though not of necessity limited thereto.

It is an object of my invention to provide a tube socket or the like that may be fabricated without the use of rivets for holding the insulating plates together.

Another object of my invention is to provide a tube socket or the like that shall necessitate the use of much less insulating material than tube sockets heretofore known.

Another object of my invention is to provide, in a tube socket of the laminated type, means having the double function of holding the laminations in place and of permitting the socket to be expeditiously and cheaply mounted on a radio receiver chassis.

Another object of my invention is to provide a radio tube socket or connector device, the component parts of which may be assembled without resorting to the use of rivets, eyelets, screws or other extraneous device for holding the insulating layers in position.

Another object of my invention is to provide a radio tube socket or connector device, comprising a plurality of perforated plates of insulating material and means for holding the said plates in position with the perforations in registry, the last mentioned means being so constructed and arranged that riveting or peening over operations thereon shall be eliminated.

A still further and more specific object of my invention is to provide a radio tube socket or connector device comprising a plurality of perforated discs of insulating material together with means for holding the said plates in superposed relation with the perforations in alignment, the last named means being so constructed and arranged that the said plates may be affixed thereto by means of a simple manual operation without the necessity for permanently deforming any portion thereof.

In accordance with my invention, I provide one top and one bottom perforated plate of insulating material and a dished metal frame for supporting the said plates and for holding them firmly in such position that the perforations are in alignment. The metal frame has means integral therewith for holding the bottom plate in fixed position and also with means for holding the top plate in position after certain hereinafter described operations are performed.

Preferably, the lower edge of the side wall of the dished portion of the frame is provided with an inwardly extending circular ledge having at

least one upwardly and axially extending ear which cooperates with a bay or notch in the periphery of the bottom plate to hold it in position and to prevent it from rotating when it rests upon the ledge.

The upper edge of the said wall of the dished portion is provided with at least two inwardly extending, diametrically disposed ears, one ear being rigid and the other ear being sufficiently long to permit a certain amount of spring action. The last mentioned ear has a downwardly and axially extending hook upon the free end thereof, which hook enters an opening in the upper plate and maintains the openings therein in registry with the openings in the lower plate.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention, itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of certain specific embodiments thereof, when read in connection with the accompanying drawings, in which:

Fig. 1 is a top plan view of a socket or connector device constructed according to my invention.

Fig. 2 is a top plan view of a metal frame constructed according to my invention, the insulating laminations or discs being omitted.

Fig. 3 is a view in vertical cross section of a socket constructed according to my invention, taken along a line corresponding to the line 3-3 in Fig. 1.

Fig. 4 is a view in vertical cross section of a metal frame constructed according to my invention, taken along a line corresponding to the line 4-4 in Fig. 2.

Fig. 5 is a plan view of a lower insulating plate.

Fig. 6 is a plan view of an upper insulating plate.

Fig. 7 is a fragmentary view in elevation of a portion of a socket assembly to which reference will be made in explanation of the manner in which my improved socket is assembled.

Fig. 8 is a view in perspective of a preferred female contact element analogous in construction and function to the contact element disclosed and claimed in the Draving Reissue Patent #20,162.

Fig. 9 is a top plan view of a socket assembly constructed according to a modification of my invention.

Fig. 10 is a top plan view of the metal frame

shown in Fig. 9, the insulating plates being omitted.

Fig. 11 is a view in vertical cross section of a socket assembly such as is shown in Fig. 9, taken along a line corresponding to the line 19-19.

Fig. 12 is a view in vertical elevation of the frame shown in Fig. 10, taken along a line corresponding to the line 20-20.

Fig. 13 is a plan view of an upper insulating plate.

Fig. 14 is a plan view of a lower insulating plate.

Fig. 15 is a view in perspective of a socket assembly of the type exemplified by Figs. 9 and 11.

In all figures, analogous elements are similarly designated.

Referring now to Figs. 1, 2, 3 and 4, a socket or connector device constructed according to my invention comprises a plurality of perforated insulating plates or discs 1 and 3 that are held within the downwardly dished portion 5 of a metal frame 7. The lower plate is provided with a plurality of non-circular perforations 9 for the purpose of accommodating the contact portions 11 of a corresponding number of contact elements 13, such as exemplified by Fig. 8, and a plurality of rectangular perforations 15, one for each non-circular perforation, through which the soldering lugs 17 of the respective contact elements extend downwardly.

The reach portion 19 of each contact element is gripped between the two plates of insulating material.

The lower edge of the downwardly dished portion of the metal frame is provided with an inwardly extending ledge 21, the said ledge having one or more upwardly and axially extending ears 23. The lower plate of insulating material is provided with one or more bays 25 which cooperate with the ears to prevent the said plate from rotating when it is supported upon the inwardly extending ledge. The upper edge of the dished portion of the metal frame is provided with a rigid ear 27 that extends inwardly, under which the upper plate 1 is slid during the assembly process. In addition to the rigid ear, the upper edge of the side wall of the metal frame is provided with an inwardly extending resilient hook 29 having a downwardly extending beveled lip 31. Preferably, the hook is disposed diametrically opposite to the fixed ear. The rigid ear and the hook are struck out from a mounting collar 33 surrounding the upper edge of the frame, leaving openings 35 and 37, respectively.

Referring once more to Fig. 5, it will be noted that the lower plate, in addition to the bays or notches 25 that cooperate with the ears 23 extending upwardly from the ledge 21, is provided with another relatively large peripheral bay or notch 39. This latter notch permits the lower plate to clear the spring hook 29 when it is dropped into the frame during the assembly operation.

It will also be noted from an inspection of Fig. 6 of the drawing that the upper plate is provided with a similar large notch 41 to permit it to clear the spring hook, and is provided, furthermore, with a small rectangular opening 43 a slight angular distance away from the large notch.

During the assembly operation, the lower plate is first placed upon the inwardly extending ledge of the metal frame with the diametrically disposed notches therein in cooperative relation with the upwardly extending ears on the said ledge. Each perforation in the lower plate is

next provided with a contact element 13 as shown in Fig. 3 of the drawings, the prong receiving portions of the elements being accommodated by the noncircular perforations and the soldering lugs extending downwardly through the rectangular openings adjacent thereto, as clearly shown in Fig. 3 of the drawings.

The upper plate is then slid under the rigid ear 27 that extends inwardly from the upper edge of the dished portion of the frame and is permitted to drop upon the lower plate. During this operation, the large notch in the periphery of the upper plate clears the spring hook 29 that extends inwardly and diametrically opposite to the fixed ear. The upper plate is then rotated in a counterclockwise direction as indicated by the arrow in Fig. 6. During the rotation, the beveled edge of the spring hook rides up over the insulating material between the large notch in the upper plate and the rectangular opening adjacent thereto and, upon continued rotation, it snaps down into the said rectangular opening. That operation is clearly exemplified by Fig. 7 of the drawings.

The spring action of the hook is facilitated by reason of the fact that the side wall of the dished portion of the frame immediately thereunder is provided with two slots 45 as shown in Fig. 4, whereby the said hook is permitted to flex around an imaginary fulcrum disposed in the lower inwardly extending ledge. If the material of the frame is sufficiently resilient, the slots may be dispensed with.

After rotation of the upper plate has brought the spring hook into registry with the rectangular opening, the prong-receiving perforations in the upper plate are in alignment with the channel portions of the contact elements per se and the two plates are locked firmly in position.

Should it become necessary to disassemble the socket or connector device, continued forced rotation of the top plate in the direction of the arrow, slightly less than 360 degrees, will cause the hook to rise out of the rectangular opening and drop into place in the large notch, after which the upper plate may be removed.

It, of course, falls within the scope of my invention to dispose the rectangular opening 43 at the other side of the notch in the upper plate as indicated and, in such event assembly and disassembly is accomplished by rotating the upper plate counterclockwise in the direction of the dotted arrow shown in the same figure.

From an inspection of Fig. 5, it will be noted that the non-circular or oval openings 9 in the lower plate are angularly disposed with respect to the radii thereof. That arrangement is for the purpose of interposing maximum insulating material between the several contact elements per se.

In certain instances, I have found that the rigid ear, extending inwardly from the upper edge of the dished portion of the frame, is not sufficiently strong to retain the plates in permanent alignment. This is easily understandable, because if the ear is made very much longer or wider than is shown in the drawings, it is substantially impossible to slide the upper plate under it without causing it to become deformed.

In such event, I may provide the metal frame with two diametrically disposed spring hooks 27, instead of but one hook, omitting the rigid ear. Such modification of my invention is clearly exemplified by Figs. 9-15, from which it will

be noted that the periphery of the upper plate is provided with two large clearance notches or bays 39 and with two rectangular openings 43, one adjacent to each of the said notches, for the purpose of accommodating the beveled ends of the spring hooks. All other elements in Figs. 9-15, inclusive, are analogous to the elements in the corresponding views hereinbefore described and are similarly designated, it being understood that a different form of contact element might be employed, with correspondingly different provisions in detail for its mounting, without affecting this embodiment of invention. Furthermore, the lower plate of insulating material may be provided with four or more notches 25 analogous to the notches cooperate with a corresponding number of upturned ears integral with the inwardly extending ledge disposed around the lower end of the dished portion of the metal frame.

The mode of assembly of the socket or connector device exemplified by Figs. 9-15 inclusive, is essentially the same as the mode of assembly of the sockets hereinbefore described and no necessity is seen for repetition.

It is to be clearly understood that my invention is not limited to the utilization of the contact element exemplified by Fig. 8, but that contact elements of any desired type may be utilized.

From the foregoing description of several embodiments of my invention, it will be apparent that it offers many advantages. In the first place, insulating material is reduced to the minimum, and because "Bakelite" or the like is more expensive than the metal used in the supporting frame, such reduction greatly lessens the cost of a completed socket. Again, the process of assembly requires much less time than the assembly of sockets of types heretofore known, because the self-locking action between the metal frame and the insulating plates, whereby the perforations are brought into exact alignment, obviates the necessity of holding the plates in position by means of a jig while they are being riveted, as was heretofore the case. In addition, the assembly of my improved socket may be accomplished by relatively unskilled labor at minimum cost.

Although I have chosen several embodiments of my invention for purposes of illustration, additional modifications will be apparent to those skilled in the art. My invention, therefore, is not to be limited except as is necessitated by the prior art and by the spirit of the appended claims.

I claim as my invention:

1. In combination, in a connector device or the like, a plurality of perforated discs of insulating material disposed in superposed relation, a metallic element encircling said discs, one end of said element being provided with an inwardly directed ledge on which the lowermost of said discs is supported, the said disc and the said ledge having interlocking parts whereby the said disc is restrained against rotation, and the other end of said metallic element having resilient means for urging the several discs toward each other and for preventing the uppermost disc from rotating, said means comprising a generally radial inwardly directed member having an axially directed angularly divergent hooked end and arranged to overlie the outer face of the upper disc with the hooked end seated in a perforation in said face.

2. As an article of manufacture, a cylindrical metallic element having at one end an inwardly directed ledge provided with at least one up-

turned ear, the other end of said cylindrical element being provided with an encircling outwardly extending collar, a spring hook struck out from said collar and directed inwardly toward the axis of the cylindrical element and the said wall of said cylindrical element being provided with two axial slots so disposed with relation to said hook as to define a tongue aligned and integral with but angularly divergent from the hook so that the resilience of the latter is enhanced.

3. As an article of manufacture, a cylindrical metallic element adapted to encircle a plurality of discs of insulating material, the lower end of said cylindrical element being provided with an inwardly directed ledge having at least one upturned ear, the upper end of said cylindrical element having an encircling collar integral therewith, an ear extending from the said upper end of the cylindrical element toward the axis of the cylindrical element, and a spring hook also extending inwardly from the last mentioned end of the cylindrical element at a point substantially diametrically opposite to the ear in the upper end of the cylindrical element, the free end of the spring hook having a depending axially extending portion having a sloping edge.

4. A socket comprising an annular lower plate, an annular upper plate, the plates having peripheral bays capable of registration in one angularly adjusted position of the plates, said upper plate having also a locking recess angularly spaced from said bay, a cylindrical element surrounding both plates and having at its lower end an inwardly projecting extension substantially normal to the axis of said element, said extension constituting a support for said annular lower plate, a resilient tongue having a depending sloping end extending from the upper portion of said element in substantial parallelism to the support of such size as to permit the plates to move axially into the cylindrical element with their respective bays in alignment and straddling said tongue until the upper plate has its outer surface in a plane substantially coincident with the lower surface of the tongue and with the depending sloping end disposed in the bay of the upper plate, said upper plate arranged for angular rotation in the cylindrical element to cause the sloping depending end of the tongue to rise out of the bay in said plate and to traverse relatively the surface of said upper plate between the bay and the locking recess and to resiliently snap into the said recess, to hold the upper plate against either axial or angular movement relative to the cylindrical element.

5. A socket comprising a cylindrical wall, a resilient tongue extending radially inwardly from said wall and having a terminal extending substantially axially of the cylindrical wall, a pair of superposed insulating sheets of substantially the same diameter as said cylinder with the upper sheet provided with a substantially radial peripheral recess such as to enable seating of said sheet in the cylinder past said tongue, an anchoring recess in spaced relation to the radial recess in the upper sheet into which the depending terminal is arranged to be resiliently engaged pursuant to rotation of the said upper plate in the cylinder, and supplemental means arcuately spaced from said tongue for holding the upper plate against axial movement outwardly of the cylindrical wall.

6. In a connector device, a perforated insulating plate, electrical contact making members supported by said plate in some of the perfora-

tions; a second insulating plate having perforations some of which are in registration with the contact making members and including a peripheral bay, a holding member substantially surrounding both of said plates at their peripheries, a portion limiting axial movement of the plates in one direction in said holding member, and a hooked substantially radial member having an angularly off-set substantially axial end arranged to pass directly through said bay as the second plate is moved substantially axially into said holding member until the lower surface of the radial member lies substantially in a plane containing the outer surface of the second plate, said second plate arranged for angular adjustment transversely of said radial member to cause the bay to move from alignment with the radial member, with the off-set end engaged in a perforation to lock the second plate against both axial and angular movement.

7. A connector device comprising two plates of insulating material, a holding member en-

gaging the plates to prevent relative movement of the plates axially in one direction and transversely in all directions while permitting rotation of the upper of said plates in the plane of one of its plane surfaces, means integral with said holding member extending toward said upper plate substantially in the plane of its upper surface, said upper plate having a peripheral recess to permit said upper plate to move axially of the holding member past said means, said upper plate and said means having interlocking portions arranged for operative interlocking engagement upon rotation of the upper plate to move the peripheral recess out of registration with said means to cause a portion of said means to overlap a solid surface of said upper plate to prevent axial outward movement thereof, while the said interlocking means prevents relative angular motion of the first mentioned means and the upper plate.

SAMUEL SUTTER.