Jan. 20, 1942. L. PENSAK 2,270,337

ELECTRICAL CONTACT ASSEMBLY

Filed Sept. 24, 1940

Fig. 1.

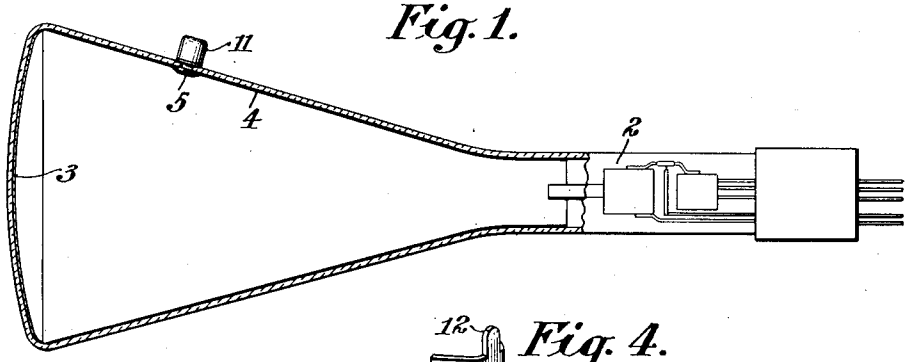


Fig. 4.

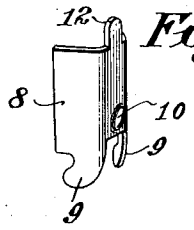


Fig. 2.

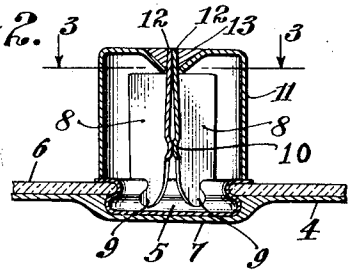


Fig. 3.

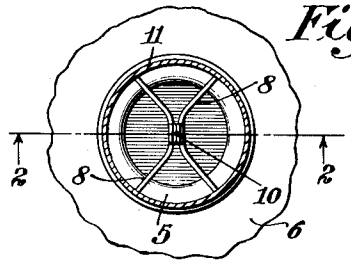


Fig. 5.

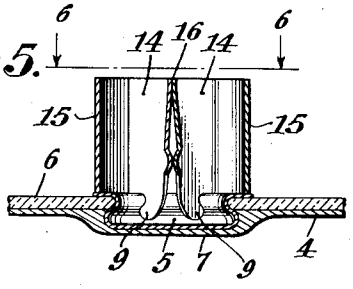


Fig. 6.

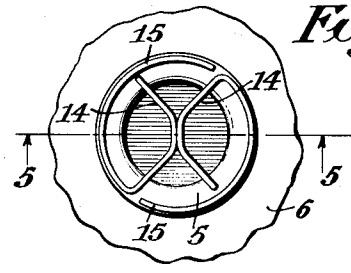


Fig. 7.

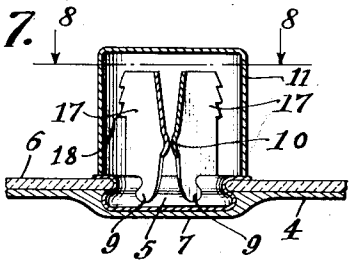
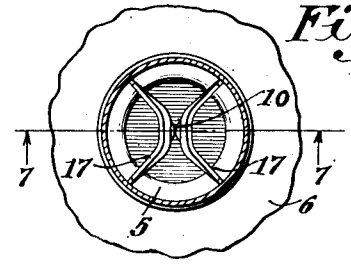


Fig. 8.



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ELECTRICAL CONTACT ASSEMBLY

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Application September 24, 1940, Serial No. 358,061

8 Claims. (Cl. 250—27.5)

My invention relates to current carrying leads and contacts and more particularly to leads and contacts which are employed in evacuated devices such as cathode ray tubes and the like.

It has been customary in cathode ray tubes, wherein a high potential electrode wall coating or deflection electrodes are supplied by potentials through the walls of the tube, to provide a current carrying lead wire of small diameter sealed through the wall of the envelope substantially perpendicular to the surface thereof. In order to make proper connection to this lead-in wire it has been necessary to attach or cement a separate cylindrical cap to the exterior of the bulb wall, the cap being connected to the lead-in wire as by soldering. Disadvantages of this structure reside in the susceptibility to breakage during processing, limited current capacity, necessity for annealing and cementing to the glass wall.

It is an object of my invention to provide an improved form of current carrying conductor and associated structure for making connection through the enclosing wall of an electron discharge device such as a cathode ray tube.

It is a further object to provide a current carrying conductor which does not extend beyond the bulb wall periphery and to which an electrical contact member may be attached without the use of cements or other binding agents between the contact and bulb wall; and it is a still further object to provide a resiliently supported electrical contact for electric discharge and similar devices which is resilient to mechanical shock and is less subject to breakage both during manufacture and subsequent use.

In accordance with my invention I avoid the above disadvantages possessed of the prior art by providing a cup-shaped conducting member sealed in the bulb wall envelope and equipped with resilient members to which a power supply connection may be made either with or without a cylindrical fitting or cap over the resilient members.

These and other objects, features and advantages of my invention will become apparent upon consideration of the following detailed description taken with the accompanying drawing in which:

Fig. 1 shows a cathode ray tube as an example of an electron discharge device incorporating my invention;

Fig. 2 is a sectional view of one form of contact made in accordance with my invention;

Fig. 3 is a cross-section of Fig. 2 taken along the line 3—3;

Fig. 4 is a perspective view of one of the members shown in Figs. 2 and 3, and

Figs. 5 and 6, and Figs. 6 and 7 are similar views as Figs. 2 and 3, showing other modifications of my invention.

Referring to Fig. 1, which shows one form of discharge device to which my invention is applicable, the cathode ray tube comprises an envelope 1 having a neck section closed at one end by a conventional stem press supporting an electron gun 2 and a frusto-conical section terminating in an end wall coated with luminescent material 3 to render visible the path of an electron beam issuing from the electron gun 2. Such tubes are usually provided with a conductive wall coating such as the conductive coating 4 to which electrical connections must be made through the bulb wall. It is to be understood that my invention is equally applicable to tubes having other electrode structure to which contact must be made through the bulb wall. In cathode ray tubes of the type shown in Fig. 1 it has been customary to merely seal a lead wire through the frusto-conical section of the bulb which makes contact with the electrodes such as the wall coating 4. However, in accordance with my invention I provide a metal cup or recessed contact 5 having an inwardly extending rim which is sealed around its periphery within a small hole in the frusto-conical section of the envelope 1, thereby forming a small portion of the envelope wall. More particularly, and with reference to Fig. 2, I provide the recessed contact 5 sealed to a portion of the bulb wall 6 in such manner that it extends inwardly of the outside surface of the envelope rather than outwardly so that it offers no large projecting surface which may suffer mechanical injury. The recessed contact 5 is preferably sealed in the envelope wall prior to the application of the conductive coating 4 so that when the conductive coating is subsequently applied, it completely covers the interior surface of the recessed contact such as shown at 7.

The recessed contact 5 is preferably made of a metal having a coefficient of expansion similar to that of the glass comprising the envelope and I have found that chrome-iron is a preferred material for use with conventional lime glasses, although other metals may be used depending upon the particular glass composition of the envelope.

Further, in accordance with my invention, I

provide a pair of resilient members 8, one type of which is shown in Fig. 4, having ears 9 which engage the rim of the recessed contact 5, as shown in Fig. 2. The members 8 are constructed of a resilient material such as phosphor-bronze and are formed with respect to the inwardly extending rim of the contact 5 in such a manner that the portions 9 of the members 8 engage and preferably extend under the rim portion of the contact 5. The members 8 are also preferably formed in the form of arcs so that when compressed, such as toward the fulcrum point 10 by the cylindrical cap 11, the portions 9 are forced against the recessed sections of the contact 5. The friction between the members 8 and the cylindrical cap 11 may be sufficient to retain these parts in position following assembly. However, for permanent assembly, I provide extensions 12 on the members 8 which protrude through a recessed aperture in the cylindrical cap 11, whereupon the extensions 12 may be bent over to retain the cap in position or may be affixed to the cap such as by soldering as shown at 13.

It will be obvious from the above description that the resilient members 8 need not be assembled in the cup-shaped member or contact 5 prior to the completion of the associated discharge device such as shown in Fig. 1 until all processing of the device has been completed. Thus there is no danger of mechanical shock being applied to the contact prior to such final assembly, and furthermore, the resilient nature of the members 8 protects the seal between the recessed contact 5 and the glass wall portion 6 should the cap 11 be subjected to accidental blows or mechanical shock.

A modification of my invention which exemplifies a different form of the resilient members 8 is shown in Figs. 5 and 6. In this modification the resilient members shown at 14 are provided with semi-circular skirt sections 15 integral therewith, in which case it is unnecessary to provide a further contacting cap such as the cap 11 of Fig. 2. Thus the two members 14 may be positioned with the ear portions 9 extending within the recessed contact 5 and fastened one to the other while being held together to force the portions 9 against the recessed contact such as by welding, soldering, or other affixing means at the upper portion of the members 14 such as at 16. It will be obvious that the assembly shown in Figs. 5 and 6 may be provided with a cylindrical cap such as that shown in Figs. 2 and 3, whereupon the members 14 may likewise be provided with the extensions similar to those shown in Fig. 2.

A still further modification of my invention is shown in Figs. 7 and 8 wherein a permanent assembly is provided without soldering or welding the resilient members together. The resilient members 17 are provided with serrated or sawtooth edges 18 which when the cap 11 is pressed downwardly become partially embedded in the side walls of the cap. The force exerted on the serrated edges 18 is transmitted by the fulcrum 10 to the portions 9 which engage the rim of the recessed contact 5.

While my invention is particularly directed to electrical contact assemblies for use in combination with electric discharge devices and only several modifications are described, it will be apparent that my invention is not limited to its use in such devices or limited to the specific modifications described, and my invention is not to be limited except as set forth in the following claims.

I claim:

1. An electrical contact assembly comprising a recessed member provided with an overhanging rim, a pair of resilient members having projections extending under said rim and means to force said projections into contact with said rim.

2. An electrical contact assembly comprising a cup-shaped member having an inwardly extending rim, a pair of arcuate metal members, integral extensions on one end of said members shaped to engage said rim, and means to exert a pressure at the end of said members opposite said integral extensions whereby said extensions are forced into contact with said rim.

3. An electrical contact assembly comprising a cup-shaped member having a constricted opening, a pair of thin resilient members, portions of which extend within said opening, said resilient members being formed to contact one another at a fulcrum point and means to exert a force on said members transferable through said fulcrum point to force the portions extending within said opening against said cup-shaped member.

4. An electrical contact assembly comprising a cup-shaped member whose diameter at the open end is less than the diameter of a section within the member, a pair of arcuate members fitted back to back having portions extending within said cup-shaped member, and means to force said members into contact with the cup-shaped member, said means including a cap which extends over said arcuate members into close proximity with said cup-shaped member.

5. An electrical contact assembly comprising a member having an inwardly extending rim, a pair of arcuate metal plates positioned back to back having ears extending within said member, an extension on each of said plates, a perforated cap covering said plates with the exception of said extensions to force said plates against the inwardly extending rim of said member and means to make good electrical contact between said extensions and said perforated cap.

6. An electrical contact assembly comprising a cup-shaped member having an inwardly extending rim, a pair of resilient arcuate members with portions thereof extending within said cup-shaped member, an arcuate extension on each of said arcuate members extending with a portion of its concave surface facing the concave surface of the arcuate member, said members being positioned so that the arcuate extensions form an exposed surface which is substantially cylindrical, and means to force the portions of said resilient members extending within said cup-shaped member into contact with said member.

7. An electrical contact assembly comprising a metal cup with an inwardly extending rim, a pair of abutting metal members having portions formed to engage the metal cup at its rim, a plurality of serrations on each of said metal members and a contact cap enclosing said members and held to said members by said serrations.

8. In combination with an electric discharge device having an evacuated envelope, a metal cup with an inwardly extending rim sealed to said envelope and forming a small portion of the envelope wall, a pair of resilient abutting metal members having portions thereof engaging the rim of said metal cup and a cap positioned over said metal members to maintain said members in contact with said metal cup.

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