April 14, 1959 R. M. NORDBY 2,882,430

HIGH VOLTAGE CONNECTOR

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Fig. 1

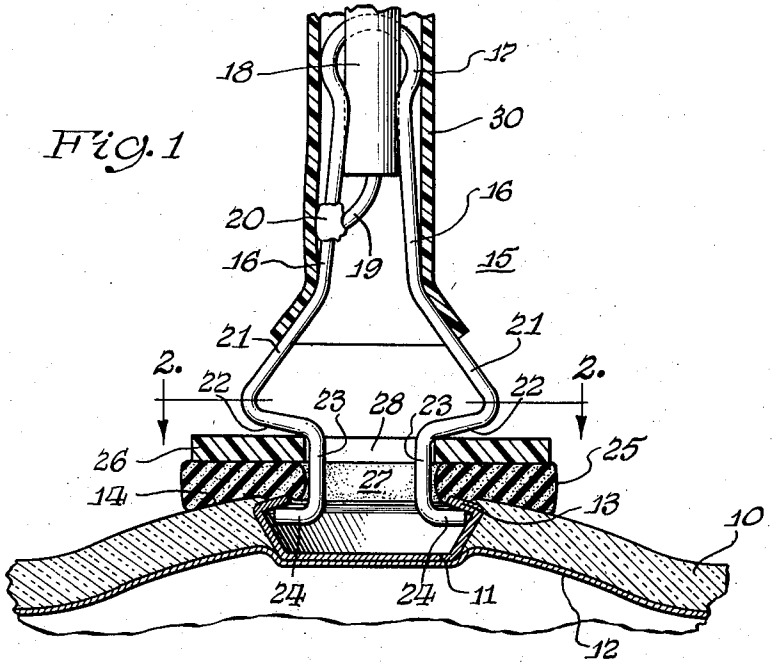


Fig. 2

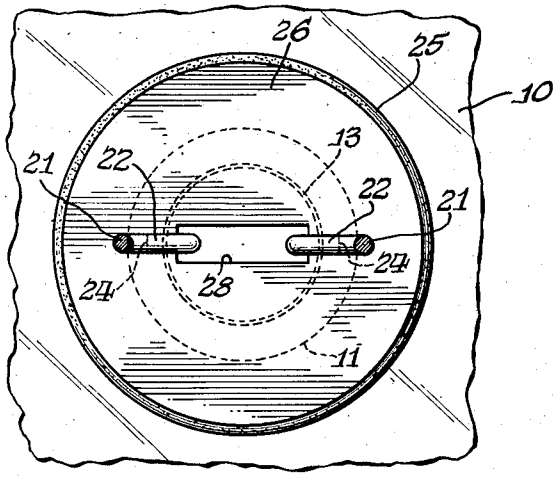
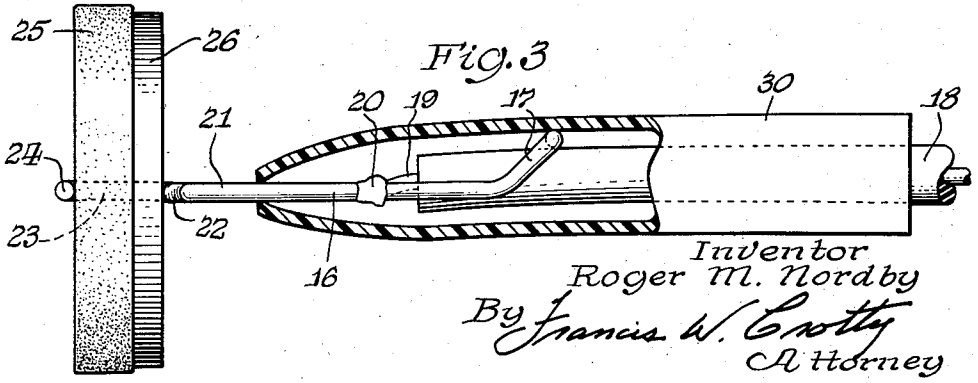


Fig. 3



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2,882,430

HIGH VOLTAGE CONNECTOR

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2 Claims. (Cl. 313—64)

The present invention relates to connectors for electron discharge devices; and more particularly to a corona suppressing connector for the anode of a cathode-ray tube.

With the introduction of large viewing screens in cathode-ray tubes it has been found that potentials of the order of eighteen to twenty thousand volts are desirable for best picture production. Such potentials create conditions conducive to corona adjacent the anode connector of the cathode-ray tube, and this is especially true where the anode connection is made by a high-voltage lead mechanically connected to a high-voltage "button," as it is called in the art, sealed into the tube envelope and in electrical connection with the anode inside the envelope. Corona is further increased by accumulation of dust and moisture adjacent the connector button. Such corona is annoying because of the attendant "crackling" noise.

Prior connectors devised to suppress corona have failed to provide sufficient detenting force when connected with the anode button and have occasionally snapped out of engagement when the conductor leading thereto was brushed against. This creates a dangerous shock hazard. To overcome this failing, high voltage connections have been provided with terminal clips to hold them securely in place. Such prior structures are both complicated and costly, constituting in effect two separate clips requiring attention when connecting and disconnecting the anode contact.

Accordingly, it is an object of the present invention to provide an improved corona suppressing connector for an electron discharge device.

A more specific object of the invention is to provide an anode connector for a cathode-ray tube with electrical and sound insulating provisions, for suppressing corona and noise caused thereby.

A connector constructed in accordance with this invention is adapted to engage any of several known contacts sealed within an envelope of an electron discharge device. It comprises an insulated conductor mechanically and electrically connected to a generally U-shaped terminal clip. This clip is made of resilient material, and terminal portions of the clip are shaped to engage the contact in the envelope. There is an offset portion in each leg of the clip defining, in conjunction with the terminal portions, a clamp section. A soft, compressible, resilient member of insulating material has a central aperture through which this clamp section projects. A stiff member of insulating material also has a central aperture through which the clamp section projects. The stiff member is positioned between the soft member and the offset portions. The length of the clamp section is so proportioned in relation to the compressed thickness of these members that the engagement of the connector with the contact firmly compresses the members within the clamp section. The resilient member is thereby pressed into firm contact with the envelope to suppress corona.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing, in the several figures of which like reference numerals identify like elements, and in which:

Figure 1 is an elevational sectional view of a high-voltage contact constructed in accordance with the invention.

Figure 2 is a sectional view taken along the lines 2—2 of Figure 1; and

Figure 3 is a side elevational view partly in section, of the contact of Figure 1.

Referring more in detail to the drawings, there is represented a section 10 of the envelope of an electron discharge tube, such as a cathode-ray tube of the type used in television sets. A metal contact 11, the so called "anode button," is sealed into the envelope during manufacture. The interior wall of the tube envelope is coated with a suitable conductive material 12, such as aquadag, in circuit with contact 11. The contact 11 may be of any suitable shape but, in general, it includes a portion designed to facilitate attaching a high-voltage lead thereto in such manner as to assure sound mechanical and electrical connections. In the construction illustrated there is a portion 13 in the form of an inturned flange to which the connection is made. This flange is substantially contiguous with the outer surface 14 of envelope 10.

The high-voltage connector for establishing a sound mechanical and electrical connection with contact 11 comprises a U-shaped connector or clip indicated generally by reference character 15. It is composed of a pair of legs 16 made of electrically conductive spring wire bent about a mid-point 17 to form a bight frictionally engaging an insulating coating 18 of a high-voltage conductor 19 connected to one of legs 16 as by solder 20. The legs 16 have offset portions 21 which define shoulders 22 for providing part of a clamp section 23. Terminal portions 24 of legs 16 are disposed away from each other in a manner to engage the under surface of flange 13 of contact 11 at substantially diametrically opposite points. End portions 24 are spaced with respect to shoulders 22 to complete therewith the clamp section 23 for a purpose more fully set forth below. With the parts in the position of use shown in Figure 1, an electrical circuit is completed from conductor 19 through legs 16, terminal portions 24 and contact 11 to the conductive coating 12 on the inside periphery of envelope 10.

The potential applied in the above described connection to the tube anode is, in the present day tubes, in the order of eighteen to twenty thousand volts. It is contemplated that with larger cathode-ray tubes or color tubes even higher voltages may be utilized. Such voltages tend to create corona. The present invention provides a device for suppressing corona that may otherwise be experienced at the high voltage connection. For this purpose the high-voltage contactor further comprises a soft, compressible, resilient member 25 made of sponge rubber or suitable synthetic that can be pressed into engagement with envelope surface 14 regardless of normal surface irregularities. A stiff member 26 is disposed above member 25 and is engaged by the clamp shoulders 22. The members 25 and 26 have elongated apertures 27 and 28 respectively of substantially the same size through which the clamp sections 23 defined between the terminal portion 24 and the clamp shoulders 22 project.

The length of clamp section 23 is proportioned with respect to the compressed thickness of members 25 and 26 so that as the connection is applied, by engaging terminal portions 24—24 with flange 13 of contact 11 as

shown in Figure 1, soft member 25, is firmly pressed against the outer surface 14 of the tube envelope. A flexible insulating tube 30 encloses legs 16 and provides a finger grip used when flexing the legs 16.

To engage clip 15 with contact 11, its legs 16 are pressed together so that their span becomes less than the internal diameter of flange 13. The clip is then inserted into contact 11 and its terminal portions enter beneath flange 13. In order to accomplish this insertion of the clip, it is necessary to compress member 25 and when legs 16 are released to engage the under surface of flange 13, member 25 remains compressed. A firm electrical and mechanical connection has now been made between the high-voltage connector and the anode button 11 and at the same time member 25 has been firmly pressed against the tube envelope to suppress corona and any noise or "crackling" incident to corona.

The resiliency of member 25 is such that the reaction pressure thereof acting against shoulders 22 causes the longitudinal axis of the terminal clip 15 to stand at substantially 90 degrees with respect to the surface of the envelope 10. This attribute renders stability to the clip 15 and simplifies servicing. The relatively soft member 25 in engagement with the surface 14 offers a resistive path to corona and suppresses same. Because of the softness of the member 25, noise attendant such corona as may still exist is damped and crackling" is inhibited. In addition the area 14 is sealed against deposits of dust and moisture. Accordingly, it is seen that a terminal connector is provided that is readily connected or disconnected; and the device for suppressing corona is positioned and compressed firmly against the tube wall simultaneously with the clipping of the terminal ends 24 into position in the contact 11.

While a particular embodiment of the invention has been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention.

I claim:

1. A connector for completing an electrical connection to a contact sealed within an envelope of an electron-discharge device comprising: an insulated conductor; a generally U-shaped terminal clip of conductive and resilient material mechanically and conductively connected to one end of said conduetor, the terminal portions of said clip being shaped to engage said contact; an offset portion in each leg of said clip defining, in conjunction with said terminal portions, a clamp section; a soft, compressible, resilient member of insulating material having a central aperture through which said clamp section projects; and a stiff member of insulating material also having a central aperture through which said clamp section projects and positioned between said soft member and said offset portions, the length of said clamp section being so proportioned in relation to the compressed thickness of said members that the engagement of the connector with said contact firmly compresses said members within said clamp section.

2. A corona suppressing high voltage connector for completing an electrical connection to a high voltage contact sealed within an envelope of an electron-discharge device comprising: an insulated conductor; a generally U-shaped terminal clip of conductive and resilient material mechanically and conductively connected to one end of said conductor, the terminal portions of said clip being shaped to engage said contact and complete a circuit connection thereto from said conductor; an offset portion in each leg of said clip defining, in conjunction with said terminal portions, a clamp section; a soft, compressible, resilient member of insulating material having a central aperture through which said clamp section projects; and a stiff member of insulating material also having a central aperture through which said clamp section projects and positioned between said soft member and said offset portions, the length of said clamp section being so proportioned in relation to the compressed thickness of said members that the engagement of the connector with said contact firmly compresses said members within said clamp section.

No references cited.