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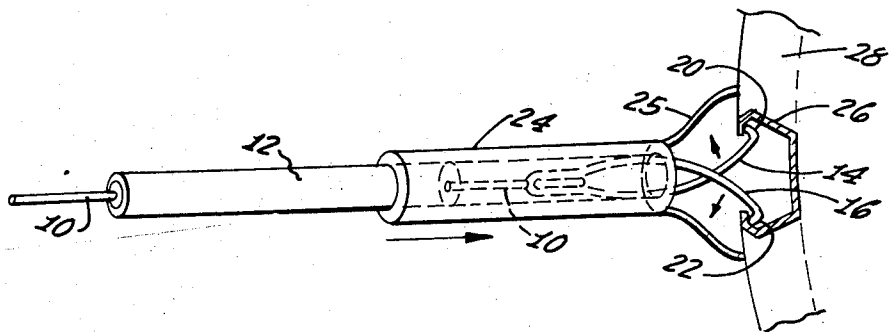
[54] **HIGH-VOLTAGE CONNECTOR**
6 Claims, 8 Drawing Figs.

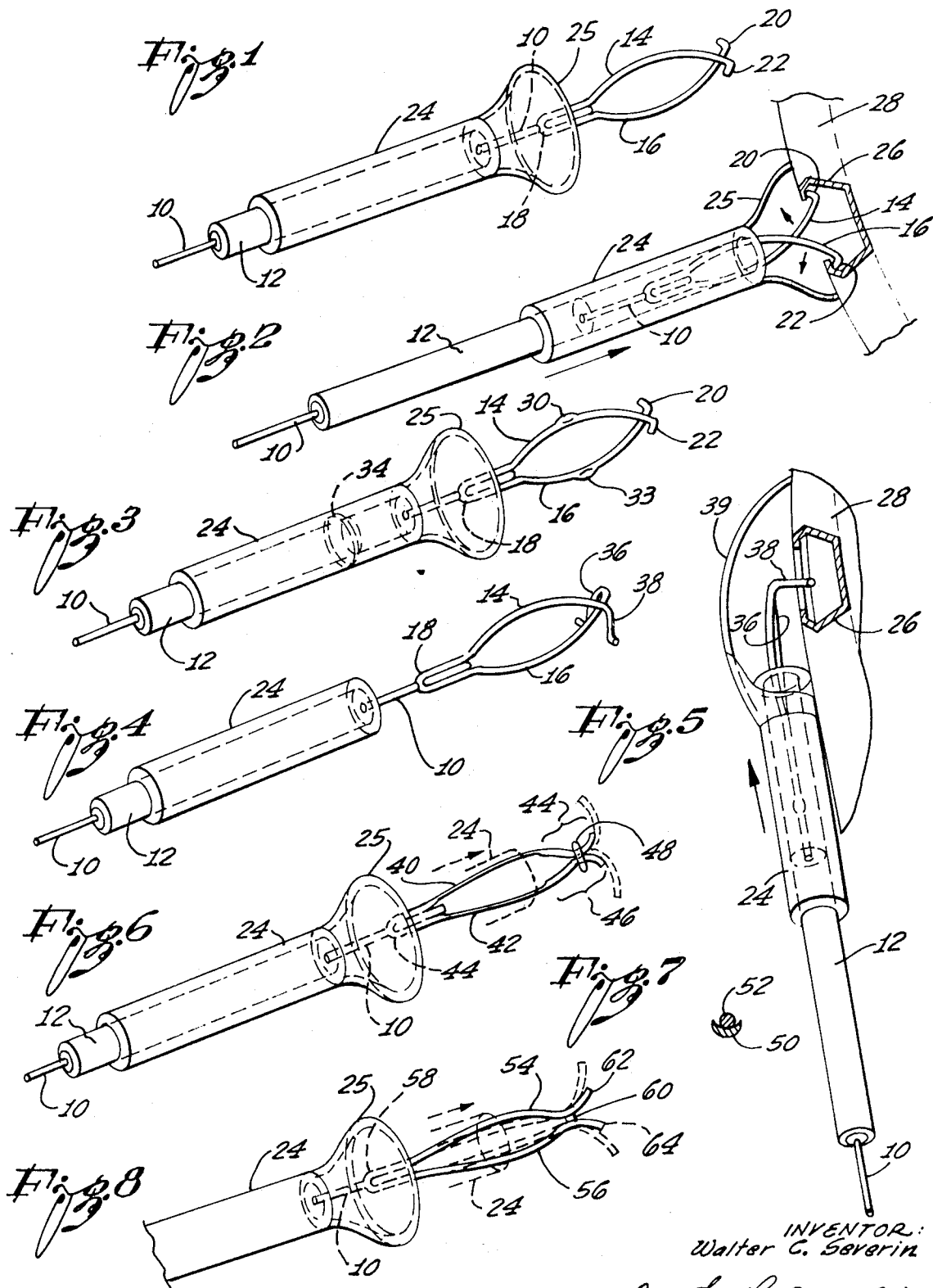
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ABSTRACT: A high-voltage connector is provided which includes a pair of contact members that are normally in a non-contacting position. The connection is made from the high-voltage conductor to a desired open contact area using a sliding member which produces an outward motion of the contact members to engage the contact area.





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HIGH-VOLTAGE CONNECTOR

The present invention is directed to an improved connector for high-voltage applications. For example, the present invention may be directed to a connector for use in attaching an anode lead to a cathode-ray tube such as a television picture tube. Most cathode-ray tubes in the prior art use a cavity containing a contact area for receiving the anode lead. The present invention includes a pair of contact members which are normally in a noncontacting position and which are moved in an outward direction to a contacting position using a sliding member.

Most of prior art means for attaching the anode lead to a cathode-ray tube such as a television picture tube employ a spring type of connector. For example, the prior art connectors normally use a pair of contact member which are biased in an outward contacting direction and the contact members are covered by an insulating member. The contact members are inserted into the contact cavity area of the cathode-ray tube by first depressing the insulating member which in turn depresses the contact members. When the contact members are depressed, the end portions of the contact members are inserted into the cavity area and the pressure on the insulating member is released to allow the end portions to expand outwardly to their normally biased position.

The manual compression of the insulation and the contact members in the conventional type of connector involves a shock hazard because the compression of the insulating member and the spring members is normally done in a rather confined space and it is difficult to provide for this compression without the possibility of touching the anode lead which normally carries a very high voltage of from 15,000 to 30,000 volts.

The present invention overcomes the difficulties with the prior art connectors by including contact members that are normally biased in a noncontacting position. These contact members include end portions which are used to make connections to the cavity contact area of the cathode-ray tube. The end portions are easily inserted into the cavity and a sliding member is moved which sliding member provides for an outward motion of the end portions to provide for a secure contact of the contact members to the cathode-ray tube. The removal of the connector is just as simple since it is only necessary to slide the sliding member in the opposite direction to allow the contact members to move to their normal noncontacting position. The end portions of the contact members may then be easily removed from the cavity in the cathode-ray tube.

The basic concept of the present invention may be accomplished in various ways such as the use of spring members for the contact members which spring members are independent of each other and are moved in an outward direction using the sliding member. Also, the contact members may have a rolling pivot area so that the sliding member provides for a rolling of one contact member on the other contact member to provide for the outward movement. Another possibility for the connector of the present invention is to use a pair of contact members which have a flexible pivot point and wherein the sliding motion of the sliding member provides for a flexing around this pivot point which flexing provides the outward movement of the ends of the contact members to make contact with the cathode-ray tube. Other aspects of the invention include means such as a detent to provide for a locking of the sliding member and also the use of a right-angle bend for the end portions of the contact members so that the connector may lie against the cathode-ray tube.

A clearer understanding of the invention may be had with reference to the following description and drawings wherein:

FIG. 1 is a first embodiment of the invention using a pair of spring wires as the contact members and showing the connector in the released position;

FIG. 2 illustrates the embodiment of the connector of FIG. 1 in the engaged position;

FIG. 3 illustrates a second embodiment of the invention similar to the first embodiment but including detent means;

FIG. 4 illustrates a third embodiment of the invention including a right-angle bend at the end portion of the contact members;

FIG. 5 illustrates the engaged position for the embodiment of FIG. 4 showing the connector lying adjacent to the cathode-ray tube;

FIG. 6 is a fourth embodiment of the invention using a rolling pivot formed by a ring;

FIG. 7 is a fifth embodiment of the invention showing a rolling pivot provided by the shape of the contact members; and

FIG. 8 is a sixth embodiment of the invention showing a flexible pivot for the contact members.

In FIG. 1 the high-voltage cable includes a lead wire 10 and a double insulation 12. The lead wire must be capable of carrying very high voltage such as voltages between 15,000 and 30,000 volts. The wire 10 extends past the end of the insulation 12 and a pair of spring contact members 14 and 16 are attached to the end of the wire 10. The contact members 14 and 16 may actually be formed of a single piece of spring wire which is bent and attached to the lead wire 10 at position 18.

The contact members 14 and 16 are bowed relative to each other and have end portions 20 and 22. An insulating member 24 is positioned as shown in FIG. 1 over the insulator 12. It can be seen that the inside diameter of the insulating member 24 is slightly larger than the outside diameter of the insulation 12. This allows the member 24 to be slid forwardly and backwardly over the insulation 12. The forward portion of the member 24 is flared outwardly to form a dust cover 25. The dust cover 25 may be constructed of flexible insulating material and may be a separate member which is attached to the member 24. It can be seen as shown in FIG. 1 that the contact members 14 and 16 are normally bent so that the end portions 20 and 22 are relatively close together. This is the normal released position for the connector of the present invention.

FIG. 2 illustrates the connector of FIG. 1 in the engaged position. The connector of FIG. 2 is shown engaging a contact cavity 26 of a cathode-ray tube 28. As can be seen in FIG. 2, the end portions 20 and 22 of the contact members 14 and 16 have been moved in and outward direction to contact the inner surface of the cavity 26. The outward movement of the end portions 20 and 22 is accomplished by sliding the insulating member 24 forward. The sliding of the insulating member 24 in a forward direction compresses the contact members 14 and 16 to produce this outward motion of the end portions 20 and 22. When the connector is in the engaged position as shown in FIG. 2, the dust cover 25 encloses the cavity 26 to prevent leakage along the glass during humid weather.

It can be seen, therefore, that the connector shown in FIGS. 1 and 2 is easily connected to the cavity 26 by merely placing the end portions 20 and 22 within the cavity 26 and sliding the insulating member 24 forward to produce the outward motion of the end portions 20 and 22 to contact the cavity 26. It is also very easy to release the connector shown in FIGS. 1 and 2. The release is accomplished by merely sliding the insulating member 24 away from the cathode-ray tube 28 which allows the contact members 14 and 16 to return to their normal position, shown in FIG. 1. Once the contact members 14 and 16 return to their normally biased position the end portions 20 and 22 are no longer in engagement with the cavity 26 and the connector may be removed.

The connector of the present invention eliminates problems with the prior art connectors wherein the person making the connection must squeeze together two wire members before inserting the ends of the wire members into the cavity. This operation is difficult to accomplish in close quarters and often the person making the connection receives a shock. The use of the sliding member eliminates the problem of squeezing wire members in close quarters which is present with the prior art connectors.

FIG. 3 illustrates an improvement over the embodiment of FIGS. 1 and 2 and similar elements in FIG. 3 to those in FIGS. 1 and 2 are given the same reference characters. Basically the embodiment in FIG. 3 is the same as that shown in FIGS. 1 and

2 except the embodiment of FIG. 3 includes a means of locking the connector so that the member 24 cannot inadvertently slide backwards which might disconnect the connector. This locking means consists of detent members 30 and 32 which are located on the contact members 14 and 16. The detent members 30 and 32 engage a groove 34 which is located on the inside surface of the insulating member 24.

When the insulating member 24 is slid forward, the detent members 30 and 32 enter the groove 34 to lock the insulating member 24 in position. It is desirable that the locking means do not lock the connector so securely that it is impossible to remove the connector. Therefore, the detent members 30 and 32 and the groove 34 are softly rounded so that the detents do not engage the groove 34 in such a manner that it will be too difficult to unlock the insulating member 24.

FIGS. 4 and 5 illustrate a third embodiment of the invention. In FIGS. 4 and 5 the elements similar to those shown in the embodiments of FIGS. 1 and 2 are given the same reference character. Specifically in FIGS. 4 and 5 the high-voltage conductor 10 includes the insulation 12. The pair of contact members 14 and 16 are attached to the conductor lead 10, for example, at the position 18. The insulating member 24 slides on the insulation 12 to provide for the outward movement of the end portions of the contact members 14 and 16. In the embodiments of FIGS. 4 and 5, the end portions of the contact members 14 and 16 are formed as right-angle portions 36 and 38.

It can be seen, therefore, as shown in FIG. 5 that the use of such a right-angle structure for the end portions 36 and 38 allows the connector to lie relatively close to the cathode-ray tube 28. In operation, the connector is placed adjacent the picture tube 28 with the end portions 36 and 38 inserted into the cavity 26. The insulating member 24 is then slid forward to provide for the outward motion of the end portions 36 and 38 so that the end portions engage the walls of the cavity 26 to provide for a connection between the high-voltage lead 10 and the cavity 26. It is to be appreciated that a locking means such as detent structure shown in FIG. 3 may be used with the embodiment of FIGS. 4 and 5. Also, a dust cover 39 constructed of insulating material may be slipped over the cavity area to preclude the entrance of moisture.

The present invention may also include other types of structures so as to provide for the outward motion of the end portions of a pair of contact members. For example, FIG. 6 illustrates an embodiment of the invention using a rolling pivot to provide for the outward motion of the end portions. In FIG. 6, the high-voltage lead 10 is surrounded by insulating material 12. The insulating member 24 is positioned over the insulating material 12. A pair of contact members 40 and 42 are joined to the lead wire 10 at the position 44.

The contact members 40 and 42 are composed of two portions. For example, the end portions 44 and 46 are composed of relatively stiff spring wire or rivet. The remaining portion of the contact members 40 and 42 is more flexible. A ring member 48 is disposed about the end portions 44 and 46 approximately intermediate the end portions 44 and 46.

It can be seen, therefore, that as the insulating member 24 is moved forward, the flexible portions of the contact members 40 and 42 are collapsed to allow the stiff portions 44 and 46 to roll through the ring member 48 and provide for an outward motion of the end portions. This motion can be seen by the dotted portions shown in FIG. 6.

It is to be appreciated that other structures may be provided for this rolling pivot. For example, in FIG. 7 a cross-sectional configuration is shown of an area between two contact members where a rolling pivot may be accomplished. It can be seen, for example, that one of the contact members 50 has a crescent shape and the second contact member 52 has a round configuration. The round portion fits within the crescent and therefore when the contact members are squeezed together in a manner similar to the collapsing of the members 40 and 42 shown in FIG. 6 by the insulating member 24, there is a rolling motion between the portions 50 and 52.

FIG. 8 illustrates another embodiment of the invention which provides for a flexible pivot. Contact members 54 and 56 are joined at position 58 to lead wire 10. The contact members 54 and 56 are relatively stiff and are joined by a flexible member 60. The contact members 54 and 56 include end portions 62 and 64. It can be seen, therefore, that as the insulating member 24 is slid forward to compress the contact members 54 and 56, the pivot 60 is flexed to provide for an outward motion of the end portions 62 and 64. This outward motion is shown by the dotted portion in FIG. 8.

It is to be appreciated, therefore, that the present invention generally is directed to a connector for high voltage wherein a pair of contact members have end portions and wherein a sliding member engages the contact members to provide for an outward motion of the end portion to provide for the electrical contact. Various embodiments have been shown providing this type of connector, but it is to be appreciated that other embodiments may be used. For example, the contact members may be made of round wires or flat ribbon without affecting the operation. The invention is only to be limited by the appended claims.

Claims:

1. An electrical connector for use in connecting a lead wire to an open contact area, including
 - a pair of contact members each having a main body and first and second ends and with the first ends of each contact member for connection to the lead wire and with the second ends of each contact member movable relative to each other and with the second ends normally in close proximity to each other,
 - an actuating member for engaging the pair of contact members and with the actuating member engaging the contact members to provide an outward motion of the second ends away from each other for connection within the open contact area and
 - a rolling pivot located intermediate the main bodies and the second ends of the contact members to provide a rolling of the contact members against each other to produce the outward motion of the second ends upon the activation of the sliding member.
2. An electrical connector for connecting a lead wire to a cavity contact area, including
 - a pair of wires each having a main body section which is outwardly bowed and each having first ends connected together and each having second ends normally in close proximity,
 - an insulating member positioned for sliding over the pair of wires and with the insulating member having an internal dimension less than the maximum distance between the pair of wires and with the insulating member normally positioned away from the second ends of the pair of wires, and
 - the insulating member when slid over the pair of wires toward the second ends of the wires moving the main body sections of the wires toward each other and producing an outward movement of the second ends of the pair of wires to have the pair of wires engage the cavity contact area.
3. The electrical connector of claim 2 additionally including a detent for locking the insulating member on at least one of the main body sections of the pair of wires.
4. The electrical connector of claim 2 wherein the second ends of the pair of wires are at an angle to the main body sections of the pair of wires.
5. The electrical connector of claim 2 additionally including a rolling pivot located intermediate the main bodies and the second ends of the contact members to provide a rolling of the contact members against each other to produce the outward motion of the second ends upon the activation of the sliding member.
6. The electrical connector of claim 2 additionally including a flexible pivot between the pair of wires to produce the outward movement of the second ends.