

Nov. 19, 1968

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3,412,366

ANODE CONNECTOR FOR KINESCOPE

Filed April 10, 1967

2 Sheets-Sheet 1

FIG. 1

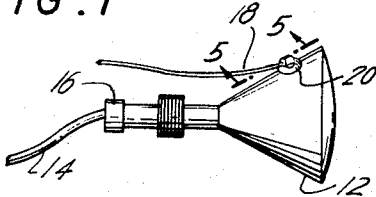


FIG. 2

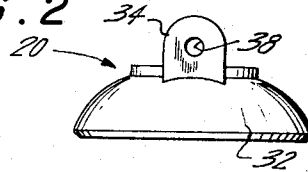


FIG. 3

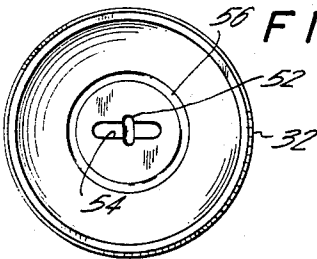


FIG. 4

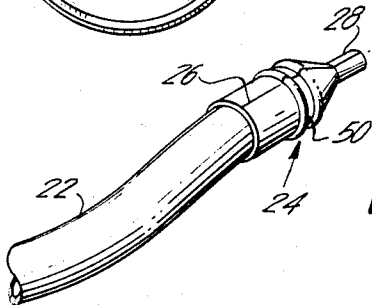
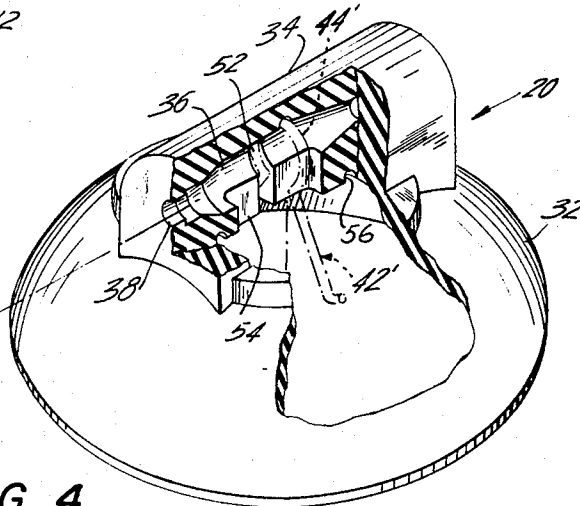
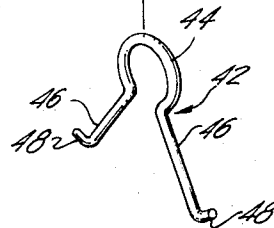
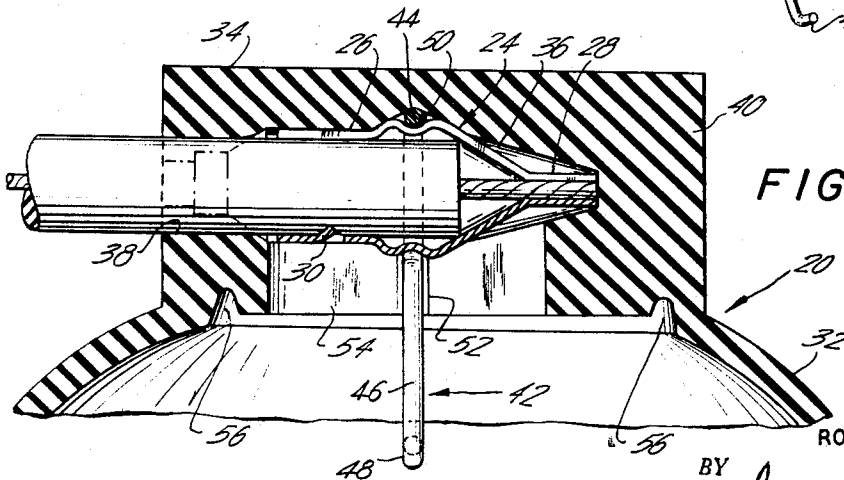


FIG. 5



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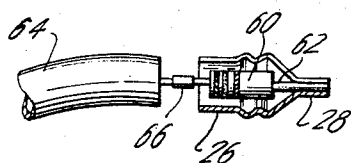


FIG. 6

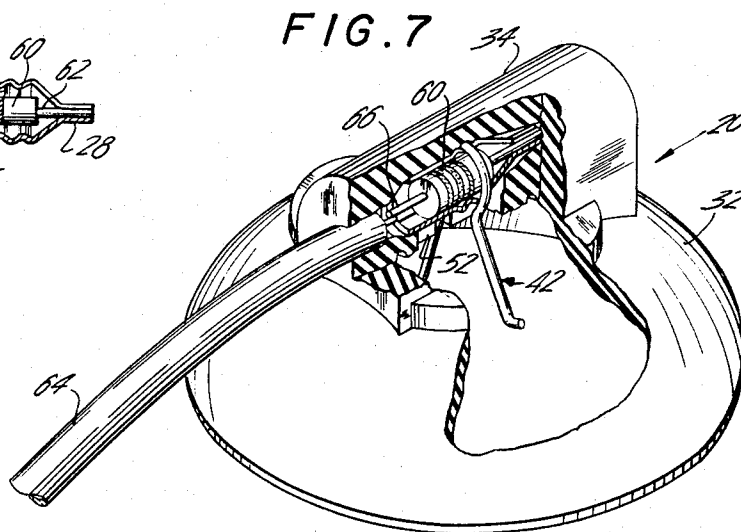


FIG. 8

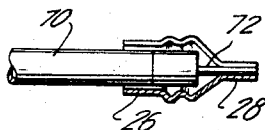
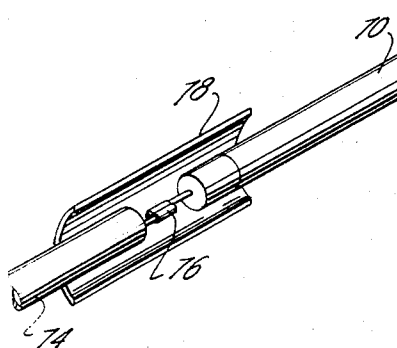
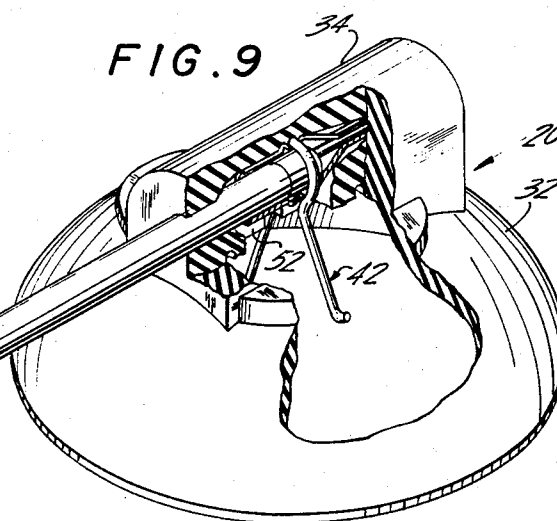


FIG. 9



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ANODE CONNECTOR FOR KINESCOPE

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13 Claims. (Cl. 339—60)

ABSTRACT OF THE DISCLOSURE

The usual anode connector has an anode lead which is electrically connected to a spring metal clip, and has a rubber cap somewhat like a suction cup to shield the clip and the ultor cap on the side of the kinescope. In the present improvement a metal ferrule having a reduced nose portion is preliminarily secured to the lead wire without the clip. The rubber cap has a lateral passage dimensioned to receive the ferrule with a stretch fit. The inside of the cap at the top is open to receive the eye of the clip, so that the ferrule may be pushed into the passage and through the eye of the clip with good electrical contact therebetween, and without need to draw the full length of the insulated wire through the rubber cap.

Background of the invention

In the present practice the high voltage lead wire is preliminarily secured to the resilient wire clip. In one form it may be wrapped around a part of the clip and soldered thereto (Wintriss Patent 2,704,837 issued March 22, 1955). In another form the stripped end of the conductor and the clip are received in a metal ferrule which is crimped in a press to secure the parts together and to provide electrical contact (Rosenberg and Coppola Patent 3,267,412, issued Aug. 16, 1966). These methods require that the free end of the high voltage wire be inserted through the rubber cap from the inside, and that the entire length of the wire be drawn through a tight hole in the cup. This is a difficult assembly operation requiring special tools to enlarge the hole. The parts have sharp edges which produce a corona effect at the high voltages here used, say 25,000 volts.

Summary of the invention

With the present improvement a metal ferrule having a body portion and a reduced nose portion is preliminarily applied to the lead wire. The resilient clip has an eye, and usual connector legs to be received in the ultor cap of the cathode ray tube. For convenience the tube is referred to hereinafter as a kinescope, but the tube may be an oscilloscope tube as well as a television picture tube. The rubber cap has a skirt with a barrel portion extending laterally thereover, and this provides a passage which is dimensioned to receive the ferrule and lead wire with a stretch fit. The inside of the cap at the top is open to the passage in order to receive the eye of the clip. For assembly the ferrule is pushed from the outside into the passage and the eye of the clip with a tight engagement which provides good electrical contact between the ferrule and the eye. The body portion of the ferrule preferably has an annular groove dimensioned to receive the eye of the clip with a snap fit. The inside of the rubber cap preferably has a transverse slot intersecting the passage and dimensioned to receive and to locate the eye of the clip during assembly. There is no need to draw the full length of the high voltage wire in reverse direction through the cap.

The body portion of the ferrule is dimensioned to be clamped on the insulation of the high voltage lead, while

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the nose portion is clamped on the stripped metal wire. However, the body portion may also act as a housing for a small component such as a resistor or a rectifier when such a component is to be connected in series with the anode lead.

The foregoing and additional features are described in the following detailed specification, which is accompanied by drawings in which:

FIG. 1 is explanatory of how the anode connector is used;

FIG. 2 is an elevation of the rubber cap;

FIG. 3 is a bottom plan view of the rubber cap;

FIG. 4 is a perspective view explanatory of how the parts of the anode connector are assembled;

FIG. 5 is a vertical section taken approximately in the plane of the line 5—5 of FIG. 1;

FIG. 6 is a fragmentary section showing a resistor inserted in the anode connector;

FIG. 7 is a perspective view;

FIG. 8 is a fragmentary section showing one end of a rectifier inserted in the anode connector; and

FIG. 9 is a perspective view.

Referring to FIG. 1 of the drawing, the kinescope 12 has most of its connections applied through a multiple wire cable or harness 14, leading to a detachable socket 16, which is applied to a ring of pins at the end of the neck of the kinescope. However, there is a separate high voltage anode lead 18 which is connected to a so-called ultor cap at the side of the kinescope, the connection being shielded by a rubber cap 20 which is much like a suction cup. The other end of the flexible anode lead 18, not shown, extends to a high voltage power supply, also not shown.

Referring now to FIGS. 2–5 of the drawing, the anode connector comprises an insulated high voltage lead wire 22 to which a metal ferrule 24 is secured. The ferrule has a body portion 26 and a nose portion 28 of reduced diameter, and when dealing with a high voltage insulated wire as here shown, the body portion 26 is clamped on the insulation of the wire at the same time that the nose portion 28 is clamped on the stripped metal end of the stranded flexible core wire, as shown in FIG. 5. As a further anchorage and strain relief, a part of the metal body may be indented into the insulation of the wire as shown at 30 in FIG. 5. This may be a simple continuous indentation, or the metal may be pierced to provide a tang as shown in FIG. 5.

The rubber cap 20 has a circular skirt 32 with a barrel portion 34 extending laterally thereover. This barrel portion has a hollow passage 36 with an opening 38 at one end, the other preferably being closed as shown at 40 in FIG. 5. The passage 36 is dimensioned to receive the ferrule 24 with a stretch fit, and the opening 38 receives the insulated anode wire 22 with a stretch fit. The rubber is preferably a carbon-free "neoprene".

The anode connector is completed by a resilient clip 42, best shown at the bottom of FIG. 4. This is made of spring wire, sometimes referred to as music wire or piano wire. It is usually tinned or plated with another metal to avoid corrosion for improved electrical contact. It comprises an eye 44 and connector legs 46. The lower ends are bent as shown at 48 for anchorage inside the flange of the metal button or ultor cap of the kinescope. The particular clip here shown is formed in a single plane, but other and more complex shapes are sometimes used. For the present purpose the clip should have an eye 44 dimensioned to receive the body of the ferrule 24.

In preferred form the body portion of the ferrule has an annular groove 50 which receives the eye 44 with a snap engagement, thus providing a good mechanical connection as well as good electrical contact. The ferrule may

be made of sheet steel which is tinned or plated to avoid corrosion.

To assemble the parts of the anode connector the clip 42 is inserted in the rubber cap, as shown by the change from the solid line position 42 to the broken line position 42' in FIG. 4. The ferruled end of the conductor 22 is then inserted in the cap through the hole 38, it being pushed into the passage 36 and through the eye 44 of the clip until the eye is received with a snap fit in the groove 50 of the ferrule. A special tool of known type may be and preferably is provided to facilitate the insertion, but this is not essential. This completes the assembly, with no need to laboriously draw the entire length of the anode wire in reverse direction through the cap as was formerly done, because heretofore the clip 42 was secured to the wire 22 before adding the rubber cap 20.

For the present purpose the inside of the cap at the top preferably is formed with a transverse slot 52 which intersects the passage 36, and which is dimensioned to receive and to locate the eye 44 of the clip.

The inside of the cap at the top also has a larger slot 54 extending in a direction longitudinal of the passage 36 and leading into the passage. One purpose of this slot is to facilitate the molding operation when making the cap, but it also serves to somewhat ease the necessary expansion of the passage 36 to fit around the ferrule.

The inside of the cap also has a circular channel 56, best shown in FIGS. 3 and 5. This facilitates turning the skirt 32 upward out of the way when desired, as when applying the clip to the ulior cap of the kinescope. The skirt then is turned down, and the legs of the clip are so dimensioned, relative to the depth of the skirt, that the skirt bears snugly against the side wall of the kinescope. It will be noted that with the construction here shown there are no sharp points which might lead to corona discharge.

As so far described the larger diameter body portion 26 of the ferrule is used to receive or to be clamped on the insulation of the high voltage anode lead 22. However, it may also act as a housing for a small component. Sometimes it is desired to connect a resistor in series in the anode supply. Such an arrangement is shown in FIGS. 5, 6 and 7, in which the resistor is a miniature resistor 60, and has one of its leads 62 clamped in the nose portion 28 of the ferrule, while the resistor 60 is itself housed in the body portion 26 of the ferrule. The other lead of the resistor 60 is physically and electrically connected to the anode lead 64, as by means of a metal clip 66 which is compressed or crimped around the wires. A soldered connection could be used.

In FIGS. 8 and 9 the component being connected in series is a rectifier 70. Here again one lead 72 is received and clamped in the nose portion 28 of the ferrule. In this case the component is longer than the body portion 26 of the ferrule, and it projects out of the rubber cap. Its other lead is connected to anode lead wire 74 (FIG. 9), as by means of a metal connector 76, and the connection may be insulated, as by means of a small insulation sleeve 78, shown split open to expose the connector 76.

It will be understood that in all cases the connections may if desired be soldered, instead of relying on mechanical compression alone. This includes the nose of the ferrule. It will also be understood that while the ferrule 24 is here shown as seamed or longitudinally split, it also may be made seamless.

It is believed that the construction and method of assembly of my improved anode connector, as well as the advantages thereof, will be apparent from the foregoing detailed description. It will also be understood that while I have shown and described the invention in a preferred form, changes may be made without departing from the scope of the invention, as sought to be defined in the following claims.

I claim:

1. An electrical connector comprising a lead wire, a

metal ferrule having a body portion and a nose portion, a resilient clip having an eye with connector legs, and a rubber cap having a skirt with a barrel portion extending laterally thereover, said skirt being open at the bottom and said connector legs being accessible through the open bottom of the skirt for releasable connection, the nose of said ferrule being clamped on the lead wire, the barrel portion of the cap having a passage extending laterally of the skirt, and dimensioned to receive the ferrule with a stretch fit, and the inside of the cap at the top being open to said passage to receive the eye of the clip, whereby the clip may be inserted in the cap with its eye at the passage, and the ferrule pushed into the passage and the eye with good contact between the ferrule and the eye.

2. An electrical connector as defined in claim 1, in which the body portion of the ferrule has an annular groove dimensioned to receive the eye of the clip with a snap fit.

3. An electrical connector as defined in claim 2, in which the inside of the cap at the top has a transverse slot intersecting the passage and dimensioned to receive and to locate the eye of the clip.

4. An electrical connector as defined in claim 3, in which the inside of the cap at the top has a slot extending in a direction longitudinal of the passage and leading into the passage, and has a circular channel which facilitates turning the skirt upward out of the way when desired.

5. An electrical connector as defined in claim 4, in which the ferrule has a small diameter nose portion which is clamped on the metal lead wire, and a larger diameter body portion which is dimensioned to be clamped on the insulation of a high voltage insulated wire, and in which the said annular groove is formed in the larger diameter body portion of the ferrule.

6. An electrical connector as defined in claim 5, in which a miniature resistor is received in the ferrule, one lead of the resistor being clamped by and electrically connected to the nose portion of the ferrule, and the other lead of the resistor being electrically connected to one end of an insulated high voltage lead wire.

7. An electrical connector as defined in claim 5, in which an elongated rectifier has one end located in the ferrule, one lead of the rectifier being clamped by and electrically connected to the nose portion of the ferrule, and the other lead of the rectifier being electrically connected to one end of an insulated high voltage lead wire.

8. An electrical connector as defined in claim 1, in which the inside of the cap at the top has a transverse slot intersecting the passage and dimensioned to receive and to locate the eye of the clip.

9. An electrical connector as defined in claim 1, in which the inside of the cap at the top has a slot extending in a direction longitudinal of the passage and leading into the passage, and has a circular channel which facilitates turning the skirt upward out of the way when desired.

10. An electrical connector as defined in claim 1, in which the ferrule has a small diameter nose portion which is clamped on the metal lead wire, and a larger diameter body portion which is dimensioned to be clamped on the insulation of a high voltage insulated wire, but which alternatively may receive a small component, and in which an annular groove is formed in the larger diameter body portion of the ferrule to receive the eye of the clip with a snap fit.

11. An electrical connector as defined in claim 1, in which a miniature resistor is received in the ferrule, one lead of the resistor being clamped by and electrically connected to the nose portion of the ferrule, and the other lead of the resistor being electrically connected to one end of an insulated high voltage lead wire.

12. An electrical connector as defined in claim 1, in which an elongated rectifier has one end located in the ferrule, one lead of the rectifier being clamped by and electrically connected to the nose portion of the ferrule,

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and the other lead of the rectifier being electrically connected to one end of an insulated high voltage lead wire.

13. In the manufacture of an electrical connector comprising a flexible insulated high voltage lead wire, a metal ferrule, a resilient clip having an eye with connector legs, and a rubber cap having a skirt and having a passage extending laterally of the skirt, said skirt being open at the bottom and said connector legs being accessible through the open bottom of the skirt for releasable connection, the method which includes clamping the ferrule on one end of the lead wire, inserting the clip in the cap with the eye of the clip at the passage, and pushing the ferrule into the passage and the eye with good contact between the ferrule and the eye.

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References Cited

UNITED STATES PATENTS

2,142,818	1/1939	Jacobson	339—223
2,147,915	2/1939	Morris	339—254
2,385,792	10/1945	Carlson	339—223
2,648,030	8/1953	Kiekhaefer	339—26
3,258,732	6/1966	Martin	339—59
3,267,412	8/1966	Rosenberg et al.	339—223

FOREIGN PATENTS

1,157,427	12/1957	France.
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