Jan. 27, 1953 W. J. COYLE 2,626,978

SHEATHED PLUG CONNECTOR

Filed March 27, 1948 2 SHEETS--SHEET 1

FIG. 1.

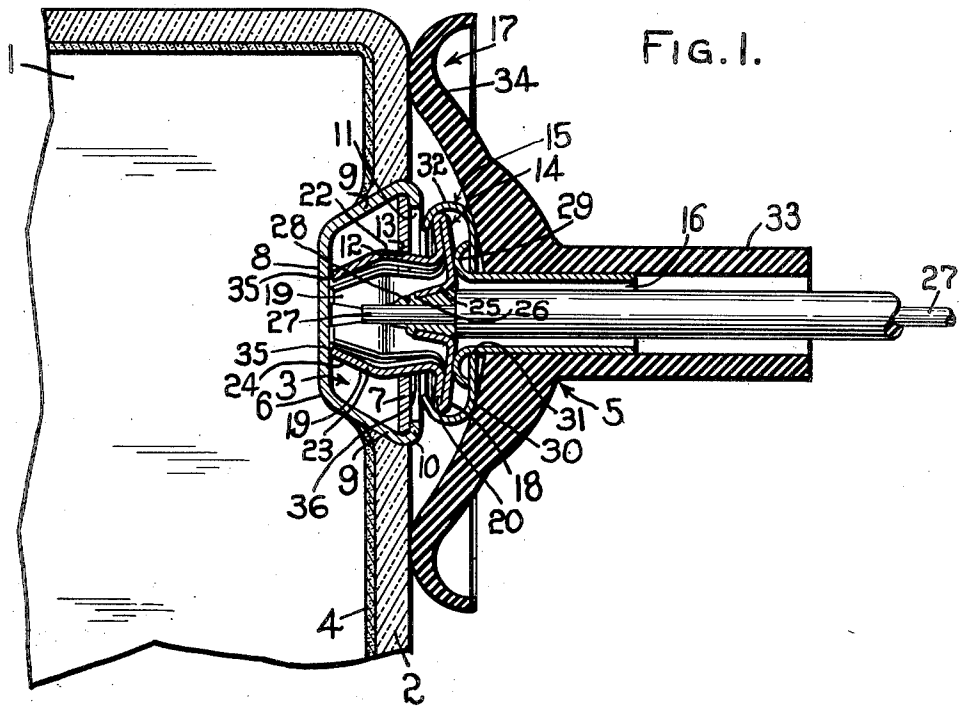

FIG. 2.

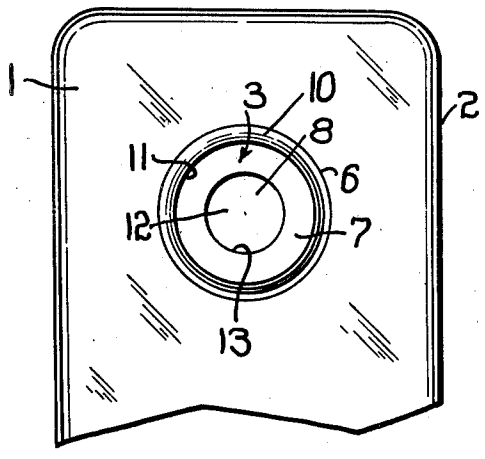

FIG. 3.

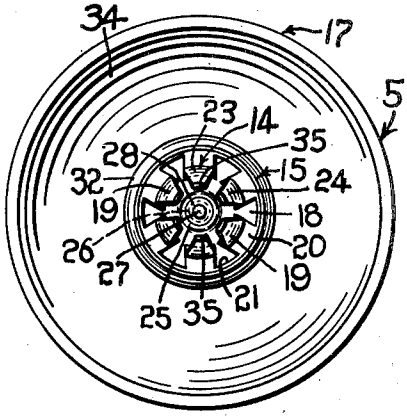

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FIG. 4.

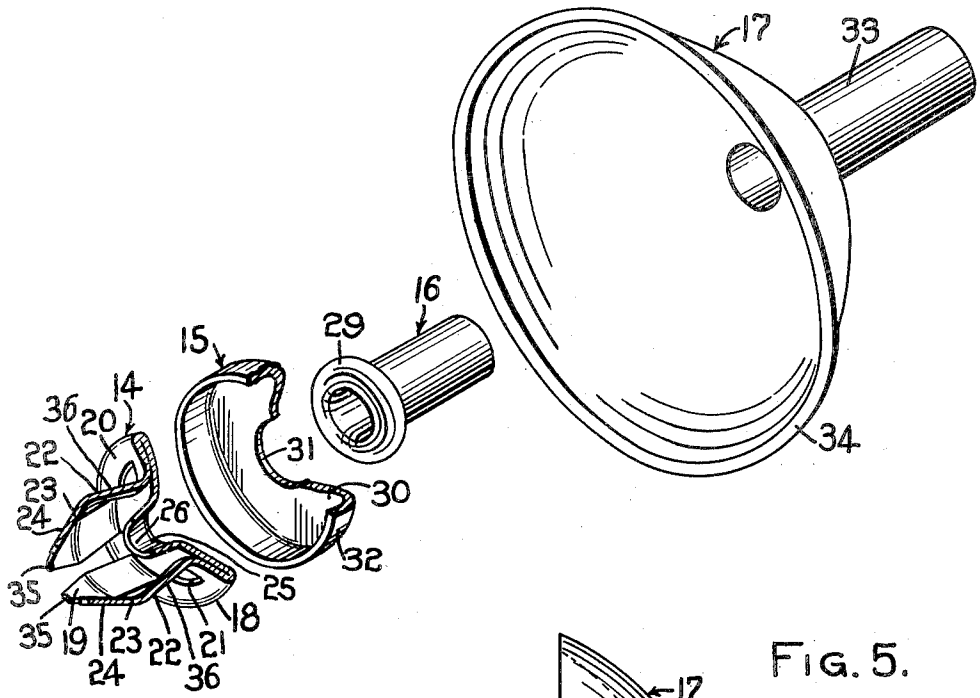


FIG. 5.

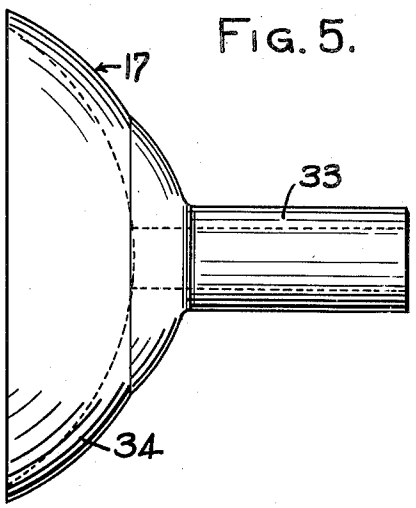


FIG. 6.

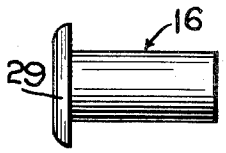


FIG. 7.

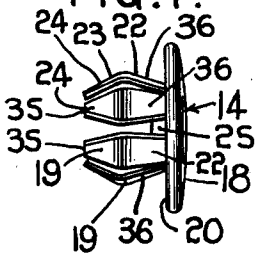
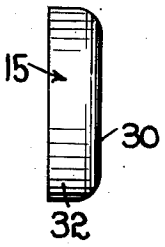


FIG. 8.



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UNITED STATES PATENT OFFICE

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SHEATHED PLUG CONNECTOR

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2 Claims. (Cl. 173—363)

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The present invention relates to electrical connectors such for example as are used for making electrical connection with the second anode terminal of a kinescope tube.

Many electrical discharge tubes such as cathode ray tubes are provided with one or more contact terminal units embedded in and sealed to the glass wall of the tube. These terminals are connected interiorly of the tube to a lead on the internal tube circuit and have a part exposed to the outside of the tube, for example a snap fastener socket unit for snap fastener engagement with a stud member connected to a suitable conductor. The present invention aims generally to improve such connectors.

The principal object of the present invention is to provide a connector of the type described that is easy to manufacture and assemble. A further object of the invention is to provide an easily manufactured and assembled connector that presents exterior surfaces devoid of sharp edges or points so as to reduce or eliminate the tendency for corona discharge in high voltage circuits. Other objects and features will be apparent from the description of the invention which follows.

Referring to the drawing in which I have illustrated a preferred embodiment of my invention:

Fig. 1 is a fragmentary view of a portion of an electron discharge tube, for example, a kinescope tube showing one form of my improved connector, the parts thereof being shown in section to better illustrate the construction;

Fig. 2 is an elevation of a portion of the electron discharge tube shown in Fig. 1 showing the socket unit of the connector;

Fig. 3 is an end elevation of the plug unit;

Fig. 4 is an exploded perspective view of the plug unit with the stud portion and attaching ring shown in section;

Fig. 5 is a side elevation of the insulating sheath of the plug unit;

Fig. 6 is a side elevation of the metal sheath of the plug unit;

Fig. 7 is a side elevation of the stud member of the plug unit; and

Fig. 8 is a side elevation of the attaching ring of the plug unit.

Referring to the drawing, the tube 1 which in illustrated form may be a kinescope tube is formed with the usual glass walls 2 having a socket terminal unit 3 sealed therein. The socket unit 3 projects into the interior of the tube and is electrically connected to the internal circuit of the tube by a carbon lining 4 of the inner surface of the glass wall 2 which electrically engages the socket unit 3. The socket unit 3 is electrically connected to a circuit of the apparatus by a plug unit 5 which with the socket unit 3 forms the electrical connector to which the invention is particularly directed.

Referring to the socket unit of my improved connector I have illustrated in Fig. 1 a preferred

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construction comprising a cup-shaped member 6 and a plate element 7. The cup-shaped member 6 is preferably drawn from a piece of sheet metal and has a bottom portion 8 and side walls 9 extending outwardly from the bottom portion 8 in a direction laterally of the axis of the cup-shaped member 6. A flange element 10 is provided at the ends of the side walls 9 away from the bottom portion 8. The flange 10 extends inwardly in a plane substantially parallel to the bottom portion 8 and surrounds an opening 11 at the open side of the cup-shaped member 6 through which the conductor element of the plug unit 5 projects in electrical connection of the parts. The plate element 7 is disposed at the open end of the cup-shaped member 6 and is clamped in firm electrical engagement with the cup-shaped member 6 between the flange 10 and the inner surface of the outwardly inclined side walls 9. The plate element 7 has an opening 12 disposed in alignment with the opening 11 of the cup-shaped member 6 to receive the plug unit 5. The opening 12 of the plate 7 is formed of a predetermined diameter whereby the walls 13 of the plate element surrounding the opening 12 electrically engage the plug unit 5 in the connection of the plug and socket units, 5 and 3 respectively, of the connector as will be hereinafter described.

Referring specifically to the plug unit 5, my preferred form includes a stud member 14 joined by a connecting ring 15 to a protective sheath 16 which is provided with an insulating covering 17. The stud member 14 is generally in the form of a plug button having a head portion 18 with arcuate prongs 19 extending from adjacent the peripheral edge of the head portion 18 in a direction generally normal to the plane thereof. The head portion 18 may generally be a circular disk with a lip 20 extending from the peripheral edge and lying adjacent one face of the disk. The arcuate prongs 19 extend from the free edge 21 of the lip 20 and have outwardly extending portions 22 adjacent the head portion 18 for engaging the inner walls 13 of the opening 12 of the plate element 7 of the socket unit 3 and have adjacent their outer ends inwardly extending portions 23 for engaging the bottom portion 8 of the socket unit 3 and providing camming surfaces 24. Substantially, in the center of the head portion 18 there is disposed a depression 25 extending in the same direction as the prongs 19 and provided with an aperture 26 at the base of the depression 25. A connecting wire 27 coated with solder 28 may be inserted into the depression 25 through the aperture 26 and affixed by soldering.

The protective sheath 16 may generally be a metal tube having an annular flange 29 at one end. The protective sheath 16 is assembled to the stud member 14 by a ring member 15 comprising a disk 30 with an aperture 31 through

which the protective sheath 16 may pass and having an annular flange 32 extending generally axially from the peripheral edge of the disk 30 and preferably joined thereto by rounded exterior surfaces. In assembling the sheath 16 to the stud member 14 the sheath is inserted through the aperture 31 in the disk 30 with the flange 29 on the tube 16 resting against the portions of the disk 30 adjacent the aperture 31. Then the head 18 of the stud portion 14 is inserted within the annular flange 32 of the ring member 15 and the flange 32 is crimped upon the lip 20 of the stud member 14. A lead wire 27 is assembled to the stud member by soldering it in the depression 25 in the head 18 with the wire 27 extending through the aperture 26 at the base of the depression 25.

The insulating sheath 17 which protects the operator from electrical shock in connecting or disconnecting the plug units 5 has a sleeve portion 33 which covers the protective sheath 16 extending for a distance beyond the straight end of the sheath 16 and an integral flange 34 or apron at the end of the sleeve 33 adjacent the stud member 14 to limit movement of the fingers of an operator toward the exposed end of the plug unit 5. In connecting the plug and socket units 5 and 3 the stud is moved into the opening of the socket unit 3. During this action the camming surfaces 24 of the arcuate prongs 19 will engage the edges 13 surrounding the opening 12 thereby contracting the prongs 19. In the final position of the stud the outer ends 35 of the arcuate prongs 19 abut the bottom of the cup-shaped member 6 to effect a wiping engagement between the ends of the arcuate prongs 19 and the inner surface of the bottom 8 of the cup-shaped member 3. At the same time the outwardly inclined engaging surfaces 36 of the stud abut the edges 13 of the opening 12 under spring tension to make a good electrical engagement at those points. This double engagement between the plug and socket units results in a secure and efficient electrical connection.

It will be apparent to persons skilled in the art that the connector of the present invention is extremely simple in construction and economical in the cost of manufacture. The provision of a three part plug unit of easily manufactured parts is particularly advantageous both from the standpoint of manufacture as well as assembly.

Furthermore, as will be apparent, the liability of corona discharge at the connector is reduced to a minimum. This is due to the fact that the exterior metal surfaces of the plug unit 5 may all be made rounded while the arcuate prongs 24 are contained within the socket unit 3, so that there will be no sharp points or edges on the exterior surface of the connector. The socket unit 3 provides a continuous conducting shield around the prongs 24 and the ring member 15 provides a continuous conducting shield around the head portion 18 of the stud member 14 and the annular flange 29 of the tubular member 16, thereby eliminating substantially any tendency of corona discharge or limiting substantially the extent of such corona discharge.

Although I have illustrated and described a preferred embodiment of my invention, I do not wish to be limited thereby as the scope of my invention is best described in the following claims.

I claim:

1. An electrical connector plug unit of the type described comprising a tubular protective sheath having an outwardly turned flange at one end, a one-piece terminal member having a head portion provided with a central conductor core-receiving seat and an annular series of resilient bowed contact members arranged annularly around said seat in spaced relation thereto and disposed substantially normal to the head portion of said terminal inwardly of the marginal edge of said head, means encompassing the marginal edge of said head and flange of said sheath for connecting said terminal member and protective sheath in assembled relation so that said sheath is coaxial with the core-receiving seat, said assembled sheath and terminal adapted to have a conductor extended axially through the sheath and a bared terminal end thereof soldered in the seat of said terminal, and a resilient insulating handle surrounding said plug unit and including a sleeve portion surrounding and connected to said protective sheath and an annular cup-shaped flange portion surrounding and spaced radially outwardly of said plug contact member and adapted to make contact with a surface disposed in a plane of at least a part of a socket member to which said plug is attached.

2. An electrical connector plug unit of the type described comprising a tubular protective sheath, a one-piece terminal member having a head portion provided with a central forwardly extending conductor core-receiving seat and an annular series of resilient bowed contact members arranged annularly around said seat in spaced relation thereto and disposed substantially normal to the head portion of said terminal, means for connecting said terminal member and protective sheath in assembled relation so that said sheath is coaxial with the core-receiving seat, said assembled sheath and terminal adapted to have a conductor extended axially through the sheath and a bared terminal end thereof soldered in the seat of said terminal, and a resilient insulating handle surrounding said plug unit and including a sleeve portion surrounding and connected to said protective sheath and an annular cup-shaped flange portion surrounding and spaced radially outwardly of said plug contact member and adapted to make contact with a surface disposed in a plane of at least a part of a socket member to which said plug is attached.

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