Feb. 28, 1939. L. W. COOK 2,149,084

ELECTRIC RECEPTACLE

Filed May 22, 1936

Fig. 1.

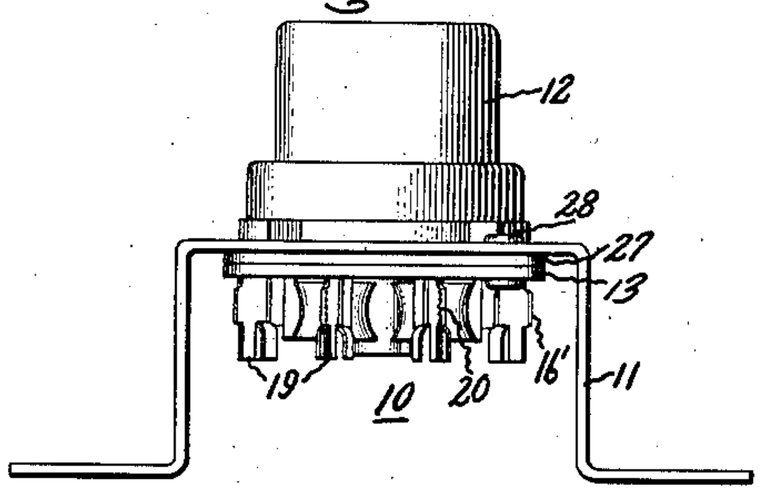


Fig. 2.

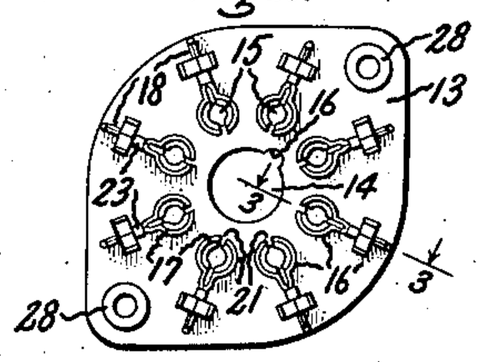


Fig. 3.

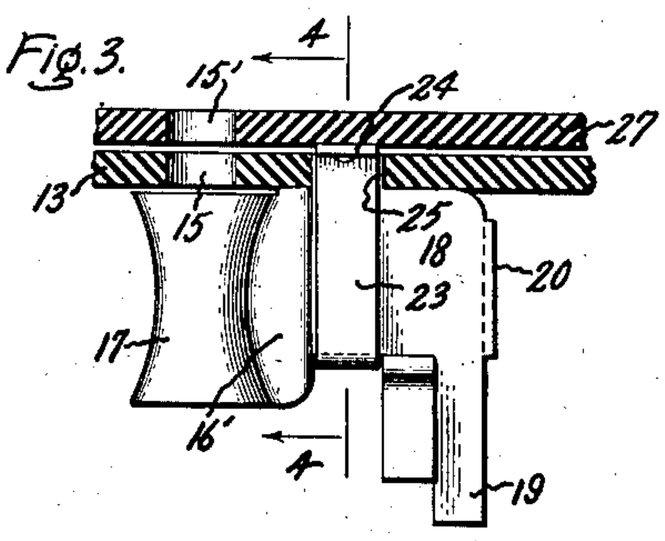


Fig. 4.

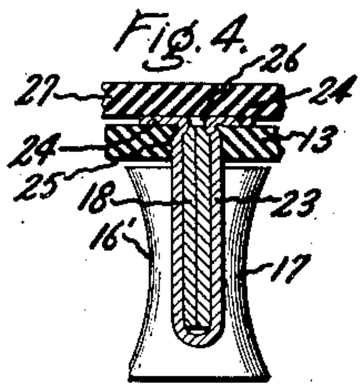


Fig. 5.

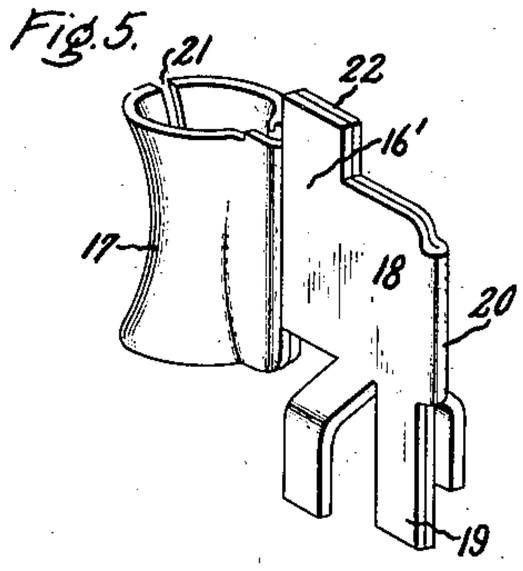
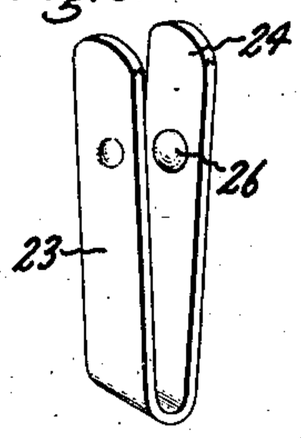


Fig. 6.



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Patented Feb. 28, 1939 2,149,084

UNITED STATES PATENT OFFICE

2,149,084

ELECTRIC RECEPTACLE

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Application May 22, 1936, Serial No. 81,205

4 Claims. (Cl. 173—328)

My invention relates to improvements in electrical receptacles or sockets. More particularly, my invention relates to a socket receptacle for vacuum tubes.

An object of my invention is to provide an improved receptacle or socket particularly for radio vacuum tubes which insures efficient contact with each and every prong of a plug-in device and to thereafter maintain such efficient contact.

Another object of my invention is to provide an improved receptacle, comprising relatively few different parts, which can be readily mounted on a panel which will have an insulated front and which will be cheap to manufacture.

A further object of my invention is to provide a receptacle which co-operates with a vacuum tube or the like, such that any given prong of the tube is always received by a predetermined prong receiving contact structure.

A further object of my invention is to provide a novel prong receiving contact structure formed from a single piece of metal.

My invention will be more fully set forth in the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims appended to and forming a part of this specification.

In the drawing, which illustrates one embodiment of my invention, Fig. 1 is a side view of the socket receptacle, showing the parts thereof in assembled relationship, the receptacle supporting structure and a radio vacuum tube plugged into the receptacle; Fig. 2 is a bottom view of the socket receptacle showing the prong receiving contact structures depending from the bottom thereof; Fig. 3 is a partial section taken along line 3—3 of Fig. 2, showing one of the prong receiving contact structures secured in place; Fig. 4 is a partial section taken along the line 4—4 of Fig. 3; Fig. 5 is a perspective view of one of the contact structures; and Fig. 6 is a perspective view of the means which fastens the contact structure in place in the receptacle.

Referring to the drawing, particularly Fig. 1, there is shown my socket receptacle, designated generally at 10, in assembled relationship, in combination with a suitable supporting structure 11, and a radio vacuum tube 12 of the metal tube type, plugged into the socket receptacle. In Figs. 2 and 3, it will be observed that the socket receptacle 10 includes a plate of insulating material 13 provided with a guide passage 14 and a plurality of prong receiving passages 15 therein. Preferably, guide passage 14 is centrally disposed in plate 13 and prong receiving passages 15 are symmetrically disposed about guide passage 14. Of course the disposition of prong receiving passages 15 depends upon the disposition of the co-operating prongs distributed about the base of vacuum tube 12, as the passages must receive the tube prongs.

The guide passage 14 is provided with a suitable groove 16 in at least one portion thereof which, together with the guide passage allows the vacuum tube 12 to be inserted into the socket receptacle only when the tube is in a predetermined position with respect to the socket receptacle. This relationship between the vacuum tube and the socket receptacle is effected by the co-operation between guide passages 14 and its groove 16 in the socket receptacle plate 13 and a central guide member provided with a key (not shown) on the vacuum tube 12. The keyed central guide member on the vacuum tube is made somewhat longer than the prongs thereabout for a purpose hereinafter described.

Thus, it is apparent, due to co-operation above described, that any given prong on vacuum tube 12 is always received by a predetermined prong receiving passage 15 in the plate of insulating material 13.

A plurality of independent contact structures 16 depend from plate 13 on the underside thereof in alignment with prong receiving passages 15 so as to receive the prongs disposed about the base of vacuum tube 12 when the tube is inserted into the socket receptacle. These contact structures firmly grip the prongs of the vacuum tube and securely hold the tube in place in addition to serving as electrical connections for the elements within the vacuum tube.

It is impossible for the prongs on the vacuum tube to make contact with the contact structures unless the tube is in proper relation with respect to the socket receptacle, as the tube prongs are shorter than the keyed central guide member on the tube.

Referring to Figs. 3 and 5, the contact structure 16′ comprises a contact portion 17 for receiving the prong of a vacuum tube, a body portion 18 and a lead-connection portion 19, formed from a single piece of metal. Preferably, the structure is struck from a piece of metal of high conductivity, such as copper or brass, and subsequently formed into the desired shape, thus producing a rugged integral structure. The struck blank comprises complementary halves which are folded together along fold 20, during the forming process, to produce the contact structure shown in Fig. 5.

The contact portion 17 of the structure is preferably formed as a hyperboloid of revolution so as to have a throat portion of less cross-sectional area than either open end of the hyperboloid. That is, the diameter of the throat of the contact is less than the diameters of the open ends of the contact. Furthermore, the diameter of the upper open end of the contact is greater than the diameter of the prong on the vacuum tube,

which the contact will receive, while the diameter of the throat of the contact is slightly smaller than the diameter of the prong. Thus, it will be apparent that when a prong is inserted through prong receiving passage 15, in insulating plate 13, into the contact portion 17 of contact structure 16' that the warped surface of the contact portion between the upper open end and the throat of the same will guide the prong easily into place and cause the prong to spread or strain the contact out of shape. The contact is free to spread, being split along its surface at 21 where the complementary halves of the same come together.

The body portion 18 of the contact structure 16' is provided with an integral tab 22 which cooperates in securing the structure in proper alignment with passage 15, as will be more fully described hereinafter, while the lead connection portion 19 is provided with a plurality of integral tails to receive suitable connecting wires. These tails may be tinned and conveniently soldered to a plurality of connecting wires.

As hereinbefore pointed out, each contact structure 16' is independently secured to plate 13. This securing means includes a U-shaped steel clip 23, shown in Fig. 6, the U of which embraces the body portion 18 of contact structure 16' and firmly holds the structure to the underside of plate 13. The ends 24 of clip 23 pass through an aperture 25 in plate 13 and are bent over to secure the contact structure 16' in place as is shown in Fig. 4. Bosses 26 are formed in clip 23 just at the point where the ends 24 of the clip are bent over in order to prevent the contact structure from rocking in the U of the clip.

Tab 22 on the body portion of the contact structure also projects into aperture 25 in plate 13, thus positively aligning contact portion 17 with prong receiving passage 15.

As better indicated in Fig. 3, the top of contact portion 17 is spaced from plate 13 to which it is secured by means of clip 23. As may be seen in Fig. 2, the contact portions 17 of adjacent contact structures 16' are in close proximity and if these contact portions 17 rested on the plate 13, the creepage path at this point along plate 13 would be very short. However, by providing an air space between the contact portion 17 and plate 13 the shortest creepage path is between the body portions 18 of adjacent contact structures 16' where they are secured to plate 13 by clips 23. This greatly increases the voltage at which the socket will break down. In addition, the space between contact portion 17 and plate 13 increases the distance a contact prong must travel before it engages the contact and insures a proper indexing of the radio tube before it is inserted in the socket so the hazard of making an improper contact and injuring the tube is reduced.

A second plate 27 of insulating material, congruent with plate 13 and provided with a passage coincident with passage 14 and with a second passage 15' coincident with the passage 15, is superimposed upon plate 13 on the side thereof opposite the contact structures, to provide an insulated front for the socket receptacle, and is secured thereto together with supporting structure 11, by a plurality of eyelets 28 or the like. Plates 13 and 27 engage the ends 24 of clip 23, thus preventing the same from slipping or working loose. Eyelets 28 secure the component parts of socket receptacle 10 together in assembled relationship and further secure the socket as a whole to its supporting structure 11.

When a prong on vacuum tube 12 is inserted into contact portion 17 of the contact structure 16' the contact portion will spread and hinge about the inner edge of clip 23. This increases both the resiliency of the contact structure and the efficiency of the electrical contact between the prong and the contact structure throughout the life of the socket. As the clip 23 permits the contact structure 17 to expand on a long radius as compared with a contact finger which bends at its base on a short radius, this permits it to return to its original shape after the prong is withdrawn therefrom and so extends the useful life of the socket.

While I have illustrated and described one embodiment of my invention, modifications thereof will occur to those skilled in the art. I desire it to be understood, therefore, that my invention is not to be limited to the particular arrangement disclosed and I intend, in the appended claims, to cover all modifications which do not depart from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a socket of the plug-in type, a sheet of insulating material having a passage therethrough to receive a prong contact, a contact structure depending from said sheet said structure including closely adjacent elements having opposed surfaces for receiving said prong contact, and a U-shaped clip extending through an aperture in said sheet and embracing said elements to fasten said contact structure to said sheet and to prevent separation of said elements while said surfaces hinge about said clip upon receiving a contact prong.

2. In a socket, a sheet of insulating material having a passage therethrough to receive a prong contact and having an aperture, a contact structure having a contact surface and having an integral tab extending into said aperture, and a U-shaped clip embracing a portion of said structure said clip extending through said aperture and securing said structure to said sheet.

3. In a socket, a sheet of insulating material having a passage therethrough to receive a prong contact and having an aperture, a contact structure having a contact surface and having an integral tab extending into said aperture, and a U-shaped clip embracing a portion of said structure said clip passing through said aperture to secure said contact structure to said sheet, said U-shaped clip having bosses to engage opposite edges of said tab to prevent the rocking of said contact structure relative to said sheet.

4. In a socket, a sheet of insulating material having a passage therethrough to receive a prong contact and having an aperture therethrough adjacent said passage, a contact structure comprising a metal sheet folded back upon itself, portions of said folds being provided with integral tabs extending into said aperture and other portions of said folds being formed to provide opposed contact surfaces, said surfaces being in axial alinement with said passage to receive a contact prong, and a U-shaped clip embracing said first-mentioned portions of said folds and said tabs, and extending through said aperture to secure said contact structure to said sheet.

LEONARD W. COOK.