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N. R. SMITH

2,291,001

ELECTRICAL SOCKET

Filed April 11, 1941

Fig. 1

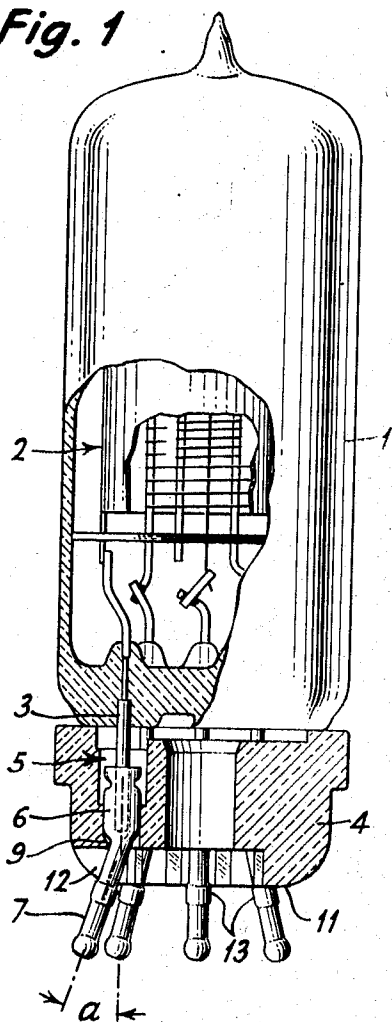


Fig. 2

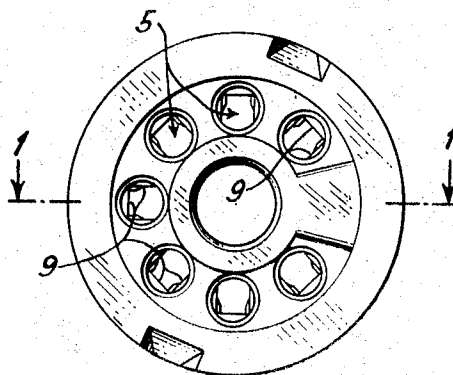


Fig. 3

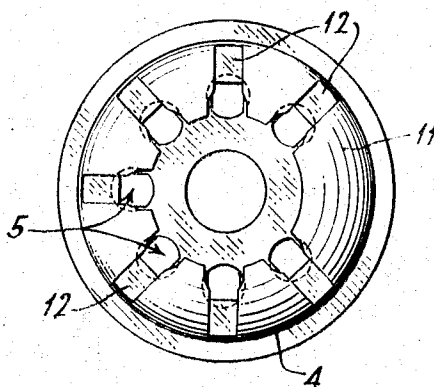


Fig. 6

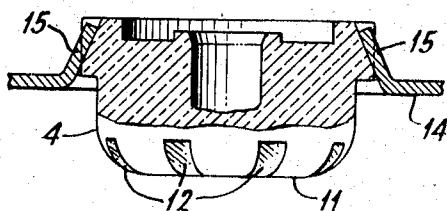


Fig. 7

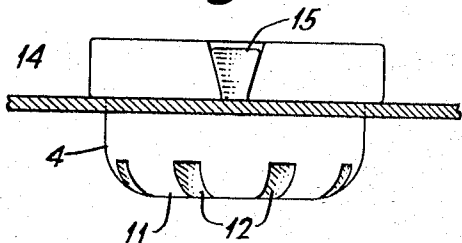


Fig. 4

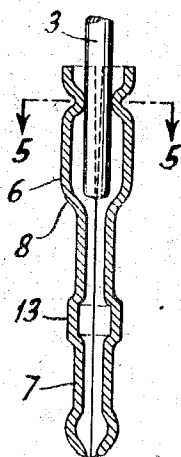
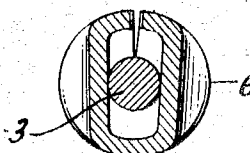


Fig. 5



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2,291,001

ELECTRICAL SOCKET

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Application April 11, 1941, Serial No. 388,014

4 Claims. (Cl. 173—328)

My invention relates to electrical receptacles, particularly to sockets for receiving the contact pins or male connecting elements of such devices as radio tubes and terminal plugs.

In my copending application, Serial No. 265,091, filed March 31, 1939, and entitled Sockets, I describe a tubular one-piece female contactor for sockets comprising a round barrel portion for receiving contact pins and a round coaxial shank of reduced diameter. The barrel and shank of the contactor are swaged from a tube of large diameter. Such a contactor cannot be passed through a hole in the socket body and the shank bent or crimped to lock the contactor in place without disturbing or distorting the adjacent metal in the walls of the contact barrel.

An object of my invention is an improved socket with tubular female contactors.

Another and more specific object of my invention is an improved socket for receiving and retaining, by a positive lock, a round one-piece female tubular contactor with an integral end-to-end contact barrel and shank.

The characteristic features of my invention are defined in the appended claims and one embodiment thereof is described in the following specification and shown in the accompanying drawing in which:

Figure 1 is a vertical sectional view, along line 1—1 of Figure 2, of my improved socket, showing a radio tube in place;

Figure 2 is a top plane view of the socket of Figure 1;

Figure 3 is a bottom plane view of the socket of Figure 1;

Figure 4 is a longitudinal sectional view of one contactor adapted to my improved socket;

Figure 5 is a sectional view of the tubular contactor taken along line 5—5 of Figure 4; and

Figures 6 and 7 are, respectively, sectional and side views of my socket and its fastening means in a metal chassis.

To facilitate the description of one embodiment of my socket, it is shown and described in combination with a radio tube. The tube 1 is conventional in construction, having internal electrodes 2 connected to male contact members or pins 3 arranged, preferably, in a circle in the base of the tube. The socket body 4 is of molded insulating material of ceramic or commercial plastics such as "Bakelite" and is provided with a number of longitudinally extending holes 5. Into the upper end of each hole is inserted a tubular female contactor with a round barrel portion 6 and an integral round shank portion 7

of smaller diameter than the barrel. The shoulder 8 joining the shank and barrel rides on a constricting ledge 9 formed in the hole below the upper end of the hole the desired distance to position the opening in the barrel below the top surface of the socket body 4. The ledge 9 may be annular and concentric with the hole 5 or it may be rectangular as best shown in Figure 2 with three straight edged ledge portions protruding into the hole. The minimum diametric distance between the ledges is such as to just clear the shank as it is pushed downwardly through the hole.

I provide, according to my invention, novel means for positively locking the contactors in the socket body, such means facilitating rapid assembly of the contactors with the body and providing a positive lock for the contactor in the body. The bottom surface of the socket body is curved at 11 and is provided with a radially extending groove 12 communicating with the lower end of opening 5. The width of the groove is sufficient to receive the shank of the contactor but is narrower than the enlargement or stop bead 13 swaged on the shank. The stop beads are spaced from the shoulder 8 a distance slightly greater than the distance between the shoulder-to-ledge bearing surface and the bottom plane of the socket body. When the lower end of the shank 7 is bent radially outward through angle α , the stop bead 13 rides outwardly over the curved surface 11. The round swaged shank of the contactor is relatively stiff and cannot be straightened to disengage the contactor from the socket body by ordinary handling in use. Engagement between the sides of the shank and the sides of the grooves 12 prevents rotation of the contactor about its longitudinal axis of the contact barrel. Experience has shown that the contactor when locked will bend about a point between the shank and the barrel and that a bend angle α of 30° or less will not spring or distort the barrel portion of the contactor.

The center of curvature of the rounded portion 11 of the socket body is preferably on the center line of the contact barrel. This center of curvature may be either above or below the bend point of the shank. If this center is above the bend point, the shoulder of stop bead 13, as it moves radially outward, will draw in toward the curved surface 11 at the edges of the radial slot and tighten the shoulder 8 of the barrel against its ledge 9, and immobilize the barrel. If, however, this center of curvature is below the bend point of the shoulder, stop bead 13 is car-

ried, as the shank is bent outwardly, away from the curved surface 11. In some sockets it is desirable to permit limited freedom of the contact barrel in its hole so as to facilitate its alignment with the contact pins as they are inserted. Limited movement is desirable where the mechanical strength of the contact pins is not as great, and where there may be some variation in the pin spacings.

Grooves 12 are just wide enough to receive the shank portion of the contactors but narrower than the stop bead 13. The sides of the groove 12 are preferably parallel and, as viewed lengthwise of the socket body, see Figures 2 and 3, the sides of the grooves intersect and pass within the circle defined by the contact barrel 6 and its hole. The shoulder thus provided on the lower surface of the socket body deflects the straight shank portion of the contactor as it is loaded into the socket and underlies the stop bead 13 when the contactor is fully inserted and straightened in the socket. Minimum bending of the shank is thus required to carry the bead 13 into locking engagement with the edges of the groove 12. The grooves are conveniently molded with their bottom portions flat and in a common plane perpendicular to the longitudinal axis of the socket body, as shown. These bottom portions could, however, be inclined to the axis of the socket body and parallel to the outwardly bent shank 7. These bottom portions, hence, may conveniently serve as stops for the outward bending of the contactor shanks.

Good results have been obtained in assembling sockets of the type shown in which the socket body is only .623 inch in diameter, and in which seven holes 5 are loaded with contactors having a barrel outside diameter of .085 inch, a shank diameter of .045 inch and a stop bead diameter of .065 inch, the contactor being swaged from cooper or steel stock as thin as .02 inch.

The small socket of my invention is conveniently locked in its chassis 14 as shown in Figures 6 and 7 by setting the socket into a round hole of a mean diameter equal to the diameter of the socket. Die cut lugs 15 integral with the sides of the hole in the chassis are struck up from its edges to admit the socket body. The lugs 15 may then be peened inwardly into complementary fan-shaped notches in the flange of the socket body to securely lock the socket in place.

My improved socket for tubular female contactors receives and retains by a positive lock round one-piece female tubular contactors with integral end-to-end contact barrel and shank, and is easy to make and assemble.

I claim:

1. A socket comprising a cylindrical body of insulating material, said body having a plurality of parallel longitudinal holes arranged in a circle concentric with the body, a one-piece female tubular contactor in each hole, each contactor comprising a barrel portion to internally receive a contact pin and an integral round shank of

less outside diameter than said barrel, said shank having an enlarged bead spaced below the shoulder portion that joins the barrel and shank, a ledge in the hole engaging said shoulder, grooves in the bottom surface of said body extending radially of the body and intersecting said holes, each shank being bent outwardly at an obtuse angle into its groove with the bead of each shank overlying said surface at the edges of its groove.

2. A socket comprising a cylindrical body of insulating material, said body having a hole longitudinally therethrough and a straight sided groove in the end surface of the body communicating with said hole, a female contactor comprising a tubular barrel open at one end to receive a male contact element and having a relatively stiff tubular shank integral with its other end, said shank being of less diameter than said barrel, a bead on said shank spaced from said other end of the barrel, said hole being slightly larger than said barrel and having a ledge to engage said other end of the barrel, said groove being smaller than said barrel and said bead but large enough to receive said shank, the depth of the groove longitudinally of the insulating body being slightly less than the distance between said bead and said shoulder, said shank being slightly bent near said shoulder to carry said shank at least partially into said groove so that a portion of said bead overlies the edge of said groove.

3. A socket comprising a body of insulating material, said body having a hole therethrough, a tubular contactor having a contact barrel and a shank, said shank being of smaller transverse dimension than the barrel and the shoulder between the barrel and shank riding on a ledge in said hole, an enlargement on said shank spaced from said shoulder, a relatively deep groove in said body intercepting said hole, said groove being, in width, intermediate the transverse dimensions of the shank and said enlargement, said shank being deflected slightly from the axis of said barrel into said groove so that said enlargement overlies the edges of the groove.

4. A socket comprising a body of insulating material, said body having a hole therethrough, the bottom surface of said body opposite the end of said hole being rounded, said hole having a constricting ledge intermediate its ends, a contactor in said hole, said contactor having a shoulder, and a shank of reduced diameter, said shank having a bead spaced from said shoulder, said shoulder engaging said ledge to restrict longitudinal movement of the contactor in one direction; a groove in the bottom of said body extending from the rounded surface to said hole and being of a depth only slightly less than the distance between said shoulder and said bead, said shank being bent near said shoulder through an angle less than 30 degrees so that said bead overlies said surface to restrict longitudinal movement in the other direction.

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