

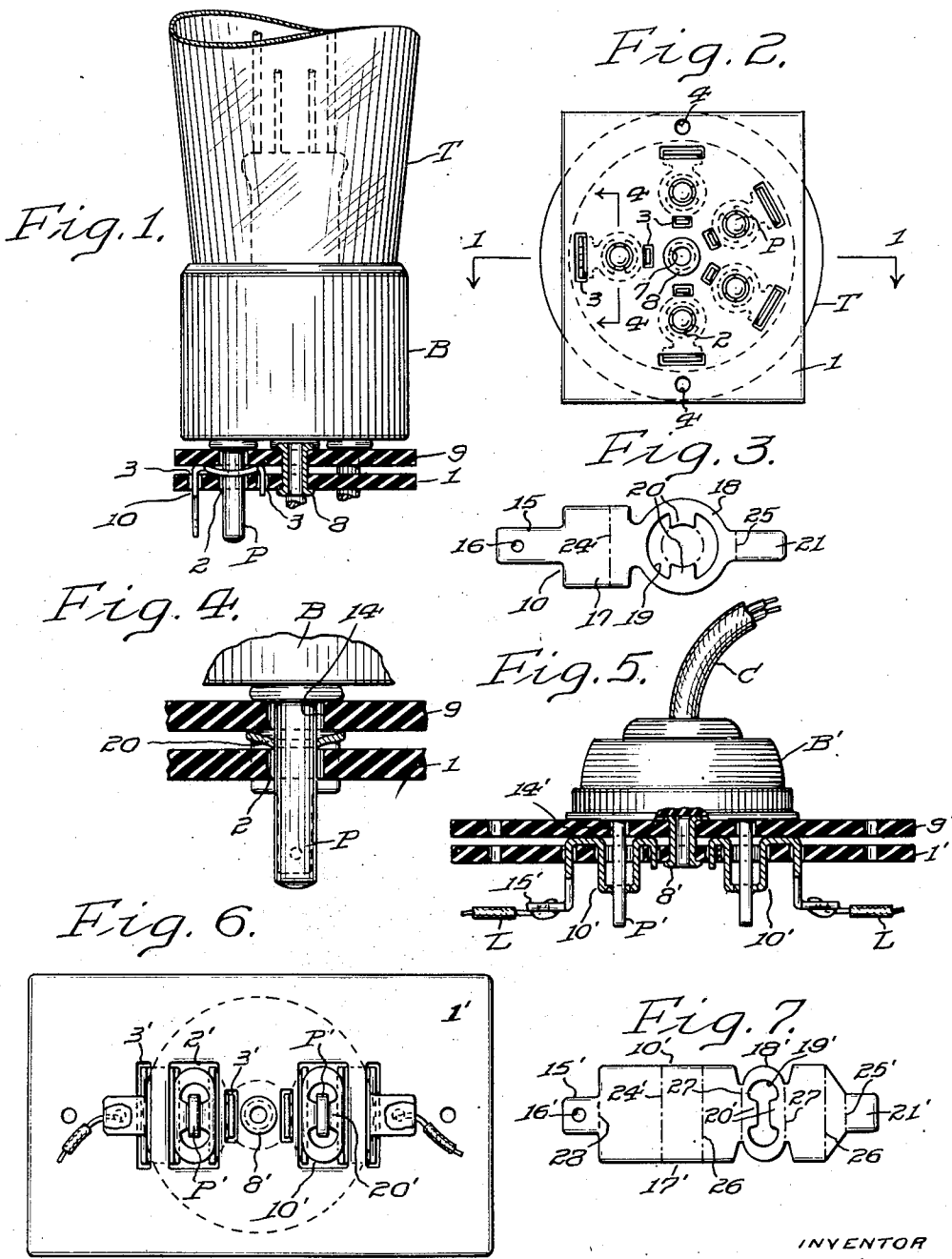
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ELECTRICAL SOCKET

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ELECTRICAL SOCKET

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While the present invention relates more particularly to sockets or receptacles such as are ordinarily employed in radio receiving sets for electrically connecting the conductors with the several contact prongs of electron discharge tubes and to other sockets adapted for generally analogous purposes, it may also, in certain of its forms, be advantageously embodied in base receptacles, extension sockets and similar electrical apparatus used in connection with ordinary house or industrial wiring circuits.

It has heretofore been extremely difficult, particularly in sockets used for the tubes of radio receiving sets, to preserve an effective contact between the several conductors and the respective prongs of the tubes, more especially since it is now customary to ship radio receiving sets entirely assembled and with the tubes in place. This places a heavy duty on the sockets and those heretofore used are frequently incapable of maintaining the desired contacts after having been subjected to the jolting and vibration necessarily incident to such shipment. Consequently, for this and other reasons failure of radio receiving sets to operate properly is quite commonly found to be due to imperfect connections with the tubes even when the set is new.

Furthermore, it is necessary in all sockets in which spring contacts are provided to make the metallic contact parts of very high grade spring bronze or other metal for them to be at all satisfactory over an extended period of time and in sockets now being manufactured the cost of this relatively expensive material constitutes a considerable part of the total cost as a result of the comparatively large amounts thereof required for each socket.

A principal object of the present invention is to provide an electrical socket having improved means for effecting electrical interconnection between the respective pins or prongs of a tube or lamp base or other removable device adapted to be received in the socket and the usual several conductors employed for supplying current thereto.

A further object of my invention is to provide improved contacting means adapted to firmly embrace a prong of such character and securely grip it between relatively sharp edges which are maintained by the prong in sprung condition and strongly resist the withdrawal of the latter, whereby accidental breakage of the circuit through the contacts is avoided.

Another object of the invention in one of its forms is to provide a prong contact for use in

radio tube sockets or, in another embodiment, in ordinary house lighting receptacles, which requires a smaller amount of material for its construction than the contacts heretofore devised for like purposes, whereby the cost of the sockets in large scale production may be appreciably reduced.

Other purposes, objects and advantages of the invention will hereinafter more fully appear or will be understood from the following description of certain embodiments thereof in which reference will be had to the accompanying drawing.

In the said drawing, Fig. 1 is a vertical section through a radio tube socket constructed in accordance with my invention and showing fragmentarily a radio tube disposed in operative position therein; Fig. 2 is a bottom plan view of the same, the lines 1—1 therein indicating the section plane of Fig. 1; Fig. 3 is a top plan view on an enlarged scale showing one of the individual connector or contact members of the tube socket at an intermediate stage of its manufacture; Fig. 4 is a fragmentary enlarged detail in vertical section of one of the contacts of the tube socket with a tube prong operatively disposed therein; Fig. 5 is a view corresponding to Fig. 1 but showing a house lighting receptacle or plug socket embodying my invention and having the usual extension cord plug associated therewith; Fig. 6 is a bottom plan view of the socket shown in Fig. 5 and Fig. 7 is a top plan view corresponding to Fig. 3 showing one of the connector or contact members employed in the socket shown in Fig. 5 at a similar stage in its course of manufacture. In the several figures the same characters are used to designate the same parts.

Radio tubes now in common use usually embody a number of elongated cylindrical prongs or pins projecting from the bottom of the base in parallel relation and suitably connected with various elements of the tube internally thereof. Thus, in the drawing, the tube T comprises a base B having prongs or pins P projecting downwardly therefrom and adapted to be received in a socket provided therefor, which may comprise a pair of bakelite or other dielectric plates suitably bored to receive the prongs and provided with connectors for contacting the latter when disposed therein.

A socket of this character embodying my invention, as shown in Figs. 1 and 2, comprises a lower plate 1 which may be made of bakelite, fibre, or any other suitable insulating material and provided with a plurality of circular holes 2 spaced to correspond with the prongs of the tube

in association with which the socket is to be used. The plate 1 is also provided adjacent each hole with a pair of oppositely disposed suitably spaced slots 3 adapted to receive portions of the connectors, as will hereafter appear, suitable perforations 4 for the reception of screws for securing the socket to the panel or other apparatus in which it is to be operatively disposed, and a central hole 7 adapted to receive an eyelet 8 or the like when the parts of the socket are in assembled relation to secure them in this relation by holding the lower plate 1 and upper plate 9 together.

During the course of manufacture of the socket and before the plate 9 is placed upon and secured to the plate 1, a contact member, generally designated 10 and hereafter more fully described, is disposed adjacent each of the prong receiving holes in the plate 1 and in registry therewith, the member having portions extending through the adjacent slots 3 when in proper position. After all the contacting members have been placed in position in the plate 1 in this manner they are held in place through the pressure of the lower surface of the plate 9 thereagainst when the latter is finally fastened to the plate 1, in the relation shown in Fig. 1, by means of the eyelet 8, suitable prong receiving holes 14 extending through the plate 9 and registering with the holes 2 in the plate 1, screw holes registering with the holes 4 in the plate 1, being also provided in the plate 9.

The contact members 10 to which reference has been made are desirably blanked out in large quantities by die stamping or otherwise, to the form shown in Fig. 3, from rather stiff spring bronze, strip or sheet stock, that used in radio tube sockets being usually about .012 to .015 inches in thickness. Each blank comprises a connecting tongue 15 provided with the usual hole 16 for receiving the end of a conductor prior to the soldering of the latter thereto, an intermediate body portion 17, usually of the same width as the original strip from which the connector is stamped when stock of this character is employed, a substantially circular portion 18 extending from the opposite end thereof from adjacent the center of which the metal is cut out to provide an opening 19 having contacting tongues 20 diametrically oppositely projecting thereinto, and a tongue 21 projecting outwardly from the circular portion 18 in a direction opposite that of the body portion 17. The flat blank, after having been cut by suitable operations to the form shown in Fig. 3 and just described, is bent at right angles along the lines 24 and 25 (Fig. 3) so that the body portion 17 and tongue 21 extend in parallelism on the same side of the circular portion 18 while the latter is slightly dished toward the same side thereof, the contacting tongues 20 being preferably so formed that when the dishing of the portion 18 has been completed their inner edges are just sufficiently widely separated to permit the pin or prong to be forced downwardly therebetween by springing the tongues 20 somewhat downwardly in the direction of the dishing and forcing them slightly outwardly apart yet without exceeding the elastic limit of the metal of the connector, so that when the bent-up contact members are respectively placed in position in the plate 1 with the bent-up portions projecting downwardly through the slots 3, the space included between the tongues 20 of each member will be in substantial registry with the adjacent bore 2 in the plate 1. After one contact member has thus been disposed adjacent each of the

bore in the plate 1 and properly fitted into the slots provided, the plate 9 is disposed thereon, with the bores 14 therein in registry with the bores 2 in the plate 1, and the eyelet 8 is inserted through both plates and headed over so as to clamp the plates together securely but sufficiently yieldingly to permit the circular portions 18 of the contact members to move slightly both radially and transversely when the prongs of a tube are inserted through the bores 14 and between the contact tongues 20 in the respective contact members. The dishing of the circular portions 18 assists in centering the prongs of the tube between the tongues 20 of the respective contact members and as the tongues are separated they are also sprung slightly downwardly as indicated in Fig. 4 and are thereby held under spring tension both radially and axially of the prong in secure and intimate contact therewith. Thus, a pull upon the prong in the opposite direction to that in which it was inserted, that is, upwardly in Fig. 4, tends to cause the tongues 20 to dig into the prong and/or to spread laterally, and if of sufficient force, to so spring the portion 18 as to permit the tongues to spring upwardly in the opposite direction, providing a sliding contact to thereby prevent scoring of the prong when the tube is withdrawn from the socket. Consequently, while the pin is held securely and is effectively contacted by the tongues 20 when in normal position, insuring the efficient operation of the tube, an initial force tending to withdraw the tube but insufficient to spread the circular portion 18 radially, causes the tongues 20 to embrace the prongs even more tightly and resist their withdrawal, so that when metal of suitable inherent strength and rigidity is employed for making the contact members, it is substantially impossible for the tubes to become dislodged by vibration, as during shipment of a radio set or accidentally for other reasons. However, the tube can readily be removed when desired, as for repair or replacement, by an upward pull great enough to spring the circular portions 18 of the connectors to a position permitting the prongs to be drawn between the tongues 20 until cleared from the socket, after which the portions 18 return to normally downwardly dished position.

Owing to the normally slightly downwardly dished configuration of the metal surrounding the prong receiving opening in each connector member which is accentuated when the prong is in place, the tongues 20 are constantly forced into snug engagement with the prong and a sharp edge contact preserved therewith which is increased rather than diminished when the parts are subjected to vibration. Thus, under such conditions, the effectiveness of the electrical contact is enhanced instead of lessened as is frequently the case with the sockets heretofore employed and is satisfactorily maintained irrespective of the distance the prong may be entered in the connector member so long as it extends beyond the tongues. Furthermore, from an inspection of Fig. 1 it will be apparent that appreciably less metal is required for the connectors employed in my invention than for the connectors heretofore utilized, since the latter have usually been provided with a section substantially embracing the entire length of the several prongs, this reduction in the amount of bronze required amounting in practice to approximately 40%. As this bronze must necessarily be of the highest quality for commercial reasons, and is relatively expensive, it will be apparent that in a plant manu-

facturing thousands of these sockets every hour a saving of 40% in the expense for the bronze strip or sheet stock employed therefor is of considerable importance.

dental, or inadvertent outward pull on the plug B' will thus tend to cause the tongues 20' to bite into the metal of the prongs P' and strongly resist such withdrawal, but if the pull be of sufficient force the tongues will be drawn toward the plate 1' and spring slightly upwardly thus permitting the plug to be readily withdrawn by an initial pull of sufficient strength.

The sockets which I have herein described may be manufactured rapidly and relatively cheaply while the comparatively small quantities of spring bronze required permit the highest quality thereof to be used without materially increasing the cost of the sockets as a whole and, in fact, frequently lowering their cost below that of the sockets heretofore commonly used. As the contact effected in my receptacles is made more intimate by any slight jarring or pull on the tube, plug or other fixture having its contact prongs extending therein, high resistance contacts such as usually develop in plug connections of this character in normal circumstances shortly after they are placed in use, if, indeed, they are not originally present, are avoided by my invention and the disadvantages thereof thus eliminated. Additionally, since the distortion of the metal normally effected in the operation of sockets embodying my invention is always well within the elastic limit thereof, the effectiveness of contact inherent therein is retained throughout long periods of use, and even when, in some cases, and due to unusual circumstances, the elastic limit of the metal may be exceeded and the contacting tongues actually bent, as distinguished from sprung, in one direction or the other through movement of the prongs in contact therewith, an ensuing movement of the prongs in the opposite direction also correspondingly moves the tongues and restores them to their original condition.

While I have herein specifically described certain embodiments of my invention, it will be understood that I do not thereby intend to limit or confine myself thereto as changes and modifications in the form, arrangement and mode of construction of the various parts thereof may be made and my invention may be embodied in sockets of other types, if desired, without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. An electrical socket of the character described comprising a plurality of contact members disposed in spaced relation, a pair of dielectric plates adapted to embrace said members and respectively provided with aligned openings adapted to receive electrically conductive prongs, and clamping means operative to secure said plates together, each of said contact members comprising a dished body having an aperture registering with a pair of said openings and a plurality of tongues integral therewith extending oppositely into the aperture adapted to resiliently engage a prong with the free edges thereof substantially at right angles when extended through said openings and between the tongues.

2. A socket of the character described comprising a pair of dielectric plates having aligned openings for the passage of an electrically conductive prong, a dished contact member disposed between said plates and having an aperture aligned with the openings, and a plurality of tongues projecting into the aperture in substantial parallelism with the plates adapted to yieldingly engage the

5 In embodying my invention in a receptacle for extension plugs for house lighting circuits, I employ similar principles as to the locking effect secured by the contact pieces and form the receptacle in a substantially similar manner, although
10 in receptacles of this character I prefer to apply the said principles in a somewhat different manner. Thus, in Fig. 5 I have shown such a receptacle formed of a pair of similar insulating plates 1' and 9' of suitable weight and size, desirably
15 heavier and larger than the corresponding plates 1 and 9, and secured together by means of an eyelet 8' disposed substantially centrally thereof. In the plate 1' are provided a pair of slots 3' on either side of the eyelet-receiving bore and a relatively
20 large generally rectangular opening 2' between each such pair of slots 3', suitable slots 14' being also provided in the plate 9' to register therewith when the receptacle is assembled. The slots 14' are suitably spaced to receive the prongs P' of a plug B' of the ordinary type used for house
25 lighting circuits and the like, the prongs P' being secured therein and respectively connected with the conductors of an extension cord C. The contact members 10' which I prefer to employ in receptacles of this character may also be made of
30 strip or sheet bronze stock stamped as indicated in Fig. 7 to provide a connecting tongue 15' integral with the body portion 18' and having a hole 16' for receiving a conductor L to be soldered to the tongue for connection with the house wiring,
35 a substantially elliptical portion 18' integral with the body portion 17' at the other end thereof and provided with an aperture 19' into which extend contact tongues 20' as shown, a second body portion on the opposite side of the elliptical portion
40 18' desirably the full width of the original strip, or substantially the same width as the body portion 17' but of less length than the latter, and a relatively narrow tongue 21'. The transverse broken lines 24', 25', 26 and 27 shown in Fig. 7
45 indicate the lines along which the connector is bent transversely and the manner of bending is clearly indicated in Fig. 5, the tongue 15' usually being bent outwardly along the line 28 after the contact member has been placed in position in
50 the plate 1', that is, after the tongues 15' and 21' have been inserted in the slots 3' so that the elliptical portion 18' lies beneath the rectangular opening 2' and is thus supported from and a short distance outwardly of the plate 1' on the opposite
55 side from the plate 9' which is thereafter disposed in position upon and secured to the plate 1' by a rivet or eyelet 8'. The tongues 20' of each contact member extend oppositely inwardly so that their inner edges are slightly closer together than the distance between the opposite
60 outer surfaces of the sides of the respective prongs P' and the latter when forced into the openings 19' therefore spring the tongues downwardly and outwardly and are firmly gripped thereby. They are thus maintained in secure
65 and efficient contact with the tongues through the resiliency of the elliptical portions 18' as well as through the resiliency of the remainder of the connector which, being made preferably of spring bronze, relatively strongly resists distortion in all
70 directions whereby the lateral portions of the contact members thus aid the portions 18' in resisting separation of the tongues when the plug prongs are inserted therebetween. A moderate acci-

prong at their inner edges when the prong is inserted therebetween.

3. A socket for a radio tube comprising a pair of spaced dielectric plates having aligned openings therein for the passage of the prongs of a radio tube, and a contact member disposed between said plates adjacent each of said openings comprising an integral substantially flat resilient metallic body defining a substantially annular aperture aligned with the adjacent openings and a plurality of integral tongues extending radially inwardly thereof substantially in the plane of said body and yieldingly embracing a prong of the tube when it is inserted therethrough.

4. A plug receptacle for an electric circuit comprising spaced plates of insulating material op-

eratively secured together having aligned prong receiving openings and a sheet metal contacting member having a portion disposed between said plates and a portion extending outwardly therefrom through one of said openings, said last mentioned portion comprising a downwardly dished region lying substantially parallel to the plates and having an aperture adapted to receive a prong of the plug, and a plurality of tongues integral with said dished region projecting inwardly of said aperture substantially in the plane thereof for engagement with corresponding faces of said prong to thereby yieldingly embrace the prong when projected through the aperture.

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