Dec. 15, 1942. A. M. DRAVING 2,304,808

CONTACT

Filed July 1, 1939

Fig. 1

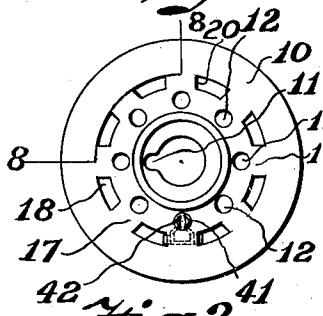


Fig. 3.

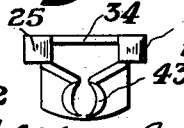


Fig. 5A

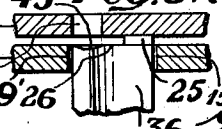


Fig. 5B



Fig. 6.

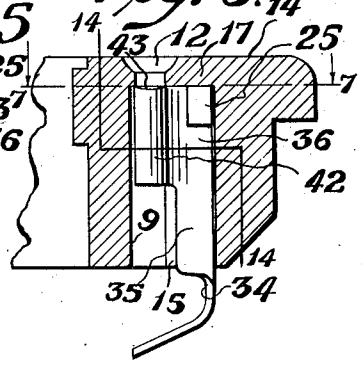


Fig. 4

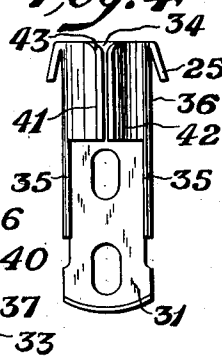


Fig. 5

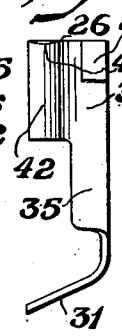


Fig. 2.

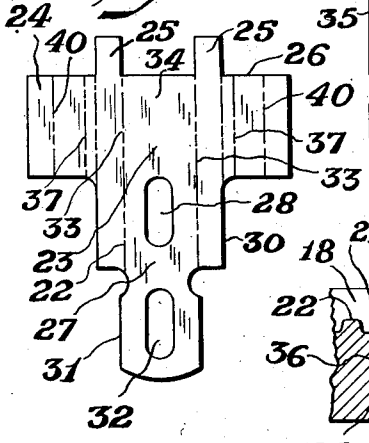


Fig. 8.

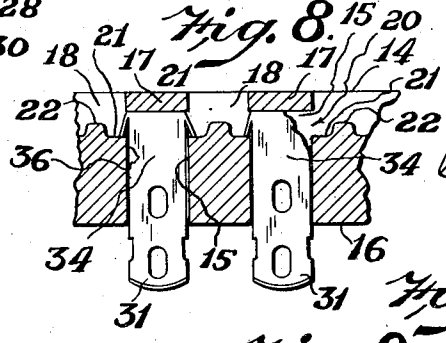


Fig. 7.

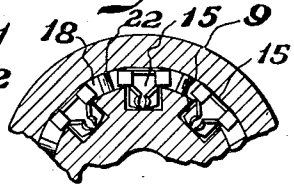


Fig. 13.

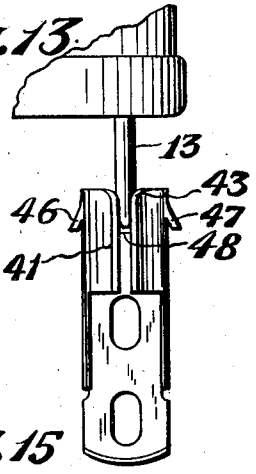


Fig. 10.

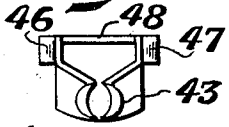


Fig. 9.

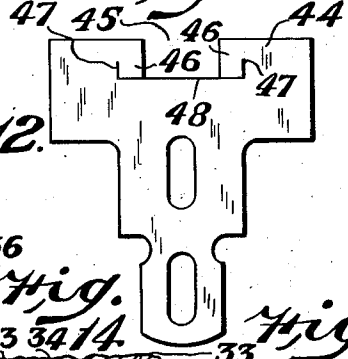


Fig. 11.

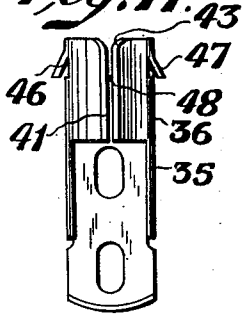


Fig. 12.

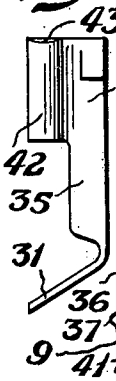


Fig. 14.

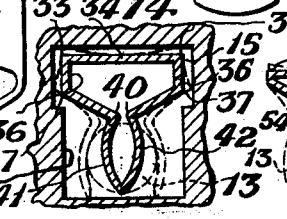
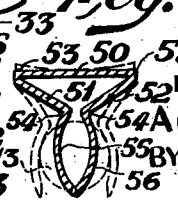


Fig. 15



INVENTOR
ARTHUR M. DRAVING.
BY Frank H. Borden
ATTORNEY

Patented Dec. 15, 1942 2,304,808

UNITED STATES PATENT OFFICE

2,304,808

CONTACT

Arthur M. Draving, Feasterville, Pa., assignor, by mesne assignments, to Penn Electric Development Corporation, Philadelphia, Pa., a corporation of Pennsylvania

Application July 1, 1939, Serial No. 282,452

1 Claim. (Cl. 173—328)

This invention relates to metallic contacts for the reception of plug in devices.

There have been many contacts developed in the past which were of more or less effectiveness for large prongs, but which are ineffectual with the relatively small prongs of the present day. In all prior art devices, so far as known, the contacts, if effective for a relatively few insertions of prongs, soon lost this effectiveness with repeated insertions and withdrawals. This, in large measure, was due to the short hinge action radius, so to speak, of flexation of contact arms relative to a backing plate from which they arose, among other objections.

It is among the objects of this invention to provide an improved contact for the reception of a prong contact of a plug-in device; to provide a contact of enhanced resilience; to provide a contact with a wide range of adaptability as regards the size of prongs associatable therewith; to provide a female contact with large expansive capacity without effecting a change of "setting" of the metal; to provide a contact for gripping a male prong with two relatively bodily movable members as opposed to relatively axially hinged movements of certain prior art devices; to provide a contact of improved electrical engagement with a male prong; to provide a contact having an improved guiding sliding engagement with an inserted prong; to provide a contact device having a plurality of points of "set" or relative rigidity whereby the springing function is as a resultant of flexing of a plurality of areas between "set" points; to provide a contact, the movable members of which swing on effective pivots widely spaced from the edges of the members; to provide a contact having in effect a pair of convergent resilient arms, at the free ends of which substantially cupped hands, functioning as contacting members, are arranged in opposed juxtaposition and arranged for bodily separation when a prong is forced between the "hands" to establish engagement therewith; to provide a contact having, external to and connecting its prong receiving members, spring means divided by bends into a plurality of distinct resiliently functioning portions; and many other objects and advantages as will become more apparent as the description proceeds.

In the accompanying drawing:

Fig. 1 represents a plan of an illustrative socket with a contact according to this invention shown in dotted and full lines in position therein.

Fig. 2 represents a plan of a blank from which the preferred form of contact according to this invention, is formed.

Figs. 3, 4, 5 represent respectively a plan, a front elevation and a side elevation of a contact formed from the blank of Fig. 2.

Figs. 5A and 5B represent respectively fragmentary vertical sections through a two piece supporting base, of the so-called "laminated" type, showing the perfect adaptability of the contact of Figs. 2 to 5, to such two piece associations.

Fig. 6 represents a transverse vertical fragmentary section through a molded socket such as shown in Fig. 1, with a contact according to Fig. 5, in side elevation therein, to show the relationship.

Fig. 7 represents a fragmentary transverse section through a molded base such as on line 7—7 of Fig. 6, showing a plurality of contacts according to Fig. 3, in plan therein.

Fig. 8 represents a fragmentary vertical section through the molded socket or base, taken on line 8—8 of Fig. 1, showing two adjacent modified contacts and their inter-engaging supporting relations with the base, with one of the contacts partially broken away.

Fig. 9 represents a plan of a blank from which the modified form of contact of Fig. 8 is formed.

Figs. 10, 11, 12 represent respectively a plan, a front elevation and a side elevation of the modified form of contact.

Fig. 13 represents a fragmentary elevation of a plug-in device with a prong contact thereon just entering the contact of Fig. 11, shown in front elevations.

Fig. 14 represents a transverse section on line 14—14 of Fig. 6, but with the contact shown in exaggerated spaced relation in full lines to show in dotted lines the substantial flexation of the component parts of the contact in adapting itself to the reception of a contact prong shown in dotted lines, the spacing exaggeration failing to disclose that there is an actual sliding guiding relation of the contact and aperture with comparatively little tolerance or play.

Fig. 15 represents a transverse section through a slightly modified form of a contact exemplifying the invention herein.

The socket 10 of Fig. 1 may be of any sort or nature, but illustratively is of the type applicable to use with a radio tube of the so-called "octal" type, having a center guide recess 11 and a plurality of prong receiving apertures 12 into each of which the prongs, as for instance the prong 13 of Fig. 13, arranged in an annular row, are re-

spectively guided into contact making insertion. The supporting or base elements obviously may be a unitary molded base as shown, or may comprise one or more laminations of insulating material, as will become evident as the description proceeds.

As shown in Fig. 6 the hole or aperture 12 merges into the enlarged longitudinal bore 9 which runs completely through the base below the aperture 12, normal to the exposed face 14 thereof. The open side of recess or bore 9 in line radially thereof, merges into a parallel contact recess 15 which extends upwardly from the lower face 16 of the base, laterally in communication throughout its length, with the prong aperture extension 9, to terminate below a wall portion 17, forming part of the surface 14. The respective wall portions 17, one for each prong aperture, are preferably arranged in a ring concentric to the ring of apertures, and adjacent wall portions 17 are spaced by facial recesses 18 extending downwardly far enough to overlap laterally the upwardly extending respective contact recesses 15. This forms lateral apertures 20 leading transversely from contact recess 15 to the floor 21 of recess 18. Preferably the floor 21 is divided into two halves by the rib 22 extending radially of the socket across the recess 18.

The blank 23 of Fig. 2 is generally T shaped in profile and is provided with a cross piece 24 from which two tabs 25 project perpendicular to the upper edge 26. The cross piece 24 merges into a shank 27 of reduced width, preferably having a median elongated slot or aperture 28 between two parallel edges 30, and the shank is prolonged into a soldering tail 31, having one or more median apertures 32.

The blank is bent along the dot and dash lines 33, just inside the tabs or ears 25, to form a rough like device comprising a backing wall 34 and shallow side edges 35 adjacent to or terminating in the edges 30, and at the upper end of the contact being continued in the side walls 36. The blank is also bent about dot and dash line 37 to bring the outer extremities of the cross piece of the blank toward each other to define a generally triangular space, of which the backing plate is the base, and which are in effect arms brought together in front of the body, and the free ends of the cross piece, from about dot and dash line 40, are substantially arcuately oppositely curved longitudinally of the contact as at 41 and 42 to form the double walled prong receiving contact making portion of the contact, which in effect represents substantially cupped hands on the end of the arms. Preferably the upper end of each contact half 41 and 42 is slightly flared outwardly as indicated at 43. The ears or tabs 25 are bent over to a position acutely divergent from the side walls 36 as at 25 in Fig. 4.

It will be apparent that the resilient "set" of the contact-making portion 41 and 42 of the contact, is not dependent solely, nor even appreciably, upon a single hinge action relative to a stiff immovable base wall, as in the conventional type of contact, comprised for instance of a triangular or oval prong channel in which a backing portion has arms bent toward convergence to define the channel. Instead the arms 41 and 42 have a mutual relative flexation incident to the slight bending of the rear wall 34 in a curvature out of the initial plane of the wall (and which obviously may be varied predeterminedly by the introduction of slots and slits and the like, or as cut down in the blank of Fig. 9, or the like), and which is permitted despite the practically tight guiding sliding engagement of the contact in the aperture or recess 15, the curvature of the side arms or walls 36, as indicated in dotted lines in exaggerated flexation in Fig. 14, and which again is permitted, despite the lateral sliding guiding engagement of the side walls 36 in the recess 15, as this is relatively a small flexation or distortion. It will usually occur that it is easier to flex the adjacent walls than the actual corner which has acquired a set or rigidity, although there will also occur some degree of flexation about the corners 33, 37 and 40 in any distortion of the contact. The greater degree of resilient curvature or flexation will probably occur in the converging arms, between the corners 37 and 40, and there will also be some degree of bending of the hands or opposed faces 41 and 42, so that the forced insertion of a prong 13 in the contact will cause the contact to assume substantially the position shown in dotted lines in Fig. 14, and represent a substantially bodily relative movement apart of the opposed cupped faces 41 and 42, each about an effective substantially long radius, as well also, as about some additional shorter radii. The whole assembly is such that great resilience is attained, and a strong and constant resilient engagement of the arcuate walls of the prong is experienced. Moreover, the spreading of the distortion over great area prevents undue working of any portion so that the initial set of the contact remains substantially unimpaired even after a great multiplicity of insertions and removals. It will be understood that in effect the prong receiving members are provided with spring means for maintaining a gripping tension. In a further subdivision as will be shown, the external spring means is divided into a plurality of portions by bends.

With the blank of Fig. 2 bent to the shape of Figs. 3, 4 and 5, and inserted upwardly into the contact recess 15, with the prong engaging portions 41 and 42 disposed in the prong aperture 12, the tabs 25 are resiliently collapsed by the side walls of the contact recess 15 until the lateral windows 20 are reached, when the upper edge 26 abuts the top wall portion 17 after which the ears 25 expand until their tip ends engage the floor 21 of the recesses 18, when the contact is anchored securely in the socket. It will be understood that although the prong contact portion itself is not supported directly, yet the spread ears 25 locked against outward movement by the recess floor 21 on each side of the backing portion and the latter having a wide bearing against the contact recess wall, due to a substantially sliding guiding fit therein, the support of the contact is secure.

Obviously the engagement of a prong in the contact portions 41 and 42 depending upon the degrees of relative curvatures of arms and prongs will have a firm line of wiping engagement on each side of the prong with a minimum of contact resistance. Obviously the closer the radius of the prong approaches the radius of the arms, the greater the contrasting areas and the greater the departure from the thin line contact, so this will be varied to suit requirements.

Referring to Figs. 5A and 5B a lower plate L has a contact receiving recess 9' and 15' in which a contact according to Fig. 2 is disposed, hanging upon the ears 25, which extend perpendicularly instead of acutely as in the form first described. The ears overlie the plate L and prevent the contact from being pushed out. A

superposed plate of insulating material U having a prong receiving aperture 12', aligned with the gripping portions of the contact only, in the composite recess 9' and 15', is clamped on ears 25, substantially, or is mounted in such relation as to permit appreciable axial movement of the contact, as will be clear.

In the blank of Fig. 9 the construction is similar to that of Fig. 2 except that the upper end of the blank on edge 44, in place of external ears, has a median recess 45, the lateral boundaries of which are formed by the ears 46 extending from the edge 44 longitudinally to severance from the recess edge 48 and laterally being separated from the metal of the cross piece by the axially extending slits 47. This construction is otherwise just like that of Fig. 2 and when the contact is bent to shape it is just like that of the earlier figures except that the upper end of the backing portion is removed, with enhanced resilience for the arms arising therefrom, and the ears 46 come out the side walls 36 instead of out of the end thereof. This form of contact has an enhanced resilience and also saves metal in the formation of the blanks.

It will be evident that the advantages of the arms and cupped hands may be secured with a different number of bends or corners than that disclosed in the previous figures, as for instance by providing more corners, or by providing less. In Fig. 15 a modification using a fewer number of corners is disclosed as comprised of a backing portion 50 having the acutely divergent side arms 51 and 52 bent therefrom about angular corners 53, and the arms terminate through corners 54 in the oppositely cupped hands or contact portions 55 and 56. The separation of the arms 55 and 56 is on effective long radii, although not as effective for the purpose as is the disclosure in Fig. 14. The operation and functioning of the modification of Fig. 15 in its distortion to the dotted line position shown in the distorting presence of a prong 13 will be understood.

It is to be understood that the provision of the slots or slits in the backing plate or portion increases or enhances the resilience thereof and varies the resilience of the entire arm mounted thereon.

It will further be observed that the contact is arranged for a quick and easy guided automatic locking into mounted position subsequent to mere insertion into the contact recess from the lower end thereof.

The various further modifications that will occur to those skilled in the art will be obvious and such are to be construed as within the scope of the invention, unless otherwise expressly limited in the appended claim.

I claim:

In radio sockets, a socket base having a contact receiving aperture in one face extending partially through the face to a transverse wall adjacent to the opposite face and a prong receiving aperture in said opposite face extending completely through the base in communication with but relatively offset from the contact receiving aperture, the contact receiving aperture having a pair of shoulder ledges extending from its opposite sides, a contact comprising a one piece metallic member disposed in the contact receiving aperture and formed by a back wall and two convergent jaws projecting laterally from said wall in juxtaposed relation, the jaws disposed in confronting relation in axial alignment with the prong receiving aperture, like end portions of each jaw extending axially well beyond the end of said back wall above said shoulder ledges to form freely expansible parts while the like opposite end portions of each jaw connect to the back portion with restricted expansibility, whereby a prong entering said jaws through said prong receiving aperture is clamped by successive stages of flexibility, and integral tongues struck out of the first mentioned end portions of the jaws from points above the end of the back wall overhanging the respective shoulder ledges to support the contact in the contact receiving aperture against axial movement in one direction, while said wall provides an abutment for substantially preventing axial movement of the contact in the other direction.

ARTHUR M. DRAVING.