Oct. 27, 1925. 1,559,358

L. G. PACENT

VACUUM TUBE ADAPTER

Filed May 1, 1925

Fig. 1,

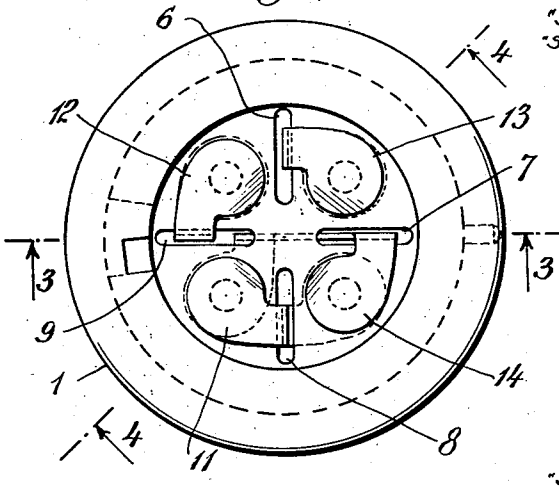


Fig. 2,

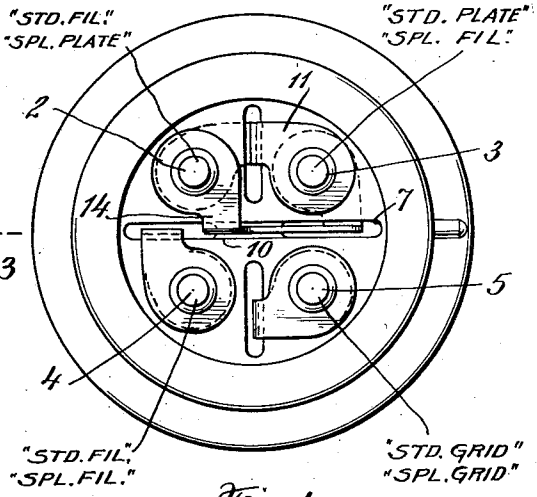


Fig. 3,

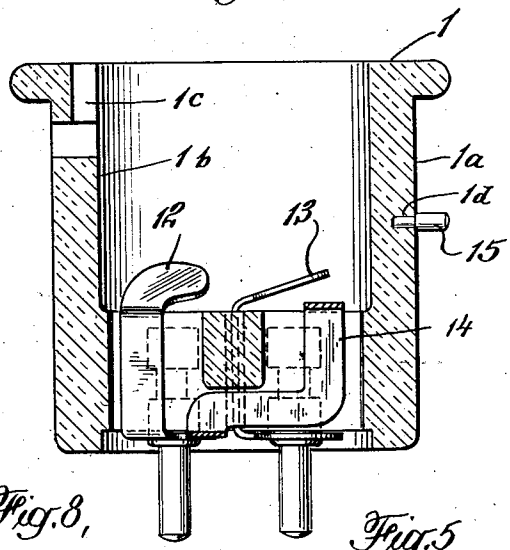


Fig. 4,

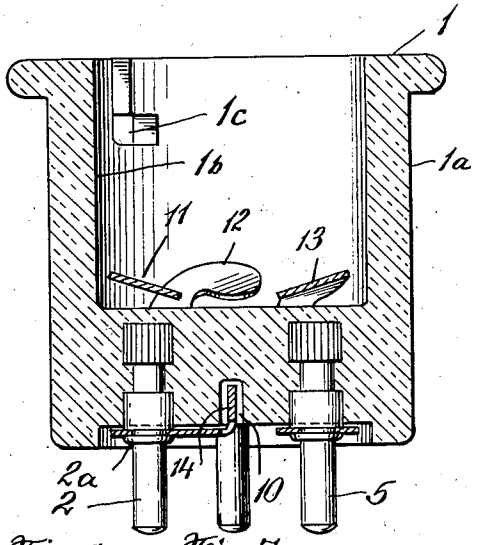


Fig. 8,

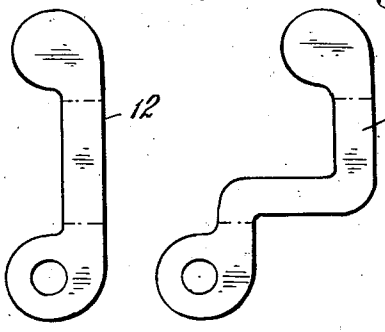


Fig. 5,

Fig. 6,

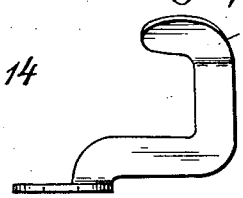
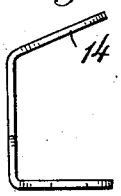


Fig. 7,



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UNITED STATES PATENT OFFICE.

LOUIS G. PACENT, OF WINFIELD, NEW YORK, ASSIGNOR TO PACENT ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

VACUUM-TUBE ADAPTER.

Application filed May 1, 1925. Serial No. 27,126.

To all whom it may concern:

Be it known that I, LOUIS G. PACENT, a citizen of the United States, residing at Winfield, in the county of Queens, State of New York, have invented certain new and useful Improvements in Vacuum-Tube Adapters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to adapters for electrical devices and has to do more particularly with an adapter for three electrode vacuum tubes whereby a tube of one particular style may be used with a vacuum tube socket intended primarily to receive a vacuum tube of a different style.

The object of the present invention is to provide a vacuum tube adapter of substantial and altogether satisfactory construction which may be produced at very low cost.

Different types of vacuum tubes in common use differ widely in their base dimensions and in their contact prong arrangements. A base of a certain diameter and having a certain arrangement of contact prongs has come to be regarded as "standard" and is used quite extensively. Most radio receiving sets are equipped with vacuum tube sockets of the standard type, that is to say sockets designed to receive tubes with standard bases.

On account of their being adapted to operate economically on dry-cell batteries, a certain type of vacuum tube not equipped with a standard base has become very popular. The base of this latter tube is not only of smaller diameter than the standard base but the arrangement of its contact prongs is different. For the latter reason it is not possible to provide a simple adapter having contact prongs which extend directly through the base of the adapter so that they may be directly engaged by the contact prongs of the vacuum tube. It is necessary to provide certain cross-connections which heretofore have been the cause of manufacturing difficulties resulting in a cost of production which is deemed excessive.

The vacuum tube adapter according to the preferred embodiment of this invention comprises a socket member of cup-like form so designed that it may be very economically produced as a molded product of dielectric material, The socket member is provided with four contact prongs which are embedded in the dielectric material of which the socket member is made. To each of the contact prongs there is secured a contact spring, referred to herein as a leaf spring conductor, each of which extends through a slot provided in the bottom of the socket member to the interior thereof where its free end is bent into a position wherein it may be engaged by one of the contact prongs of a vacuum tube which may be inserted in the socket.

The features of the invention consist in the ingenious arrangement of contact springs hereinafter referred to as leaf spring conductors, together with the arrangement and design of the socket member whereby the necessary cross-connections which will hereinafter be explained may be effected while maintaing a very simple form of construction, all the parts of which are inexpensive and the assembling operations of the simplest character.

In the accompanying drawing—

Figs. 1 and 2 are, respectively, top and bottom plan views of a vacuum tube adapter in accordance with the preferred embodiment of this invention.

Fig. 3 is a cross-sectional view of the adapter taken along the line 3—3 of Fig. 1,

Fig. 4 is a cross-sectional view taken along the line 4—4 of Fig. 1,

Fig. 5 illustrates a metal punching out of which the leaf spring conductor shown in Fig. 6 is made,

Fig. 7 is an edgewise view of the leaf spring conductor of Fig. 6, and,

Fig. 8 illustrates a metal punching from which the leaf spring conductors, other than those shown in Figs. 5, 6 and 7 are made.

The adapter comprises a cup like receptacle or socket member 1 made of any suitable dielectric material, as for example hard rubber or any of the well-known dielectric compositions. The outside diameter at 1^a of the socket member is such that it will fit in a standard vacuum tube socket, while the inside diameter at 1^c is such as to permit the easy insertion of a vacum tube of the type which is to be used with this particular adapter.

As is well known, a three electrode vacuum tube has four contact prongs. In Fig. 2, whnch is a bottom plan view of the adapter

four contact prongs 2, 3, 4 and 5 are shown projecting from the bottom of the socket member. These contact prongs correspond with those of a standard base tube and each is labeled in such a way as to indicate with which one of the contact springs of a standard vacuum tube socket it is intended to engage. The four prongs are labeled as follows: "Std. fil."; "Std. plate"; "Std. fil."; "Std. grid"; meaning respectively standard filament; standard plate; standard filament; standard grid. In addition to the foregoing labels, the contact prongs bear the following labels, respectively: "Spl. plate"; "Spl. fil."; "Spl. fil."; "Spl. grid," meaning respectively, special plate; special filament; special filament; special grid. The latter labels indicate the positions of the contact prongs of a vacuum tube of the type intended to be used with this adapter. For example it will be seen that the position of the plate contact prong of the vacuum tube intended to be used with this adapter corresponds with one of the filament contact prongs of a standard vacuum tube. Vice versa, it will be seen that one of the filament contact prongs of the vacuum tube intended to be used with this adapter corresponds with the plate contact prong of a standard vacuum tube. It will also be noted that the other two contact prongs of the vacuum tube intended to be used with this adapter correspond in each instance with the similar contact prong of a standard vacuum tube. The contact prong 2 engages one of the filament contact springs of the standard vacuum tube socket in which the adapter is inserted. Since the contact prong of the vacuum tube which comes directly over the contact prong 2 leads to the plate of the vacuum tube, the two cannot be connected together. Likewise, since the contact prong 3 connects with the plate contact spring of a standard vacuum tube socket, it cannot be connected with the contact prong of the vacuum tube which comes directly over it for the reason that the latter is connected to one side of the filament of the vacuum tube. Since the contact prong 2 corresponds electrically with the contact prong of the vacuum tube coming directly over contact prong 3 and since the contact prong 3 corresponds electrically with the contact prong of the vacuum tube directly over contact prong 2, it follows that the electrical connections must be crossed. In other words the inside and outside connections, with respect to contact prongs 2 and 3, must be reversed. This essential reversal of connections has heretofore been accomplished in vacuum tube adapters by embedding wires or other conductors in the molded socket members and providing suitable resilient contact members inside the socket member to which the electrical conductors were connected. A construction of that character, while it may be satisfactory from an operating standpoint, is quite costly for such a keenly competitive product.

In the structure here shown there are four slots, 6, 7, 8 and 9 extending through the bottom of the molded socket member. These slots are formed in the process of molding. In addition there is a groove 10 also formed in the process of molding along the bottom of the socket member. Four contact springs 11, 12, 13 and 14 each referred to herein as a leaf spring conductor for the purpose of more definitely distinguishing from contact springs of other types are each attached to one of the contact prongs, 2, 3, 4, 5. The method of attaching the leaf spring conductors to the contact prongs is clearly shown in the cross-sectional view of Fig. 4. Each leaf spring conductor is provided with an aperture as shown in Figs. 5 and 8 through which one of the contact prongs extends, the latter being riveted over or staked as shown for instance at 2^a—the leaf spring conductors being thereby secured to the contact prongs.

One of the flat metal punchings out of which the leaf spring conductors 12 and 13 are made is illustrated in Fig. 8. The free ends of the leaf spring conductors projecting within the socket member are bent over as is most clearly shown in Fig. 3 to form suitable resilient contacts for engaging the contact prongs of a vacuum tube which may be inserted in the adapter. In the operation of assembling, the flat punchings are each first given a right angle bend; passed through one of the slots in the socket member and secured to one of the contact prongs in the manner previously described.

For the purpose of accomplishing the necessary cross-connections leaf spring conductor 11 which is attached to contact prong 3 has its free end bent into a position wherein it lies over contact prong 2 instead of its own contact prong 3. Leaf spring conductor 14 is of different form than the others as is clearly illustrated in Figs. 5, 6 and 7, wherein Fig. 5 is a blank and Figs. 6 and 7 are two views showing the leaf spring conductor in final form. Leaf spring conductor 14 is secured to contact prong 2. It is formed so as to extend along and within the groove 10 to the slot 7 through which it extends upwardly into the recess within the socket member wherein its free end is bent into a position lying over contact prong 3.

The socket member 1 is formed with a bayonet-lock joint at 1^c, adapted to receive and cooperate with the pin ordinarily provided on the base of a vacuum tube for holding it in place in the adapter. The socket member is also formed with a small pin hole at 1^d into which a lock pin 15 is forced. This pin serves to engage the

bayonet-lock joint of a standard vacuum tube socket into which the adapter is intended to be inserted.

From a careful consideration of the several views of the drawing the outstanding simplicity of the structure illustrated will be noted. The mold required to form the socket member is exceedingly simple due to the absence of any intricate inserts which are difficult to hold in place during the molding process. In fact the only inserts are the contact prongs 2, 3, 4, and 5 which may be very easily supported in the mold. When the socket member comes from the mold all that remains to be done is to insert the locking pin 15 and attach the leaf spring conductors. The latter are each given a right angle bend with a suitable tool, slipped over their respective contact prongs and the latter staked to rigidly secure the leaf spring conductors in place. The free end of the leaf spring conductors are then bent as clearly shown in Figs. 3, 4, 6 and 7.

All the metal parts are simple screw machine and punch press products which may be readily produced in large quantities at small labor cost and the assembling operations are so simple as to require the employment of only the most unskilled labor to perform—while the resultant product may be of the highest quality, depending only upon the materials selected.

The particular adapter illustrated in the drawing and described herein, although representing the preferred embodiment of the invention is not to be construed as representing the only construction possible within the scope of the invention. On the contrary the invention is, in fact, capable of being embodied in a number of modified forms and should not be considered as limited except by the terms of the appended claims.

I claim:

1. A vacuum tube adapter comprising a cup like socket member, a plurality of contact prongs attached to and projecting from the bottom of said socket member and arranged to engage the resilient contacts of a vacuum tube socket into which said adapter may be inserted, a plurality of slots extending through the bottom of said socket member, a plurality of leaf spring conductors each of which is attached, individually, to one of said contact prongs and extends individually through one of said slots to the interior of said socket member, the end portion of each of said leaf spring conductors which is inside said socket member being so positioned as to engage, individually, one of the contact prongs of a vacuum tube which may be inserted in said socket member, the arrangement being such that each contact prong of the vacuum tube is electrically connected through one of said leaf spring conductors, individually, to the proper one of said contact prongs forming a part of said adapter.

2. A vacuum tube adapter comprising a molded cup like socket member of dielectric material, a plurality of contact prongs embedded in and projecting from the bottom of said socket member and arranged to engage the resilient contacts of a vacuum tube socket into which said adapter may be inserted, a plurality of slots extending through the bottom of said socket member, a plurality of leaf spring conductors each of which is staked individually to one of said contact prongs and extends, individually, through one of said slots to the interior of said socket member, the end portion of each of said leaf spring conductors which is inside said socket member being so positioned as to engage individually, one of the contact prongs of a vacuum tube which may be inserted in said socket member, the arrangement being such that each contact prong of the vacuum tube is electrically connected through one of said leaf spring conductors, individually, to the proper one of said contact prongs forming a part of said adapter.

3. A vacuum tube adapter comprising a cup like socket member, the bottom of said socket member being formed with a groove and provided with a plurality of slots extending therethrough, a plurality of contact prongs attached to and extending from the bottom of said socket member, a leaf spring conductor attached to one of said contact prongs and extending along and within said groove to one of said slots, thence through said last mentioned slot to the interior of said socket member, the free end portion of said leaf spring conductor within said socket member being disposed in a position wherein it is engageable by the contact prong of a vacuum tube corresponding electrically to the said contact prong to which said leaf spring conductor is attached, and a plurality of additional leaf spring conductors each attached individually to one of said contact prongs and each extending, individually, through one of said slots to the interior of said socket member.

In testimony whereof I affix my signature.

LOUIS G. PACENT.