Nov. 8, 1960 M. SCHLEE 2,959,762

TUBE SOCKET

Filed Oct. 15, 1959

FIG. 1

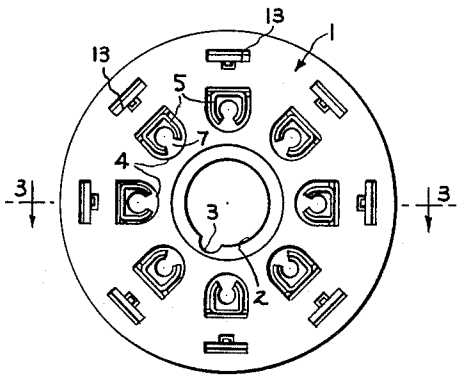


FIG. 4

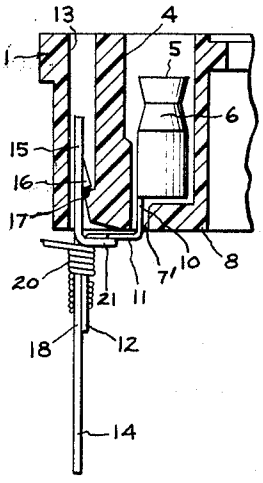


FIG. 3

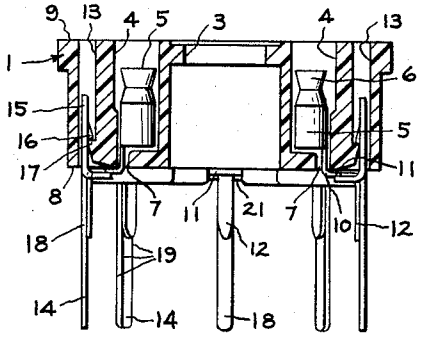
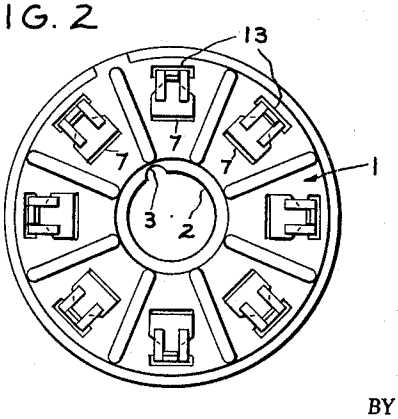


FIG. 2



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TUBE SOCKET

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8 Claims. (Cl. 339—193)

This invention relates to tube sockets, and more particularly to tube sockets of the type which are adapted for use in assemblies where connections are made by wrapping wire several times about terminals instead of soldering it thereto.

The use of the type of connection wherein a wire to be connected to a terminal is mechanically and electrically secured thereto by wrapping it tightly around the terminal several times is quite wide spread, being used to some extent in the manufacture of television receiver sets and the like. This type of connection, known as a wire-wrap connection, is used to eliminate hand crimping and soldering of connections and has already proved itself to be a reliable and suitable means of connection for many purposes.

A substantial amount of difficulty has, however, been encountered in attempting to apply the wire-wrap connection approach to terminals of tube sockets. This results, briefly, from the fact that the characteristics required for a member intended to grip and be electrically secured to the pin of a tube and those required for the portion of the terminal which is intended to be wire-wrapped are very different. The type of material needed for the pin socket proper must be relatively thin, hard, and resilient so that without fracturing it will yield slightly when the tube pin is inserted while at the same time clamping tightly onto the pin. A specific material which has been found to give the desired results is, for instance, spring brass, easily achieved by a rolling operation, the material being on the order of 10 to 12 thousandths of an inch in thickness. The terminal which is to be wire-wrapped, on the other hand, needs to be quite thick because of the fact that the wrapping of wires around the terminal is inherently a relatively violent mechanical procedure and substantial rigidity (of the type which must necessarily be lacking in the tube socket proper) is necessary. A further needed attribute of the wire-wrap portion of the terminal is that it should be quite soft relative to the type of material used for the pin socket itself, so that the wire wrapped around the terminal will actually bite into the edges of the terminal to give a good electrical connection. A specific material that has been found effective in this connection is a rectangular section of quarter hard brass whose dimensions may, for instance, be on the order of .032 by .060 inch.

The fact that two entirely different sets of characteristics are required, one at that part of the terminal which engages the tube pin and one at the part of the terminal which is to be wire-wrapped, has made it most difficult to provide a tube socket suitable for wire-wrapping at a reasonably economical price.

It is therefore an object of this invention to provide an improved tube socket which is suitable for wire-wrapping purposes while retaining the necessary resilient clamping characteristics insofar as the pin retaining portion is concerned.

A further object of the invention is to achieve this goal by the provision of a tube socket wherein the wire-wrap terminal portion is provided by a separate piece of the desired characteristics which is locked in a keyway formed in the socket, and is contiguous to part of the pin contact terminal so that when wire is wrapped around the wire-wrap terminal it will, by its own action, secure the wire-wrap terminal portion and the pin contact terminal portion together electrically.

In one aspect of my invention I provide a tube socket which has the ordinarily provided body section of rigid insulating material with a plurality of recesses formed in one face thereof, and with a plurality of openings communicating with the recesses. In each recess there is provided a contact terminal made of thin resilient metal and formed and positioned in the recesses so as to electrically and mechanically engage a tube pin inserted in that recess. Each of the contact terminals has, in the usual manner, a portion extending out from the opening communicating with that recess. In addition, as an essential feature of my invention, I incorporate in the body section of the socket a plurality of keyways each having a locking indentation formed therein. Associated with each keyway is a wire-wrap terminal formed of relatively thick soft metal which has a projecting tab locked in the indentation of the keyway. Each wire-wrap terminal also has a portion extending from the keyway and provided with the necessary sharp edges as described above. The extending portion of each of the pin contact terminals is formed substantially parallel and contiguous to the extending portion of one of the wire-wrap terminals.

With this construction, when the wire-wrap terminal receives the wire, the coiling of the wire about the terminal holds the extending portion of the contact terminal rigidly to the extending portion of the wire-wrap terminal, in good mechanical and electrical securement thereto.

The subject matter which constitutes my invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. The invention, together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawing.

In the drawing, Figure 1 is an elevational view of the pin receiving face of a tube socket constructed in accordance with my invention;

Figure 2 is an elevational view of the opposite side of the improved tube socket of my invention from that shown in Figure 1;

Figure 3 is a view along line 3—3 in Figure 1; and

Figure 4 is an enlarged fragmentary view of a portion of the socket as shown in Figure 3, with wire wrapped on the terminals to show the device in actual use.

Referring now to the figures of the drawing, there is shown a tube socket having a body section 1 composed of a suitable rigid insulating material such as, for instance, molded phenolic resin. Body section 1 may be formed in the conventional manner by molding, or by any other design process. The conventional socket, as shown, may have a generally annular body section provided with a central opening 2 which incorporates a keyway 3 for the purpose of correctly positioning the aligning plug of a tube (not shown) whose pins are to be inserted in the recesses 4 of the insulating body section. Positioned within each recess is a contact terminal 5 intended to receive and secure electrically and mechanically a tube pin inserted in the socket. While the precise shape of contact terminal 5 may be varied considerably, a shape generally such as that shown wherein the contact terminal is generally annular in nature, with possibly a necked-down section 6 and a split or opening 7, is preferred. The split 7 permits a limited amount of expan-

sion when a pin is forced into the contact terminal while at the same time the inherent resilience of the material of which each contact terminal 5 is formed (such as spring brass for instance) causes the terminal to enter into tight mechanical and electrical engagement with the pin at the necked down portion 6.

The base of each recess 4 communicates with an opening 7' which extends through to the opposite face 8 of the body section 1 from the face 9 toward which the recesses open. Referring particularly to Figure 3, it can be seen that an extension 10 of the contact terminal 5 extends down through opening 7' and merges into a portion 11 extending parallel and contiguous to face 8 of body section 1; portion 11 in turn merges into a portion 12 extending beyond the confines of the body section 1 of the socket. It will readily be understood that the contact terminal 5 and the additional portions thereof 10, 11 and 12 represent normally a single piece of thin sheet material whose characteristics are tailored as described to the need for resilient clamping engagement of a pin within each contact terminal 5.

Body section 1 of the tube socket is also provided with a number of rectangular keyways 13 which, as can best be seen in Figures 3 and 4, extend substantially parallel to the recesses 4. It will further be observed that there is one keyway 13 for each recess 4, each keyway being preferably positioned in radial alignment with its associated recess as appears in Figure 1. In each of the keyways 13 there is inserted a terminal member 14 of the type intended to receive wire wrapped around it in order to obtain good electrical and mechanical connection. Such a terminal is an elongated member of preferably substantial cross section and formed of not too hard a material with relatively sharp edges so that when wire is wrapped tightly around it it will bite into the edges of the member 14 and provide the desired good electrical and mechanical securement. Each of the members 14 has a base portion 15 which extends into a keyway 13. A tab 16 is formed out of the section 15 and when terminal 14 is in position in the keyway tab 16 cooperates with a tab retaining indentation 17 formed in the keyway to retain the terminal therein.

Each of the terminals 14 has a wire receiving part 18, preferably rectangular in cross-sectional configuration, which extends a substantial distance out of keyway 13 from face 8 of the body section and which has, as described above, relatively sharp edges as shown for instance by the edges 19 of one of the terminals 14 in Figure 3. It will be recalled that each keyway is radially aligned with one of the recesses 4. Because of this, and because of the radially outwardly extending portion 11 of contact terminal member 5, the extending portion 12 of each terminal 5 extends not only substantially parallel to the extending portion 18 of terminal member 14 but also substantially contiguous thereto. Thus, referring to Figure 4, it will be seen that when wire such as that shown by the numeral 20 is wrapped tightly around the base of the extending portion 18 of a terminal 14 it not only will provide a good electrical and mechanical connection between the wire and the member 14 but it will also tightly bind the extending portion 12 of terminal 5 to the extending portion 18 of terminal 14 so as to provide a good electrical and mechanical securement between the two extending terminal portions.

As can be seen by reference to the figures, the terminal member 14 is formed with portion 15 somewhat wider than portion 18 so that retainer tabs 21 may be cut and bent out of the plane of terminal 14. The tabs 21 of terminal member 14 when so bent down bear down on the portion 11 of a terminal member 5 and hold it against face 8 of the body section.

It will readily be seen that the positioning of the tab 16 behind projection 17 prevents terminal 14 from falling out of the keyway 13 when it is in the position shown in Figure 4. In addition, the tabs 21 not only prevent the movement of terminals 14 in the opposite direction in keyways 3 (which for manufacturing purposes are preferably open at both ends) but also lock the terminal member 5 in position in the body section. While the engagement of the two terminals 14 and 5 may not be completely rigid prior to the wrapping of wire 20 on the terminals, the way that the two terminals 5 and 14 are formed causes the wrapping of the wire about them to inherently provide mechanical and electrical connection. In addition, assembly of the structure is exceedingly easy since it is necessary only to insert and form the terminal 5 and to insert the terminal 14, with the insertion of terminal 14 inherently securing both terminals in the desired position by the locking action of tab 16 and tabs 21. Thus, the desired type of construction for terminal 5, that is, a thin hard resilient metal and the desired type of construction for terminal 14, that is, of relatively thick and softer metal, may be achieved without any need for a special operation bonding the two together since the bonding operation is performed by the wire-wrapping operation.

It will be seen from the foregoing that my invention provides a tube socket of the type suitable for wire-wrapping operations wherein the different characteristics necessary for the pin contact terminal and for the wire-wrap terminal are readily provided in an economical fashion in different members which maintain themselves in a suitable position in the device and are so positioned relative to each other that they automatically are forced into good electrical and mechanical securement upon the performance of the wire-wrapping operation.

While in accordance with the patent statutes I have described what at present is considered to be the preferred embodiment of my invention, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and I therefore aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

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

1. A tube socket comprising a body section of rigid insulating material having a plurality of recesses formed in a face thereof and having a plurality of openings respectively communicating with said recesses, a plurality of contact terminals formed of thin resilient metal and positioned in said recesses so as to electrically and mechanically engage tube pins inserted in said recesses, each of said contact terminals having a portion extending through and out from one of said openings, said body section also having a plurality of keyways formed therein, each of said keyways having a locking indentation formed therein, a plurality of wire-wrap type terminals formed of relatively thick soft metal positioned respectively in said keyways and each having a portion extending from said keyways, each of said wire-wrap terminals having a projecting tab portion locked in the indentation of its associated keyway, the extending portion of each said contact terminal being substantially parallel to and contiguous the extending portion of one of said wire-wrap terminals.

2. The article defined in claim 1 wherein said body section of rigid insulating material is formed of molded material.

3. The apparatus defined in claim 1 wherein said recesses and said openings communicate with opposite faces of said body section.

4. The apparatus defined in claim 1 wherein said recesses and said keyways are formed with each recess adjacent the parallel to a keyway.

5. The apparatus defined in claim 1 wherein the portion of said contact terminals within said recesses has a split annular pin-receiving shape whereby a pin inserted within the tubular shape of said contact terminal

causes a resilient clamping action of the terminal on said pin.

6. The apparatus defined in claim 1 wherein said recesses and said openings are arranged substantially in a circle in said body section, each of said keyways being radially aligned with its associated recess.

7. The apparatus defined in claim 1 wherein said wire-wrap terminal extending portions are substantially rectangular in cross-section.

8. A tube socket comprising a body section of rigid insulating material having a plurality of recesses formed in a face thereof and a plurality of openings formed in the opposite face thereof and respectively communicating with said recesses, a plurality of contact terminals formed of thin resilient metal and positioned in said recesses so as to electrically and mechanically engage tube pins inserted in said recesses, each of said contact terminals having a first portion extending through one of said openings, a second portion extending parallel to and contiguous with said other face of said body section, and a third portion extending away from said body section, said body section having a plurality of keyways formed therein, each said keyway having a locking indentation formed therein, a plurality of wire-wrap terminals formed of relatively thick soft metal positioned respectively in said keyways and each having a portion of substantially rectangular cross-section extending therefrom, each of said wire-wrap terminals having a locking tab secured in the indentation of its associated keyway, each of said wire-wrap terminals further having a retaining tab formed thereon extending over said second portion of the associated contact terminal thereby to retain said contact terminal in position in said body section, said third extending portion of each said contact terminal being substantially parallel to and contiguous with the extending portion of one of said wire-wrap terminals.

No references cited.