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SUBMINIATURE TUBE RECEPTACLE

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Fig. 1.

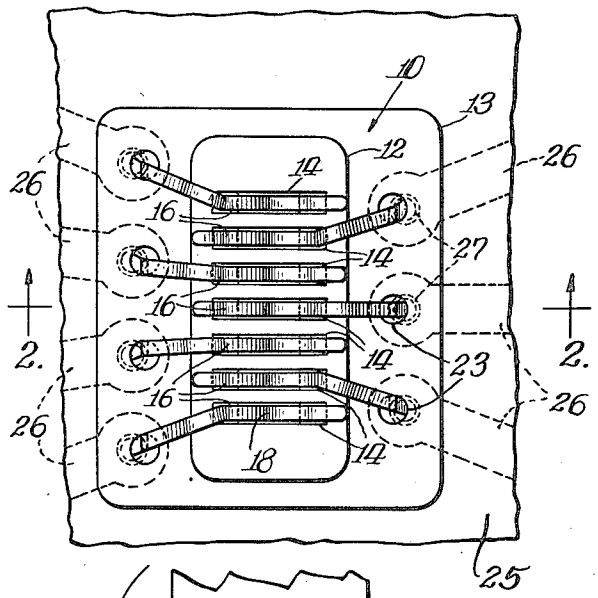


Fig. 2.

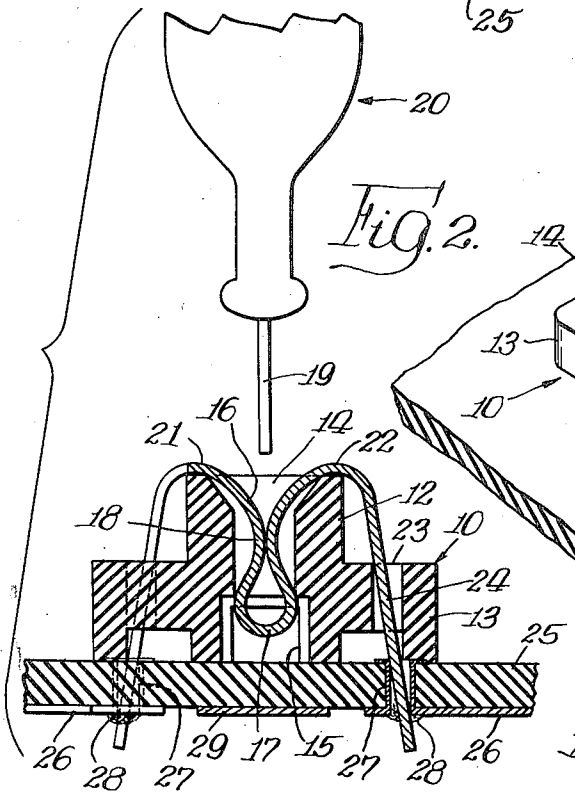
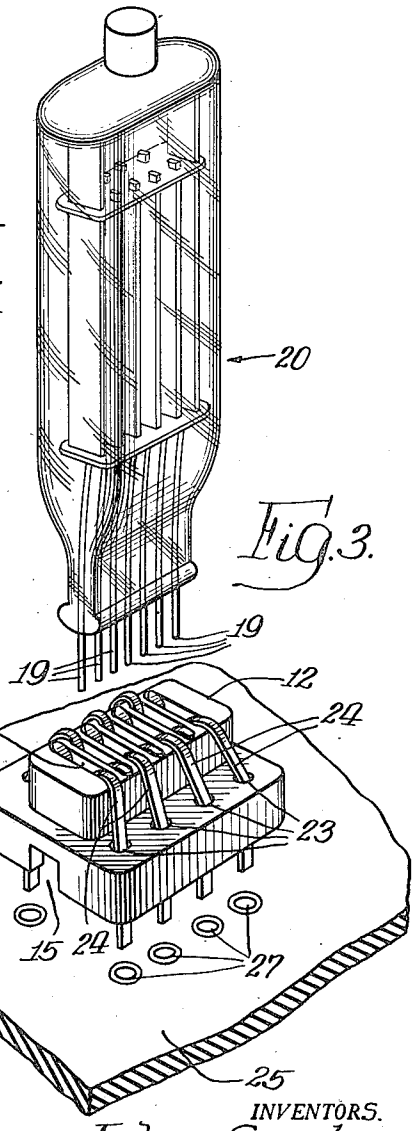


Fig. 3.



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SUBMINIATURE TUBE RECEPTACLE

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3 Claims. (Cl. 339—192)

The present invention relates to receptacles or sockets for electron valves, and more particularly to an improved receptacle for a subminiature electron valve which has particular utility when used in connection with a plated circuit panel.

Electron valves presently designated as the "subminiature" type are generally constructed to have connection pins in the form of small diameter, rigid wires extending in spaced parallel relation from the base of the valve. In many applications it is not expedient to solder connections directly to these connection pins because of the inconvenience of replacement and the possibility of damage with such a permanent installation.

Sockets used to retain the larger size valves, which have larger and more rugged connection pins, are not suitable for the accommodation of the connection pins of subminiature valves. This is due to the difficulty and expense involved in attempting to construct this type of socket with a sufficiently reduced size so that it is suitable for receiving a subminiature valve. Because of this, sockets have been designed which are especially adapted for subminiature valves. However, there is a need for a miniature socket of the latter type that may be formed conveniently and at low cost, which makes good electrical and mechanical contact with the connection pins of a subminiature valve, and which may be expeditiously mounted on a supporting panel.

It is accordingly a general object of the present invention to provide an improved socket or receptacle for a subminiature valve that supplies the need referred to above.

A more specific object of the invention is to provide such an improved receptacle for a subminiature valve that may be supported on a base or chassis and connected into an electrical circuit with the utmost ease and simplicity, and which is constructed to retain the connection pins of a subminiature valve inserted therein securely and rigidly so as to establish good electrical and mechanical connection thereto and yet allow for the removal of the valve without undue force.

A feature of the invention is the provision of an improved receptacle for a subminiature valve which includes an insulating body having a series of apertures therein for receiving the connection pins of the valve, each of the apertures having a metallic strip looped therein with the looped portion of the strip being firmly retained in the socket and making electrical connection with the corresponding pin on both sides thereof, and which strip has a portion extending from the base of the loop to constitute an electrical connector and also a means for supporting the receptacle on the panel with which it is associated.

The above and other features of the invention which are believed to be new are set forth with particularity in the

appended claims. The invention itself, however, together with further objects and advantages thereof may best be understood by reference to the following description when taken in conjunction with the accompanying drawing in which:

Figure 1 is a plan view of the improved socket of the present invention shown mounted on a plated circuit panel, and shown greatly enlarged for purposes of clarity.

Figure 2 is an enlarged cross-sectional view of the socket taken along the lines 2—2 of Figure 1, and

Figure 3 is an enlarged perspective exploded view of a subminiature valve, the improved socket of the invention, and a fragment of a plated circuit panel.

The improved socket or receptacle of the present invention is formed of a block or body of insulating material having a series of apertures in the top surface thereof each of which extends into the interior of the body and has an enlarged section disposed a selected distance from that surface. A loop formed from a resilient metallic strip is disposed in each of the apertures, and each loop has an enlarged closed end portion which extends into the enlarged section of its corresponding aperture so that the loop may be self-retaining in the aperture. The loop also has a constricted intermediate portion within the aperture for resiliently retaining a connection pin of a subminiature valve between the opposing sides of the metallic strip. Toward the pin-entry end of the aperture, the loop has a pair of bent-over base sections extending in opposite directions across the top surface of the block and engaging that surface so as to prevent inward motion of the loop within the aperture. One base section of the loop has an extended portion which is bent down over the side of the body to form an electrical connection to the looped portion and also to form a mounting means for the socket.

Referring now to the drawing, the improved socket of the present invention is illustrated therein and includes a body portion 10 which is formed of a block of insulating material such as molded phenolic, polystyrene or other suitable substance. The body 10 is preferably of molded construction and, in the illustrated embodiment, has an upper portion 12 of rectangular section and a lower integral rectangular flange portion 13, the flange portion having greater transverse dimensions than the upper portion.

The top surface of upper portion 12 has a series of apertures 14 formed therein which extend downwardly into the interior of the body 10. These apertures have a rectangular section and are disposed in spaced parallel relation along portion 12 with their long dimension extending transversely thereof. The lower portion 13 of body 10 has a slot or channel 15 formed therein which extends from one end of the lower portion to the other in communication with apertures 14. In this manner, and as more clearly shown in Figure 2, channel 15 forms an enlarged section for each of the apertures 14 spaced a selected distance from the top surface of upper portion 12.

Each of the apertures 14 has a strip 16 of resilient electrically conductive metallic material associated therewith. Each of the strips 16 has a looped portion disposed in a corresponding one of apertures 14 and bent around an axis of symmetry. The looped portion has a rounded closed end 17 of enlarged section extending into slot 15 and serving to hold the looped portion of strip 16 in the aperture by engaging the shoulder formed between the aperture and the slot. The looped portion also has an intermediate resilient constricted section 18 which

serves firmly but resiliently to engage a corresponding one of the connection pins **19** of subminiature electron valve **20** and to make electrical contact with the corresponding pin on two sides thereof.

The upper open end of the looped portion of each of the strips **16** is flared outwardly across the top surface of upper portion **12**, and this provides a pair of bent-over base sections or flared portions **21** and **22** extending away from the axis of symmetry of the looped portion in opposite directions across the top surface so as to prevent downward motion of the looped portion within the aperture. The lower flange portion of body **10** has a series of apertures **23** extending therethrough, and one of the base sections, for example, section **22** has an extended portion **24** which is bent over the side of upper portion **12** and through a corresponding aperture **23** in lower portion **13**.

The improved receptacle of the present invention is shown mounted on a plated circuit panel **25**. This panel may be constructed, for example, in accordance with the process disclosed and claimed in copending application Serial No. 297,285, filed July 5, 1952 now Patent No. 2,699,425, in the name of Temple Nieter, and assigned to the present assignee. Such has an electrical circuit **26** plated thereon and includes terminal points in the form of plated holes **27** which are aligned with holes **23** in the flange portion **13** of the various receptacles. The ends of the extended portions **24** of metallic strip **16** extend down through the plated holes referred to above in the plated circuit panel, and are secured at soldered joint **28** so as to provide respective electrical connections to the various looped portions thereof and so as to hold the receptacle firmly on the panel. A shield **29** may be conveniently formed as a part of the plated circuit, and is disposed on the panel **25** below the receptacle to minimize grid-to-plate capacity between the soldered ends of extended portions **24**.

The subminiature tube connection pins are firmly but resiliently held in the receptacle by means of the constricted sections **18** of the looped portions of the various strips **16**. Superior electrical contact is made to the connection pins since they are engaged on two sides by the strip **16** on both sides of the constricted section of the looped portion. Soldering of the ends of extended portions **24** is facilitated since these ends are spaced an appreciable distance apart in spite of the extremely small size of the socket. Moreover, due to the improved construction of the socket, the likelihood of solder or flux flowing up the extended portions **24** into the pin-receiving portion of the receptacle due to capillary action is reduced to a minimum.

In a constructed embodiment of the invention the insulating body of the receptacle had the following dimensions, and these are given merely as an example of the size of the body and are not intended to be a limitation on the invention.

Portion 12—3/16" x 3/8" x 1/8"
Portion 13—7/16" x 1/2" x 1/8"
Slot 15—1/2" x 1/8" x 1/16"

The invention provides, therefore, an improved receptacle for a subminiature valve that uses relatively few component parts and may be of a simple molded construction. The socket may be easily secured to a plate circuit panel by the soldering of the extended portions of the various metallic strips to the terminal points of the electrical circuit and there is no need for any other mounting means to be provided. Moreover, the socket is constructed to facilitate soldering and to prevent excess solder from entering the pin-receiving portion thereof due to capillary action or the like.

While a particular embodiment of the invention has been shown and described, modifications may be made and it is intended in the appended claims to cover all such

modifications as fall within the true spirit and scope of the inventon.

We claim:

1. A receptacle for receiving connection pins of a subminiature electron valve and the like including in combination, a body of insulating material having an upper portion with a series of apertures therein extending inwardly from the top surface thereof and having a lower integral flange portion with transverse dimensions exceeding those of said upper portion, said flange portion having a series of apertures extending therethrough and having a channel extending across the bottom surface thereof in communication with said apertures in said upper portion; a resilient electrically conductive strip member associated with each of said apertures in said upper portion and having a looped portion extending into a corresponding one of said apertures in said upper portion and resiliently engaging the sides thereof; said looped portion having a closed enlarged end section extending into said channel in said lower portion to retain said looped portion in said corresponding aperture, having a constricted intermediate resilient pin-retaining section formed by opposing sides of said loop, having a pair of bent-over base sections extending in opposite directions across said top surface of said upper portion to prevent downward motion of said looped portion in the aperture, and one of said base sections having an extended portion extending around said upper portion of said body and through a corresponding one of said apertures in said flange portion thereof for making electrical connection to said looped portion and for securing the receptacle to a mounting surface.

2. A receptacle for receiving connection pins of a subminiature electron valve and the like including in combination, a body of insulating material having an upper portion with a series of apertures therein extending inwardly from the top surface thereof and having a lower integral flange portion with transverse dimensions exceeding those of said upper portion, said flange portion having a series of apertures extending therethrough and having a channel extending across the bottom surface thereof in communication with said apertures in said upper portion and with a transverse dimension exceeding the transverse dimension of each of such apertures; a resilient metallic strip member associated with each of said apertures in said upper portion and having a looped portion bent around an axis of symmetry and disposed in a corresponding one of said apertures in said upper portion, said looped portion having a closed rounded end extending into the aforesaid channel to retain said looped portion in said corresponding aperture and having an opposite open end with portions flared away from said axis of symmetry across said top surface to prevent downward motion of said looped portion in said corresponding aperture, said looped portion further having a constricted pin-engaging section intermediate said ends, and one of said flared portions having an extended portion extending around said upper portion of said body and through a corresponding one of said apertures in said flange portion thereof for making electrical connection to said looped portion and for securing the receptacle to a mounting surface.

3. A socket for a subminiature electron valve or the like, including in combination: a body of insulating material having a top with a series of apertures extending inwardly therefrom and further having a base opposite said top and adapted to be disposed upon a mounting surface, said base being apertured to provide an enlarged section for each of said apertures; a resilient electrically conductive strip member associated with each of said apertures in said top, each of said strip members having a looped portion disposed in one of said apertures including a closed, enlarged end section extending into said enlarged section in said base to retain said looped portion against withdrawal, said looped portion also having a constricted intermediate resilient pin retaining section

formed by opposing sides of said loop and further having a pair of bent over sections extending in opposite directions across said top of said body to prevent inward motion of said looped portion, and said strip members having alternate ones of said bent over sections extending over said body from said top and terminating below said base thereof for engaging the mounting surface to make electrical connection and to mount the socket.

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