

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 362 979 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **08.06.94** (51) Int. Cl.⁵: **H01R 33/76**

(21) Application number: **89303168.2**

(22) Date of filing: **30.03.89**

(54) **Socket for a cathode-ray tube.**

(30) Priority: **30.09.88 JP 128483/88**

(43) Date of publication of application:
11.04.90 Bulletin 90/15

(45) Publication of the grant of the patent:
08.06.94 Bulletin 94/23

(84) Designated Contracting States:
GB

(56) References cited:
EP-A- 0 173 790
DE-U- 8 716 179
US-A- 4 588 250

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Description

This invention relates to a socket for a cathode-ray tube (hereinafter referred to as a "CRT socket") used specifically in a color television receiver.

Generally, it is necessary for a color television receiver to alleviate aberration of an electric lens in a cathode-ray tube so as to improve the picture quality of the television receiver. To attain this, there has been a tendency of rather increasing the focusing voltage in the latest color television receivers.

Now, ordinary cathode-ray tubes generally have stem pins (electrode terminals) which are disposed circularly around a venting stem portion so that the electrodes other than an anode electrode can be supplied with electric voltage from contacts of the CRT socket through the stem pins. However, in recent years, with the tendency of increase of the focusing voltage as noted above, the CRT sockets have been susceptible to dielectric breakdown between a focusing contact and the adjacent contact during service.

The breakdown between the focusing contact and the adjacent contacts is caused by electric discharge or surface leak of an electric current flowing through the contacts. Specifically in a case of using a CRT socket which is moulded of an insulating material such as a synthetic resin, an electric surface leakage is apt to occur.

Some CRT sockets having means intended to prevent dielectric breakage from occurring between the focusing contact and the adjacent contact have been previously proposed as follows, and as illustrated in the accompanying drawings.

In Figures 1(A) to 1(D) is illustrated an example of a conventional CRT socket. A tube neck portion 1 of the cathode-ray tube (CRT) has a focusing stem pin 2 and some other stem pins 3 which protrude from the end surface of the neck portion 1 and are arranged circularly around a venting stem portion 1a. To the neck portion 1, a terminal support base 4 is fitted so as to permit the stem pins 2, 3 to be retained in the state penetrating the support base 4 as shown in Figure 1(A). The terminal support base 4 and the neck portion 1 are adhered to each other with insulation bonding agent 6 of synthetic resin or the like as shown in Figure 1(C). The terminal support base 4 has an insulation barrier means 5 formed in a hollow shape so as to encircle the focusing stem pin 2.

On the other hand, the CRT socket has a cylindrical centre hole 11 passing from the upper surface through to the lower surface of a socket body 10 as shown in Figures 1(B) and 1(C). Around the centre hole 11 there are bored a focusing contact hole 12 and other contact holes 13. That is, the focusing contact hole 12 accommodates the

focusing contact 14 having a lead terminal 14a. This lead terminal 14a extends toward the upper right in Figure 1(C) so that it can be electrically connected to an external lead wire in an insulation barrier frame 15. In the contact holes 13 other than the focusing contact hole 12 there are inserted contacts 16 each having a lead terminal 16a which is arranged along the lower surface of the socket body 10 so that the leading end of the lead terminal 16a can be soldered to a printed wiring line on a printed circuit board 17.

Around the focusing contact hole 12 there is formed a barrier fitting groove 18 for tightly receiving the insulation barrier means 5 formed on the aforesaid terminal support base 4. When the terminal support base 4 is attached to the tube neck portion 1 of the cathode-ray tube and further the socket body 10 is engaged with the united terminal support base 4 and tube neck portion 1, the focusing contact 14 and focusing stem pin 2 which are joined together are embraced by the insulation barrier means 5. As a result, the surface conduction length extending along the surface of the insulation barrier means 5 between the focusing stem pin 2 (focusing contact 14) and the adjacent stem pin 3 (adjacent contact 16) becomes longer, consequently reducing the possibility of causing electric surface leakage to some extent.

However, it cannot be said that use of the insulation barrier means 5 and barrier fitting groove 18 as described above suffices for the purpose of preventing electric surface leakage occurring along the surface of the barrier means 5, because there is a tendency recently of increasing the focusing voltage and making parts in a television receiver compact. Therefore, there is a possibility of bringing about the electric surface leakage between the root portion of the lead terminal 14a of the focusing contact 14 and the side edge portion of the lead terminal 16a of the adjacent contact 16 (as indicated by the arrow a in Figure 1(D)) or the root portion of the lead terminal 14a and the leading end of the adjacent contact 16 (as indicated by the arrows b and c in Figure 1(D)). Thus, the reliability of the conventional CRT sockets is not satisfactory.

To eliminate the drawbacks suffered by the aforementioned prior art, there has been proposed another CRT socket in which the socket body 10 is provided between the barrier fitting groove 18 and the adjacent contact hole 13 with a slot 19a as shown in Figure 2(A) or a notch 19b as shown in Figure 2(B). However, in the CRT socket of this type, the aforementioned surface conduction routes a and b as shown in Figure 1(D) cannot sufficiently be elongated, though the surface conduction route c becomes longer. Thus, the troublesome problem of causing surface leakage as described above is still not settled.

EP-A-0 173 790 describes a socket of this type with a high voltage protective groove communicating with the central hole and a protective member inserted in the groove; ribs are formed on the cover member to increase the creeping distance inside the cover member.

Even if a slot 20 is bored piercing from the lower surface of the socket body 10 between the barrier fitting groove 18 and the adjacent contact hole 13 as shown in Figure 3, the aforementioned problem of leakage still cannot be solved because the surface conduction routes b and c shown in Figure 1(D) are not sufficiently elongated.

Furthermore, there has been so far proposed a CRT socket in which the lower opening of the cylindrical centre hole 11 formed in the socket body 10 is closed with an insulation member 21 as shown in Figure 4. However, this structure cannot sufficiently elongate the aforesaid surface conduction routes b and c in Figure 1(D). Also the problem of leakage as described above still remains.

Besides, if the cylindrical centre hole 11 in the socket body 10 is closed with the insulation member 21 as noted above, the venting stem portion 1a of the tube neck portion 1 illustrated in Figure 1(A) cannot be inserted into the centre hole 11. As a result, the CRT socket thus constructed entails a disadvantage in that it becomes too large in height to allow miniaturization of a television receiver.

In any of the conventional CRT sockets, when the terminal support base 4 is united with the socket body 10, the circumferential surface of the cylindrical centre portion of the support base 4 comes in face contact with the inner surface of the centre hole 11 in the socket body 10. Consequently, capillary action which takes place in a narrow gap between the support base 4 and the centre hole 11 causes moisture in the air or water produced due to dew condensation to soak into the gap therebetween, thereby to readily bring about dielectric breakdown between the focusing contact and the adjacent contact. Thus, the CRT sockets of the past still have problems unique to one another.

The present invention was made in view of the drawbacks of past CRTs described above and has an object to provide a socket of a cathode-ray tube having a highly reliable structure capable of preventing electric surface leak and dielectric breakdown between a focusing contact and an adjacent contact and soaking of moisture in the air or water produced due to dew condensation into a socket body.

According to the invention we provide a socket for a cathode-ray tube comprising a socket body having a cylindrical centre aperture, a focusing contact hole and other contact holes all of which are circularly arranged around said centre aperture, and a barrier fitting groove which is formed round

said focusing contact hole to receive an insulation barrier means so as to protect electrically a focusing contact, characterised in that said socket body is provided with through-slits which are formed between said barrier fitting groove and the respective contact holes adjacent to said focusing contact hole, said slits being open to said centre aperture.

Since the focusing contact and adjacent contacts are split by the through slits, the surface conduction routes extending along the surface of the socket body from the focusing contact to the adjacent contacts become sufficiently longer, thereby to prevent electric surface leak of an electric current flowing through the contacts. Besides, the through-slit formed in the socket body serves as an air vent hole so as to prevent dew condensation in the socket and dielectric breakdown which is probably brought about between a focusing contact and the other contacts due to the condensation of dew.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein:-

Figure 1(A) is an exploded perspective view showing a tube neck portion and a terminal support base used in an ordinary cathode-ray tube; Figure 1(B) is a perspective view of one example of a conventional socket; Figure 1(C) is a sectional side view showing the manner in which the socket of Figure 1(B) is used; Figure 1(D) is a partially sectioned, enlarged perspective view of the same; Figures 2(A), 2(B), 3 and 4 are explanatory diagrams of other prior art sockets; Figure 5 is a perspective view showing one embodiment of the CRT socket, viewed from the top, according to this invention; Figure 6 is a bottom view of the same; Figure 7 is a partial section view of the socket taken along the line VII-VII in Figure 6; Figure 8 is a partially sectioned, enlarged perspective view of the same; and Figure 9 is a partially sectioned, enlarged perspective view of another embodiment of the invention.

One preferred embodiment of a socket of a cathode-ray tube (CRT socket) according to the present invention will be described hereinafter with reference to Figures 5 to 8. In the drawings, reference numeral 20 denotes a socket body of the CRT socket. The socket body 20 has a cylindrical centre hole 21, and a focusing contact hole 22 and other contact holes 23 which are all coaxially arranged around the centre hole 21.

Round the focusing contact hole 22 there is formed a barrier fitting groove 28. In the focusing contact hole 22, a focusing contact 24 is inserted from the upper side of the socket body 20 in Figure 5. A lead terminal 24a extending from the lower part of the focusing contact 24 is laid across the bottom surface of the barrier fitting groove 28

and connected to an external lead wire in an insulation cover 25. In the contact holes 23 other than the focusing contact hole 22, contacts 26 are inserted from the lower side of the socket body 20. Lead terminals 26a extending downward from the respective contacts 26 are radially introduced outwardly along the lower surface of the socket body 20. Each leading end portion of the lead terminals 26a is bent at a right angle and pierces through a printed circuit board 27. Then, the leading end of the lead terminal 26a is soldered to a printed wiring line on the lower surface of the printed circuit board 27.

The barrier fitting groove 28 is separated from the adjacent contact holes 23 at a distance to the extent that one contact hole can be formed on either side of the barrier fitting groove 28. In the socket body 10 there are made hollows 32 which open downwards to save raw materials such as synthetic resin required for moulding the CRT socket. In the space between the barrier fitting groove 28 and the adjacent contact hole 23 there is formed a through-slit 33 through which the hollow 32 is open upward and communicates to the centre hole 21. Thus, the through-slit 33 is defined among the upper surface of the socket body 20, the inner circumferential wall of the centre hole 21 and the defining surface of the hollow 32. A through-slit 33 is formed on either side of the focusing contact hole 22.

In the CRT socket having the structure described above, though there are three conceivable surface conduction routes along the surface of the socket body from the exposed part of the lead terminal 24a of the focusing contact 24 laid on the bottom of the barrier fitting groove 28 to the adjacent contact 26, all the surface conduction routes become rather longer as illustrated in Figure 8. That is to say, the routes e and f on the upper side of the socket body 20 extending from the lead terminal 24a to the adjacent contact 26 pass through the outer raised surface of the barrier fitting groove 28, the upper surface of the socket body 10 and the defining surface of the through slit 33. The remaining route d lies through the lower surface of the socket body 10 under the barrier fitting groove 28 and the defining surfaces of the through-slit 33 and the hollow 32.

In the state that the venting stem portion 4 extending from the tube neck portion 1 of the cathode-ray tube is inserted into the cylindrical centre hole 21 as shown in Figure 7, the through-slit 33 functions as a ventilating path for allowing air to pass, thereby preventing dew condensation in the socket.

The CRT socket described above may be modified as shown in Figure 9. In the modified embodiment, a dent or recess 29b is formed close

to the through-slit 33 in the upper surface portion of the socket body 20. Since other elements are identical to the previously described embodiment, like elements are given like reference numerals.

As described above, the CRT socket of this invention is provided with the through slit which pierces through from the upper surface to the lower surface of the socket body and is open to the cylindrical centre hole in the socket body, whereby the surface conduction routes extending along the surface of the socket body from the focusing contact to the adjacent contacts become sufficiently longer. Thus, this invention can provide a highly reliable socket of a cathode-ray tube capable of preventing electric surface leak and dielectric breakdown between the focusing contact and the adjacent contact even if remarkably high voltage is supplied to the focusing electrode of the cathode-ray tube. Besides, since the through slit formed in the socket body functions as a ventilating path for allowing air to pass, dew condensation in the socket can be prevented.

Claims

1. A socket for a cathode-ray tube, comprising a socket body (20) having a cylindrical centre aperture (21), a focusing contact hole (22) and other contact holes (23) all of which are circularly arranged around said centre aperture (21), and a barrier fitting groove (28) which is formed round said focusing contact hole (22) to receive an insulation barrier means (5) so as to protect electrically a focusing contact (24), characterised in that said socket body (20) is provided with through-slits (33) which are formed between said barrier fitting groove (28) and the respective contact holes (23) adjacent to said focusing contact hole (22), said slits being open to said centre aperture (21).
2. A socket for a cathode-ray tube according to Claim 1, wherein said socket body (20) has hollows (32) which are open downward to save material required for forming the socket body (20), and said through-slits (33) communicate respectively with said hollows (32).
3. A socket for a cathode-ray tube according to Claim 1 or Claim 2, wherein at least one dent or recess (29b) is formed in the upper surface of said socket body (20) to extend between the barrier fitting groove (28) and the adjacent through slit (33).

Patentansprüche

1. Fassung für eine Kathodenstrahlröhre, die einen Fassungskörper (20) mit einer zylindrischen Mittelöffnung (21), ein Fokussierkontaktloch (22) und andere Kontaktlöcher (23) umfaßt, die sämtlich kreisförmig um die Mittelöffnung (21) herum angeordnet sind, sowie eine Sperr-Paßnut (28), die um das Fokussierkontaktloch (22) herum ausgeformt ist und eine Isoliersperreinrichtung (5) aufnimmt, um so einen Fokussierkontakt (24) elektrisch abzuschirmen, **dadurch gekennzeichnet**, daß der Fassungskörper (20) mit durchgehenden Schlitten (33) versehen ist, die zwischen der Sperr-Paßnut (28) und den entsprechenden Kontaktlöchern (23) an das Fokussierkontaktloch (22) angrenzend ausgeformt sind, wobei die Schlitzze zur Mittelöffnung (21) hin offen sind.

5
2. Fassung für eine Kathodenstrahlröhre nach Anspruch 1, wobei der Fassungskörper (20) Aushöhlungen (32) aufweist, die nach unten offen sind, um zur Herstellung des Fassungskörpers (20) erforderliches Material einzusparen, und wobei die durchgehenden Schlitzze (33) jeweils mit den Aushöhlungen (32) in Verbindung stehen.

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3. Fassung für eine Kathodenstrahlröhre nach Anspruch 1 oder Anspruch 2, wobei wenigstens ein Einschnitt oder eine Aussparung (29b) an der Oberseite des Fassungskörpers (20) ausgeformt ist und sich zwischen der Sperr-Paßnut (28) und dem angrenzenden durchgehenden Schlitz (33) erstreckt.

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2. Douille pour un tube à rayons cathodiques selon la revendication 1, dans laquelle le corps de douille (20) a des cavités (32) s'ouvrant vers le bas pour économiser de la matière nécessaire pour former le corps de douille (20), et dans laquelle les fentes traversantes (33) communiquent respectivement avec ces cavités (32).

20
3. Douille pour un tube à rayons cathodiques selon la revendication 1 ou la revendication 2, dans laquelle une indentation ou encoche (29b) est formée dans la surface supérieure du corps de douille (20) et s'étend entre la gorge de logement (28) d'un écran et la fente traversante adjacente (33).

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Revendications

1. Douille pour un tube à rayons cathodiques, comprenant un corps de douille (20) ayant une ouverture centrale cylindrique (21), un trou de contact de concentration (22) et d'autres trous de contact (23), tous ces trous étant disposés sur un cercle autour de l'ouverture centrale (21), et une gorge de logement (28) d'un écran, formée autour du trou de contact de concentration (22) pour recevoir un écran d'isolation (5) de façon à protéger électriquement un contact de concentration (24), caractérisé en ce que le corps de douille (20) comporte des fentes traversantes (33) qui sont formées entre la gorge de logement (28) d'un écran et les trous de contact respectifs (23) adjacents au trou de contact de concentration (22), ces fentes s'ouvrant sur l'ouverture centrale (21).

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FIG. 1(A)
PRIOR ART

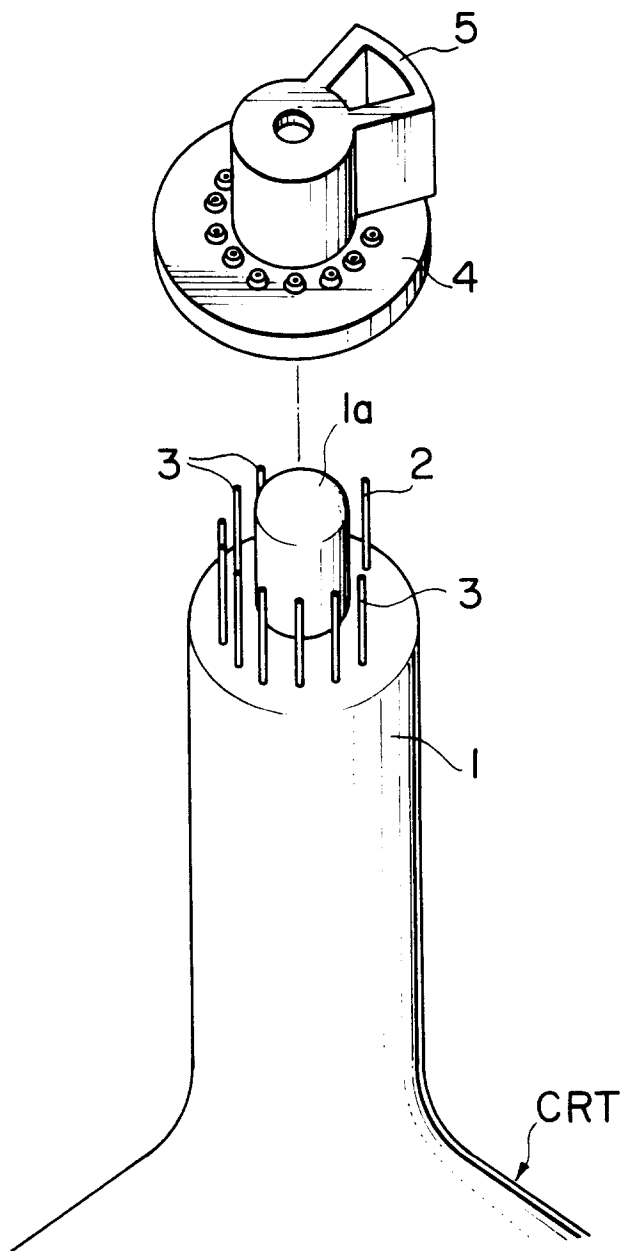


FIG. 1(B)

PRIOR ART

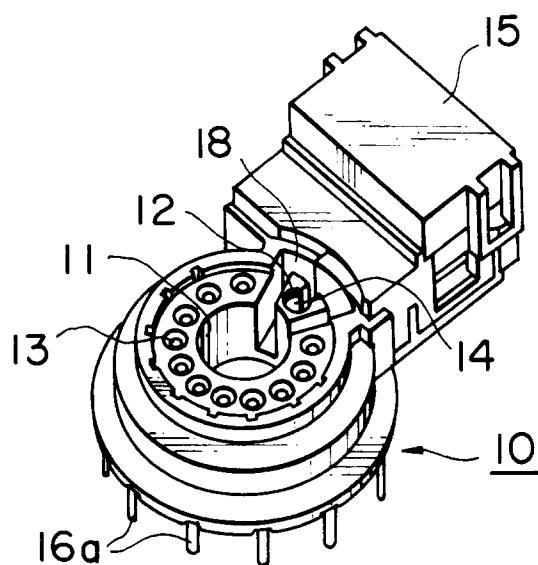


FIG. 1(C)

PRIOR ART

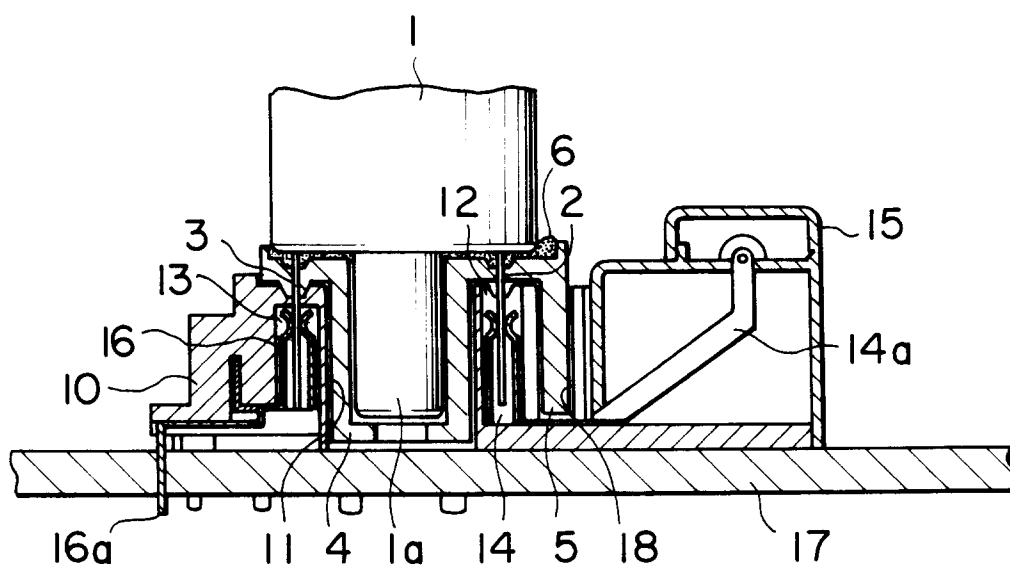


FIG.1(D)
PRIOR ART

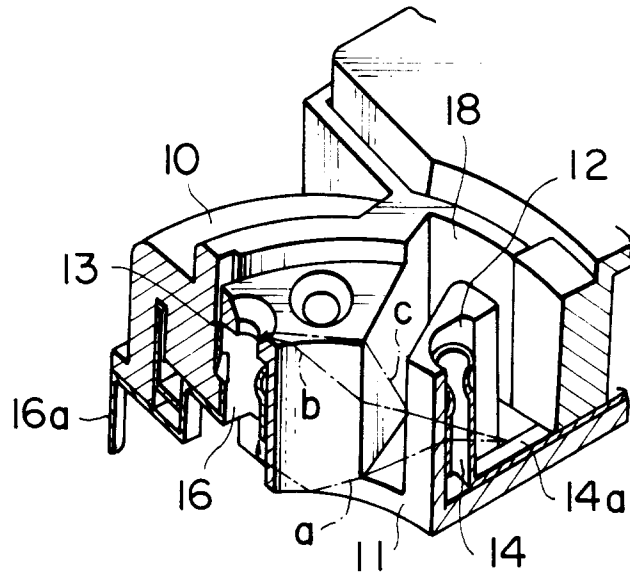


FIG.2(A)
PRIOR ART

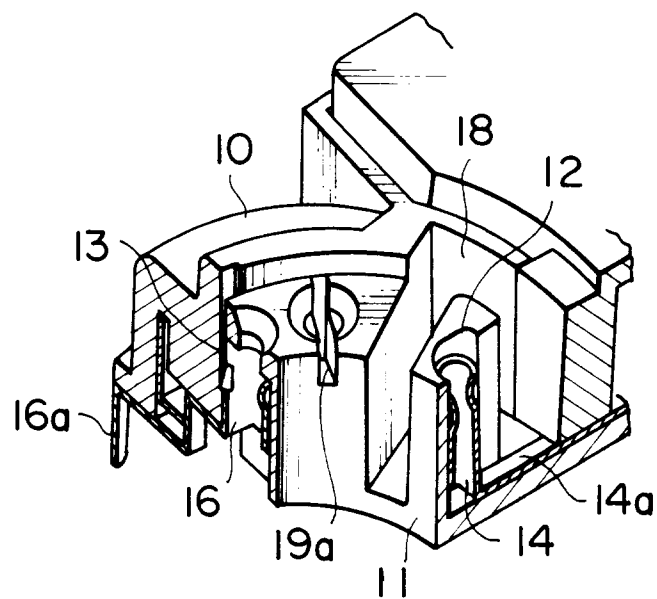


FIG. 2(B)
PRIOR ART

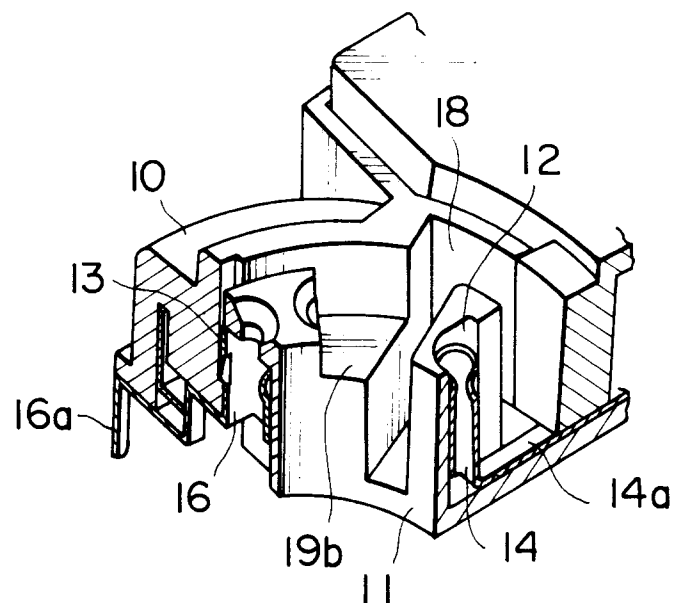


FIG. 3
PRIOR ART

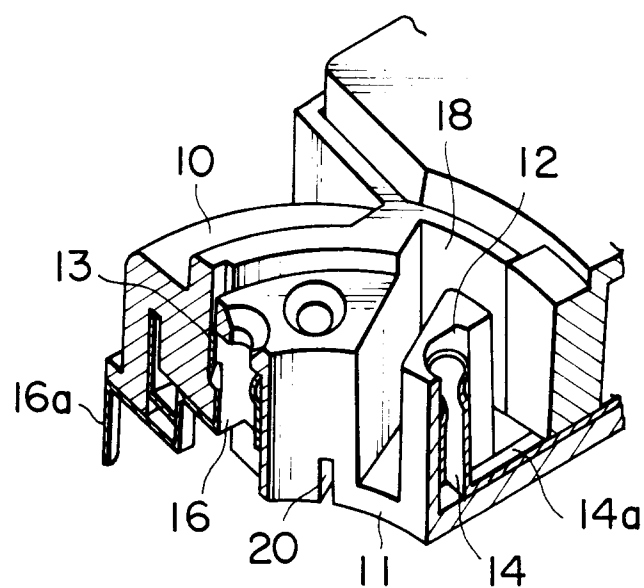


FIG. 4
PRIOR ART

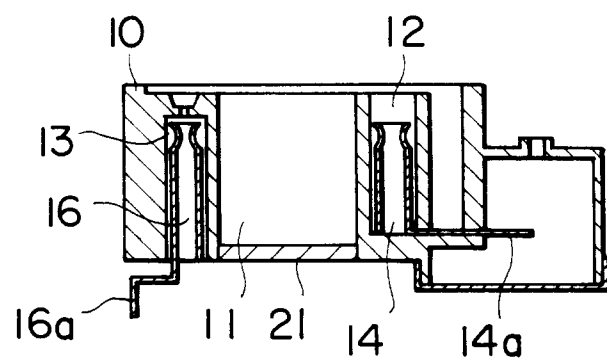


FIG. 5

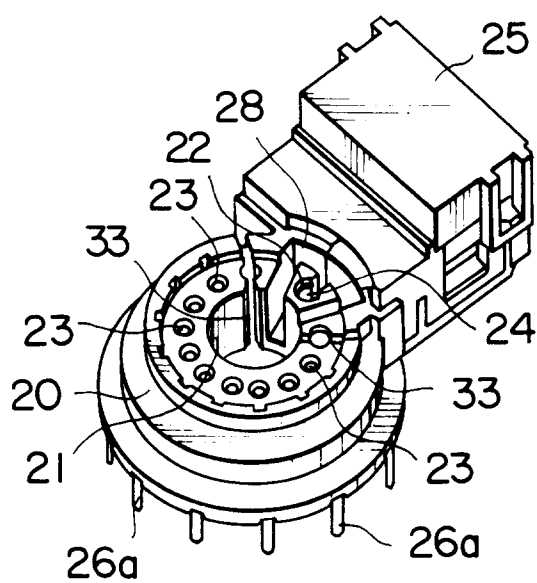


FIG. 6

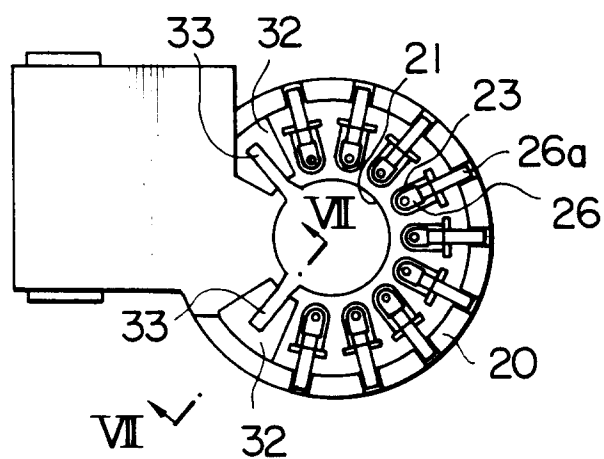


FIG. 7

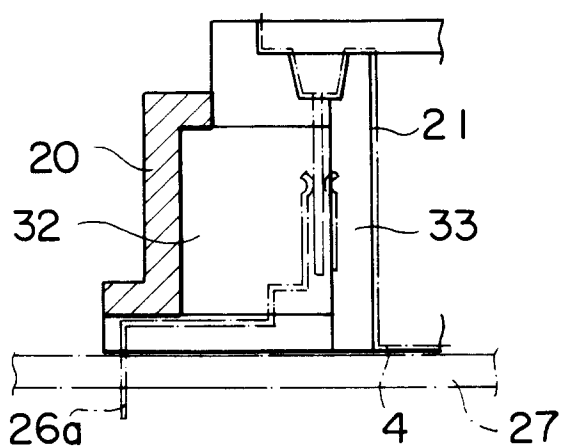


FIG. 8

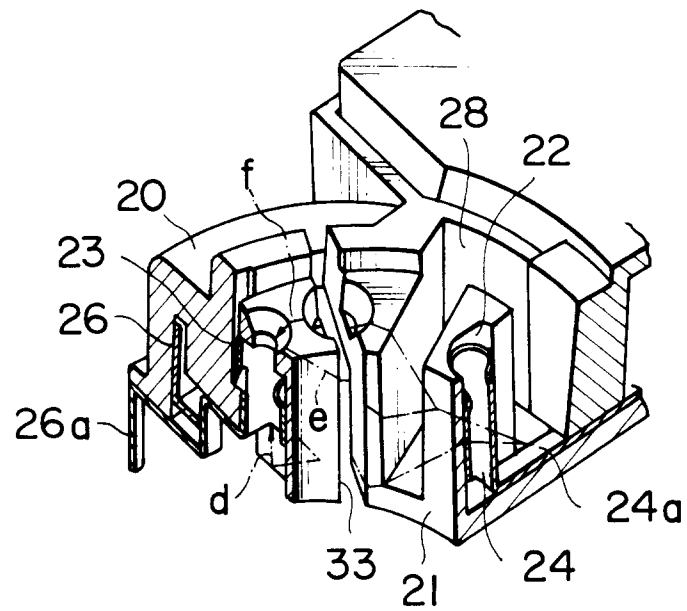


FIG. 9

