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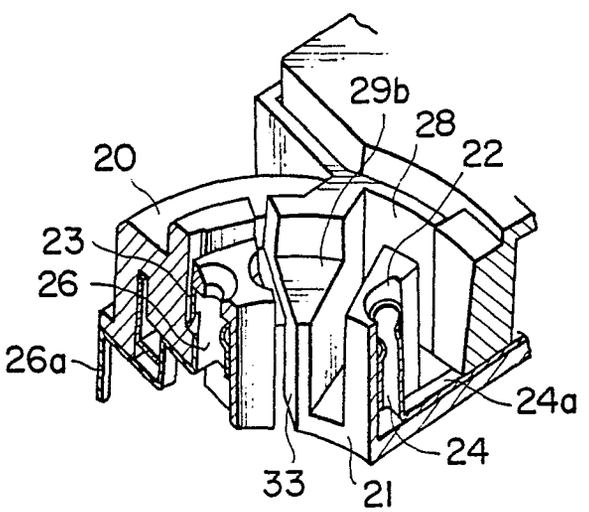
(54) Socket for a cathode-ray tube.

(57) The socket body (20) of a socket for a cathode-ray tube used particularly in a color television receiver, has a focusing contact hole (22) and other contact holes (23) arranged around a central aperture (21). A barrier fitting groove (28) is provided round the focusing contact hole (22), and through slits (33) are formed intermediate the barrier fitting groove (28) and the contact holes (23) adjacent to the focusing contact hole (22) to open into the central aperture (21). The through slits (33) act to prevent leakage of electric current flowing through the contacts, in conjunction with an insulation barrier means (5) inserted into the barrier fitting groove (28), and also act to prevent condensation in the socket body (20).

FIG. 9



EP 0 362 979 A1

SOCKET OF A CATHODE-RAY TUBE

This invention relates to a socket of a cathode-ray tube (hereinafter referred to as "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, the latest color television receivers have a tendency of rather increasing focusing voltage.

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 applied with electric voltage from contacts of the CRT socket through the stem pins. However, in recent years, with the tendency of increasing 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 the CRT socket which is moulded of insulation material such as synthetic resin, electric surface leak is apt to occur.

Some CRT sockets having a measure of preventing dielectric breakage from occuring between the focusing contact and the adjacent contact have been conventionally proposed as follows, and as illustrated in the accompanying drawings.

In Figures 1(A) through 1(D) one of the conventional CRT sockets is illustrated as one example. 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 of increasing the focusing voltage and making parts in a television receiver compact of late. As such, 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.

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 attain 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.

The object of the invention is attained by the provision of a socket of a cathode-ray tube comprising a socket body having a cylindrical centre hole passing from the upper surface through to the lower surface of the socket body, a focusing contact hole and other contact holes which are coaxially formed around the centre hole, and a barrier fitting groove formed encircling the focusing contact hole so as to detachably receive an insulation barrier means so as to protect electrically a focusing contact, which socket is characterized in that the socket body is provided between the barrier fitting groove and the respective contact holes adjacent to the focusing contact hole with through slits open to the centre hole.

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 dew condensation.

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 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 insula-

tion 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 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.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been changed in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

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) 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), said socket body (20) being 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) and which 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 lor 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).

4. The features as herein described, or their equivalents, in any patentably novel selection.

FIG. 1(A)
PRIOR ART

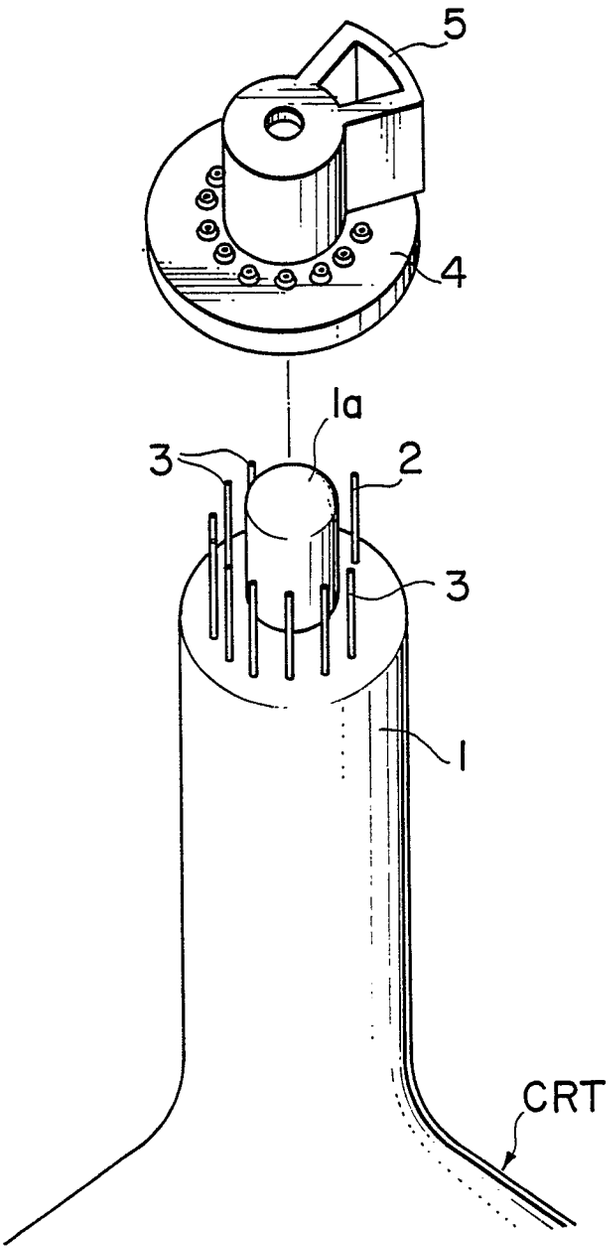


FIG.1(B)
PRIOR ART

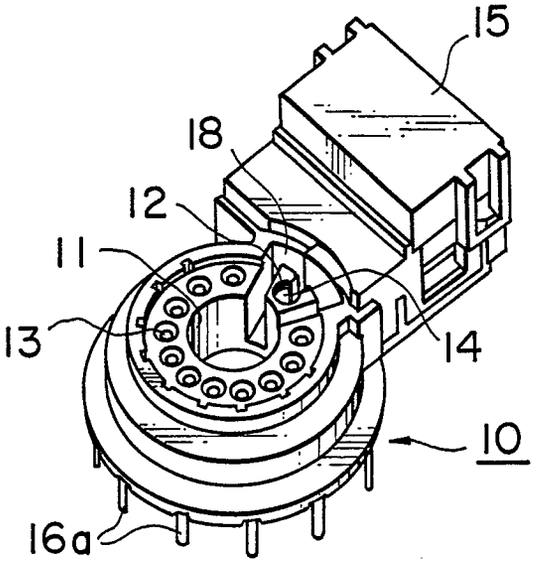


FIG.1(C)
PRIOR ART

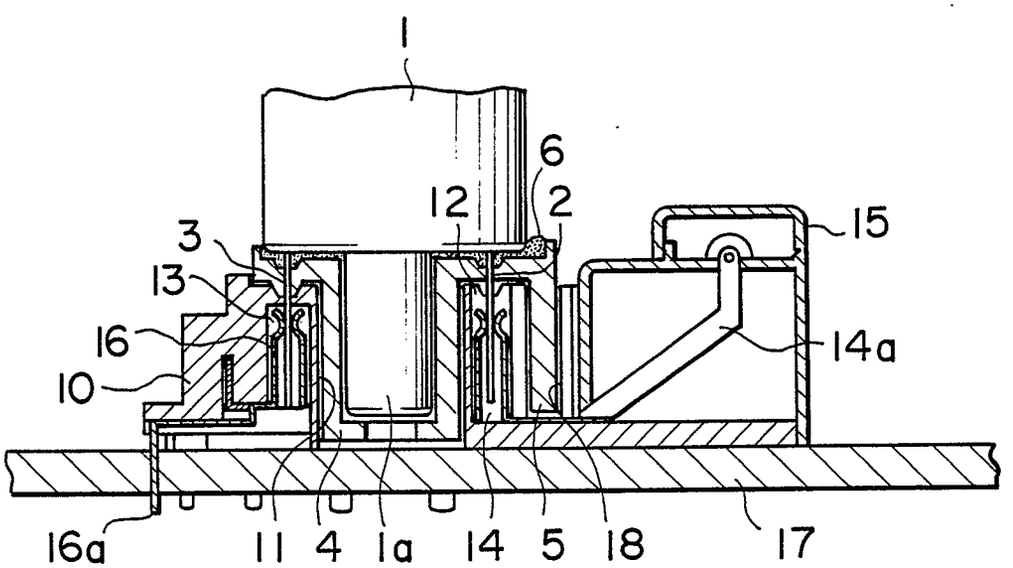


FIG.1(D)
PRIOR ART

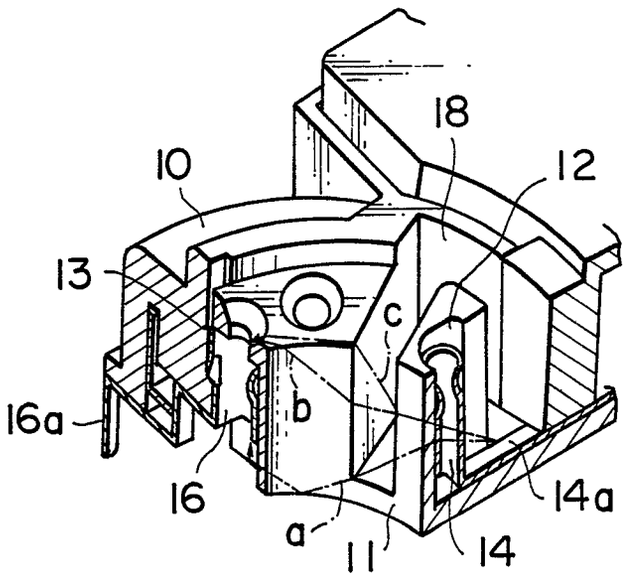


FIG.2(A)
PRIOR ART

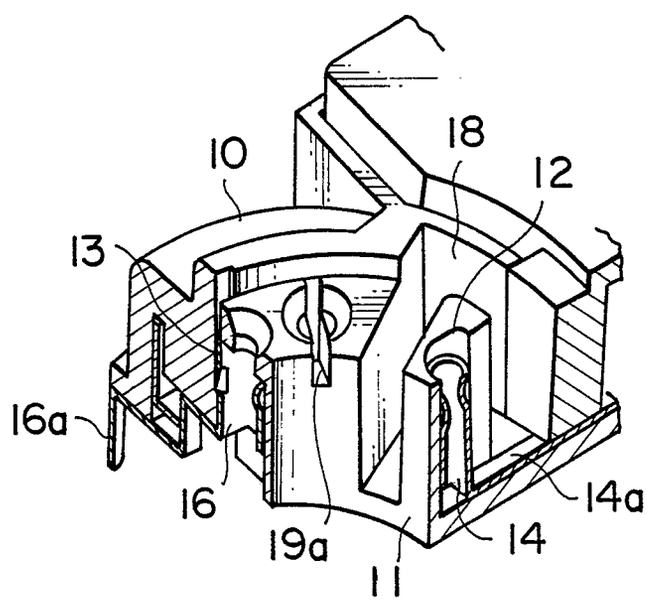


FIG.2(B)
PRIOR ART

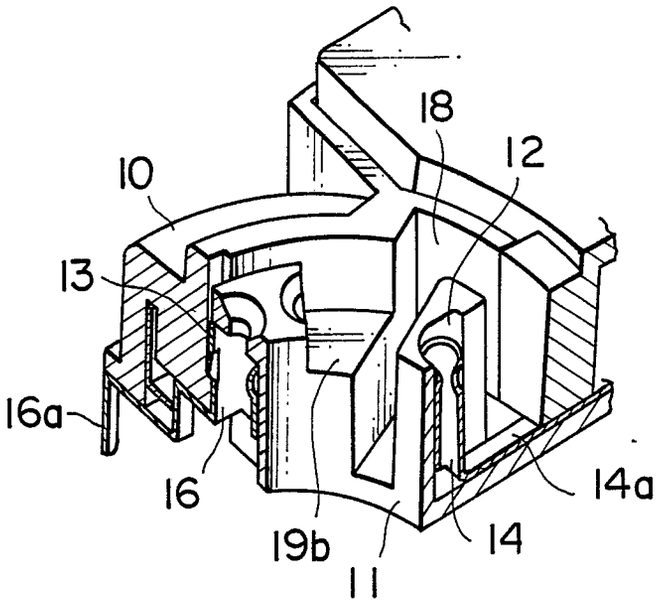


FIG.3
PRIOR ART

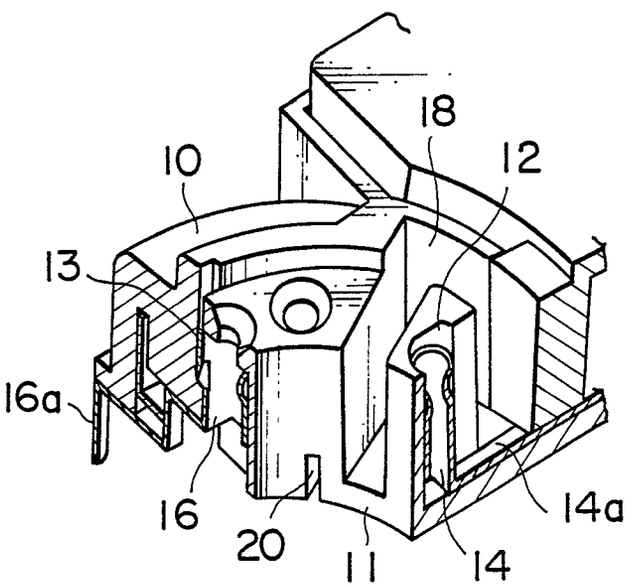


FIG. 4
PRIOR ART

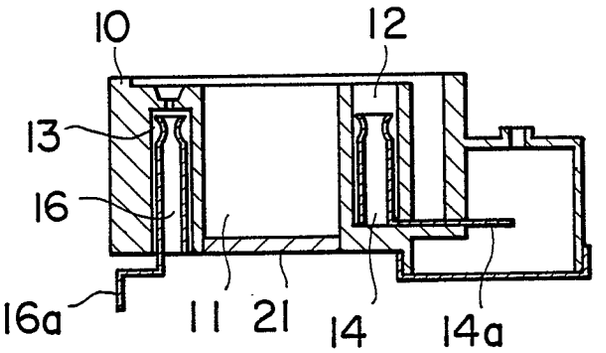


FIG. 5

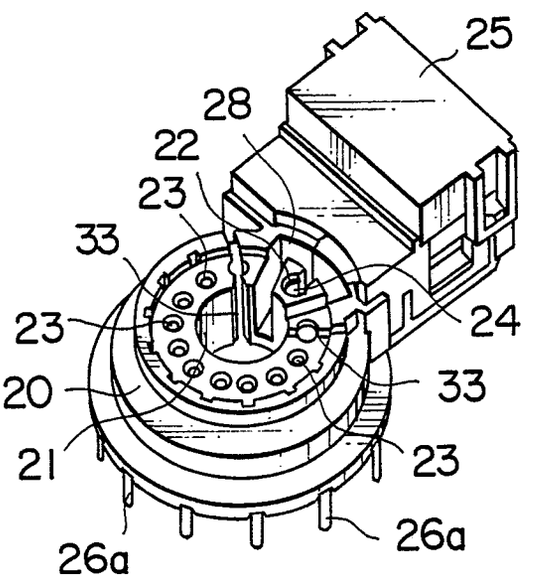


FIG.6

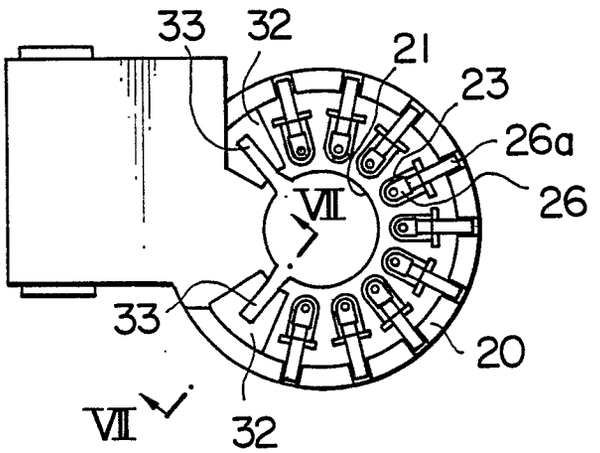


FIG.7

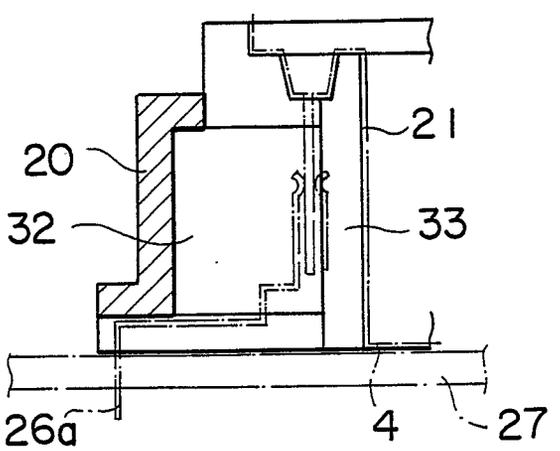


FIG. 8

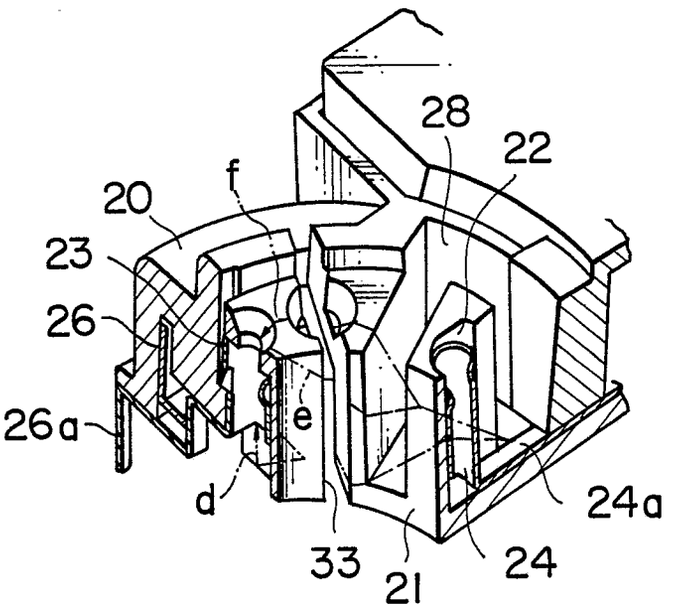

28
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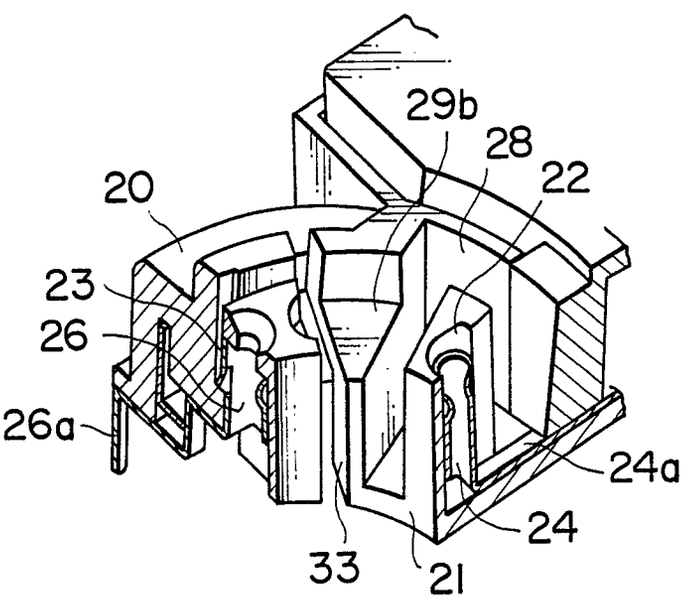
FIG. 9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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 30 3168

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	DE-U-8 716 179 (JUNGBECKER) * page 10, lines 5-13; figure 1 *	1	H 01 R 33/76
A	EP-A-0 173 790 (HOSIDEN ELECTRONICS) * page 13, line 25 - page 14, line 9; figures 1,2,9 *	1	
A	US-A-4 588 250 (P.G. PUHAK et al.) * column 4, lines 46-59; figures 1,3 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

H 01 R 33/00
H 01 J 29/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	03-01-1990	CLOSA D.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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