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(71) Applicant(s)

Bel Fuse Inc
(Incorporated in USA - New Jersey)
198 Van Vorst Street, Jersey City, New Jersey 07302,
United States of America

(72) Inventor(s)

Elliot Bernstein
John Chen
Robery G Schilling

(74) Agent and/or Address for Service

Reddie & Grose
16 Theobalds Road, LONDON, WC1X 8PL,
United Kingdom

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(56) Documents Cited

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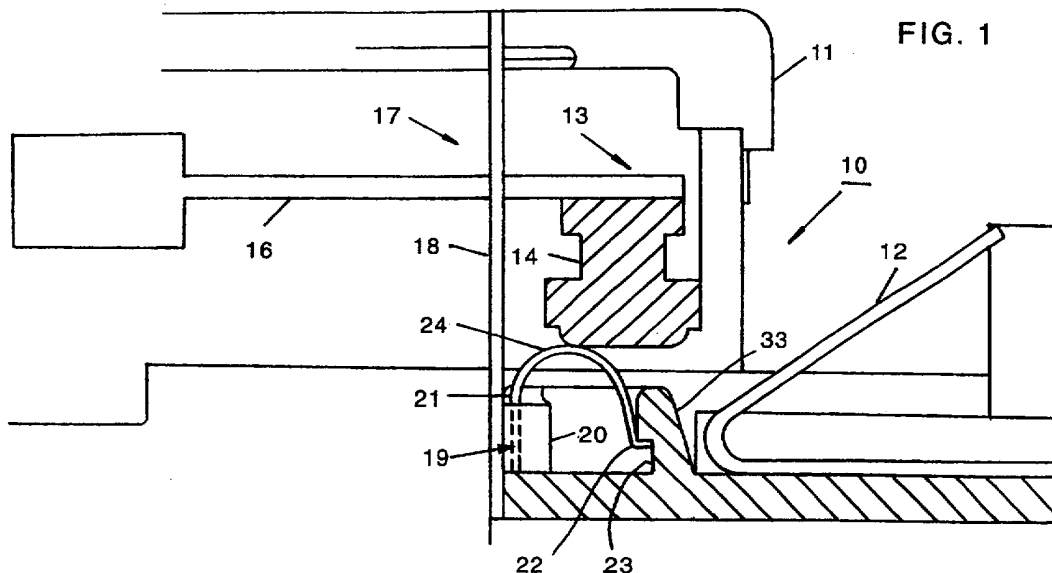
(58) Field of Search

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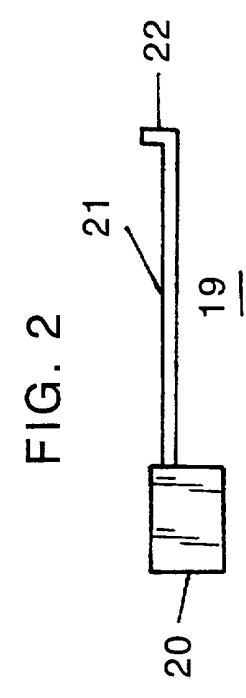
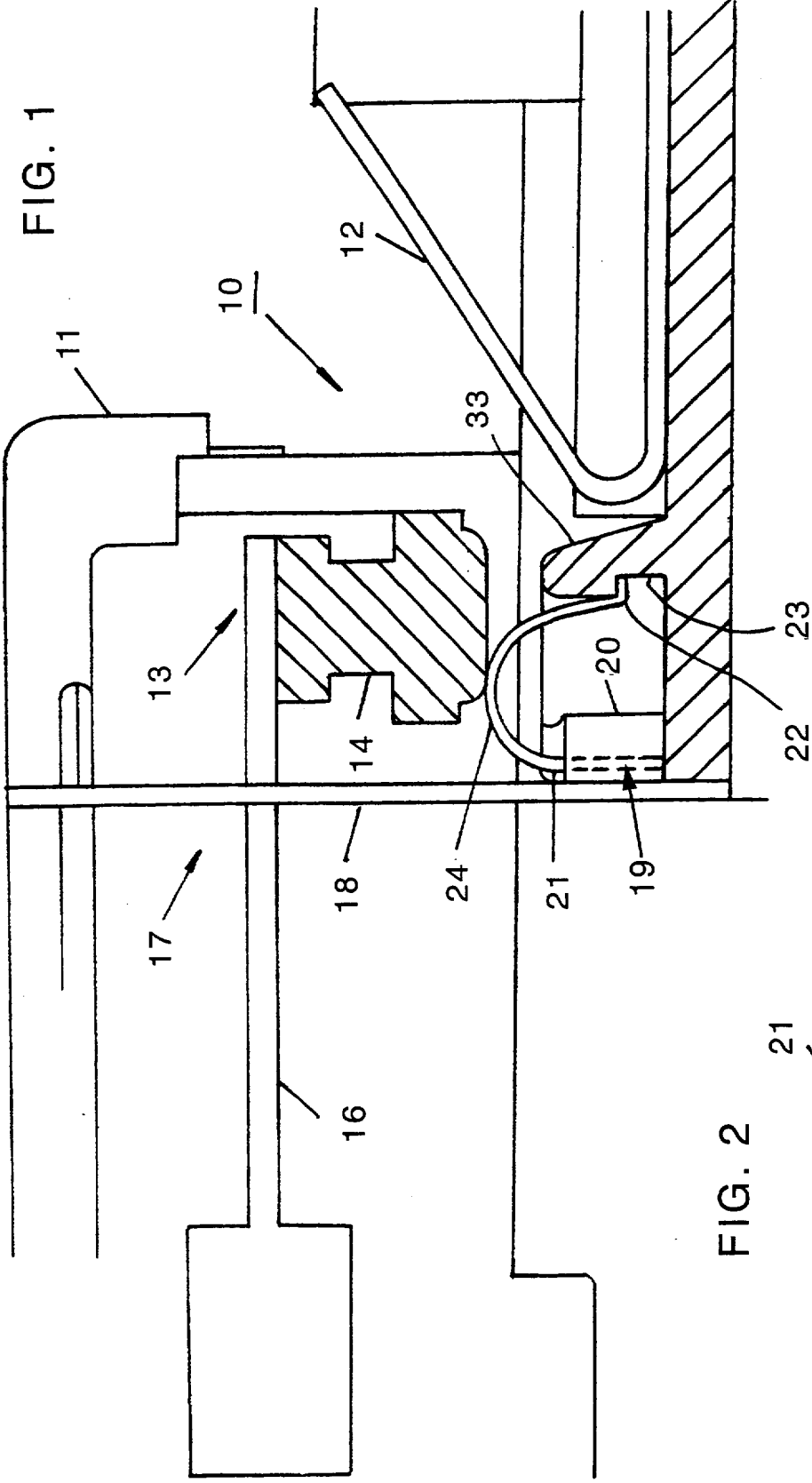
(54) Abstract Title

Jack socket with resistive temporary grounding contacts

(57) A jack socket 10 for a plug 16 has grounding contacts 24 resistively connected to the host device's ground in addition to the normal jack contacts 12. When the plug is inserted, the grounding contacts 24 make contact with the plug contacts 14, discharging any static electricity which may be present. Preferably, the plug contacts break contact with the grounding contacts before they make contact with the jack contacts 12. Thus the equipment connected to the jack socket is unaffected by the grounding process. The grounding contacts may be flat wires 21 in a resistive support 20, or may be made from a resistive tube (25, Fig 4) or may be molded conductive O-rings (29, Fig 5) in a resistive support (32, Fig 5).



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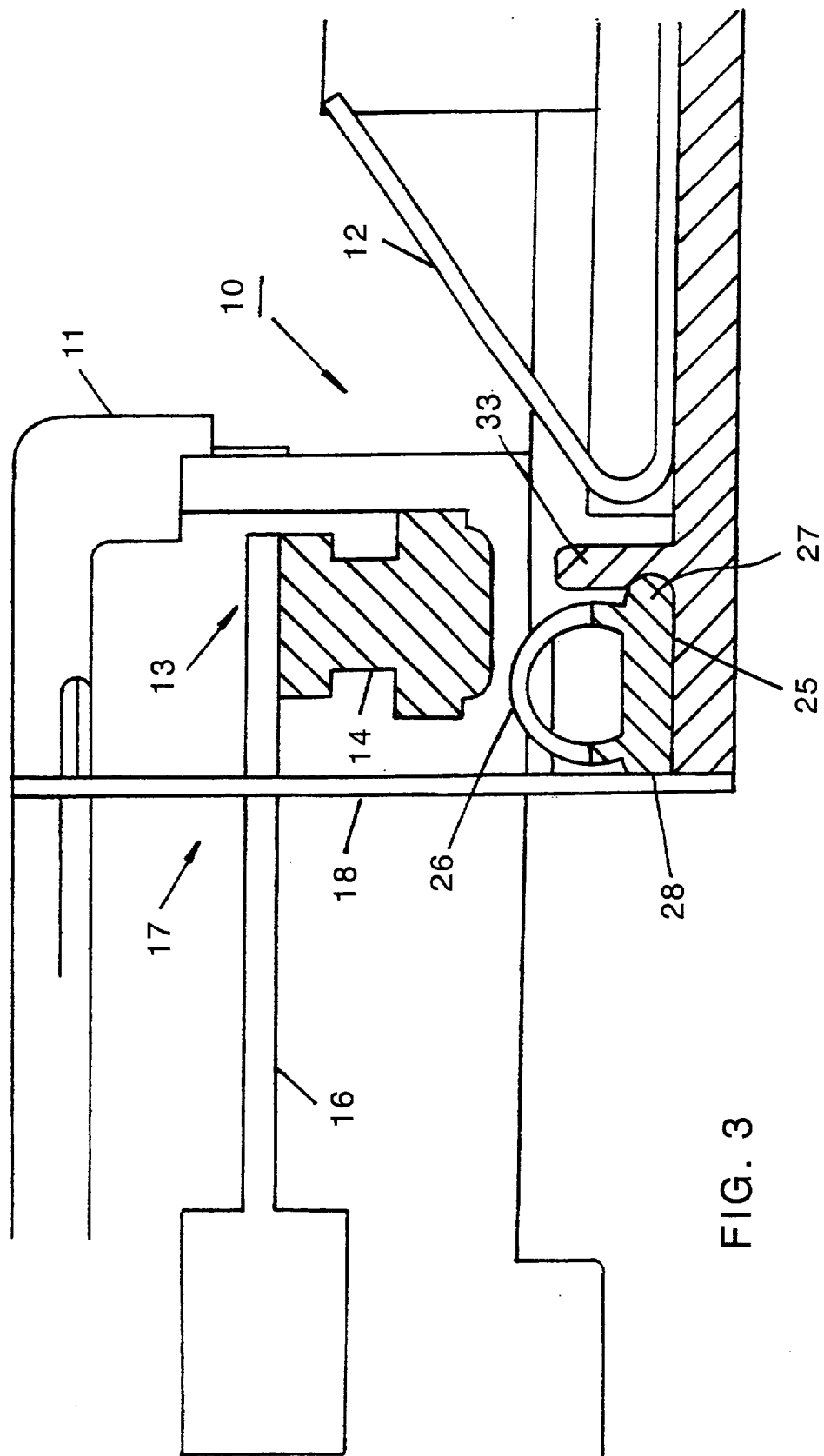


FIG. 3

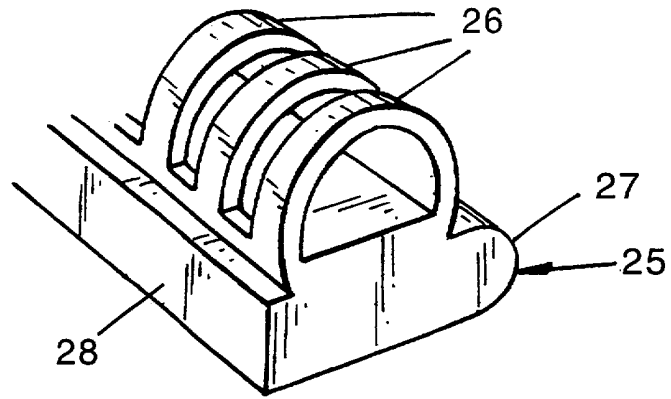


FIG. 4

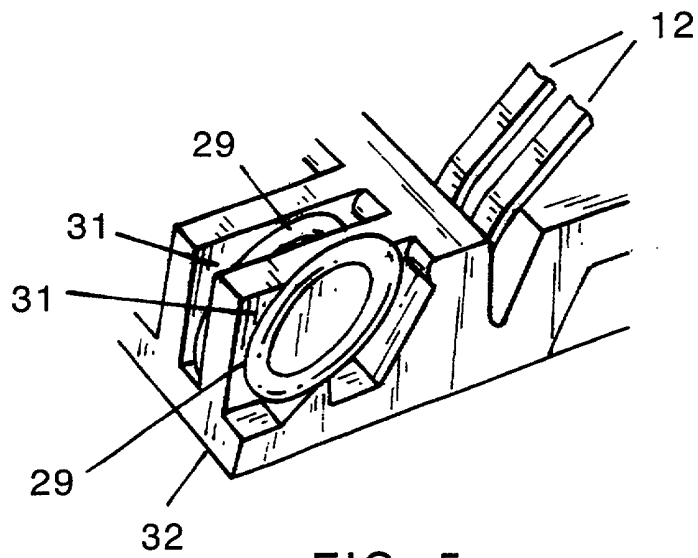


FIG. 5

A JACK PROVIDING ELECTRICAL DISCHARGE OF A PLUG THROUGH A
RESISTIVE ELEMENT

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BACKGROUND OF THE INVENTION

10 The present invention relates to a plug and a jack system used to interconnect computer equipment or other static sensitive electronic devices using multiconductor cables. More particularly, the invention relates to a jack for providing electrical discharge of a plug, particularly through resistive elements.

15 Often the cable and the contacts of a plug become electrostatically charged and, before being plugged into a computer port, the plug is initially inserted into and removed from an electric discharge socket which shorts the plug contacts and discharges the contacts and the cable. Even afterwards, while the plug is being inserted into the computer port, some additional electric charging might occur. Accordingly, there are usually further electric discharge elements, such as diodes, in the circuit for
20 further discharging the contacts.

SUMMARY THE INVENTION

 The invention provides a discharge arrangement integral with the jack that serves as the equipment's port. This eliminates the need for a separate discharging

step; assures minimum time lapse between discharge and initial port contact and safeguards against the possibility of accidentally omitting the discharge step during connection. It also greatly reduces the need for additional protective circuitry within the equipment itself. It further provides for discharge through resistive elements thereby preventing any damage resulting from the discharge feeding back to other hardware on the cable.

More specifically, the invention is defined by the independent claims appended hereto.

Other features and advantages of the present invention will become apparent from the following description of preferred embodiments of the invention given by way of example only, which refers to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING(S)

Fig. 1 is a cross sectional view of a first embodiment of the invention;

Fig. 2 is a cross sectional view of an insert forming part of the first embodiment of the invention;

Fig. 3 is a cross sectional view of a second embodiment of the invention;

Fig. 4 is a perspective view of a conductive pipe forming part of the second embodiment of the invention; and

Fig. 5 is a perspective view of a third embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In a first embodiment, referring to Fig. 1, there is a jack 10 having a housing 11 in which a plurality of jack contacts 12 are disposed within a chamber 13 of the housing 11. The jack contacts 12 are arranged for receiving the contacts 14 (only one of which is shown) of a plug 16 receivable into the chamber 13 through a port 17. As is conventional, there is a grounded shield 18 around the port 17.

Just inward of the port 17 and past the shield 18 there is an insert 19. Referring to Fig. 2, the insert 19 includes a molded block 20 of a conductive plastic of known resistivity through which flat wires 21 serving as grounding contacts are run

(only one of which is shown in Figs. 1 and 2). Advantageously, the insert 19 may be manufactured by molding into a strip and then separating the strip at the same time as end feet 22 are formed on the wires 21.

5 The number of wires is equal to the number of contacts 14 of the plug 16, which correspond to the number of jack contacts 12. For example, if the plug 16 has eight (8) contacts 14, there are eight (8) flat wires 21. When the jack 10 is assembled, the feet 22 of the insert 11 are hooked into slots 23 in a comb 33 of the jack 10 and the insert 19 is rotated 180° into position. This forms arcs 24 in the wires 21 and insures pressure between the inner face of shield 18 and the block 19.

10 As the plug 16 is inserted or withdrawn, the feet 22 of the wires 21 travel up and down in their respective slots 23 to permit the vertical motion required for the wires 21. The thickness of the flat wires 21 is sized to permit adequate elastic travel.

15 As the plug 16 is inserted into the port 17 and just before the plug contacts 14 make contact with the jack contacts 12 within the chamber 13, there is electric contact between the plug contacts 14 and the wires 21, which is caused because the arcs 24 of the wires 21 are positioned to interfere with movement of the plug contacts 14 and the plug contacts 14 push the wires 21 out of the way by pushing the wires 21 downwardly in the slots 23. Since the wires 21 are grounded to the shield 18 via the block 19, this results in momentary grounding and simultaneous discharging of
20 any static build-up in the plug contacts 14 to ground through a series resistance, i.e., the resistance of the block 19.

25 The positions and motions of the wires 21 are such that their ground connection to the plug contacts is broken before the plug contacts 14 make connection with the jack contacts 12, thereby preventing damage due to improper grounding of the internal circuits internally connected to the jack contacts 12.

Another embodiment is shown in Figs 3 and 4. This embodiment employs a segmented carbon filled conductive pipe 25 having a known resistivity. The segmented portions 26 of the carbon filled conductive pipe 25 are flexible and engage

respective plug contacts 14. The pipe 25 is inserted between the shield 18 and a wall of the comb 33 and is held in position by a locking toe 27. The conductive pipe 25 makes an electrical contact with the shield 18 via a grounding face 28.

5 In operation, as a plug 16 is inserted into the port 17 and just before the plug contacts 14 make contact with the jack contacts 12, the plug contacts 14 engage the segmented portions 26. Because of the flexibility of the segmented portions 26, the segmented portions 26 are moved out of the way, resulting in a momentary grounding of the plug contacts 14 to ground (i.e., the shield 18) through respective series resistances, i.e., the resistance of the pipe 25. As was the case with the first
10 embodiment, the positions and motions of the segmented portions 26 are such that their ground connection is broken before the plug contacts make contact with the jack contacts 12.

Another embodiment is shown in Fig. 5. This embodiment uses individual molded conductive O-rings 29 which are be positioned in slots 31 of a
.5 conductive support member 32 having a known resistivity and function in a similar manner to the segmented portions 26 of the embodiment of Figs. 3 and 4.

Although the present invention has been described in relation to particular embodiments thereof, many other variations and modifications and other uses will become apparent to those skilled in the art. It is preferred, therefore, that the
20 present invention be limited not by the specific disclosure herein, but only by the appended claims.

WHAT IS CLAIMED IS:

1. A jack comprising:

a housing having an interior chamber for receiving a plug;

at least one jack contact in said interior chamber for making contact with
at least one contact in the plug; and

at least one grounding contact disposed in said interior chamber housing
in a conductive support having a known resistivity and positioned in the path of said
at least one plug contact to electrically contact said plug contact when said plug is inserted
into said jack, but before said plug is inserted sufficiently that said plug contact contacts
said jack contact; said at least one grounding contact being so shaped and spaced from
said at least one jack contact that said plug contact breaks contact from said grounding
contact before said plug contact makes electrical contact with said at least one jack
contact upon further insertion of said plug.

2. The jack of claim 1, further comprising a shield that is connectable to
ground and wherein said at least one grounding contact is electrically connected to said
shield through said conductive support.

3. A jack comprising:

a housing having an interior chamber for receiving a plug;

a plurality of jack contacts in said interior chamber for making contact
with corresponding contacts in the plug when the plug is received in said interior
chamber, said plug being received in said interior chamber along a defined path; and

a plurality of grounding contacts disposed in said interior chamber in a
conductive support having a known resistivity and positioned in the path of the plug
contacts to electrically contact said plug contacts when said plug is inserted into said

jack, but before said plug is inserted sufficiently that said plug contacts contact said jack contacts; said grounding contacts being so shaped and spaced from said jack contacts that said plug contacts break contact from said grounding contacts before said plug contacts make electrical contact with said jack contacts upon further insertion of said plug.

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4. The jack according to claim 3, wherein said conductive support of each grounding contact is located at an entrance to said interior chamber, each grounding contact comprising a conductive wire having one end embedded in said conductive support for said conductive wire and a free end which extends upwardly and then downwardly to engagement with a wire guide, each conductive wire thereby being formed into an arcuate shape with the free end of the wire being movably received in a slot formed in the wire guide to enable such conductive wire to move downwardly from an initial position in which a portion of such conductive wire is located in a path of a corresponding plug contact to electrically contact such plug contact as it is moved into the interior chamber and to be moved downwardly by such electrical contact and to then return to the initial position after such plug contact moves out of electrical contact with such wire.

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5. The jack according to claim 4, further comprising a shield connectable to ground and wherein each of said plurality of jack contacts is connected to said shield through a respective conductive support.

20

6. A jack comprising:
a housing having an interior chamber for receiving a plug;
a plurality of jack contacts in the interior chamber for making contact with corresponding contacts in the plug when the plug is received in the chamber, the plug being received in the chamber along a defined path; and

25

5 a plurality of grounding contacts formed from a segmented conductive tube having a known resistivity located transversely beneath the path of movement of the plug contacts into the interior chamber, each of the segments having an initial position in the path of the plug contacts and being flexible so that upon engagement with a corresponding plug contact it moves downwardly to enable such plug contact to move past the segment and into contact with a corresponding jack contact, the segment returning to the position after being disengaged by such plug contact.

10 7. The jack according to claim 6, further comprising a grounding shield connectable to ground and wherein each of said segments are electrically connected to said shield through said conductive tube.

8. The jack according to claim 3, wherein each of the grounding contacts comprises a conductive O-ring.

15 9. A jack according to claim 6, wherein the support comprises a conductive member of a known resistivity having a plurality of slots, each of the plurality of O-rings being received in a respective one of the slots.

10. The jack according to claim 9, further comprising a shield connectable to ground and wherein each O-ring is electrically connected to the shield through said conductive member.

11. A jack, substantially as herein described with reference to figures 1 and 2, 3 and 4 or 5 of the accompanying drawings.



INVESTOR IN PEOPLE

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Claims searched: 1 - 11

Examiner: Paul Nicholls
Date of search: 22 November 2000

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Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): H2E (EDF)

Int Cl (Ed.7): H01R 13/648; H05K 9/00

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	EP 0,608,814 A1 (WHITAKER) - See finger 54	1, 3, 6
A	EP 0,501,749 A1 (POLAROID) - See figure 7	1, 3, 6
A	US 5,319,523 A (GANTHIER et al) - See contact 60	1, 3, 6
A	US 4,568,133 A (AMANO et al) - See plate 207	1, 3, 6
A	US 4,138,711 A (BREMENOUR et al) - See figures 4 and 5	1, 3, 6

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Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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