

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

**EP 1 098 401 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:

**09.05.2001 Bulletin 2001/19**

(51) Int. Cl.<sup>7</sup>: **H01R 13/719**

(21) Application number: **00309632.8**

(22) Date of filing: **01.11.2000**

(84) Designated Contracting States:

**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE TR**

Designated Extension States:

**AL LT LV MK RO SI**

(30) Priority: **03.11.1999 US 432778**

(71) Applicant: **Yang, Tai-Her**

**Si-Hu Town, Dzan-Hwa (TW)**

(72) Inventor: **Yang, Tai-Her**

**Si-Hu Town, Dzan-Hwa (TW)**

(74) Representative:

**Pratt, David Martin et al  
Withers & Rogers,  
Goldings House,  
2 Hays Lane  
London SE1 2HW (GB)**

(54) **Plug or socket**

(57) Plug or socket structured integral with electro-magnetic noise signal inhibition device, to which is mounted magnetic ring by means of conductor or conduction pin, or conduction reed which is associated with the plug assembly or the socket assembly, on both the power side and the load side of the conductor or conduction pin or conduction reed linked to the magnetic ring as established is respectively connected in parallel filter capacitor to form a two-way filter ckt., and that optionally incorporating a surge absorbent element still parallel therewith, integrally structured with both the plug assembly and the socket assembly.

**EP 1 098 401 A1**

**Description****BACKGROUND OF THE INVENTION:**

(a) Field of the Invention

5

**[0001]** Plug or socket structured integral with electromagnetic noise signal inhibition device.

(b) Description of the Prior Art:

10

**[0002]** Along with the ever increasing supply as well as demand for household electric appliances, portable electric appliances, PCs and mobile phone sets, true of today as well as tomorrow, it has become more and more important for different electric appliances to functionally tolerate each other, that is, the Electric Mutual Compatibility has become of top concern, and that giving rise to rapid developments of various noise signal filtration or inhibition ckts, this invention in the name of Plug or Socket structured integral with electromagnetic noise signal inhibition device emerges in response to afore-mentioned concern, meant to inhibit electromagnetic noise signal at a lowered cost, incurring the least possible spacing requirements by reason of the unique structural integration as employed.

15

20

25

**SUMMARY OF THE INVENTION**

**[0003]** The primary object of the invention is to provide a plug or socket structured integral with electromagnetic noise signal inhibition device, whereof the leader or conductor pin on the plug or socket is inserted with a magnetic ring, in addition a capacitor is connected spanning across the power supply in parallel with the load, or alternatively a parallel surge absorbent element is connected if needed, moreover, leader or conductor piece on the plug or socket, duly inserted with a magnetic ring, is arranged further to have a filter capacitor in parallel across both the power supply and the load, or optionally a surge absorbent element may join in the parallel too, a layout as such will help in substantially inhibit electromagnetic noises at lowered costs, with minimum spacing requirements, leading to positive improvements in electromagnetic environments.

30

35

40

45

**BRIEF DESCRIPTION OF THE DRAWINGS:**

**[0004]**

50

Fig. 1 is an illustration of the invention executed in an embodiment integral with the plug assembly;  
Fig. 2 is a section view taken along segment A-A' of Fig. 1;  
Fig. 3 is a further illustration of the invention executed in an embodiment integral with the plug, assembly;

55

Fig. 4 is a section view taken along segment A-A' of Fig. 3;

Fig. 5 is a third illustration of the invention executed in an embodiment integral with the plug assembly;  
Fig. 6 is a section view taken along segment A-A' of Fig. 5;

Fig. 7 is a fourth illustration of the invention executed in an embodiment integral with the plug assembly;

Fig. 8 is a section view taken along segment A-A' of Fig. 7;

Fig. 9 is an illustration of the invention executed in an embodiment integral with the socket assembly;  
Fig. 10 is a section view taken along segment A-A' of Fig. 9;

Fig. 11 is a further illustration of the invention executed in an embodiment integral with the socket assembly; and,

Fig. 12 is section view taken along segment A-A' of Fig. 11.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

**[0005]** Referring to Fig. 1, an illustration of the invention plug or socket structured integral with electromagnetic noise signal inhibition device, and Fig. 2, a section view taken along segment A-A' of Fig. 1, it will seen that the invention comprises essentially:

-- Insulation casing 100: covering the plug, to house two more sets of conductive pin 101;

-- Conductive Pin 101: composed of excellent conductive metal, hollow-set or concrete in the form of a circle, or flat or polygon or otherwise configured; with one end exposed on the insulation casing 100 to facilitate insertion into power supply socket; and the other end connected to the load to transmit electric power; characterized in that:

-- Each conduction Pin 101 is respectively mounted concentrically with magnetic ring 102 composed of annular magnetized sheets; to produce inductive impedance;

-- On the power side of the conduction pin 101 that is mounted with said magnetic ring 102 is connected in parallel a filter capacitor 103, or optionally an additional surge absorbent element 107, still in parallel;

-- On the load side of the conduction pin 101 that is mounted with said magnetic ring 102 is connected in parallel a filter capacitor 104, or optionally an additional surge absorbent element 108;

**[0006]** These elements combined together forms the invention executed in a plug structured integral with electromagnetic noise signal inhibition device.

**[0007]** Referring to Fig. 3, a further illustration of the invention executed in an embodiment integral with the

plug assembly, together with Fig. 4, a section view taken along segment A-A' of Fig. 3, it is seen that this embodiment comprises essentially:

- Insulation casing 200: covering the plug set, to house two or more sets of conduction pin 201;
- Conduction pin 201: composed of excellent conductive metals, hollow-set or concrete in the form of a circle, or flat or polygon or otherwise configured, with one end exposed on the insulation casing 200 to facilitate insertion into power supply socket, and the other end connected to the power supply to transmit electric power; characterized in that:
  - Each conduction pin 201 is respectively mounted concentrically with a magnetic ring 202 which consists of magnetized ferrous powdery core 202, to produce inductive impedance;
  - On the power side of the conduction pin 201 that is mounted with a magnetic ring 202 is connected in parallel a filter capacitor 203, or optionally with an additional surge absorbent element 207 also in parallel;
  - On the load side of the conduction pin 201 that is mounted with said magnetic ring 202 is connected in parallel a filter capacitor 204, or optionally with an additional surge absorbent element 208 connected in parallel;

**[0008]** These elements combined together forms the invention executed in a plug set structured integral with electromagnetic noise signal inhibition device.

**[0009]** Referring to Fig. 5, a third illustration of the invention executed in an embodiment integral with the plug or socket together with Fig. 6, a section view of Fig. 5 taken along the segment A-A', it will be seen that this embodiment comprises essentially;

- Insulation casing 100: covering the socket assembly, to house two or more sets of conduction pin 101;
- Conduction pin 101: composed of excellent conductive metals, hollow-set or concrete in the form of a circle, or flat or polygon or otherwise configured, with one end exposed outside the insulation casing 100 to facilitate insertion into the socket, the other end connected to power supply to transmit electric power; characterized in that:
  - In the middle section of each conduction pin 101 are applied a coating or alternatively plated a filmy magnetic ring 1020, to produce inductive impedance;
  - On the power side of the conduction pin 101 that is coated or plated with filmy magnetic ring 1020 is connected in parallel a filter capacitor 103, or optionally an additional surge absorbent element 107, also in parallel;
  - On the load side of the conduction pin 101 that is coated or plated with a filmy magnetic ring 1020 is

connected in parallel a filter capacitor 104, or optionally an additional surge absorbent element 108, also in parallel;

**[0010]** These elements combined together forms the invention executed in a plug set structured integral with electromagnetic noise signal inhibition device.

**[0011]** Referring to Fig. 7, a fourth illustration of the invention plug or socket structured integral with electromagnetic noise signal inhibition device together with Fig. 8, a section view taken along segment A-A' of Fig. 7, it is seen to comprise essentially:

- Insulation casing 200: covering the plug assembly, to house two or more sets of conduction pin 201;
- Conduction pin 201: composed of excellent conductive metals, hollow-set or concrete, in the form of a circle, or flat or polygon or otherwise configured, with one end exposed outside the insulation casing 200 to facilitate insertion into power supply socket, the other end connected to the load by way of leader 2000 to transmit electric power; characterized in that:
  - The leader 2000 for each conduction pin 201 is respectively connected in series about the annular magnetic ring 202, to produce inductive impedance;
  - On the power side of the magnetic ring 202 and leader 2000 both in series with the conduction pin 201 is connected in parallel a filter capacitor 203, or optionally an additional surge absorbent element 207 also in parallel;
  - On the load side of the magnetic ring 202 and leader 2000 both in series with the conduction pin 201 is connected in parallel a filter capacitor 204, or optionally an additional surge absorbent element 208 in parallel;

**[0012]** These elements combined together forms the invention executed in a plug set structured integral with electromagnetic noise signal inhibition device.

**[0013]** Referring to Fig. 9, still another illustration of the invention plug or socket structured integral with electromagnetic noise signal inhibition device, together with Fig. 10, a section view taken along segment A-A' of Fig. 9, it is seen to comprise essentially:

- Insulation casing 300: covering the socket, to house two or more sets of conduction reeds 301;
- Conduction reeds 301: composed of excellent conductive metals, adapted to match the geometry of the socket conduction pin and for coupling thereto;
- Stacks of magnetic rings 302: composed of annular sheets mounted concentrically over each conduction reed 301, to produce inductive impedance;
- Filter capacitor 303 connected in parallel across

the power side of the conduction reed 301 that is mounted with magnetic ring 302, or optional surge absorbent elements 307 where needed;

-- Filter capacitor 304 connected in parallel across the load side of the conduction reed 301 onto which magnetic ring 302 is mounted, or optional surge absorbent elements 308 also in parallel;

**[0014]** These elements, combined together forms the invention executed in a socket assembly structured integral with electromagnetic noise signal inhibition device.

**[0015]** Referring to Fig. 11, still another illustration of the invention plug or socket structured integral with electromagnetic noise signal inhibition device, together with Fig. 12, a section view taken along segment A-A' of Fig. 11, it is seen that the invention in this embodiment comprises essentially:

-- Insulation casing 400: covering the socket, to house two or more sets of conduction reeds 401;

-- Conduction reeds 401: composed of excellent conductive metals to match the geometry of conduction pin of the socket and meant for engagement coupling at the same time;

-- Magnetic ring 402: composed of annularly-shaped ferrous magnetic powdery core mounted on respective conduction reeds 401, to produce inductive impedance;

-- Filter capacitor 403: connected in parallel across the power side of the conduction reed 401 that is mounted with magnetic ring 402, or optional surge absorbent elements 407, also in parallel;

-- Filter capacitor 404: connected in parallel with the load side of the conduction reed 401 that is mounted with magnetic ring 402, or optional surge absorbent elements 408, also in parallel;

**[0016]** These elements combined together forms the invention executed in a socket assembly structured integral with electromagnetic noise signal inhibition device.

**[0017]** Afore-mentioned plug assembly in term of the quantity, shape, relative dimension, positioning required of its conduction pin, and the quantity, shape, relative dimension, positioning required of socket sets and conduction reeds are determined largely in accord with local specifications, the same is true as of the grounding conduction pin for the plug assembly and the grounding conduction reed for the socket assembly.

## Claims

1. Plug or socket structured integral with electromagnetic noise signal inhibition device, to which is mounted respectively magnetic ring by means of conductor or conduction pin or conduction reed which is associated with the plug assembly or the

socket assembly, on both the power side and the load side of the conductor or conduction pin or conduction reed linked to the magnetic ring as established is respectively connected in parallel filter capacitor to form a two-way filter ckt., and that optionally incorporating a surge absorbent element still in parallel therewith, integrally structured with both the plug assembly and the socket assembly.

2. Plug or socket structured integral with electromagnetic noise signal inhibition device according to Claim 1, comprising essentially:

-- Insulation casing 100: covering the plug, to house two more sets of conductive pin 101;

-- Conductive Pin 101: composed of excellent conductive metal, hollow-set or concrete in the form of a circle, or flat or polygon or otherwise configured; with one end exposed on the insulation casing 100 to facilitate insertion into power supply socket; and the other end connected to the load to transmit electric power; characterized in that:

-- Each conduction Pin 101 is respectively mounted concentrically with magnetic ring 102 composed of annular magnetized sheets; to produce inductive impedance;

-- On the power side of the conduction pin 101 that is mounted with said magnetic ring 102 is connected in parallel a filter capacitor 103, or optionally an additional surge absorbent element 107, still in parallel;

-- On the load side of the conduction pin 101 that is mounted with said magnetic ring 102 is connected in parallel a filter capacitor 104, or optionally an additional surge absorbent element 108;

These elements combined together forms the invention executed in a plug structured integral with electromagnetic noise signal inhibition device.

3. Plug or socket structured integral with electromagnetic noise signal inhibition device according to Claim 1, comprising essentially:

-- Insulation casing 200: covering the plug set, to house two or more sets of conduction pin 201;

-- Conduction pin 201: composed of excellent conductive metals, hollow-set or concrete in the form of a circle, or flat or polygon or otherwise configured, with one end exposed on the insulation casing 200 to facilitate insertion into power supply socket, and the other end connected to the power supply to transmit electric power; characterized in that:

--Each conduction pin 201 is respectively

mounted concentrically with a magnetic ring 202 which consists of magnetized ferrous powdery core 202, to produce inductive impedance;

-- On the power side of the conduction pin 201 that is mounted with a magnetic ring 202 is connected in parallel a filter capacitor 203, or optionally with an additional surge absorbent element 207 also in parallel;

-- On the load side of the conduction pin 201 that is mounted with said magnetic ring 202 is connected in parallel a filter capacitor 204, or optionally with an additional surge absorbent element 200 connected in parallel;

These elements combined together forms the invention executed in a plug set structured integral with electromagnetic noise signal inhibition device.

4. Plug or socket structured integral with electromagnetic noise signal inhibition device according to Claim 1, comprising essentially:

-- Insulation casing 100: covering the socket assembly, to house two or more sets of conduction pin 101;

-- Conduction pin 101: composed of excellent conductive metals, hollow-set or concrete in the form of a circle, or flat or polygon or otherwise configured, with one end exposed outside the insulation casing 100 to facilitate insertion into the socket, the other end connected to power supply to transmit electric power; characterized in that:

-- In the middle section of each conduction pin 101 are applied a coating or alternatively plated a filmy magnetic ring 1020, to produce inductive impedance;

-- On the power side of the conduction pin 101 that is coated or plated with filmy magnetic ring 1020 is connected in parallel a filter capacitor 103, or optionally an additional surge absorbent element 107, also in parallel;

-- On the load side of the conduction pin 101 that is coated or plated with a filmy magnetic ring 1020 is connected in parallel a filter capacitor 104, or optionally an additional surge absorbent element 108, also in parallel;

These elements combined together forms the invention executed in a plug set structured integral with electromagnetic noise signal inhibition device.

5. Plug or socket structured integral with electromagnetic noise signal inhibition device according to Claim 1, comprising essentially:

-- Insulation casing 200: covering the plug

assembly, to house two or more sets of conduction pin 201;

-- Conduction pin 201: composed of excellent conductive metals, hollow-set or concrete, in the form of a circle, or flat or polygon or otherwise configured, with one end exposed outside the insulation casing 200 to facilitate insertion into power supply socket, the other end connected to the load by way of leader 2000 to transmit electric power; characterized in that:

-- The leader 2000 for each conduction pin 201 is respectively connected in series about the annular magnetic ring 202, to produce inductive impedance;

-- On the power side of the magnetic ring 202 and leader 2000 both in series with the conduction pin 201 is connected in parallel a filter capacitor 203, or optionally an additional surge absorbent element 207 also in parallel;

-- On the load side of the magnetic ring 202 and leader 2000 both in series with the conduction pin 201 is connected in parallel a filter capacitor 204, or optionally an additional surge absorbent element 208 in parallel;

These elements combined together forms the invention executed in a plug set structured integral with electromagnetic noise signal inhibition device.

6. Plug or socket structured integral with electromagnetic noise signal inhibition device according to Claim 1, comprising essentially:

-- Insulation casing 300: covering the socket, to house two or more sets of conduction reeds 301;

-- Conduction reeds 301: composed of excellent conductive metals, adapted to match the geometry of the socket conduction pin and for coupling thereto;

-- Stacks of magnetic rings 302; composed of annular sheets mounted concentrically over each conduction reed 301, to produce inductive impedance;

-- Filter capacitor 303 connected in parallel across the power side of the conduction reed 301 that is mounted with magnetic ring 302, or optional surge absorbent elements 307 where needed;

-- Filter capacitor 304 connected in parallel across the load side of the conduction reed 301 onto which magnetic ring 302 is mounted, or optional surge absorbent elements 308 also in parallel;

These elements combined together forms the invention executed in a socket assembly structured integral with electromagnetic noise signal inhibition device.

7. Plug or socket structured integral with electromagnetic noise signal inhibition device according to Claim 1, comprising essentially:

-- Insulation casing 400: covering the socket, to house two or more sets of conduction reeds 401; 5

-- Conduction reeds 401: composed of excellent conductive metals to match the geometry of conduction pin of the socket and meant for engagement coupling at the same time; 10

-- Magnetic ring 402: composed of annularly-shaped ferrous magnetic powdery core mounted on respective conduction reeds 401, to produce inductive impedance; 15

-- Filter capacitor 403: connected in parallel across the power side of the conduction reed 401 that is mounted with magnetic ring 402, or optional surge absorbent elements 407, also in parallel; 20

-- Filter capacitor 404: connected in parallel with the load side of the conduction reed 401 that is mounted with magnetic ring 402, or optional surge absorbent elements 408, also in parallel; 25

These elements combined together forms the invention executed in a socket assembly structured integral with electromagnetic noise signal inhibition device. 30

8. Plug or socket structured integral with electromagnetic noise signal inhibition device according to Claim 1, whereof the quantity, shape, relative dimension, positioning required of the conduction pin, spoken of the plug assembly; and the quantity, shape, relative dimension, positioning required of socket sets and conduction reeds are determined largely in accord with local specifications, the same is true spoken of the grounding conduction pin for the plug assembly and the grounding conduction reed for the socket assembly. 35 40

45

50

55

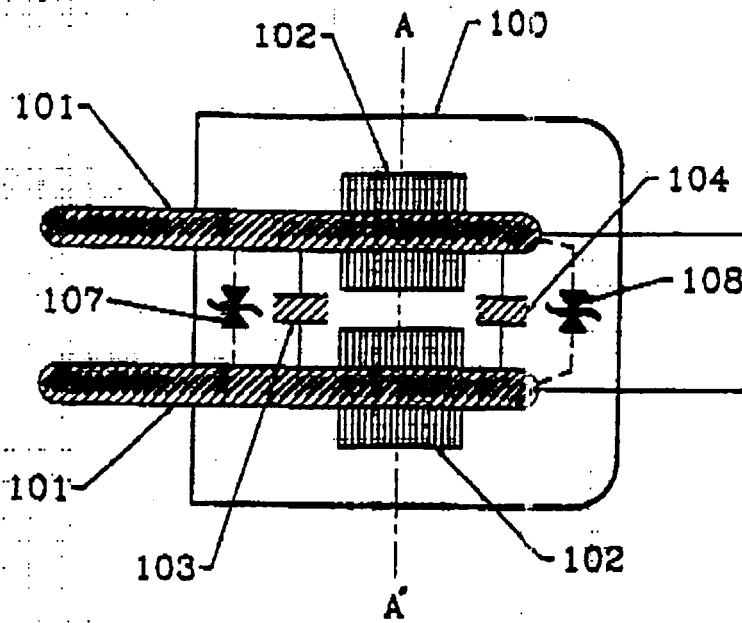


FIG. 1

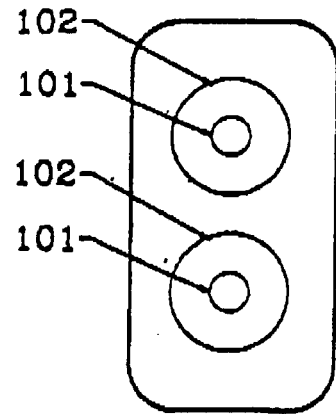


FIG. 2

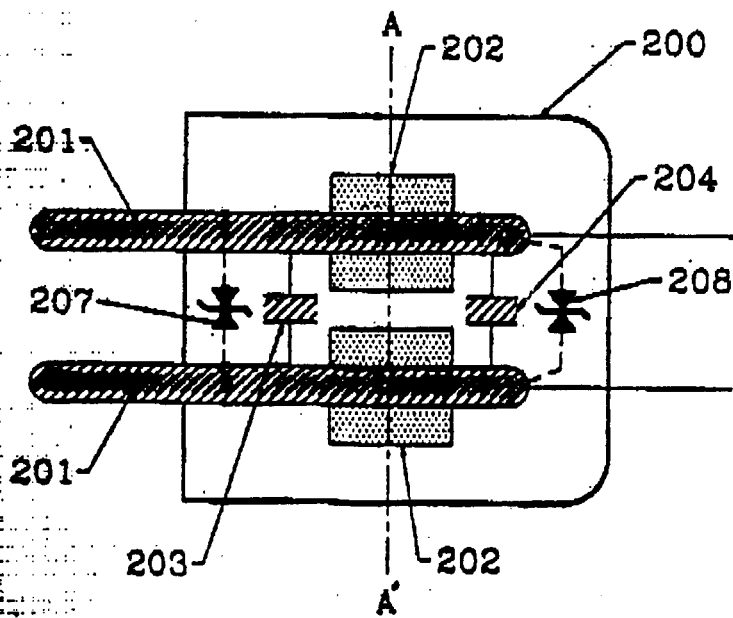


FIG. 3

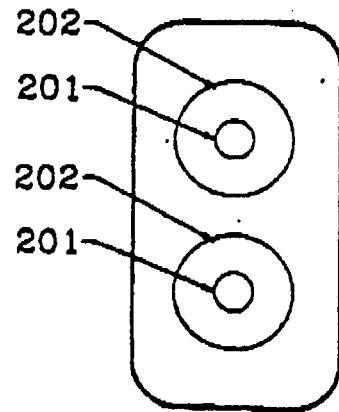


FIG. 4

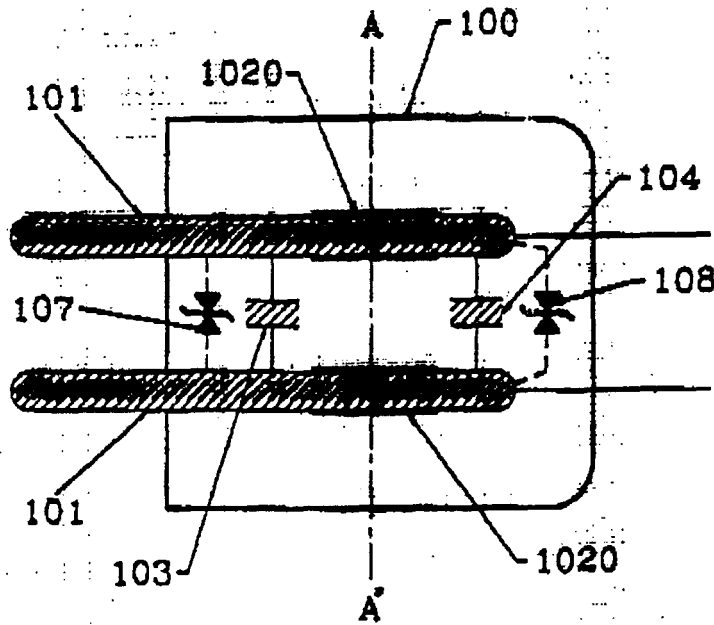


FIG. 5

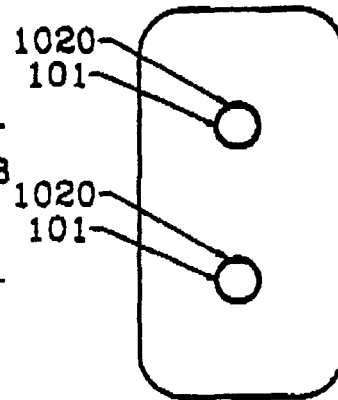


FIG. 6

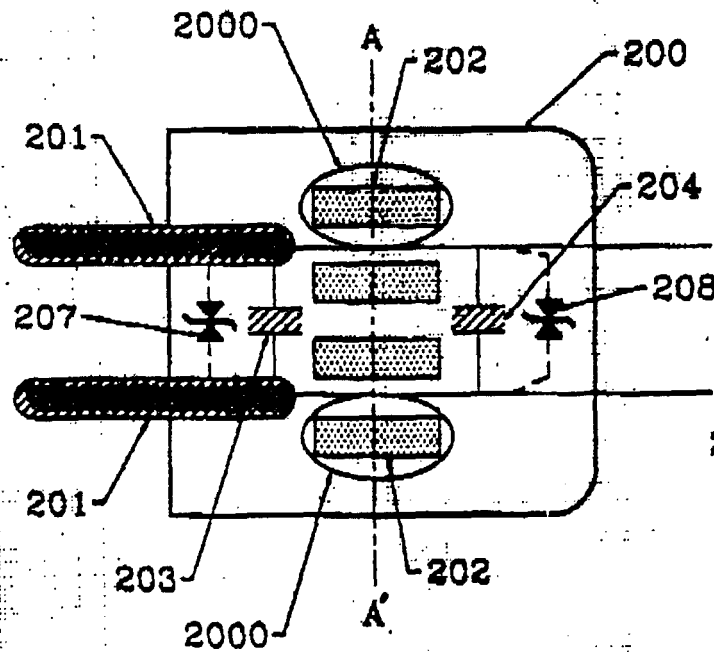


FIG. 7

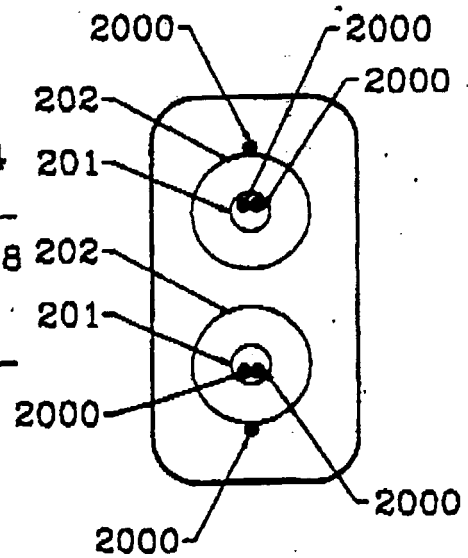
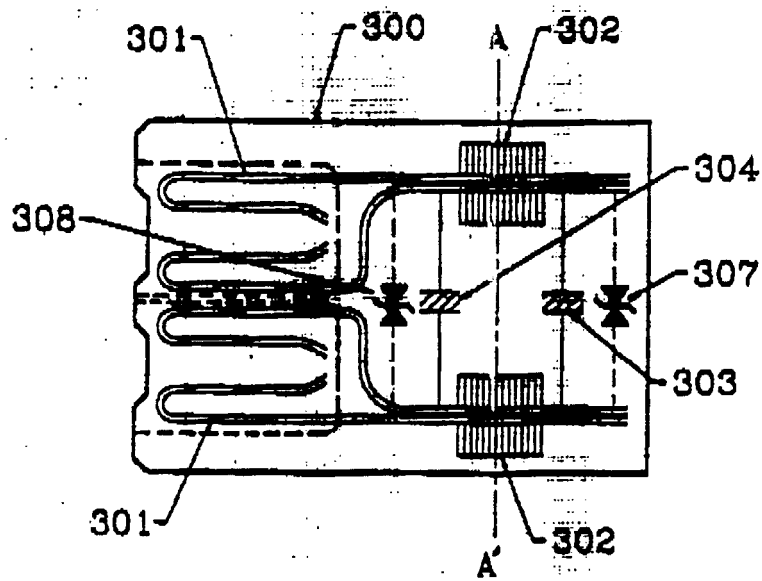


FIG. 8



**FIG. 9**

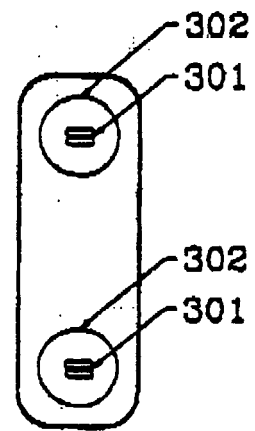


FIG. 10

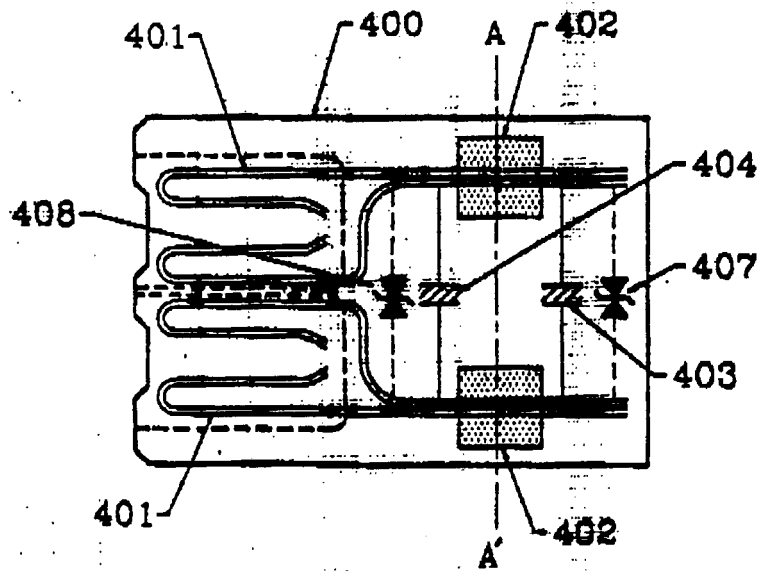


FIG. 11

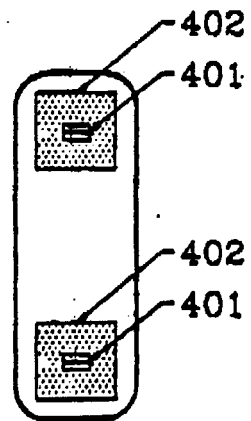


FIG. 12



European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 00 30 9632

| 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.7) |
| X                                                                                                                                                                                                                          | DE 296 21 936 U (SHIN JIUH CORP)<br>11 September 1997 (1997-09-11)<br>* page 6 - page 8; figure 1 *                                                                                                                                                                                                       | 1                                                                                                                                                                                                                                                                                           | H01R13/719                                   |
| X                                                                                                                                                                                                                          | DE 31 48 351 A (SHARP KK)<br>22 July 1982 (1982-07-22)<br>* page 5; figures 1,2 *                                                                                                                                                                                                                         | 1                                                                                                                                                                                                                                                                                           |                                              |
| Y                                                                                                                                                                                                                          | ---                                                                                                                                                                                                                                                                                                       | 2,3,6-8                                                                                                                                                                                                                                                                                     |                                              |
| X                                                                                                                                                                                                                          | PAULUS E J: "SURGE/NOISE SUPPRESSION<br>WITHIN ELECTRICAL CONNECTORS"<br>PROCEEDINGS OF THE ELECTRONIC COMPONENTS<br>AND TECHNOLOGY CONFERENCE,US,NEW YORK,<br>IEEE,<br>vol. CONF. 44, 1 May 1994 (1994-05-01),<br>pages 239-247, XP000479153<br>ISBN: 0-7803-0914-6<br>* page 239 - page 247; figure 3 * | 1,4,5                                                                                                                                                                                                                                                                                       |                                              |
| Y                                                                                                                                                                                                                          | GB 2 153 165 A (AVX CORP)<br>14 August 1985 (1985-08-14)<br>* page 1; figure 1 *                                                                                                                                                                                                                          | 2,3,6-8                                                                                                                                                                                                                                                                                     |                                              |
|                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                             | TECHNICAL FIELDS<br>SEARCHED (Int.Cl.7)      |
|                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                             | H01R                                         |
| The present search report has been drawn up for all claims                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                             |                                              |
| Place of search<br><b>BERLIN</b>                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                           | Date of completion of the search<br><b>5 February 2001</b>                                                                                                                                                                                                                                  | Examiner<br><b>Stirn, J-P</b>                |
| CATEGORY OF CITED DOCUMENTS                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                           | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or<br>after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>-----<br>& : member of the same patent family, corresponding<br>document |                                              |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another<br>document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                             |                                              |

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 9632

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-02-2001

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)                    | Publication<br>date                    |
|-------------------------------------------|---------------------|-----------------------------------------------|----------------------------------------|
| DE 29621936 U                             | 11-09-1997          | NONE                                          |                                        |
| DE 3148351 A                              | 22-07-1982          | NONE                                          |                                        |
| GB 2153165 A                              | 14-08-1985          | DE 3426369 A<br>FR 2558661 A<br>JP 60154482 A | 01-08-1985<br>26-07-1985<br>14-08-1985 |