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(12) # EUROPEAN PATENT APPLICATION

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(54) **Safety plug set and corresponding socket.**

(57) A safety plug set and corresponding socket comprise a plug (1) and a socket (2) wherein the socket has plug holes (211, 211') each in the form of "T" or "L" with conductive plate (22, 22') at the inner side, upper end of the conductive plate being a bent retaining plate (221), and lower end of the conductive plate being bent to the form of a hook (222) located in front of a control block (23). The socket (2) is an assembly composed of a frame, a front cover (21) and a back cover (24) with components therein, in which control blocks and conductive plates are placed.

Electric wires are led to the socket through a hole on the back cover and retained by the hooks respectively. The hooks can be raised by the control blocks respectively for removal of the wires. After inserting in plug holes, the plug can be slid downward so that the end of each pin (12, 12') is retained by retaining plate for connection to power source.

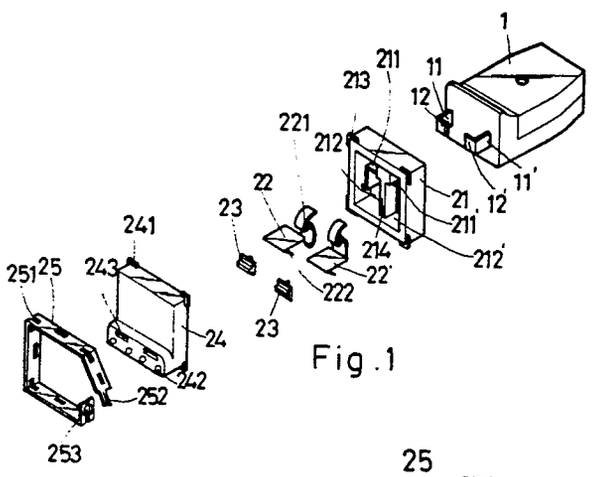

Fig.1

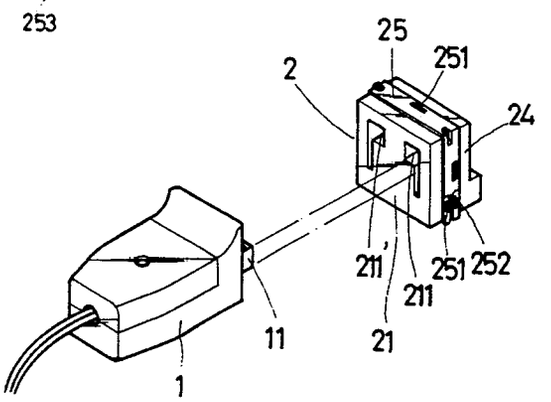

Fig.2

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SAFETY PLUG SET AND CORRESPONDING SOCKET

This invention relates to safety plug set and corresponding socket.

Conventionally copper retainers with an appropriate gap to receive plug pins are used in a socket. Such a structure has some defects such as (1) prolonged use will cause looseness and consequentially poor contact, spark, surface oxidation and loss of conductivity, and then adjusting the retainer and plug pin is required; (2) insertion of a metal piece or other in the gap of the copper retainer by children will cause shock and is dangerous; and (3) hand touching plug pin during inserting plug into the socket will cause electric shock or even death. In view of these defects, the inventor developed a safety plug set and corresponding socket.

The present invention provides an improved safety plug set and corresponding socket comprising a front cover, a plurality of conductive plates, a plurality of control blocks, a back cover, the socket further having L-shaped or T-shaped plug holes on the front cover. Each plug hole has a partitioning board on the back, and is incorporated with a conductive plate having a retaining portion at the upper end and a hook, which is apt to fix an electric wire at the lower end. The hook can be raised by the control block for removal of electric wire. All these components are placed in an assembly composed of the front cover, the back cover and a frame to form a socket, as before mentioned. The plug has corresponding L-shaped or V-shaped or U-shaped pins.

An adapter has plug holes for the connection of a conventional plug, and a plug for the connection to the socket according to the present invention.

Embodiments of the invention are described in detail below with reference to drawings, in which:

Fig. 1 is an exploded view of a plug and socket, as a first preferred embodiment according to the present invention.

Fig. 2 is a perspective view of the first preferred embodiment according to the present invention.

Fig. 3 is a cross sectional view of a socket taken in the first preferred embodiment according to the present invention.

Fig. 4 is a partial perspective cross sectional view of an adapter and socket according to the present invention.

Fig. 5 is a perspective view of the present invention being used on a wall lamp.

Fig. 6 is an exploded view of a plug and socket, as a second preferred embodiment according to the present invention.

Fig. 7 is a perspective view of the second preferred embodiment according to the present invention.

Fig. 8 is a perspective cross sectional view illustrating the connection between L-shaped pin and socket according to the present invention.

Fig. 9 is a perspective cross sectional view illustrating the connection between V-shaped pin and socket according to the present invention.

Fig. 10 is a perspective cross sectional view illustrating the connection between another U-shaped pin and socket according to the present invention.

Fig. 11 is a perspective cross sectional view illustrating the connection between reverse L-shaped pin and socket according to the present invention.

Fig. 12 is an exploded view of a plug and socket, as a third preferred embodiment according to the present invention.

Fig. 13 is a perspective view of a round socket and plug, as a fourth preferred embodiment according to the present invention.

Fig. 14 is a cross section view of the fourth preferred embodiment according to the present invention.

Fig. 15 is a perspective view of the fourth preferred embodiment according to the present invention.

Fig. 16 is a perspective view illustrating the use of the present invention on electric appliance.

Fig. 17 is an exploded view of a special socket, as a fifth preferred embodiment according to the present invention.

Fig. 18 is a cross sectional view of the fifth preferred embodiment, showing the special socket and adapter according to the present invention.

Fig. 19 is a perspective view of the fifth preferred embodiment according to the present invention.

First referring to Fig. 1 to 4, a plug 1 has two pins 11, 11′, each pin having an end in the shape of "L", and a socket 2 has a design corresponding to the plug 1. The socket 2 mainly comprises a front cover 21, conductive plates 22, control blocks 23, a back cover 24, and a frame 25. A front cover 21 has plug holes 211, 211′ in the shape of "L" or "V", and flange portions 213 along its edge. A partitioning board 214 separates plug holes 211, 211′ inside a chamber 212, which is defined by the front cover 21. There are two conductive plates 22, 22′, each plate having its upper end bent to form a curved retainer 221, 221′ which is used to retain the end 12, 12′ of a pin 11, 11′, and its lower end bent upward to an appropriate position and then

bent backword to form a hook 222 to be placed in the chamber 212.

Any of Control blocks 23, 23 is in the form of a block placed behind the hook 222 of the conductive plate 22 to control raising and lowering of the hook 222. The back cover 24 is in the form of a hollow frame having flange portions 241 along its edge, and has holes 242 for passing through electric wires, as well as slots 243 to drive the control blocks 23, 23.

A frame 25 is a rectangular split structure with a plurality of stop slots 251 to connect flange portions 213 of the front cover 21 and flange portions 241 of the back cover.

A stop pin 252 and a stop hole 253, which are provided at the frame ends, respectively, are designed to allow the assembling of the socket 2, by fixing together each other. By inserting a screwdriver in the slot 243 to press down the control block 23 in order to raise the hook 222, wire can be removed easily.

Fig. 4 shows an adapter for fitting a conventional plug into holes 13, 13' of the present invention. Therefore, the socket according to the present invention can be used for any conventional electric appliance without changing its plug.

Referring to Figs. 5 and 16, a plug for wall lamp and an adapter according to the invention are connected to respective sockets by hooks to increase bearing capacity and security is assured.

As shown in Figs. 6 and 7, the plug and socket set is for use on extension line. The plug 1 has a structure identical to that described above.

Electric wires 14 are connected to the pins 11, 11', respectively. Each of the pins 11, 11' has an end 12, 12' in the shape of "V". The socket comprises a front cover 31, an intermediate frame 32, conductive plates 33, 33 and a back cover 34. Each conductive plate 33 is installed in a manner that its slant contact position 331 is passing through a hole 321 of the intermediate frame 32 and then in a slant slot 311 of the front cover 31 so that, after insertion, the plug 1 can slide downwards till ends 12, 12' of the pins 11, 11' keep contacting with the slant contact portions 331, 331 for the connection to power source. The embodiment shown has three pairs of plug holes 312 on the socket 3, from which the plug 1 can be removed from either the upper, intermediate or lower position, and therefore the conductive plate 33 has three cut off 332 to ease removal of the plug 1, and has a hook 333 at one end for connection of electric wire. The back cover 34 has a hole 341 to connect together front cover 31, intermediate frame 32, conductive plates 33, 33 and back cover 34 by a screw 35.

Now, referring to Fig. 8, the end 12 of each pin 11 on the plug 1 is bent inward and then inserted in the socket 3 to keep in touch with the slant contact portion 331 on a metal plate 33 in the socket 3 for connection to power source.

With reference to Figs. 9, 10 and 11, therein is shown that, after insertion, the pins 11 maintain close contact with the slant contact portions 331, and the contact is very firm by action of gravity of the plug and tension of the slant contact portion 331.

Referring to Fig. 12, end 12, 12' of the plug pin 11, 11' is bent inward to a shape of "L". The socket 4 comprises a front cover 41, conductive plates 42, 42' a back cover 43. The front cover 3 has three pairs of plug holes 411, 411', and three pairs of rails 412, 412'. Except the three sets of plugs holes 411, 411' and three sets of rails 412, 412', which are projected from inner wall of the front cover 41, the other parts are recesses 413, 413', to contain the conductive plates 42, 42' which are placed symmetrically, with their spring portions 421, 421' at appropriate position. The spring portions 421, 421' are in slots 414, 414'. The recess 422 on the conductive plate 42 is just aligned with the projected part 412 of the front cover 41 so that the conductive plate 42 can be placed entirely in the recess 413. The end of the conductive plate 42 is connected to two electric wires 44 running along a curved slot 415 on the front cover 41 and a curved slot 431 on the back cover 43. The back cover 43 has a plurality of support plates 432 to press the conductive plate 42, and is connected to a block 416 by means of a screw 45 through a hole 433.

As shown in Figs. 13 to 15, the plug and socket set according to the invention can be used for two phase, three phase three wires or three phase four wires power source. An end of each pin 52 of the plug 5 is connected to an electric wire and then fixed to a block 55 by means of screw 54. The other end of the pin 52 is passed through a hole 56 and then exposed outside. End 57 of the pin 52 is bent to a shape of "L". The plug is threaded with a thread 53 for connection of a cap 51. Socket 6 according to the present invention mainly comprises a front cover 61, conductive plates 62, a frame 63, spring contact plates 64, control blocks 65 and a back cover 66. The socket 6 can be designed to fit two phase or three phase power source. The socket 6 shown in the drawing is for three phase three wires power source. The front cover 61 has a certain number of plug holes 611, each connected to a curved rail 612 with slot 613 along inner side for containing contact portion 621 of a conductive plate 62. The other end of the conductive plate 62 is in the form of a long bar and is inserted through a hole 631 of the frame before placing the bent part 641 of the spring contact plate 64 into the hole. The bent part 641 is firmly

fixed in the hole 631 and is kept contacting with the conductive plate 62. The other end of the spring contact plate 64 is bending downward to form a hook 642. There is a control block 65 behind the hook 642. The back cover 66 is positioned and used to fix the above components by means of screws 67. Electric wires are inserted through a round hole 661 on the back cover 66 and firmly held by the hook 642. By pressing the control block 65 with a square spline 662 to raise the hook 642, the electric wire can be removed.

Fig. 15 illustrates use of the present invention on three phase power. As shown in the drawing, a pin 52 of the plug is smaller than others as a distinction to avoid wrong connection between plug 5 and socket 6. Of course, a round pin may be designed among three pins or four pins in different spaces or a smaller pin may be designed for use on power source of three phase four wires. After inserting it in the socket 6, the plug is rotated so that the end 57 of the pins 52 are kept contacting with the respective contact plates 621 and thus connected to power source. End of pin 11 on a plug according to the present invention is bent at an appropriate angle to a form of "L" or "V" or "U" or like and a corresponding socket is used. In order to fit plugs of different shapes, a socket is designed. As shown in Figs. 17 to 19, the front cover 71 of the socket 7 has two plug holes 711, each in the form of "T". Along inner side of the front cover 71 there is a U-slot 712 with a size just for containing a conductive plate 72 with its front end 721 bending outward and its rear end perpendicular to the front end. The rear end 722 is bending downward to form a hook 723. End 12 of each pin 11 is kept in touch with the front end 721 elastically. There is a control block 73 behind each hook 723. Like that shown in Fig. 1, the back cover 74 has flange portions 741 along its edge, a hole 742 for passing through wires and a slot 743 for removal of wires. It is fixed to a frame. Its structure will not be herein described because it has been described in detail above.

With reference to Figs. 18 and 19, the adapter 8 has holes 81 for pins of a conventional plug 82 and pins and bent ends 83 for the connection to a socket 7 according to the present invention.

Claims

1. A safety plug set and corresponding socket comprising:

-a socket composed of:

a front cover having a certain number of plug holes each with a slot at inner side for placing a conductive plate, a partitioning board to separate left-hand components from right-hand components, and flange portions along its edge;

a certain number of conductive plates with an upper bent end to form a retainer with electric conductivity and elasticity, a lower end bending upward in an appropriate angle and then backward to form a hook for hooking the conductive part of an electric wire;

a certain number of control blocks each at one of said hooks to control raising and lowering of said hook;

a back cover with flange portions along its edge and in the form of hollow body with hole and slot for passing through wires;

a rectangular split frame having stop slots arranged at appropriate interval along its length, and stop pins and pin holes at one and other end thereof respectively, to connect the front cover to the back cover by fitting the stop pins into the pin holes; and

-a plug having pins with bent ends for inserting in said plug holes and keeping contact with said conductive plates in a manner that the plug and the socket are firmly connected without risk of electricity leakage.

2. A safety plug set and corresponding socket as claimed in Claim 1 wherein end of each pin of the plug is bent at an appropriate angle to form a shape of "L" or "V" so that it can be held in the socket easily and can bear gravity.

3. A safety plug set and corresponding socket as claimed in Claim 1 wherein a plastic insulation sleeve of appropriate length can be incorporated to each pin of the plug for safety and preventing from electric leakage purposes.

4. A safety plug set and corresponding socket as claimed in Claim 1 wherein for use on extension line the socket comprises:

-a front cover in the form of a rectangular block with one or more pairs of plug holes and two rails each with a slant slot for the insertion of a retaining plate, arranged in a manner that plug holes on the same side are connected by a rail, and each pair of plug holes are isolated by a partitioning plate;

-an intermediate frame corresponding to the front cover, which is provided with long slots for passing through retaining portions of the conductive plates;

-a number of conductive plates each in the form of a strip with a plurality of pairs of slant type retaining portions and holes, and each having a hook for the connection of electric wire; and

-a back cover in the form of a plate corresponding to the intermediate frame and front cover, which is provided with holes for fixing screws;

assembled fo form an elongated socket so that plug, after inserting therein, can be slided down-

ward to keep contact with conductive plates for connection to power source, plug can be inserted in and removed from plug hole, and there is a plurality of pairs of plug holes for a plurality of plugs.

5. A safety plug set and corresponding socket as claimed in Claim 1 wherein the socket for use on extension line comprising:

-front cover having a plurality of pairs of plug holes, recesses at inner wall surface, holes for fixing screws and partitioning plate;

-number of conductive plates each in the form of a strip having a plurality of elastic and bent retaining portions located in a recess beside plug holes and end in the form of a hook to retain electric wire; and

-a back cover in the form of a strip with support plate arranged in appropriate interval to fix conductive plates and partitioning plate and holes for fixing,

assembled in a manner that plug after inserting can be secured firmly and insertion of plug is easy.

6. A safety plug set and corresponding socket as claimed in Claim 1 wherein the socket for round-pin type plug comprising:

-a front cover with at least two plug holes each connecting to a curved rail so that the plug hole is curved, and a curvilinear slot at inner wall surface of each plug hole;

-a number of conductive plates each with a retaining portion bending downward at the front end, the lower end of such retaining portion having a recess to be placed in the slot of the front cover, and a rear end in the form of a long strip so inserting in a hole of a frame;

-a frame having holes corresponding to plug holes of the front cover;

-a number of spring contact plates each having a bent retaining portion at the front end and a bent hook at the rear end;

-a number of control blocks each beneath the hook of each spring contact plate to control the hook; and

-a back cover having a plurality of fixing screw holes, a hole for passing through electric wires, and spare spline to displace the control block;

assembled in a manner that the plug, after being inserted, can be turned till end of each respective pin of the plug keeps contact with a conductive plate to assure safe application.

7. A safety plug set and corresponding socket as claimed in Claim 1 or 6 wherein the socket has a plug hole larger or smaller than others and located in the middle to ease distinguishing of phase and the plug has a corresponding design to ease wiring.

8. A safety plug set and corresponding socket as claimed in Claim 1 wherein the socket has a plurality of plug holes each in the shape of "T" to fit insertion of plug with "L" or "V" pins, and each plug hole has a slot in the form of "U" to hold a retaining portion in the form of "U" at the end of each conductive plate so that plug of any type can be fitted and the socket is capable to bear load from gravity of the plug.

9. A safety plug set and corresponding socket as claimed in Claim 1 wherein the socket can be connected with an adapter with pins corresponding to plug holes of the socket on one side and plug holes for the conventional plug on the other side.

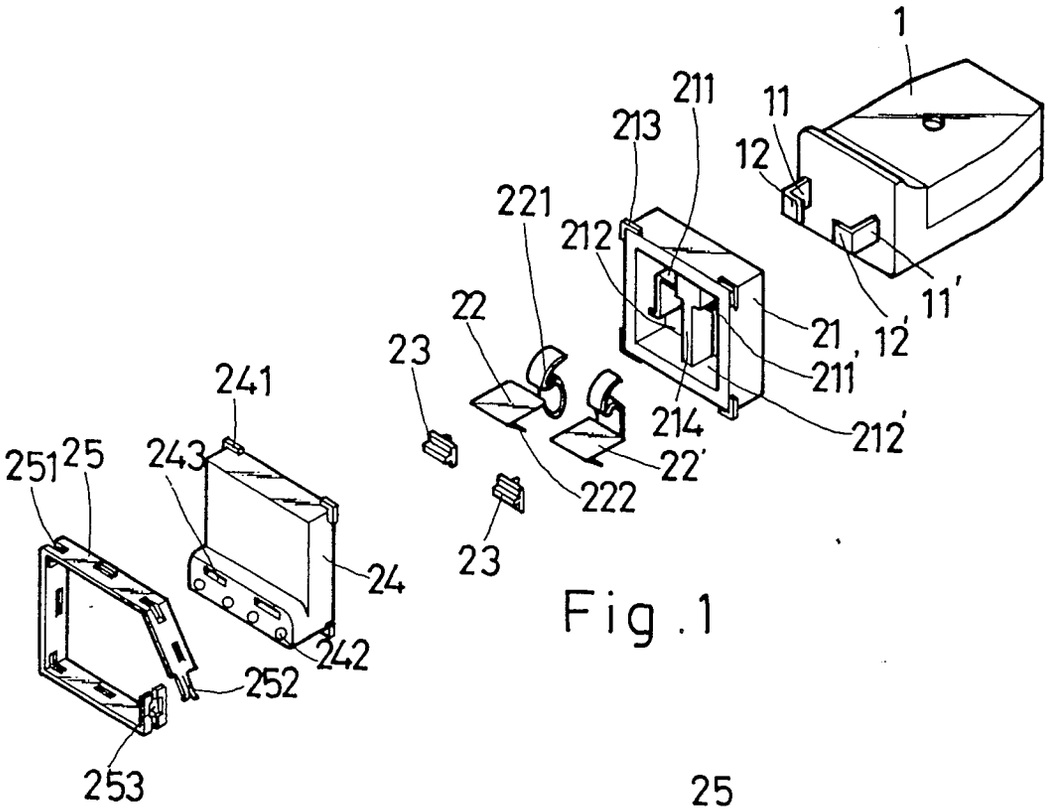
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Fig. 1

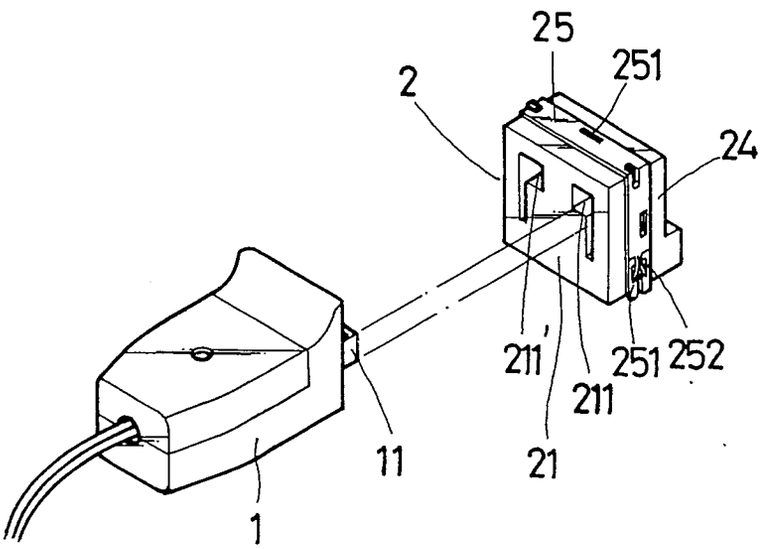
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Fig. 2

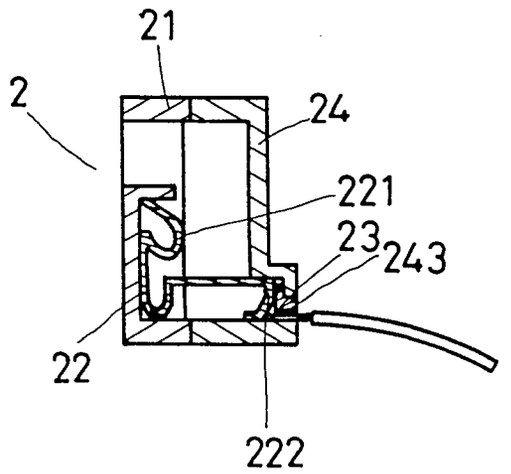

Fig. 3

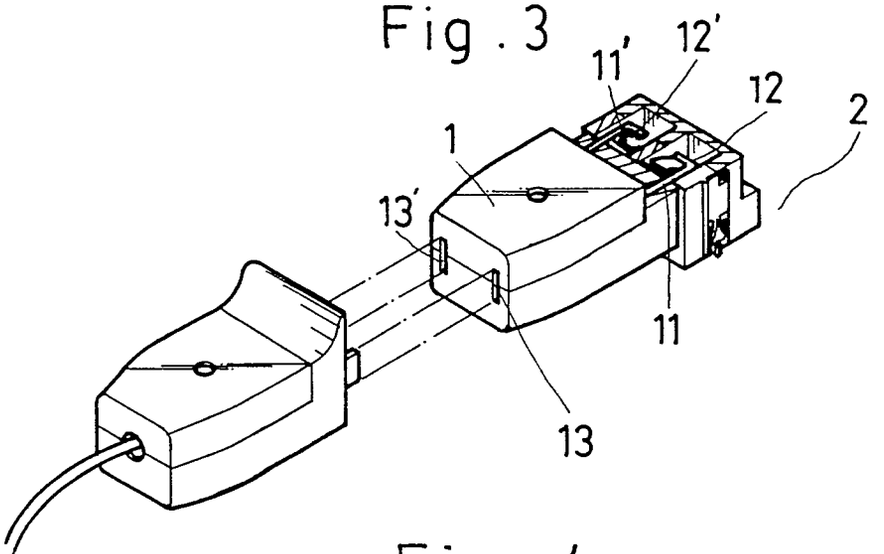

Fig. 4

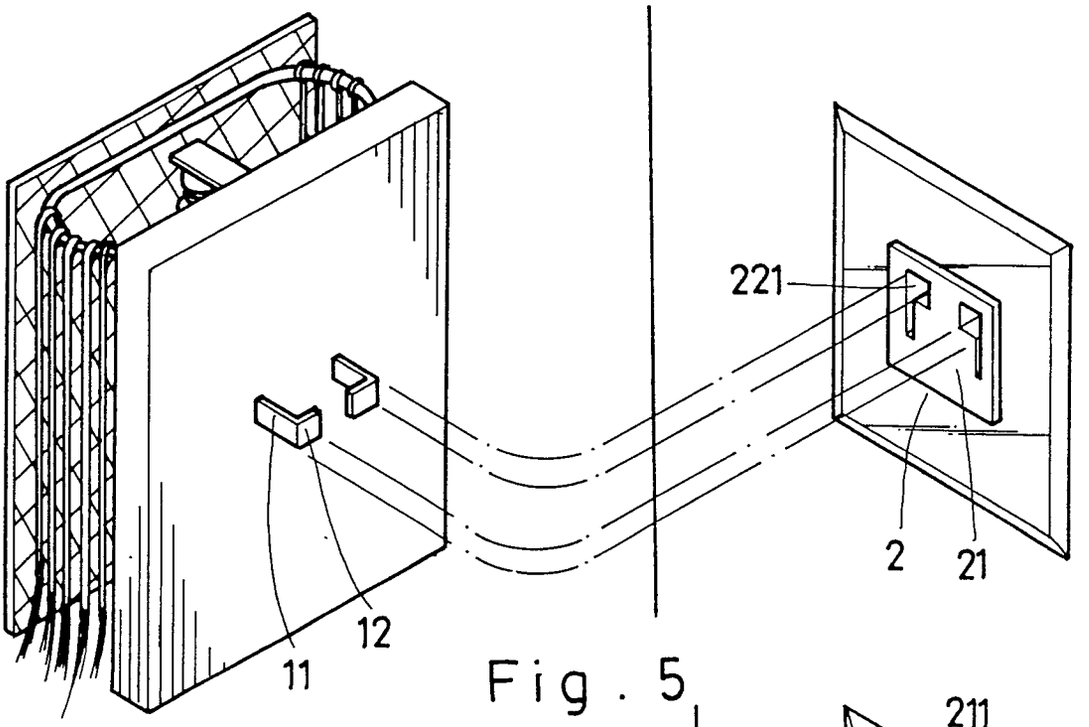

Fig. 5

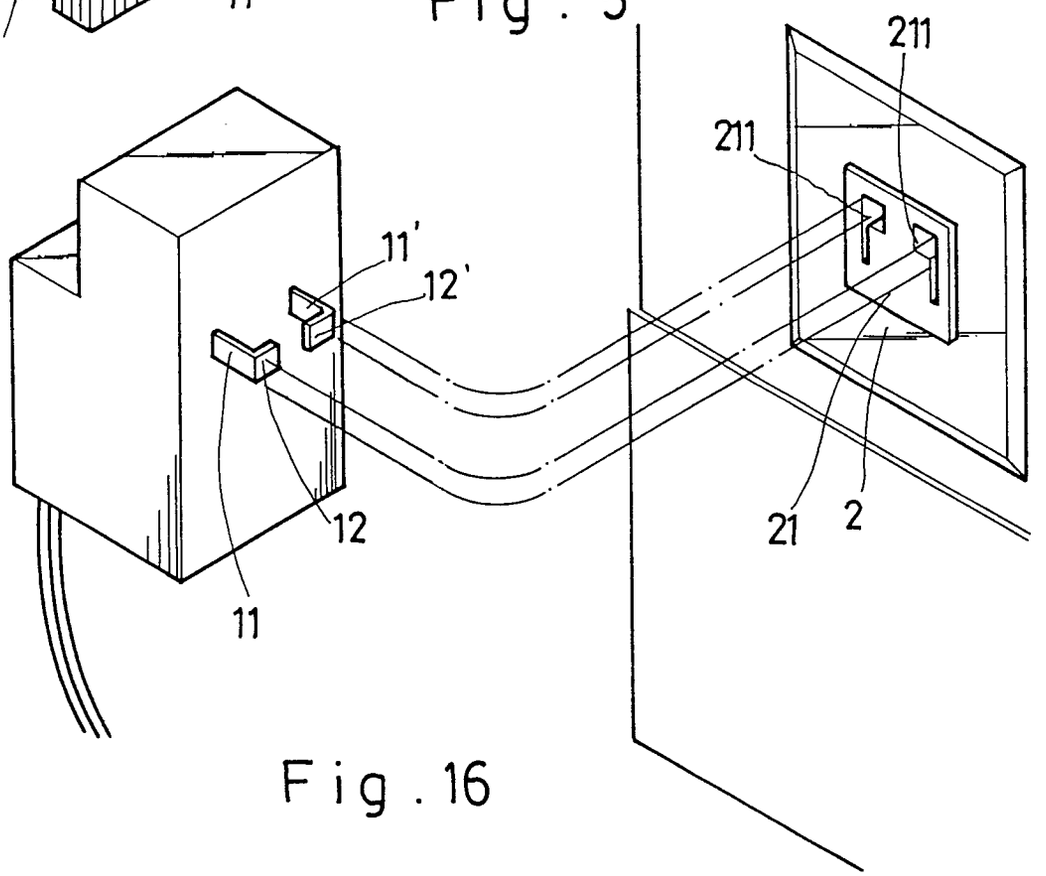

Fig. 16

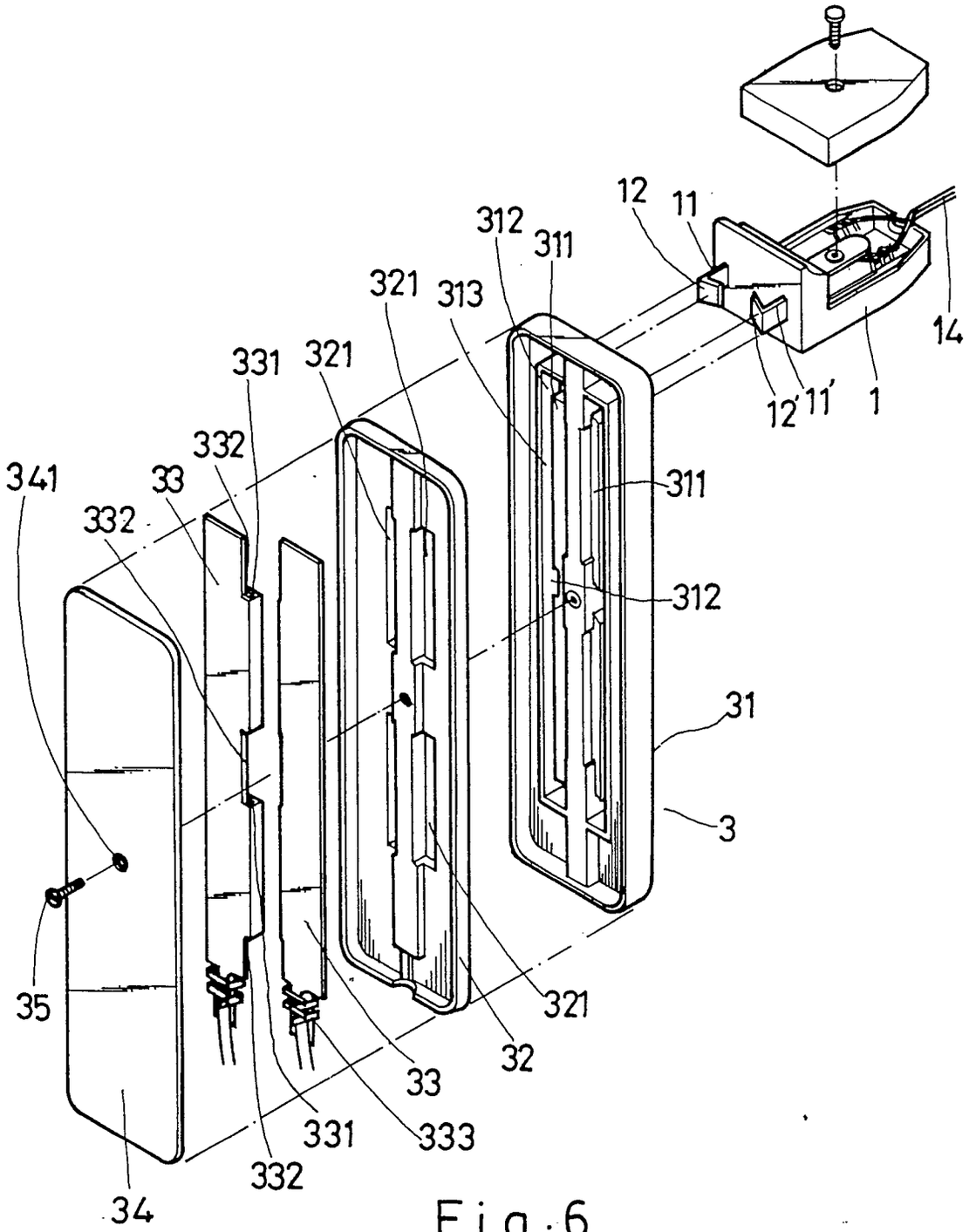
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Fig.6

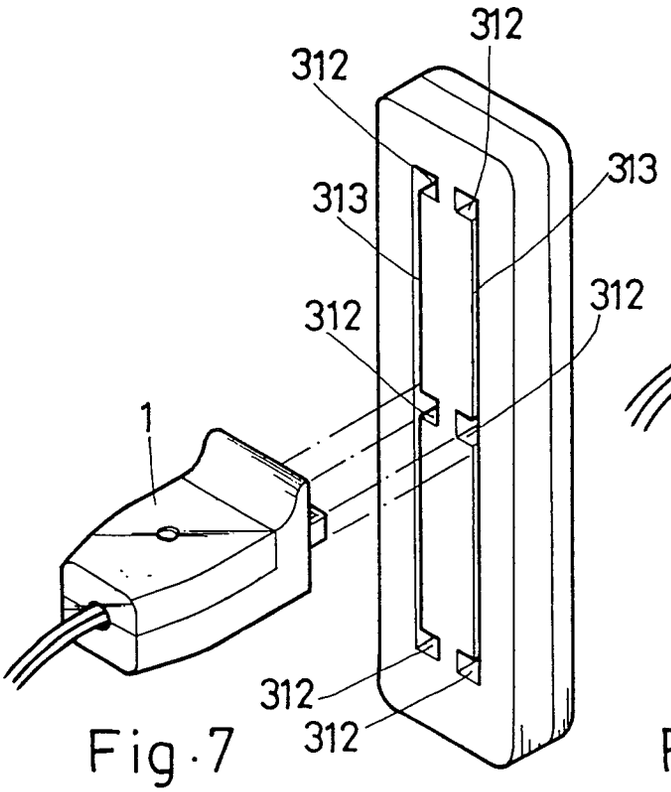

Fig.7

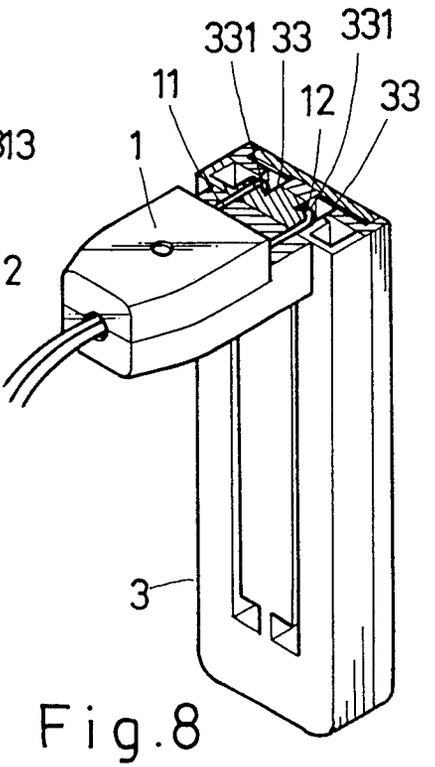

Fig.8

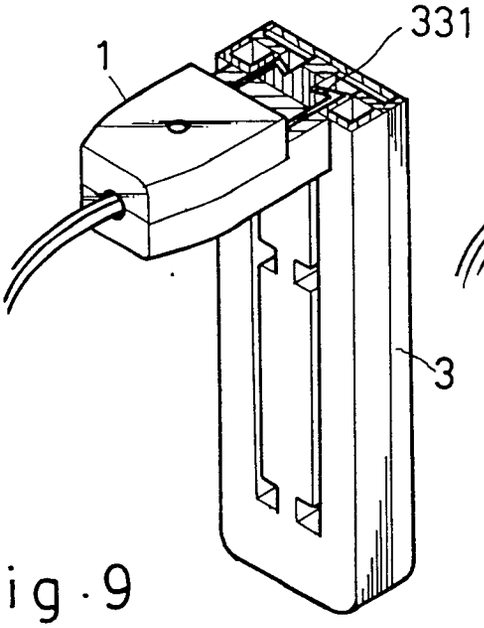

Fig.9

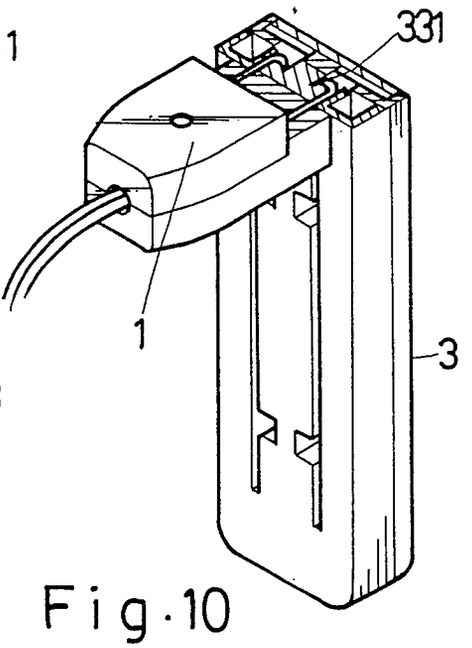

Fig.10

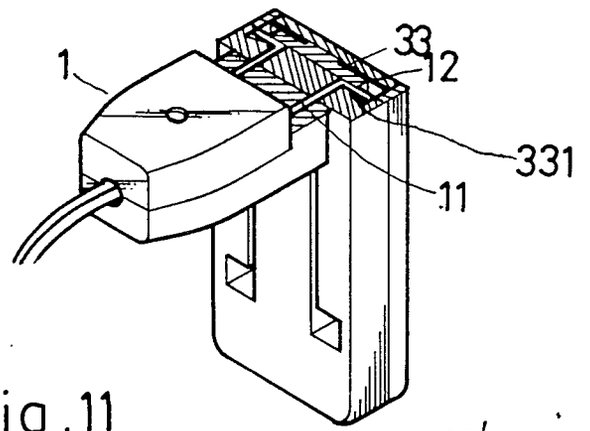
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Fig.11

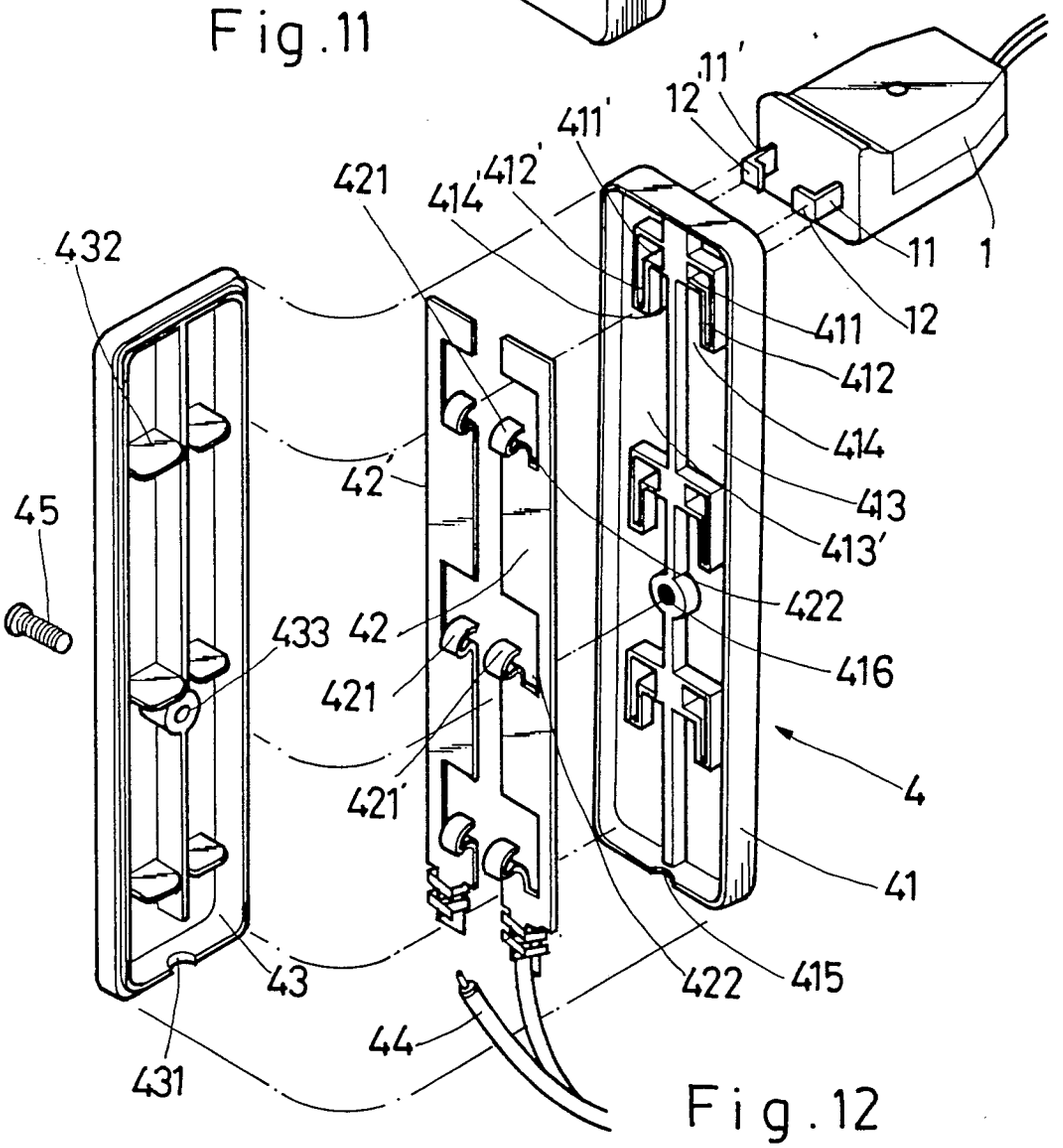
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Fig.12

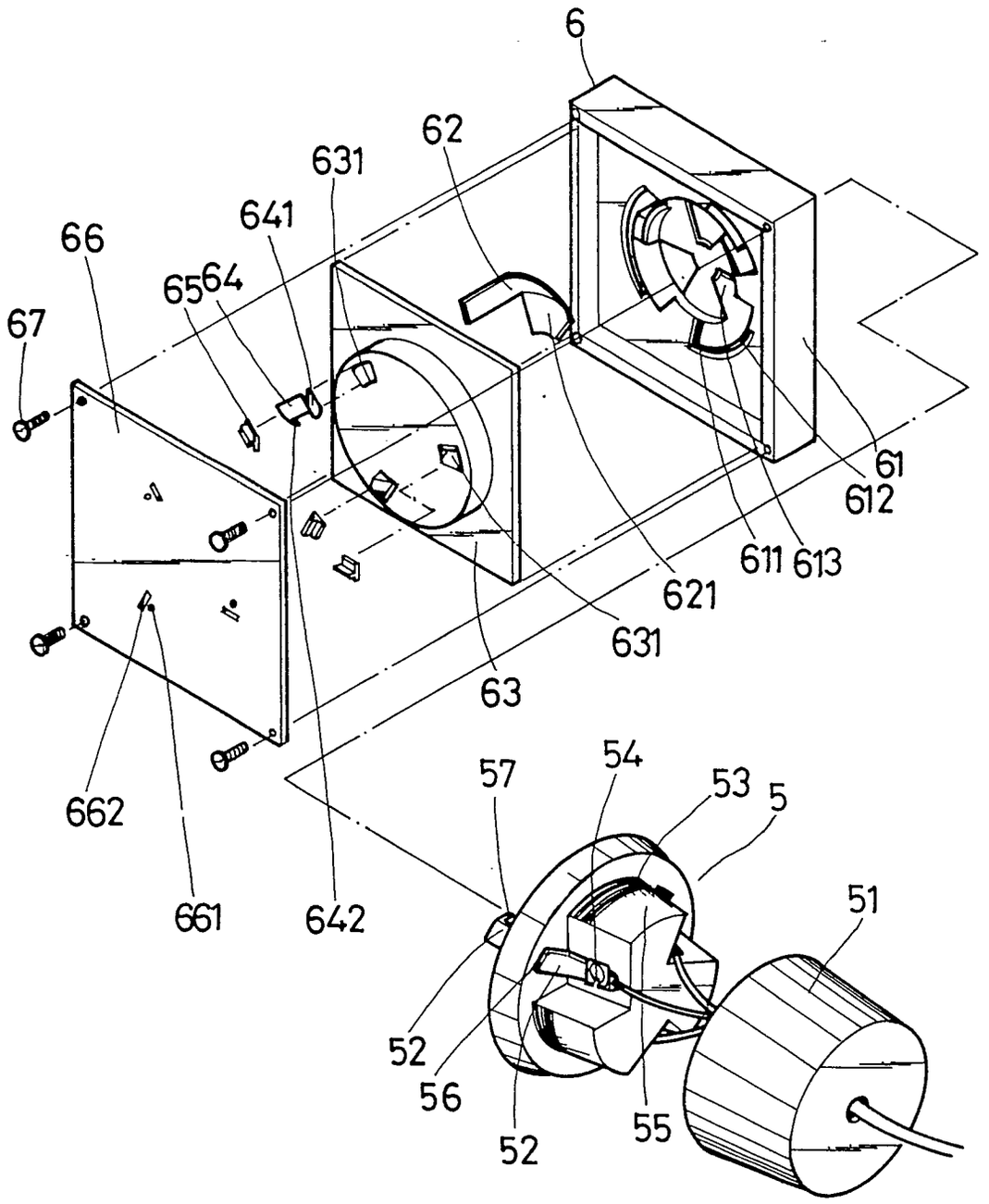
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Fig.13

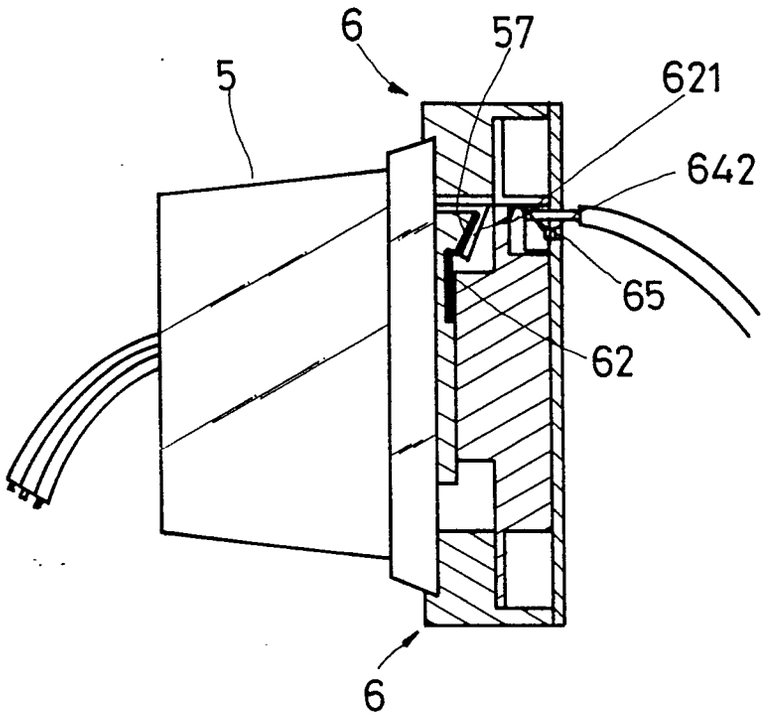

Fig. 14

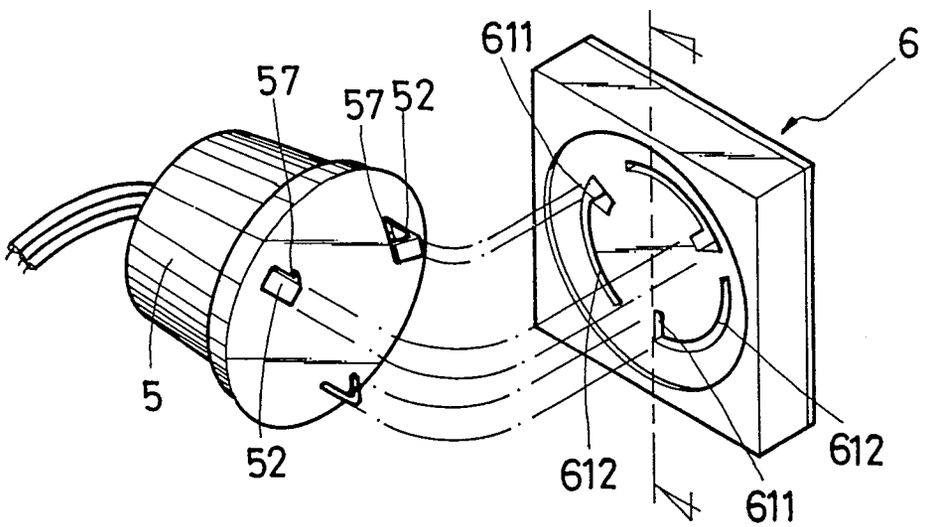

Fig. 15

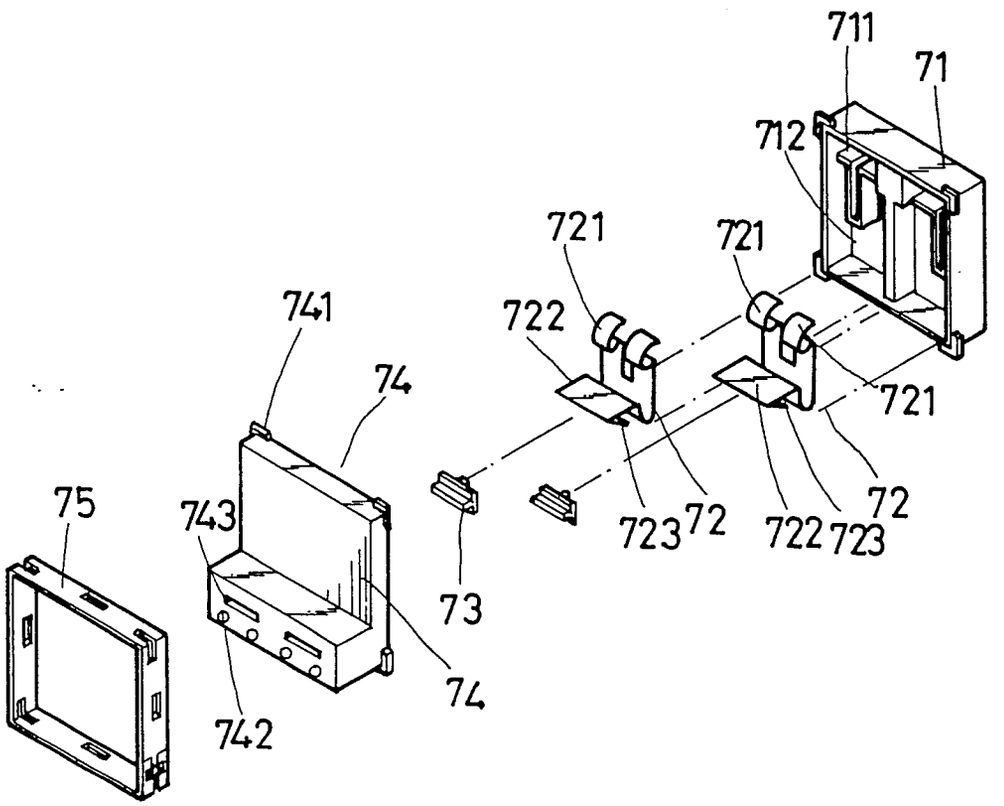
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Fig.17

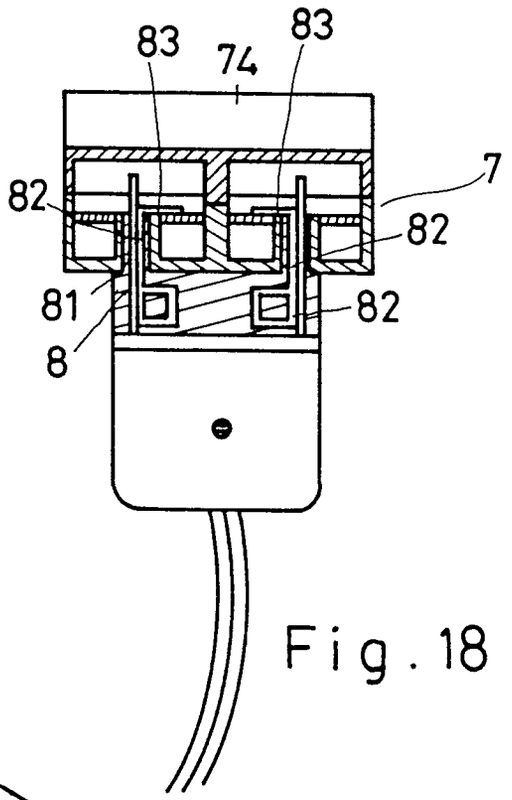

Fig. 18

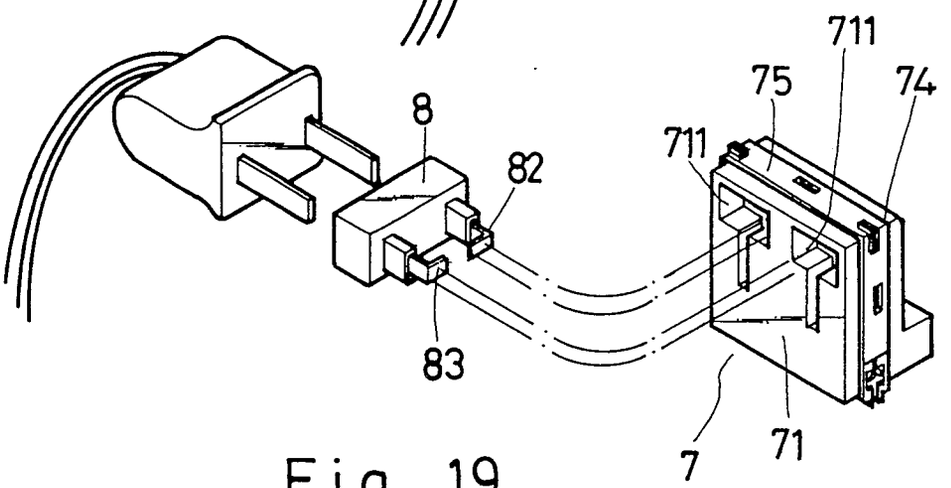

Fig. 19

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 87 83 0164

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.4)
A	US-A-2 926 327 (METELLI) * figures 1-4; column 2, line 69 - column 4, line 21 *	1-3,6	H 01 R 13/447
A	FR-A-2 256 558 (IMFELD et al.) * figures 1-5; page 1, line 24 - page 2, line 11 *	1,3,4	
A	AU-B- 514 393 (CROUSE-HINDS) * figures 1-5; page 4, line 14 - page 9, line 4 *	1,6	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

H 01 R 13/44
H 01 R 13/70

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	03-12-1987	HAHN G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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