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(71) Applicant: **G.V.P. Elettronica S.r.l.**
21042 Caronno Pertusella (IT)

(72) Inventors:
- **Pizzi, Gian Vittorio**
  21047 Saronno (IT)
- **Villa, Rosaria**
  20049 Concorezzo (IT)

(74) Representative: **Barbaro, Gaetano**
Società Italiana Brevetti S.p.A.
Via Carducci, 8
20123 Milano (IT)

(54) Electric power distribution box feeding the circuits of an electrical appliance

(57) The classic abutment means of the conductors of the flexible connection cable to the electric mains are substituted by a standard IEC plug integrated on a planar face of the power distribution block, the perimeter of which is eventually extended to constitute a flange-plate around the triplet of conductors of the plug. A collar, integral with the body of the block and of the flange-plate crossed by conductors of the standard IEC plug, with a size suitable for accommodating at least part of a standard IEC angular socket connected with the conductors of the integrated IEC plug, protrudes from the planar surface of the flange-plate. The lower part of the collar has a half-circular cut through which the flexible isolated connection cable to the electric mains passes. A box-like cover, having a similar half-circular cut in the lower side, is forcibly engaged on the collar thus locking as a guillotine the cable passing through the half-circular cuts until a stable union of the two bodies is established. The two parts, permanently unified and thus non separable without using a hand tool, enclose in a splash and drip proof box the connection between the fixed (integrated) IEC plug and the detachable IES socket of the connection cable to an electric socket of the mains.

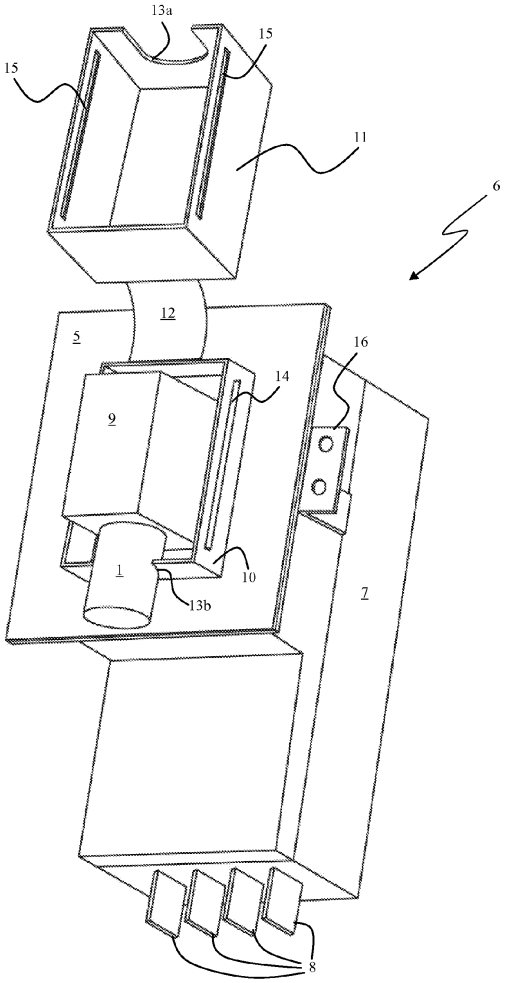

FIG. 2

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Description

TECHNICAL FIELD

[0001] This invention relates in general to connection to mains of household electrical appliances.

BACKGROUND

[0002] Competitive commercialization of household electrical appliances, such as for example refrigerators, washing machines, dishwashing machines, centrifugal driers, gas stoves, microwave ovens and similar, imposes maximum limitation of production costs also through optimization of assembly and finishing processes of parts and functional components of the electrical circuits of the appliance.

[0003] Present regulations require electrical connections of electrical appliances to supply sockets be characterized by a protection degree not smaller than the ruled standard IPX4. This means that the supply cable must be connected to the electrical appliance such that water drips cannot penetrate and reach live parts. For this reason, present electrical appliances are realized as shown in FIG. 1, with a supply cable 1 exiting from the external casing 2 of the appliance 3, the conductors of which are abutted against appropriate connection terminals of a distribution block of the supply to the circuits of the appliance, inside the casing such to be protected against water drips by the casing of the appliance, the opening in the external casing being covered by a plate 5 through which the cable 1 and a grounding metal flap 16 come out.

[0004] A drawback of this solution is the fact that the cable 1 may be substituted only by experts by dismounting the casing 2 of the appliance. Moreover, the kind of plug 4 to be inserted in the supply socket depends on the country, thus it is necessary to differentiate the production depending on the destination country.

[0005] It would be desirable a device for connection to the electrical mains allowing to connect a supply cable with an end plug of the standard of the destination country whilst ensuring a protection degree no smaller than the ruled standard IPX4, without needing to access inside the appliance.

SUMMARY

[0006] A more flexible way has been found of connecting to the electric mains an electric power distribution block to the circuits of a household appliance through a detachable cable such that it may be substituted with a cable having a terminal plug of a type adapted to the standard of the destination country, without having to remove the external casing of the appliance or part of which, though ensuring at the same time a splash and drip proof connection effectively shrouded from water or other liquid that may wet the outer surface of the casing.

[0007] This result is achieved by modifying the structure of a typical internal electric power distribution block of the appliance, generally made of molded plastic and embedding or equipped with metal interconnections, through which are powered functional circuits, motors, moto-compressors, microprocessors, programming, control and/or safety devices of the appliance.

[0008] Instead of the classic lug and screw block for the wires of the flexible connection cable to the electric mains, a standard IEC socket/plug is integrated on a planar side of the molded body of the power distribution block, the perimeter of which extends to constitute a flange-plate around the triplet of metal conductors of the socket/plug.

[0009] A collar, integral to the flange-plate through which the conductors of the standard IEC /socket/plug protrude, of size suitable to accommodate at least part of a standard IEC angular socket plugged into the integrated IEC socket/plug, rises from the planar surface of the flange-plate. The rim of the collar has a half-circular cut through which the flexible isolated connection cable to the electric mains passes.

[0010] A box-like plastic cover of size adapted to slip over the collar, has a similar half-circular cut in its rim adapted to cooperatively match with the cut in the rim of the collar in order to clamp in a guillotine fashion the cable when the cover is forcibly pressed as far as establishing a stable engagement of matching lock means in the two bodies that are thus stably and permanently united. The two joined parts, are not separable without using a tool, and effectively shroud in a splash and drip proof enclosure the connection between the fixed (integrated) IEC socket/plug and the detachable IEC terminal socket of the connection cable.

[0011] The novel power distribution block is installable in household electric appliances in correspondence of a purposely realized opening of their external casing, that is closed by the flange-plate integral with the distribution block, leaving externally accessible the protection box of the coupling between the angular detachable socket to the integral plug.

[0012] According to an embodiment, the box-like cover is fixed to the collar through a stable union with a clamp of the box-like bodies, i.e. the cover and the collar, determined by the clamping of appropriate protrusions of the coupling surface of one in matching grooves of the other.

[0013] According to an alternative embodiment, the covering is fixed to the collar by means of winglets with holes on the external sides of the box-like cover and tightening screws of the winglets of the flange-plate.

[0014] The invention is defined in the annexed claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Figure 1 shows a known household appliance with

a fixed supply cable exiting from the external casing.

Figure 2 shows an embodiment of the novel distribution block with protrusions on the outer sides of the collar that surrounds the socket and matching grooves on the box-like cover.

Figure 3 shows another embodiment of the novel distribution block with winglets with holes on the box-like cover to be tightened to the flange-plate by means of screws.

Figure 4a is an outer view of a novel distribution block installed on a household appliance, with a box-like cover of protection of the connection between the fixed plug/socket of the block and the socket/plug of the detachable cable.

Figure 4b is a sectional view of the block of FIG. 4a.

Figure 5 shows a novel household electric appliance with a novel distribution block installed such to cover an opening in the external casing.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0016] An exemplary embodiment of the novel distribution block 6 is shown in FIG. 2. The novel block has a molded body 7, containing the distribution circuitry to internal circuits of the household appliance, such as for example an EMI filter, and connection terminals 8, that may be either four "fastons" connectors as shown or connectors of different type and/or number, to be fixed depending on the household appliance.

[0017] The block 6 has a flange-plate 5 that will be installed for covering an opening of an external casing of the household appliance, such to close the molded body 7 inside the household appliance. The conductors of a standard IEC plug/socket, adapted to be connected to an angular socket/plug 9 of a supply cable 1, protrude from the flange-plate 5 surrounded by a collar 10.

[0018] In order to prevent improper or accidental removing of the covering, there are permanent locking means. According to an embodiment, these locking means may be protrusions 14 on the outer sides of the collar 10 that match corresponding grooves 15 on the inner sides of the box-like cover 11. In this way the box-like cover may be removed only by using a tool, whenever it is necessary for freeing the angular socket/plug 9 for substituting the connection cable to the electric mains.

[0019] Optionally, the novel distribution block may be equipped with an external or internal grounding metal flag 16, to be connected to the external casing of the household appliance. As an alternative to the metal flag 16, it is possible to install a cable connected to the external casing. Obviously, it is not indispensable to tie the box-like cover 11 using a flexible stripe 12, being possible to substitute the stripe with hinges, pins or springs.

[0020] Another embodiment of the novel distribution block 6 is shown in FIG. 3, wherein the parts corresponding to those of the block of FIG. 2 are labeled with the same reference numerals. Differently from the embodiment of FIG. 2, the locking means are constituted by winglets with holes 17, that are fixed to the flange-plate 5 by means of screws in the holes 18a and 18b.

[0021] Once the angular IEC socket/plug is plugged in and the cover is closed, the part of the novel block of FIG. 2 visible from the exterior of the household appliance is as shown in FIG. 4a. The sectional view of FIG. 4b shows how the collar 10 and the cover 11 enclose the angular socket/plug, thus creating a protrusion inside the box-like enclosure that prevents liquids, that may wet the external surface of the casing, from reaching the conductors of the angular socket/plug 9.

[0022] FIG. 5 shows schematically a household appliance 3 with a distribution block as shown in FIG. 2, the cover 11 being open, before connecting a supply cable to the standard IEC plug/socket 19.

[0023] The novel distribution block may be made of metal and/or plastic and may have any shape and size. The height of the box-like cover 11 and of the collar 10 will be fixed depending on the encumbrance of the angular socket/plug 9.

[0024] The claims as filed are integral part of this description and are herein incorporated by reference.

Claims

1. A distribution block of electric power (6) to electric circuits of a household appliance (3) with an external casing (2), comprising a molded body (7) containing electrical distribution circuits, having on a face electrical connection terminals (8) to the circuits of the household appliance, and on another face a flange-plate (5) from which the the triplet of conductors of a standard IEC plug/socket (19) protrude, surrounded by an external collar (10), adapted to be connected to an angular standard IEC socket/plug (9) of a supply cable (1) having at the other end a standard plug (4) adapted to be inserted into an electric supply socket;
   a box-like cover (11), adapted to slip over to said external collar (10) and to be securely held in place by locking means (14, 15; 17, 18a, 18b);
   said distribution block of the electrical supply (6) being installable in an opening in said external casing of the appliance and said flange-plate (5) being adapted to be fastened to the external casing of the household appliance (2) for covering said opening in the casing;
   said collar (10) and said cover (11) defining a box-like enclosure adapted to accomodate said angular standard IEC socket/plug (9) coupled to said standard IEC plug/socket (19), the supply cable (1) exiting from the enclosure through a guillotine hole defined by cuts (13b, 13a) in corresponding sides of said collar (10) and of said cover (11), between which the external jacket of the cable (1) is clamped;
   said locked box-like cover (11) being adapted to prevent liquids from entering the box-like enclosure and

to prevent access without using a hand tool.

2. The distribution block (6) of claim 1, wherein said locking means (14, 15) consist in outer protrusions (14) and/or grooves of the collar (10) cooperating with matching inner grooves (15) and/or protrusions of the box-like cover (11).

3. The distribution block (6) of claim 1, wherein said locking means (17, 18a, 18b) consists in winglets with holes (17, 18a) on the external sides of the box-like cover (11) and tightening screws of the winglets screwing into corresponding holes (18b) of said flange-plate (5).

4. The distribution block (6) of one of claims from 1 to 3, wherein said flange-plate (5) has at least a flag with holes (16), that may be fixed with screws, for grounding the block (6) to the external casing (2) of the household appliance (3).

5. A household appliance (3) having an external casing (2) with an opening, **characterized in that** it comprises a distribution block (6) as defined in one of claims from 1 to 4 installed in said opening and anchored to close the opening on said external casing (2).

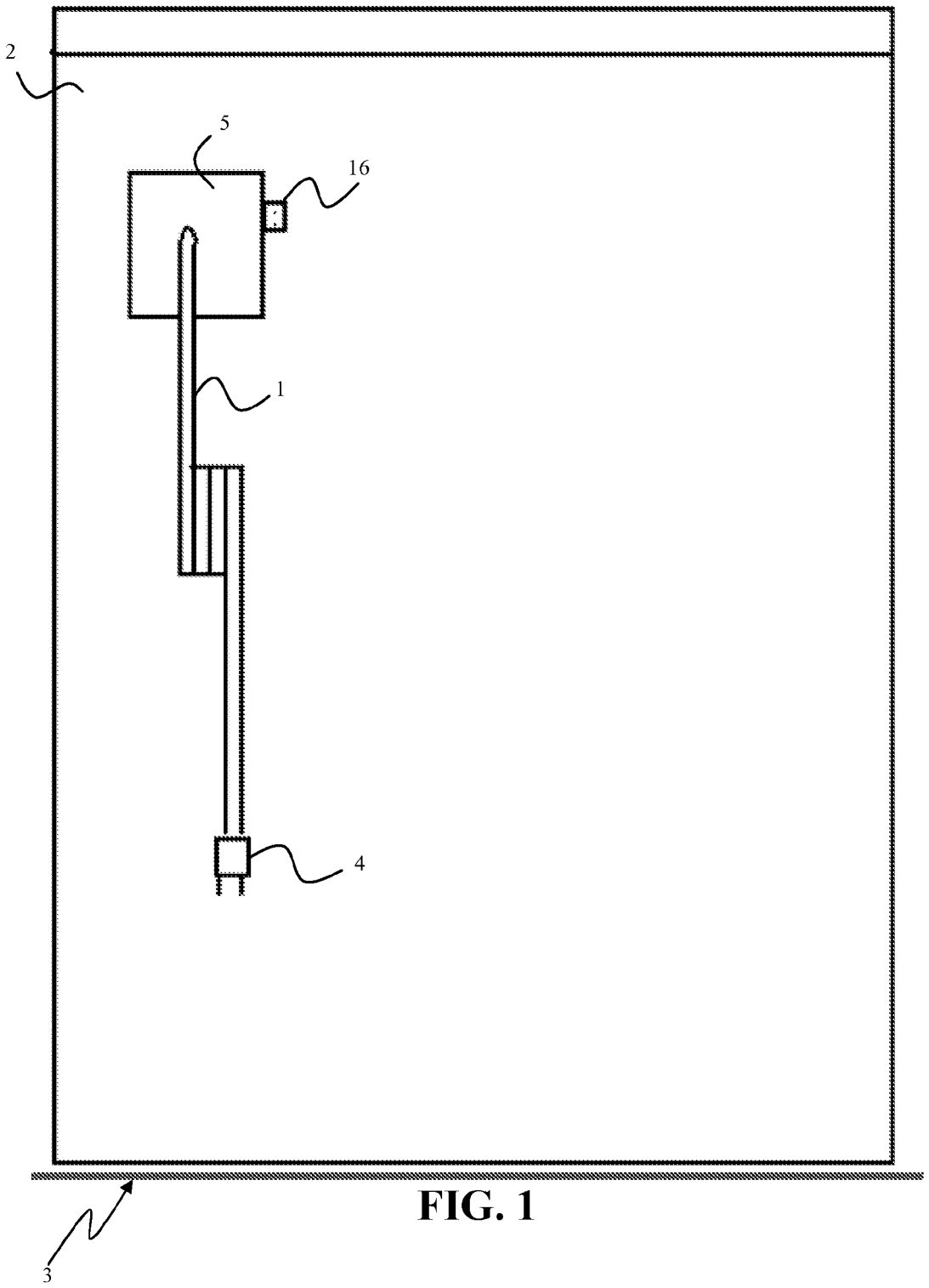


FIG. 1

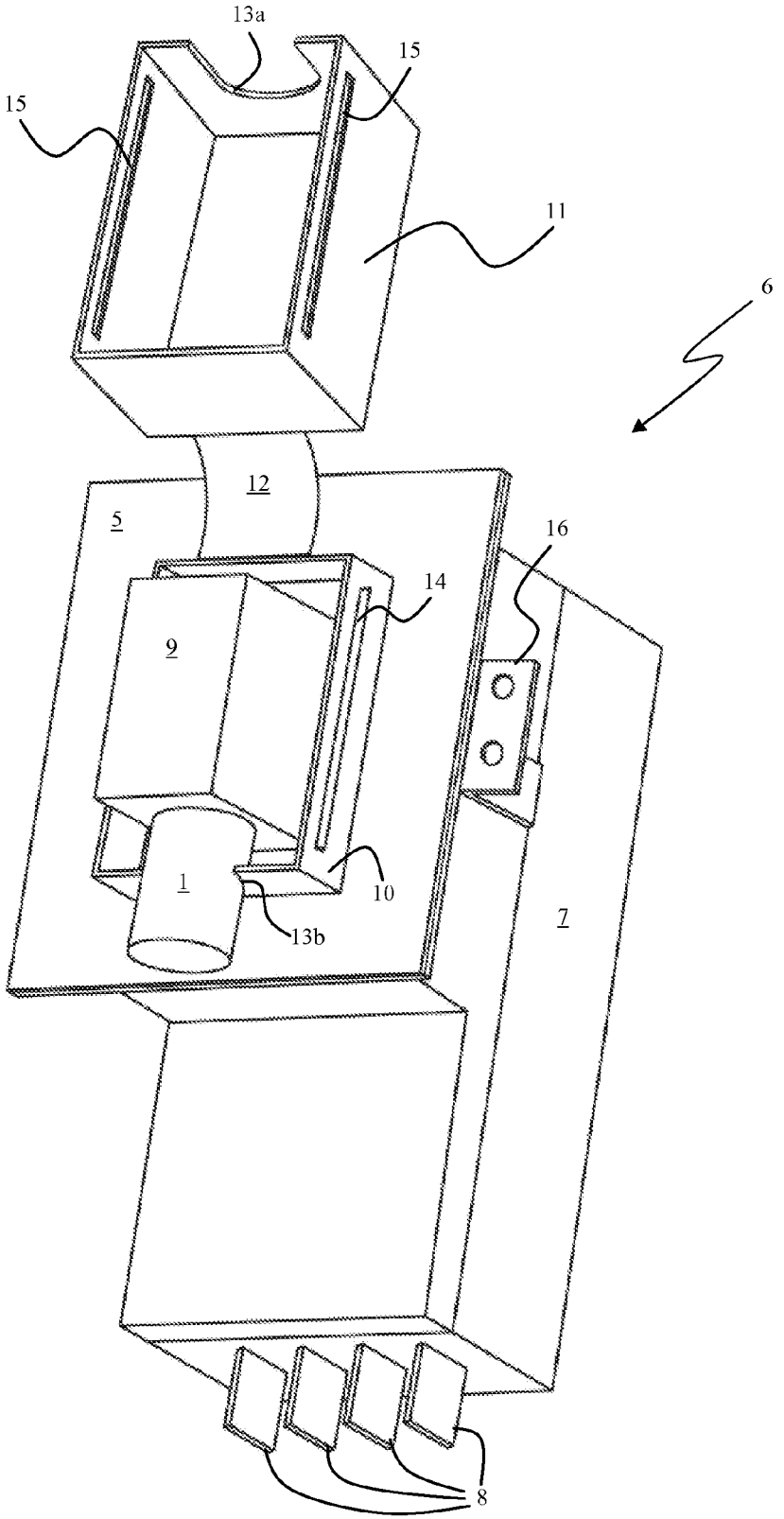


FIG. 2

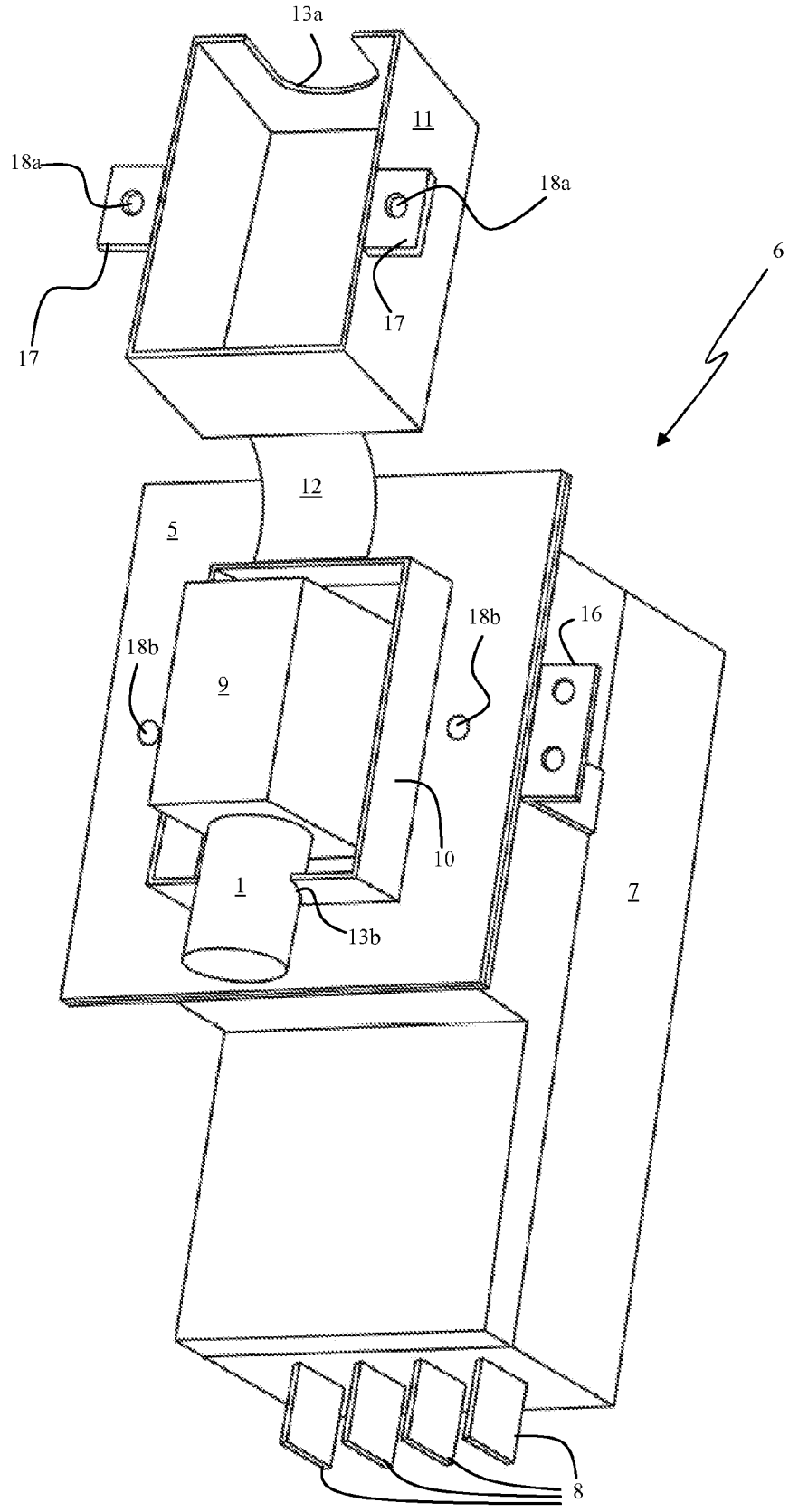
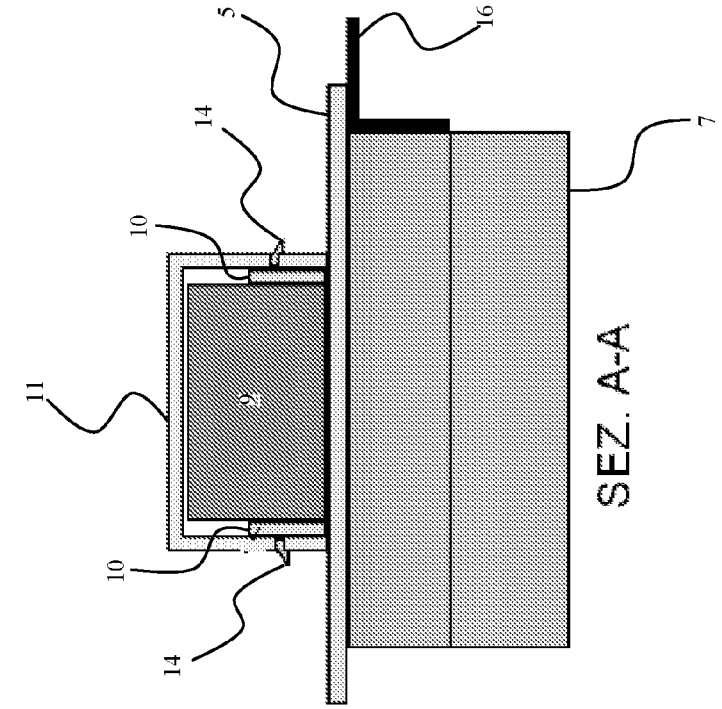


FIG. 3



SEZ. A-A

FIG. 4B

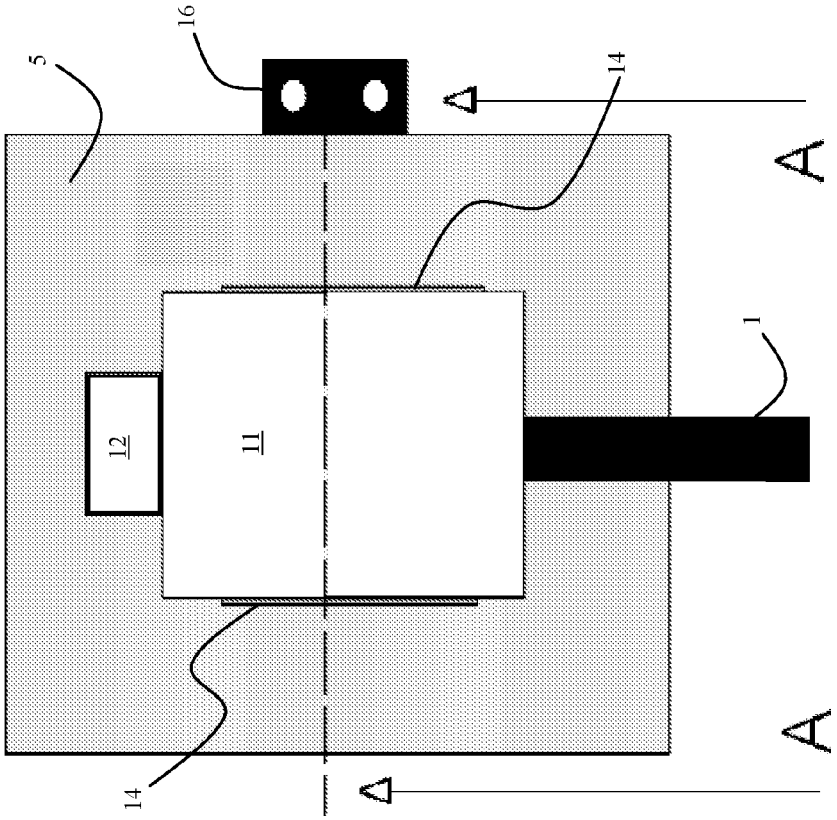


FIG. 4A

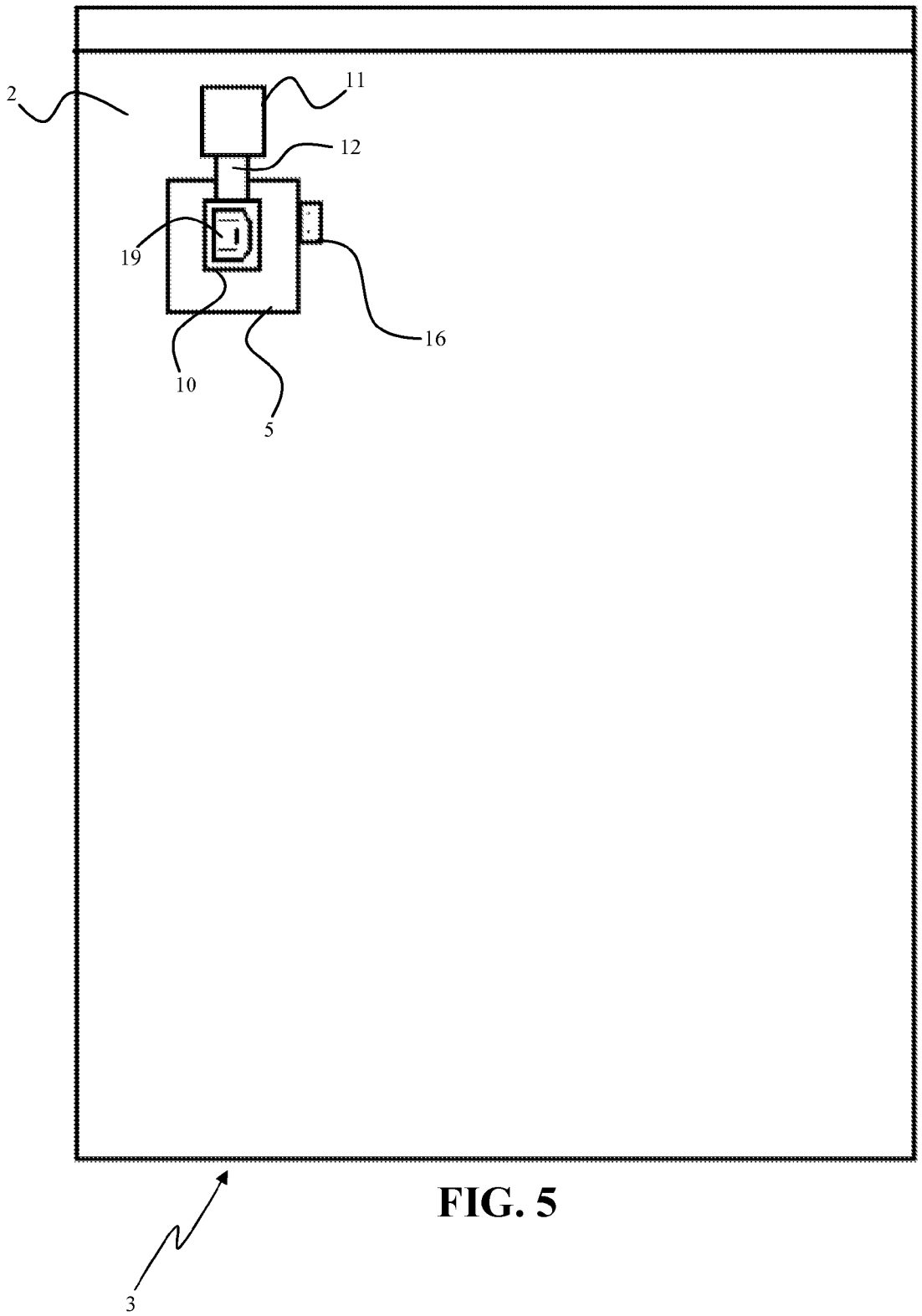


FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 11 15 1006

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 April 2011	Serrano Funcia, J

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82