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(54) **Fast-fit electric connecting device and use thereof for neutralizing a surplus high-voltage output terminal of an electronic gas lighter for electric household appliances, in particular a cooking range**

(57) A fast-fit electric connection to ground device of a surplus high-voltage output terminal of an electronic gas lighter device (3) intended to be fixed in use against an electrically conducting element (4), typically a cooking range for electric household appliances, consisting of an electrically deformable metallic foil (1) including an asymmetric U-shaped assembly portion (10) adapted to be inserted in a contact carried stack (11) of an electrically non-conducting casing (12) of the gas lighter device, and a working portion defined by an arm (14) which extends askew and cantilevered from a first end (15) of the assembly portion and shaped so as to be adapted to cooperate in use in contact against the electrically conducting element (4); the assembly portion being provided with a slot (16) for the mechanical and electrical coupling with a respective blade terminal (2b) accommodated within said contact carried stack of the gas lighter device and a second end (18), opposite the first, adapted to engage in use an internal side wall (21) of the contact carried stack in consequence of an elastic deformation of the foil (1) consequent to the cooperation in reciprocal contact of said cantilevered arm protruding (14) from the working portion with the electrically conducting element (4).

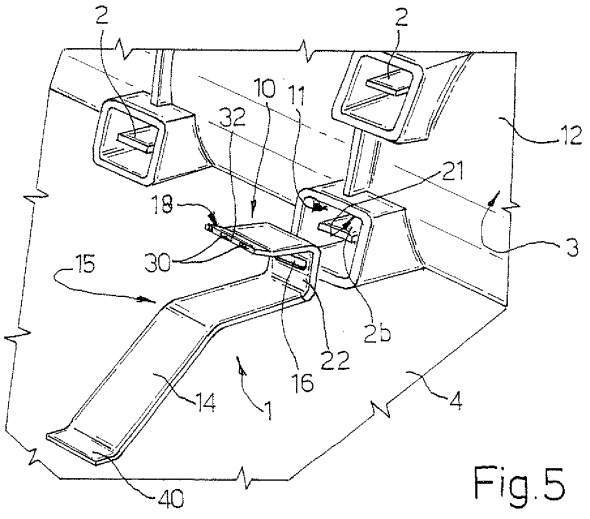

Fig.5

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Description

[0001] The present invention relates to a fast-fit electric connecting device intended to be coupled to a terminal, in particular a high-voltage output terminal, of an electronic gas lighter device for an electric household appliance; and to the use thereof for neutralizing a surplus high-voltage output terminal exceeding the number of terminals needed by the aforesaid gas lighter device by electrically grounding the surplus terminal, in particular for electrically connecting the surplus terminal to an electric conducting element of the electric household appliance, typically a cooking range, against which the gas lighter device is intended to be integrally fastened in use, by means of screws and/or by snap-fitting.

[0002] It is known that the lighting of gas fed cooking ranges for electric household appliances is performed by means of electronic gas lighter devices, which are mounted in close contact against the lower face of the cooking range, forming an electrically conducting element normally electrically connected (e.g. by means of the terminal board of the gas lighter device itself) to a reference potential (so-called "grounding connection"), for safety reasons.

[0003] From European patent n. 1101066B1 it is known to rapidly and electrically ground part of the lighting circuit of the gas lighter device (in order to avoid electromagnetic interference) by means of a U-shaped grounding spring which is integrally carried by the gas lighter device, astride an edge of the electrically insulating casing of the gas lighter device itself, in order to be sandwiched (squeezed) in use between such a casing and the electrically conductive element of the cooking range, so that the circuit of the gas lighter device is automatically grounded through the latter by means of the simple fixing of the gas lighter device to the cooking range, generally obtained by snap-fitting, by means of specific teeth of the casing which engage perforated seats of the cooking range, and/or by means of screws.

[0004] Furthermore, from European patent application n. EP 1469255A1 it is known that the gas lighter devices available on the market today all display an even number of output terminals; each terminal is intended in use to supply high voltage to a spark plug of a burner of a cooking range. Therefore, in the case of a cooking range having an odd number of burners, a gas lighter device having an immediately following even number of terminals must be used and the surplus terminal must be grounded, by means of a specific wire, so as to neutralize the action thereof without damaging the operation of the lighter.

[0005] A drawback of the above-described solution therefore consists in that the assembler of the cooking range must use an additional grounding wire (as well as the grounding wire prescribed by the specifications for the device as a whole, possibly replaced by the U-spring according to EP 1101066B1), with consequent increased costs, times and assembly difficulties (the operation is normally performed in restricted spaces).

[0006] It is the object of the present invention to solve the drawbacks of the above-described known devices of the prior art, by providing a fast-fit device for the electric connection of a high-voltage output terminal of an electronic gas lighter device to an electric conducting element of an electric household appliance, against which the gas lighter device is intended to be integrally fixed in use, e.g. a cooking range, which is both highly reliable, of low manufacturing and assembly cost and small in size, and which essentially allows to completely avoid the use of grounding wires, without however requiring modifications to the internal structure of the gas lighter device, such as required instead by the solution to the same technical problem known from EP 1469255A1.

[0007] The present invention thus relates to a device of the aforesaid type, as defined in claim 1.

[0008] In particular, the device according to the invention is used, according to an aspect of the invention, to neutralize, by means of grounding through the electric connection to the mentioned electric conducting element of the electric household appliance, of a high-voltage output terminal of the gas lighter device exceeding the number of high-voltage output terminals needed by the electric household appliance itself.

[0009] The device according to the invention consists in an elastically deformable metallic foil, comprising: a U-shaped assembly portion, adapted to be inserted in a contact carrier stack of an electrically non-conducting casing of the gas lighter device; and a working portion defined by an arm, which extends askew and cantilevered from a first end of the assembly portion and which is shaped so as to be adapted, in use, to extend in cantilevered manner out of the contact carrier stack and distanced from the casing to cooperate in contact against the electrically conducting element.

[0010] The assembly portion is then provided with a slot for the mechanical and electrical coupling with a respective blade contact (to be neutralized) accommodated within the contact carrier stack of the casing of the gas lighter device and with a second end, opposite to the first, and adapted to engage in use an internal side wall of the contact carrier stack, consequent to an elastic deformation of the foil consequent to the reciprocal contact between the cantilevered arm of the working portion and the electrically conducting element of the electric household appliance.

[0011] In this manner, it is possible to arrange the contact device formed of the foil onto the high-voltage terminal to be neutralized (e.g. the sixth terminal of a gas lighter device intended to equip a cooking range having only five burners) simply by inserting the assembly portion in the respective contact carrier stack corresponding to the terminal to be neutralized, which is engaged in the slot of the foil, thus leaving the arm askew and laterally cantilevered, transversally with respect to a longitudinal axis of the gas lighter device, out of the stack and so as to be distanced in a cantilevered manner from the casing of the gas lighter device, askew with respect to the aforesaid

axis of symmetry of the gas lighter device and towards the conducting element formed by the cooking range.

[0012] Thus, as a consequence of the assembly of the gas lighter device on the cooking range, performed for example by snapping or by means of screws as shown in EP 1101066B1, the aforesaid arm extends askew and cantilevered from the stack of the terminal to be neutralized with respect to the casing, and in direction so as to be distanced from the casing itself, is pressed against the cooking range with at least its free end by interference coupling, because it protrudes from the casing of the gas lighter device towards the cooking range more than the clearance normally present in use, after assembly, between casing of the gas lighter device and surface of the cooking range of other conducting element of the electric household appliance to which the gas lighter device is fixed in use (e.g. to the part of the armature of the household appliance).

[0013] Therefore, the askew and cantilevered arm of the working portion of the connection device according to the invention elastically bends, thus leading the coupling portion of the stack to possibly turn (in the presence of sufficient clearance), on the terminal to be neutralized (which serves as a hinge), taking the end of the assembly portion opposite to the cantilevered arm and provided with specific teeth, to be driven into the relatively soft synthetic plastic material, forming the side wall of the stack, thus ensuring the impossibility of accidental removal of the foil of the fast-fit connecting device according to the invention from the stack itself (and the relative high-voltage terminal). In this manner, the surplus high-voltage terminal is actually naturalized in permanent, simple and rapid manner, without the use of grounding wires and without the need to internally modify the gas lighter device.

[0014] Further features and advantages of the present invention will be apparent from the following description of a non-limitative embodiment thereof, with reference to the accompanying drawings, in which:

- figure 1 diagrammatically shows a perspective three-quarters top view of a fast-fit electric connecting device made according to the invention;
- figure 2 shows an orthogonal plan view from the bottom of the device in figure 1;
- figure 3 shows a section view taken along a plotting plane III-III of the device in figure 2; and
- figures 4 and 5 show a perspective view (figure 5 is a magnified detail) of an example of use and assembly of the connection device in figures 1-3.

[0015] With reference to figures from 1 to 5, numeral 1 indicates as a whole a device for the fast-fit electrical connection of a high-voltage output terminal 2 of an electronic gas lighter device 3 (of known type, e.g. from EP 1101066B1, and which is thus not further described in detail for the sake of simplicity) to an electrically conducting element 4 of an electric household appliance (known and not shown for the sake of simplicity) against which the gas lighter device 3 is intended in use to be integrally fixed, e.g. to a lower surface of a cooking range equipped with a certain number of burners, known and not shown, or a part of the carcass of the electric household appliance.

[0016] Electrically conducting element 4 is normally connected (in known manner and not shown for the sake of simplicity) to a reference potential, i.e. it is electrically "grounded", e.g. by means of part of the electric circuit within device 3 itself and, as shown below, device 1 is used according to the invention (figures 4 and 5) to neutralize the ground connection (by means of element 4) of an output terminal 2b (figure 5) exceeding the number of high-voltage output terminals 2 of gas lighter device 3 needed by the household appliance, e.g. exceeding the number of burners of the cooking range forming conducting element 4 (in general).

[0017] According to an aspect of the invention, electric connecting device 1 consists of a simple elastically deformable metallic foil, particularly shaped by folding over the elastic limit, so as to comprise a U-shaped assembly portion 10, adapted to be inserted in use in a contact carrier stack 11 (figure 5) of an electrically non-conducting casing 12 (e.g. formed by an injection moulded synthetic plastic material) of the gas lighter device 3; and furthermore so as to comprise a working portion defined by an arm 14, which extends askew and cantilevered from a first end 15 of assembly portion 10 and which is shaped so as to be adapted, in use, to cooperate in contact against electrically conducting element 4 (figure 4).

[0018] Assembly portion 10 is provided with a slot 16 for the mechanical and electrical coupling with respective terminal 2b of the blade type accommodated within contact carrier stack 11 of casing 12, and a second end 18, opposite to end 15, adapted to engage in use to engage an internal side wall 21 of contact carrier stack 11, also consequent to an elastic deformation of foil 1 consequent to the reciprocal contact in use between cantilevered arm 14 and electrically conducting element 4 of the electric household appliance.

[0019] Specifically, assembly portion 10 is asymmetrically U-shaped, where first end 15 forms a side branch having longer length than the asymmetric U and second end 18 forms an opposite side branch, having a shorter length than the asymmetric U.

[0020] Furthermore, slot 16 is made through an intermediate connection segment 22 of the U between the longer and the shorter length side branches formed by ends 15 and 18, and is transversally oriented with respect to cantilevered arm 14 forming the working portion, displaying (figure 1) a longitudinal direction of extension (length) oriented perpendicularly with respect to a longitudinal direction of extension (length) of cantilevered arm 14, identifiable in figure 2 with a perpendicular to the plane of the sheet and with the plane of the sheet, respectively.

[0021] Finally, slot 16 displays dimensions such as to

couple in use with a predetermined clearance with blade terminal 2b to be neutralized of gas lighter device 3; such predetermined clearance is specifically of an order such that elastically formable foil 1 may oscillate in use on blade terminal 2b to which it is coupled within contact carrier stack 11 so as to press second end 18 against side wall 21 of stack 11; for the same purpose, assembly portion 10 is also preferably shaped so as to be coupled with a slight predetermined clearance within stack 11. In this manner, a very high assembly ease of device 1 on gas lighter device 3 is obtained, also in the presence of relatively high machining tolerances without, on the other hand, the risk of leading the electrical connection of terminal 2b with element 4 through blade 1 to fail, as shown below.

[0022] Second end 18 is preferably provided with at least one anchoring tooth 30, even more preferably with a pair of anchoring teeth 30 side by side, for anchoring side wall 21, essentially isosceles-triangle-shaped, adapted to be driven into side wall 21 of contact carrier stack 11 of casing 12 in virtue of the fact that the latter, as the entire casing 12, are formed by relatively soft synthetic plastic material with respect to the metallic material with which elastically deformable foil 1 forming the fast-fit electric connection device of the invention is made, typically steel (or other alloy, e.g. even brass) of the harmonic type.

[0023] Anchoring tooth 30 or pair of teeth 30 to wall 21 is/are cantilevered at an end edge 32 of second end 18 of assembly portion 10, which edge 32 (figure 3) was folded askew (with respect to the branch of the U defined by end 18 itself) on opposite side to the skew and cantilevered direction of extension of opposite arm 14 defined by end 15.

[0024] Cantilevered skew arm 14 is in turn provided with a free end 40 folded so as to be essentially parallel to respective side branches of U-shaped assembly portion 10 when metallic foil 1 is in undeformed conditions (figure 3).

[0025] As shown in figures 4 and 5, fast-fit electric connecting device 1 in figures 1-3 described herein is used in an innovative manner according to the invention to effectively neutralize a high-voltage output terminal 2b of electronic gas lighter device 3 exceeding the number of high-voltage output terminals 2 needed by the electric household appliance, by grounding terminal 2b (surplus with respect to the total number of existing terminals 2) with electrically conducting element 4 of the electric household appliance, against which gas lighter device 3 is however intended to be integrally fixed in use.

[0026] The use according to the invention is characterised in that elastically deformable foil 1 is integrally mounted onto gas lighter device 3 with its assembly portion 10 inserted against contact carrier stack 11 of casing 12 corresponding to surplus terminal 2b and throughly accommodating the same; furthermore, slot 16 is, in such configuration, mechanically and electrically connected to surplus terminal 2b, which is throughly inserted across the same in assembly portion 10.

[0027] Concurrently, in the configuration described and illustrated in figures 4 and 5, arm 14 is arranged askew and cantilevered from contact carrier stack 11 accommodating terminal 2b and extends laterally cantilevered, transversally with respect to a longitudinal axis A of gas lighter device 3 and out of stack 11, so as to be distanced in cantilevered manner from casing 12 askew with respect to aforesaid axis A and towards conducting element 4.

[0028] Finally, the use of the invention provides for the fixing in a known manner (besides necessary in any case) of gas lighter device 3 to electrically conducting element 4, performed so that arm 14 is pressed, at least with its free end 40, against electrically conducting element 4 with a force such as to press for example by elastic reaction and/or by oscillation of foil 1 on terminal 2b and in stack 11, second end 18 of assembly portion 10 (in particular edge 32 with teeth 30) against side wall 21 of stack 11.

Claims

1. A device (1) for the fast-fit electric connection of a high-voltage output terminal (2) of an electronic gas lighter (3) to an electric conducting element (4) of an electric household appliance upon which the gas lighter is intended in use to be integrally fastened, for example a cooking range, in particular for neutralisation by grounding connection of an output terminal (2b) exceeding the number of high-voltage output terminals (2) of the gas lighter (3) needed by the electric household appliance; **characterised in that** it consists of an elastically deformable metallic foil (1) comprising: a U-shaped assembly portion (10), adapted to be inserted in a contact carrier stack (11) of an electrically non-conducting casing (12) of the gas lighter; and a working portion defined by an arm (14), which extends askew and cantilevered from a first end (15) of the assembly portion and which is shaped so as to be adapted, in use, to cooperate in contact against the conducting element (4); the assembly portion (10) being provided with a slot (16) for mechanical and electrical coupling with a respective blade terminal (2) accommodated within said contact carrier stack of the gas lighter casing, and a second end (18) opposite to the first and adapted to engage in use an internal side wall (21) of the contact carrier stack, consequent to the reciprocal contact between said cantilevered arm (14) of the working portion and the electrically conducting element (4) of the electric household appliance.

2. A device according to claim 1, **characterised in that** said assembly portion (10) is asymmetrically U-shaped, said first end (15) forming a side branch of a longer length of the asymmetric U and said second

end (18) forming an opposite side branch, of a shorter length of the asymmetric U.

3. A device according to claim 2, **characterised in that** said slot (16) for coupling with said blade contact of the gas lighter is made through an intermediate connection segment (22) of the U between said longer side branch and said shorter side branch.

4. A device according to any of the preceding claims, **characterised in that** said slot (16) for coupling with said blade contact of the gas lighter is transversally oriented with respect to said cantilevered arm (14) of the working portion, presenting a longitudinal direction of extension oriented perpendicularly with respect to a longitudinal direction of extension of the cantilevered arm (14).

5. A device according to claim 4, **characterised in that** said slot (16) presents size so as to couple in use with predetermined clearance with the blade contact (2b) of the gas lighter; said predetermined clearance being such that said elastically deformable foil (1) may oscillate in use on the blade contact (2b) which it is coupled within said contact carrier stack so as to press said second end (18) of said assembly portion against said side wall (21) of the stack, in particular consequent to an elastic deformation of the foil (1).

6. A device according to one of the preceding claims, **characterised in that** said second end (18) of the assembly portion of said elastically deformable metallic foil (1) is provided with at least one anchoring tooth (30), preferably with a pair of anchoring teeth (30), to said side wall (21) of the contact carrier stack.

7. A device according to claim 6, **characterised in that** said at least one anchoring tooth (30) is adapted to be driven into said side wall (21) of the contact carrier stack of the casing of the gas lighter; said casing (12) being made of relatively soft synthetic plastic material relatively to the metallic material with which said elastically deformable foil (1) is made.

8. A device according to claim 6 or 7, **characterised in that** said at least one anchoring tooth (30) is cantilevered at an end edge (32) of said second end of the assembly portion folded askew on opposite side to the skew and cantilevered direction of extension of said arm (14) of the working position of the elastic foil.

9. A device according to any of the preceding claims, **characterised in that** said cantilevered skew arm (14) is provided with a free end (40) folded so as to be essentially parallel to respective side branches of the U-shaped assembly portion (10) when the metallic foil is not deformed.

10. Use of a quick electric connection device (1) according to any of the preceding claims, for neutralization of a high-voltage output terminal (2b) of an electronic gas lighter (3) for an electric household appliance, exceeding the number of high-voltage terminals (2) needed by the electric household appliance, by electric grounding connection of the surplus terminal (2b) with an electric connecting element (4) of the electric household appliance against which the gas lighter (3) is intended in use to be integrally fastened; said use being **characterised in that** the elastically deformable foil (1) is integrally fitted to the gas lighter (3) with its assembly portion (10) inserted in a contact carrier stack (11) of an electrically non-conducting casing (12) of the gas lighter (3) accommodating the surplus terminal (2b), mechanically and electrically connected to the surplus terminal (2b) by means of said slot (16) in the assembly portion (10) and with said arm (14) in working position askew protruding from the contact carrier stack (11); and by fastening said gas lighter (3) to said electrically conducting element (4) so that said arm (14) is pressed at least with one its free end (40) against the electric conducting element (4) with such a force to press said second end (18) of the assembly portion (10) against a side wall (21) of the contact carrier stack (11).

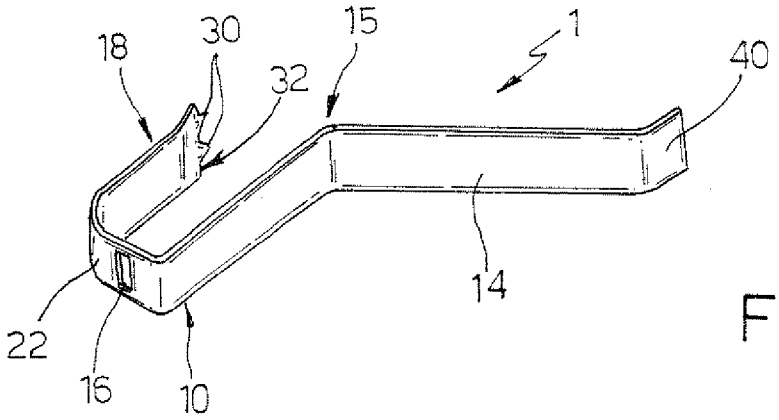

Fig.1

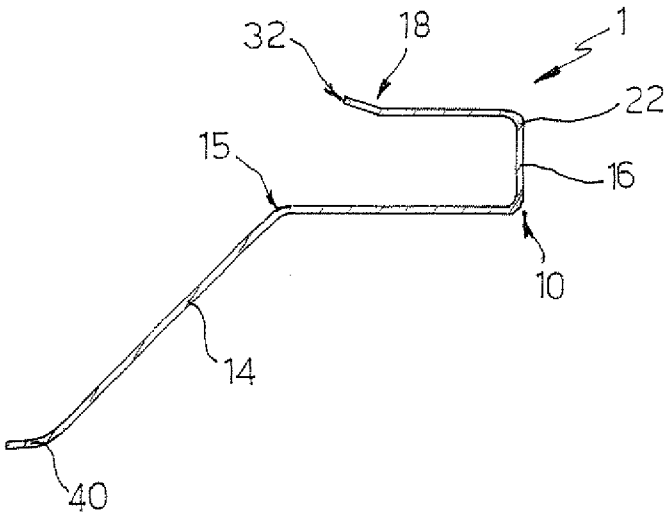

Fig.3

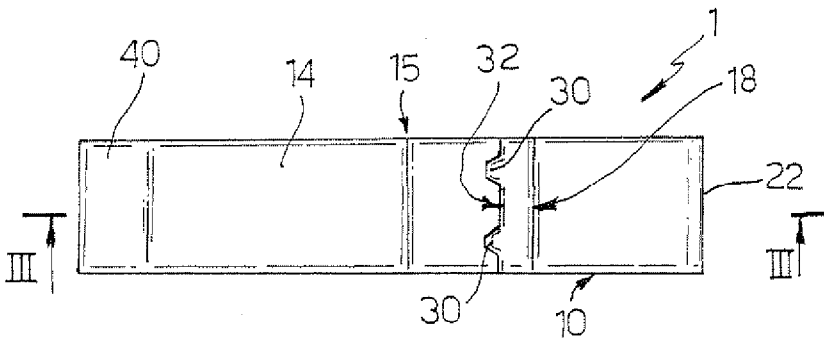

Fig.2

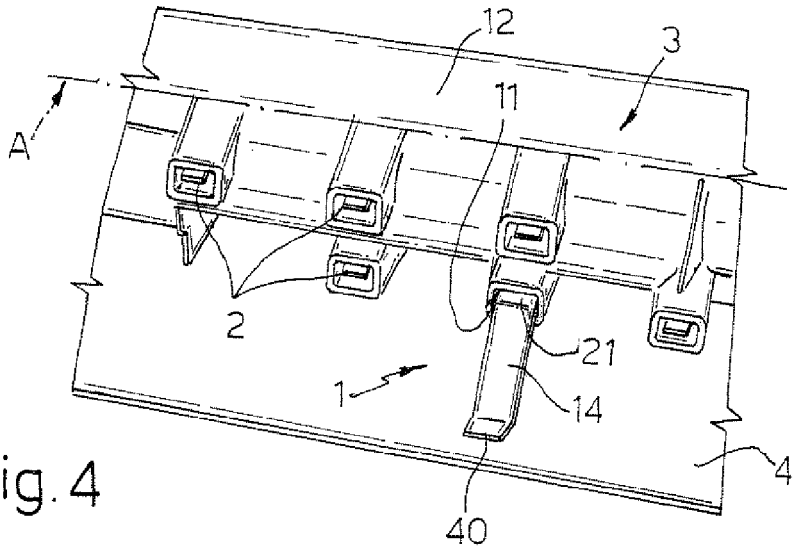

Fig. 4

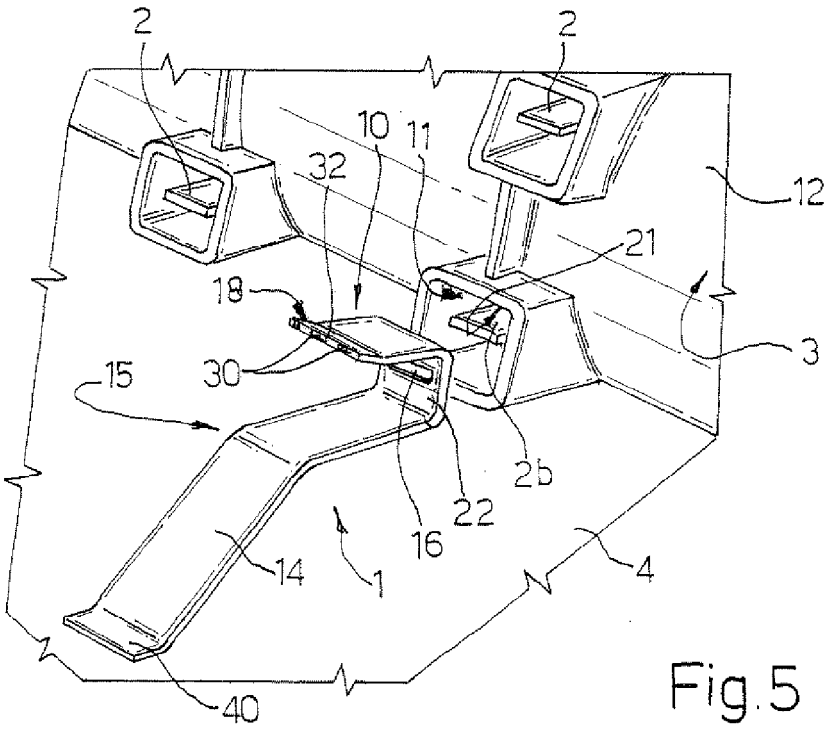

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1101066 B1 **[0003] [0005] [0012] [0015]**
- EP 1469255 A1 **[0004] [0006]**