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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) Clasping device for the engagement with a suspended electrical duct

(57) Device for engagement with a suspended electrical duct having a channel which is open at the bottom and provided with a pair of opposite and parallel engaging edges (41,42), comprising, housed inside a case (1) closed by a cover, a pair of sliders (2,3) which are moved away from each other by a compression spring (12) so that the opposite ends (4, 5) of the sliders protrude from the case and form two engaging teeth which can be engaged with said duct edges (41,42), the sliders being able to be moved towards each other manually via a pair of openings (15,16) formed in the bottom wall of the case, so as to retract the ends (4,5) and allow insertion of the device between the pair of opposite duct edges.

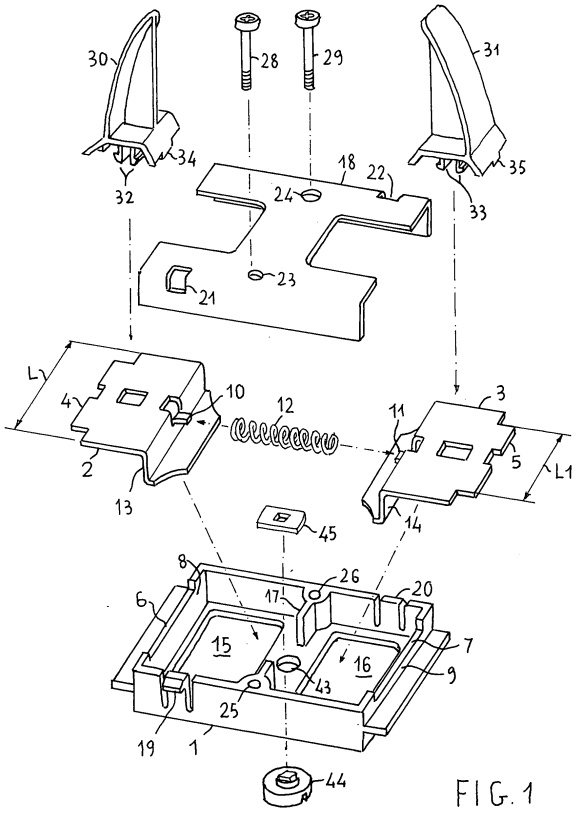

FIG. 1

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Description

[0001] The present invention relates to a clasping device for engagement with a suspended electrical duct, which can be operated without tools in a particularly ergonomic, secure and reliable manner.

[0002] It is known that suspended electrical ducts are mainly used, for example in offices, warehouses and shopping centres, for the distribution of electric power.

[0003] At any point along their length it is possible to connect, depending on requirements, branch-off plugs, lighting apparatus, fans and the like, using the duct as a suspension element.

[0004] Examples of these ducts are described in European patent EP0015356 and, more recently, in European patent application No. 06425836.1 filed on 14 December 2006.

[0005] These ducts essentially consist of a metal case which forms a channel which is open at the bottom and which internally accommodates conducting bars.

[0006] Along the bottom opening two parallel opposite edges of the case, facing each other, act as a support for the apparatus which are connected to the duct.

[0007] The apparatus are provided with clasping means, generally consisting of a rotating cam with two teeth, which, once inserted in the duct, is rotated so that the two teeth engage with the edges of the duct.

[0008] This engagement system, although simple and inexpensive, is difficult to operate and not very reliable.

[0009] It must be remembered that installation is normally carried out in precarious conditions, standing on stairs or scaffolding, and that the person performing installation must simultaneously support the apparatus to be installed and rotationally operate the engaging cam or, more frequently a pair of cams, in particular when the apparatus extend in a lengthwise direction, as in the case of straight fluorescent-tube lighting apparatus.

[0010] Incorrect rotation of the cams may result in precarious or only apparent engagement, with the risk of the apparatus falling.

[0011] Very often the apparatus to be installed blocks vision of the duct inside which the engaging device must be inserted, this making execution of the engaging operation even more difficult and precarious.

[0012] The present invention solves these problems and proposes a clasping device which is relatively simple, particularly reliable and is easy to operate since the clasping device forms at the same time a part for gripping and supporting the apparatus, such that with the same hand it is possible to perform simultaneously the two supporting and engaging functions.

[0013] Advantageously, moreover, the clasping device may incorporate a safety system which keeps the clasping device in the engaged position and prevents accidental release.

[0014] In a preferred embodiment, this safety system intervenes automatically with execution of the clasping operation, without the need for additional operations on the part of the operator.

[0015] By way of a further aspect, the clasping device is provided with receiving parts which guide the device into the correct engaging position.

[0016] The aspects and advantages of the invention as characterized by the claims will result more clearly from the description which follows of a preferred embodiment and variations thereof, provided with reference to the accompanying drawings in which:

- Figure 1 is an exploded perspective view of a preferred embodiment of the clasping device;
- Figure 2 is a cross-sectional view of the device according to Figure 1 in relation to a duct inside which it must be engaged, during the engaging step;
- Figure 3 is a cross-sectional view of the device according to Figure 2 and the duct, once engagement has been performed;
- Figures 4, 5 and 6 are schematic cross-sectional views of a variant of the device according to Figure 1 which incorporates an automatic system for performing locking during engagement and show, in order, the various engaging steps.

[0017] In the various figures, parts which are functionally and structurally equivalent are identified by the same reference numbers.

[0018] With reference to Figure 1, the clasping device according to the present invention comprises a case 1 which is in the form of a rectangular parallelepiped and preferably obtained by means of plastic moulding and which houses, in a transversely slidable manner, two engaging sliders 2,3 which are obtained by means of shearing of a plate made of metal, preferably ferromagnetic steel, and are folded in the form of a double L in the transverse direction.

[0019] The opposite ends 4,5 of the sliders, which have a breadth L1 smaller than the width L of the sliders, form a pair of engaging teeth which protrude laterally from the case 1 which is provided for this purpose with two reliefs 6,7 on its opposite sides 8,9.

[0020] Projection of the teeth 4,5 from the sides 8,9 is defined by interference of the sliders 2,3 with the sides 8,9 of the case.

[0021] A tongue 10,11, which acts as a positioning head for a helical compression spring 12 arranged between the two sliders 2,3, is formed on the vertical wall 13,14 of each of the sliders 2 and 3 by means of blanking and folding.

[0022] The spring tends to move the sliders away from each other so that the teeth 4,5 project from the sides of the case.

[0023] The bottom wall of the case 1 has two openings 15,16 through which it is possible to insert two fingers of the hand (index finger and thumb which ensure a strong

grip) and exert on the vertical walls 13,14 a compressive force which moves the two sliders 2,3 together and retracts the two teeth 4,5.

[0024] The travel movement of the sliders when moved together is limited by their interference with a central rib 17 of the case 1.

[0025] The case 1, which is completed by the sliders 2,3 and by the spring 12, is closed by a sheet-metal cover 18 which is folded in the form of a C and which snap-engages with the case 1 provided for this purpose, on the front and rear walls, with two resilient engaging teeth 19,20 which engage in openings 21,22 formed in the cover.

[0026] Both the cover 18 and the case 1 are provided with a pair of openings 23,24 and 25,26, respectively, for receiving screws 28,29 which fix the device to the apparatus which must be engaged with the duct and support the weight thereof (the case and cover are snap-engaged together merely for the purposes of assembly of the device).

[0027] The screws are able to be screwed equally well into the apparatus as shown, or, when mounted from underneath, may be screwed into the Openings 23,24 which are threaded or provided with threaded inserts.

[0028] It should be noted that the case 1 may also be formed as an integral part of the apparatus to be engaged with the duct, in which case the second alternative is preferable.

[0029] Advantageously, an upwardly extending wing 30,31 is mounted by means of snap-engagement of each of the sliders 2,3.

[0030] For this purpose, the wings 30,31 are provided with engaging teeth 32,33 and dowels 34,35 which engage in corresponding openings in the sliders 2 and 3 and ensure correct and stable positioning of the wings 30,31 on the respective sliders.

[0031] The pairs of wings 30,31 form a kind of wedge which acts as a guide for insertion of the clasping device inside the channel of the duct case.

[0032] Before describing other optional aspects of the clasping device, it is appropriate to consider Figures 2 and 3 which show the clasping device during installation in the duct and with the device installed, respectively.

[0033] In Figure 2, the clasping device, which is fixed onto an apparatus, for example a lighting apparatus, the frame 36 of which is shown schematically and partially, is gripped between the index finger and the thumb of one hand by the person performing installation.

[0034] The gripping action allows the apparatus associated with the clasping device to be supported and at the same time causes the movement of the two sliders 2,3 towards each other such that the teeth 4,5 are arranged flush with the sides of the case.

[0035] The clasping device may then be inserted inside the channel 37 formed by the case 38 of a suspended electrical duct.

[0036] The wings 30,31 guide the clasping device inside the channel.

[0037] Moreover, by interfering with the opposite edges 41,42 of the duct case 38, they ensure complete retraction of the engaging teeth 4,5.

[0038] Two ribs 39,40, which are formed on the sides 8,9 of the case, define the depth of insertion by means of interference with the opposite edges 41,42.

[0039] It is clear that the depth of insertion may also be defined by the structure of the frame 36, in which case the ribs 39,40 are superfluous.

[0040] Once insertion has been performed, the person performing installation releases the grip on the sliders 2,3, such that the latter, owing to the action of the spring, move away from each other and the end teeth protrude outside the case and engage with the opposite edges 41,42, surmounting them.

[0041] This condition is shown in the cross-section of Figure 3.

[0042] The pressure of the spring 12 is sufficient to ensure reliable engagement with the duct.

[0043] For greater safety a bolt or cam type locking device which prevents retraction of the teeth 4,5 may be envisaged.

[0044] For example, Figure 1 shows how the bottom of the case is provided with an opening 43 which pivotably seats a rotatable head 44 to which a cam 45 arranged inside the case is fixed by means of clinching.

[0045] Rotation of the head 44, which is achieved by means of a screwdriver once the engagement operation has been performed, allows the cam 45 to be arranged in a locked position so that, by interfering with the sliders, it prevents them moving together.

[0046] Clearly this is only one of the various measures which may be adopted.

[0047] It is also possible to design the clasping device so that it intrinsically assumes, once engaged, a locked configuration.

[0048] The cross-sections in Figures 4, 5 and 6 illustrate this concept schematically.

[0049] With reference to Figure 4, it can be seen that the spring 12 acts on a middle point of the vertical arm 13,14 of the sliders 2,3 with a force F1.

[0050] The reactive force F2, exerted by the case on the sliders and equal to F1 in terms of magnitude and direction, is instead applied onto the sliders in the region of the engaging teeth, offset by a certain amount with respect to F1.

[0051] It is therefore clear that the sliders are subject to a moment which pushes them downwards.

[0052] This moment is counterbalanced by the reaction F3 exerted by the bottom of the case on the sliders.

[0053] By shortening the vertical arm 13,14 (for example by 1-2 mm) relative to the depth of the case, the sliders may be subject to a certain angle of rotation relative to the point of application of the reactive force F2.

[0054] It is therefore possible to envisage on the bottom of the case, in its central position, a projection 48, which may consist of a metal insert and which forms a locking shoulder which prevents the sliders 2,3 moving

together.

[0055] By acting on the sliders with a gripping operation which pushes them upwards with a force F4, as necessarily occurs in order to raise the apparatus associated with the engagement device, the sliders assume the position shown in Figure 5 and are disengaged from the stop 48.

[0056] It is therefore possible, by exerting a pressure in the direction indicated by the arrows 50 on the vertical walls of the sliders, to compress the spring and move the sliders towards each other, as shown in Figure 6.

[0057] After insertion of the engagement device inside the duct, releasing the sliders brings the device back into the condition shown in Figure 5, with the consequent engagement of the device.

[0058] At this point, it is possible to let go of the device, and the sliders 2,3 automatically, as a result of the action of the spring 12 and the weight supported by the engaging teeth, assume the position shown in Figure 4 which causes locking of the sliders in the engaged position.

Claims

1. Clasping device for engagement with a suspended electrical duct having a channel which is open at the bottom and provided with a pair of opposite and parallel engaging edges (41,42), **characterized in that** it comprises, housed inside a case (1) closed by a cover (18):

   - a pair of opposite sliders (2,3) which are moved away from each other by a compression spring (12) so that the opposite ends (4, 5) of the sliders protrude from the case (1) so as to form two opposite engaging teeth which can be engaged with said engaging edges (41,42) of the duct, said sliders being able to be moved towards each other manually via a pair of openings (15,16) formed in the bottom wall of said case, so as to retract said ends (4,5) inside said case.

2. Clasping device according to Claim 1, comprising, mounted on said sliders (2,3), a pair of wings (30,31) forming a guiding wedge for insertion of said device inside said duct channel.

3. Engagement device according to Claim 1 or 2, comprising means (45,48) for locking said sliders in the engaged position.

4. Device according to Claim 3, in which said locking means (45) consist of a rotating cam (45) pivotably mounted on the bottom of said case (1) and able to be operated from outside said case.

5. Device according to Claim 3, in which said sliders are able to rotate on said ends (4,5) in order to assume a position where the movement of said sliders towards each other is prevented by a stop (48) provided on said case and a position where said sliders disengage from said stop and may be moved towards each other.

Amended claims in accordance with Rule 137(2) EPC.

1. Clasping device for engagement with a suspended electrical duct having a channel which is open at the bottom and provided with a pair of opposite and parallel engaging edges (41, 42) , said clasping device comprising:

- a case (1) closed by a cover (18) and housing a pair of opposite sliders (2,3) which are moved away from each other by a compression spring (12) so that the opposite ends (4, 5) of the sliders protrude from the case (1) so as to form two opposite engaging teeth which can be engaged with said engaging edges (41, 42) of the duct, said sliders being movable towards each other via a pair of openings (15, 16) formed in the bottom wall of said case, so as to retract said ends (4,5) inside said case; said device being **characterised in that**
- the size of said openings (15,16) allows for insertion of two fingers of a hand in said case (1) and **in that**
- said sliders (2,3) each consists in a metal plate shaped in the form of a double L and having a vertical wall (13,14) onto which the fingers inserted in said openings (15,16) can exert a compression force which moves the two sliders (2, 3) together, while at the Same time supporting said device.

2. Clasping device according to Claim 1, comprising, mounted on said sliders (2,3), a pair of wings (30,31) forming a guiding wedge for insertion of said device inside said duct channel.

3. Clasping device according to Claim 1 or 2, comprising means (45, 48) for locking said sliders in the engaging position.

4. Device according to claim 3, in which said locking means (45) consist of a rotating cam (45) pivotably mounted on the bottom of said case (1) and able to be operated from outside said case.

5. Device according to Claim 3, in which said sliders (2,39 can slightly rotate on the opposed sides (8,9) of said case (1), from which sides their ends (4,5) protrude, in order to assume a position where the movement of said sliders towards each other is pre-

vented by a stop (48) provided on said case and as position where said sliders disengage from said stop and may be moved towards each other.

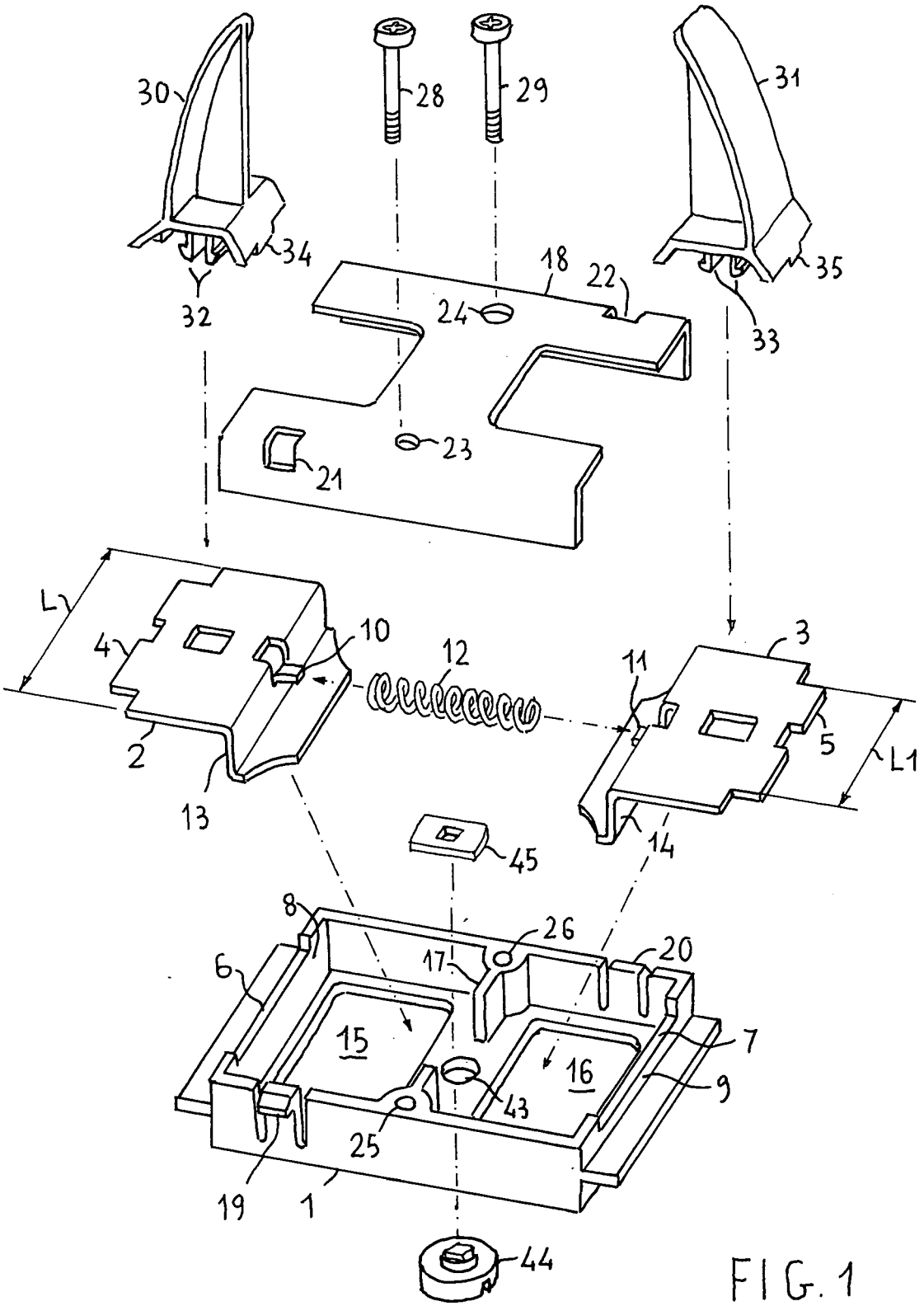
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FIG. 1

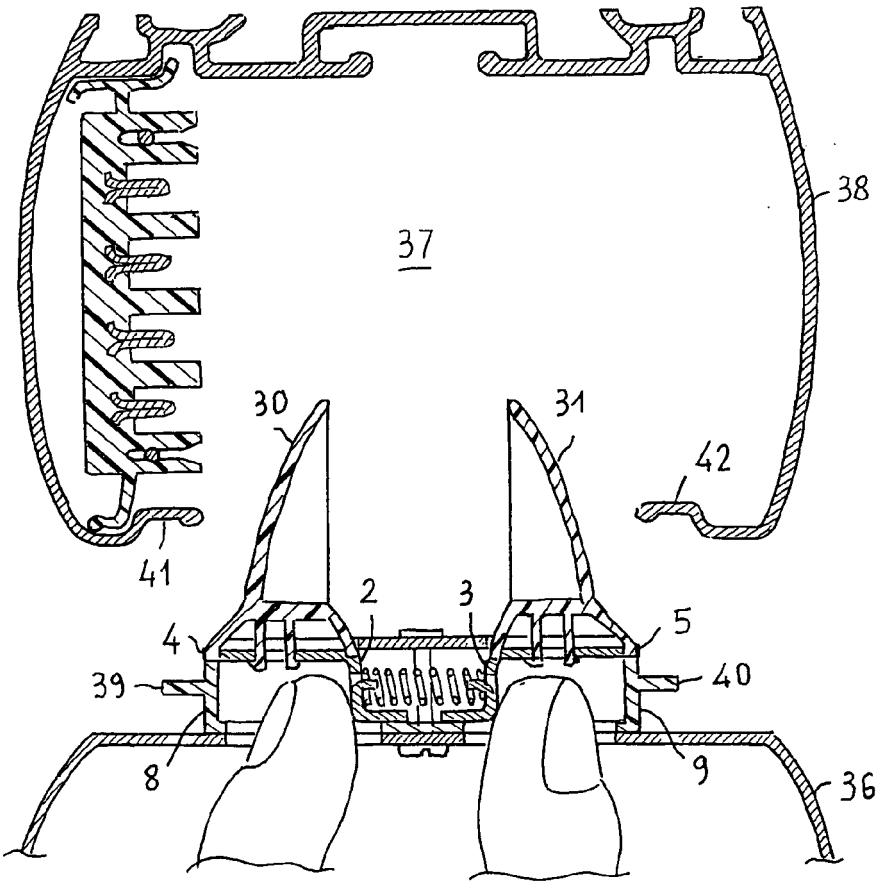

FIG. 2

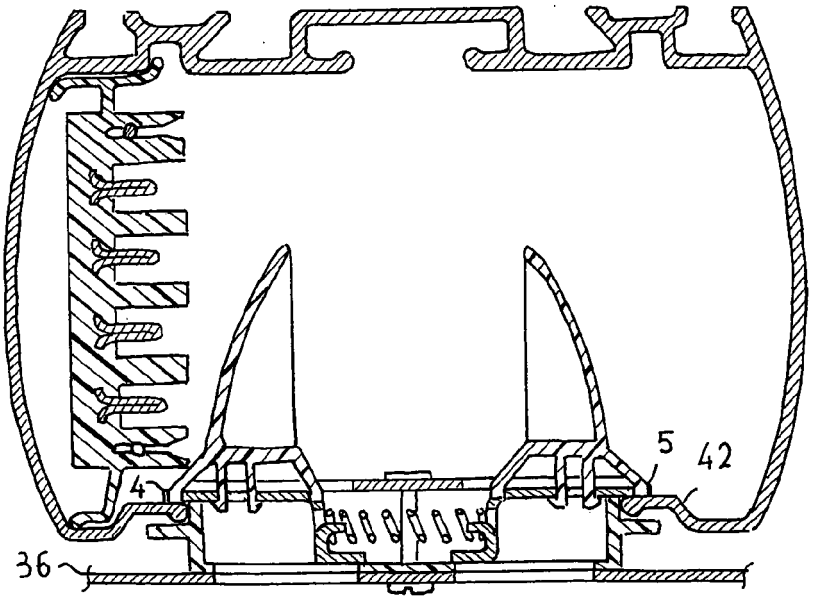

FIG. 3

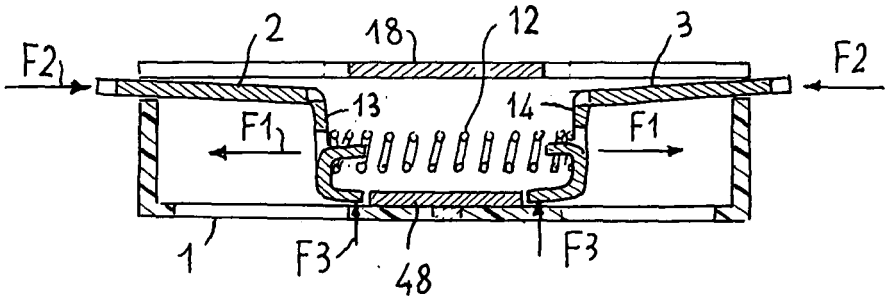

FIG. 4

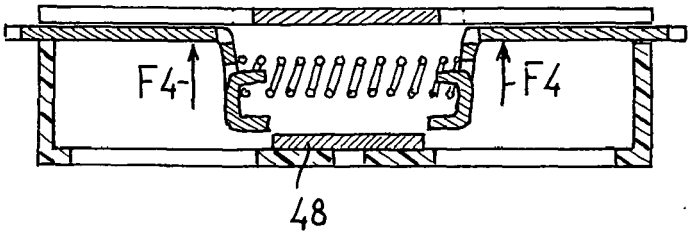

FIG. 5

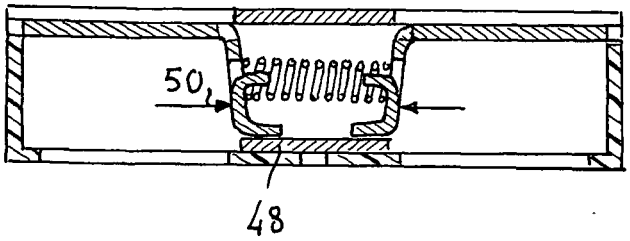

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5053

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 148 187 A (STAFF & SCHWARZ GMBH) 11 March 1973 (1973-03-11) * page 4, line 1 - line 13 * * page 4, line 39 - page 5, line 4 * * page 7, line 28 - line 39 * * page 8, line 15 - line 19; figures 3,4,8 * -----	1-4	INV. H01R25/14

TECHNICAL FIELDS SEARCHED (IPC)

H02G
H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 October 2008	Moueza, Anita

CATEGORY OF CITED DOCUMENTS

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- EP 06425836 A **[0004]**