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(54) **Adjustment device for reclining chairs or the like and method of making and mounting same, as well as chair incorporating such device**

(57) An adjustment device for the armrests of a reclining chair or the like, comprising at least one catch member (2), which is engageable in a plurality of adjacent retaining seats (3), that may be associated to an armrest (B) of a chair (C) to selectively lock said armrest in predetermined positions. The retaining seats (3) are at least partly covered by a boxlike shield (4), having an elongate aperture (5) for the passage of the catch member (2), to protect the hands of a user. The catch member

(2) has a platelike shape, its maximum thickness (M) being smaller than the minimum width (H) of said elongate aperture (5), and has an expanded head (6) which defines a longitudinal axis (L). Such head (6) is designed for selective engagement in each retaining seat (3) and is joined to a main body (8) which is connected to the frame (S) of the chair (C) by a twisted portion (9), adapted to allow the head (6) to be inserted in the elongate aperture (5) from below, by relative rotation about the longitudinal axis (L).

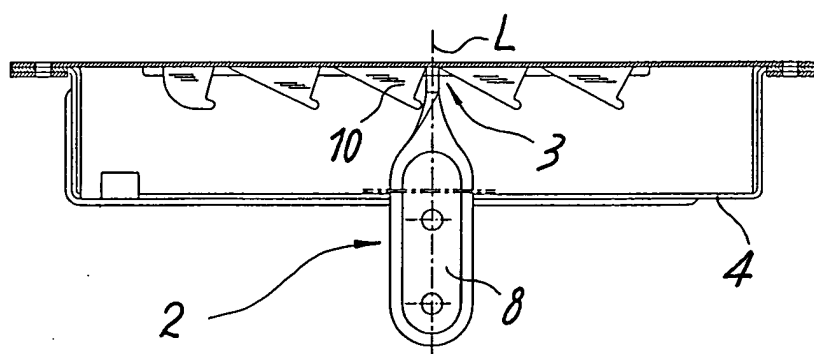


FIG. 11

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Description

Technical field

[0001] The present invention may generally be applied in the field of indoor and outdoor furniture and particularly relates to an adjustment device for reclining chairs or the like and a method of making and mounting same, as well as to a chair incorporating such device.

Background art

[0002] A number of devices are known for adjusting the inclination of the backrest of chairs, armchairs and lounge chairs. One type of such devices provides the use of two armrests linked to the movable backrest of the chair, and having a plurality of equal recesses aligned along their underside. A forward or backward motion of the armrests causes the movable back to rotate. Therefore, by simply selectively locking the armrest position relative to the supporting legs of the chair, the backrest can be set in the desired position.

[0003] DE-A-3707804 and ES-A-252097U disclose two arrangements for locking the movable backrest in a desired position. To this end, both arrangements include a pair of locking members integral with the supporting legs of the chair. Each locking member is made in such a manner as to allow engagement thereof in one of the recesses provided on the underside of each armrest, thereby selectively locking the backrest inclination. The backrest position may be changed by simply raising both armrests, releasing the locking members from the corresponding recesses and lowering the armrests, thereby engaging each locking member in a second recess.

[0004] An apparent limit of such arrangements is that each locking member has a projecting upper portion with an essentially hook-like shape. This portion is exposed when the armrests are raised, and this may involve a risk for the user. Also, there is the risk that clothes or body parts, e.g. the fingers of hand, may get pinched between the locking members and the recesses formed on the underside of the armrests.

[0005] US-A-297801 discloses a solution similar to the preceding ones, wherein a ring is fitted on the upper hook-like portion of each locking member, which ring extends substantially transverse to the member. Here, the armrest is formed by a tubular member having an elongate aperture formed on its underside, and the recesses are formed on an elongate plate inserted in the tubular body itself. Upon assembly, the ring is fitted on a locking member, whose upper portion is later inserted in the corresponding tubular body at an end thereof. Hence, the upper hook-like portion of the locking member may selectively engage in the recesses of the inner elongated plate. Each armrest may be raised to change the recess in which the corresponding locking member engages, but the vertical displacement is restricted by the addi-

tional ring, which does not pass through the longitudinal aperture and prevents the upper hook-like portion from coming off the tubular body.

[0006] This arrangement reduces the risk for users to be injured or trapped in the device, but has a considerably complex structure. Particularly, a relatively great number of components is required and, accordingly, the assembly thereof is difficult and time-consuming, whereby it has a poor cost effectiveness.

[0007] US-A-20020121800 discloses yet another solution, similar to those described above. Here, the locking member is formed by an elongate stem, with a T-shaped upper portion, which is shaped in such a manner as to engage in a succession of recesses on the underside of the armrest. The succession of recesses is covered by a boxlike shield, which is screwed on the underside of the armrest and has an elongate aperture which allows the passage of the stem of the locking member, but not of its upper T-shaped portion. The latter prevents the locking member from coming out of the boxlike shield when the armrests are raised to change the backrest position, whereas the stem may slide freely along the aperture.

[0008] Here again, a drawback consists in assembly complexity, particularly regarding the upper T-shaped portion of the boxlike shield. Furthermore, the problem becomes even more serious if the elongate aperture of the boxlike shield is relatively narrow in the transverse direction. A narrow aperture of the boxlike shield is required by certain safety standards and is anyway very useful to prevent fingers or other objects from being dangerously introduced therethrough, but makes the assembly difficult. One way to only partly facilitate the insertion of the upper T-shaped portion in the boxlike shield consists in forming a thin connecting portion between the upper T-shaped portion and the stem. This configuration simplifies the assembly and the relative movements between the locking member and the boxlike shield, but may cause a considerable loss in strength and reliability.

Disclosure of the invention

[0009] A primary object of this invention is to obviate the above drawbacks, by providing a cost-effective adjustment device for reclining chairs and the like.

[0010] A particular object is to provide a device which is so designed as to prevent the occurrence of potentially dangerous conditions for users, and to comply with the current safety standards.

[0011] A further object of the invention is to provide a device which has a small number of components and allows a relatively easy assembly.

[0012] Yet another particular object is to provide a sturdy and reliable device, whose features remain unchanged with time.

[0013] Another particular object is to provide a simple and easily implementable method for fabricating the de-

vice.

[0014] These objects, as well as others that will be more apparent hereinafter, are achieved, according to claim 1, by an adjustment device for the armrests of a reclining or the like chair, comprising at least one locking member, which is engageable in a plurality of adjacent retaining seats, that may be associated to an armrest of a chair to selectively lock said armrest in predetermined positions. The retaining seats are at least partly covered by a boxlike shield, having an elongate aperture for the passage of the locking member, to protect the hands of a user. The locking member has a platelike shape, its maximum thickness being smaller than the minimum width of said elongate aperture, and has an expanded head which defines a longitudinal axis. Such head is designed for selective engagement in each retaining seat and is joined to a main body which is connected to the frame of the chair by a twisted portion, adapted to allow the insertion of the head in the elongate aperture from below, by relative rotation about the longitudinal axis.

[0015] Thanks to this particular configuration, an adjustment device may be obtained that is relatively easy to fabricate and fit on the armrests of a chair, while being sturdy and reliable, also by appropriately sizing all of its components.

[0016] Preferably, the elongate aperture extends substantially parallel to the armrest and has such a maximum width as to prevent any accidental introduction of users' fingers and, particularly, equal to or less than 7 mm.

[0017] This particular arrangement allows to prevent any potentially dangerous situation for users and to comply with the safety standards in force.

[0018] Appropriately, the plurality of retaining seats is monolithic for the boxlike shield. This particular characteristic will help to reduce the overall number of components and to simplify fabrication and assembly steps.

Brief Description of the Drawings

[0019] Further features and advantages of the invention will be more clearly understood from the detailed description of several preferred, but not exclusive embodiments of an adjustment device according to the invention, illustrated by way of a nonlimiting example with reference to the attached drawings, in which:

FIG. 1 is a perspective view of a chair according to the invention;

FIG. 2 is a perspective view of a device according to the invention;

FIG. 3 is a top view of a detail of the device as shown in Fig. 2;

FIG. 4 is a side view of the detail of FIG. 3;

FIG. 5 is a side view of the detail of FIG. 3, in an intermediate processing step;

FIG. 6 is a sectional view of a further detail of the device as shown in Fig. 2;

FIG. 7 is a second sectional view of the detail of FIG. 6;

FIG. 8 is a front view of the detail of FIG. 6;

FIGS. 9, 10, 11 are three sectional side views of the device of FIG. 2, showing two successive steps of the fabrication and assembly method according to the invention.

Detailed description of a preferred embodiment

[0020] Particularly referring to the above Figures, an adjustment device according to the invention is described, which is generally designated with numeral 1, and may be fitted on the armrests B of a chair C, armchair, lounge chair or the like, to change the inclination of the backrest R.

[0021] The device 1 comprises at least one locking member 2, which is engageable in a plurality of adjacent retaining seats 3. The retaining seats 3 are designed to be associated to a corresponding armrest B of a chair C, whereas the locking member 2 is designed to be fitted on the frame S of the chair C. Also, the armrest B is advantageously hinged at one end E with a side of the reclining backrest R. Hence, any displacement of the armrest B relative to the frame S causes the backrest R to rotate and accordingly, by changing the retaining seat 3 in which the locking member 2 is engaged, the backrest R may be locked in a desired angular position. The device 1 may be mounted in the same manner on both armrests B of the chair C.

[0022] The retaining seats 3 are at least partly covered by a boxlike shield 4, to protect the hands of a user. The locking member 2 may engage in the retaining seats 3 by being at least partly inserted in the boxlike shield 4. Therefore, in order to allow the passage of the locking member 2, the boxlike shield 4 has an elongate aperture 5.

[0023] The locking member 2 has a platelike shape, its maximum thickness M being smaller than the minimum width H of the elongate aperture 5, and a head 6 which defines a longitudinal axis L and is designed to be selectively engaged in each of the retaining seats 3. The head 6 is expanded and has a pair of projecting appendices 7, which extend in the same direction transverse to the longitudinal axis L. These transverse appendices 7 have such an extension, transverse to the longitudinal axis L, as to prevent the head 6 from coming out of the boxlike shield 4, once the latter has been properly inserted in the shield.

[0024] The locking member 2 comprises a main body 8, which is connected to the head 6 by a twisted portion 9. This main body 8 has the function of connecting the locking member 2 to the frame S of the chair C, whereas the twisted portion 9 is shaped in such a manner as to allow the insertion of the head 6 in the elongate aperture 5 from below, by relative rotation thereof about the longitudinal axis L. The head 6 has such a maximum thickness as to allow insertion thereof in the elongate aper-

ture 5, with the projecting appendices 7 being substantially parallel to the aperture. The twisted portion 9 also allows the head 6 to rotate and engage in a retaining seat 3, with the projecting appendices 7 disposed orthogonal or anyway inclined relative to the elongate aperture 5, so as to prevent the head 6 from coming out of the boxlike shield 4. Thanks to the twisted portion 9, the connection between the head 6 and the main body 9 is strong and safe, as well as very easily insertable in the elongate aperture 5, even in case the latter has a relatively small minimum width H.

[0025] The elongate aperture 5 extends substantially parallel to the armrest B and has such a maximum width as to prevent any accidental introduction of users' fingers. Advantageously, the maximum width H' of the elongate aperture 5 is equal to or less than 7 mm.

[0026] Suitably, the twisting angle of the twisted portion 9 may be of about 90°, so that the head 6 and the main body 8 are substantially orthogonal to each other.

[0027] The plurality of retaining seats 3 may be made of one piece with the boxlike shield 1. In one particular embodiment, as shown in the annexed drawings, each retaining seat 3 comprises two substantially parallel and adjacent saw teeth 10, which are designed to interact with the head 6 to prevent any relative displacement between the armrest B and the frame S of the chair C.

[0028] Advantageously, each saw tooth 10 has a first edge 11, which is adapted to engage an end of the head 6 and a second edge 12, adjacent to the first edge, but having a different inclination. Particularly, the inclination of the second edge 12 is gentler than that of the first edge 11, to assist the user in the change of the retaining seat 3 in which the head 6 is engaged and accordingly in the adjustment of the inclination of the backrest R.

[0029] The above device 1 is fabricated and mounted in a plurality of successive steps.

[0030] In a first step a), a reclining chair C is provided, comprising a frame S for a seating surface and a movable backrest R, hinged to the frame.

[0031] A second step b) includes the preparation of at least one monolithic assembly 13, comprising a plurality of adjacent retaining seats 3 and a boxlike covering shield 4 which has an elongated aperture 5 of a predetermined maximum width H'. Particularly, a first plate of a rigid material is blanked, thereby obtaining a flat blank (not shown) of the monolithic assembly 13. Blanking also includes drilling of holes 14 for through screws. Later, the flat blank is folded according to a predetermined geometry to bring a plurality of saw teeth 10 to their operating position and to form the boxlike shield 4.

[0032] A third step c) includes the provision of a pair of armrests B, and a fourth step d) includes the preparation of a monolithic assembly 13 on each of the armrests B.

[0033] In a fifth step e), a locking member 2 is formed for each monolithic assembly 13. Each locking member 2 comprises an expanded head 6 which defines a longitudinal axis L and at least one twisted portion 9 where-

by it is joined to a main body 8 for connection to the frame S. Particularly, a second plate made of a rigid material is blanked, to obtain the flat blank 15 of the locking member 2, comprising the head 6 and the main body 8, joined together by a flat joining portion 16.

[0034] Then, the head 6 is rotated about the longitudinal axis L relative to the main body 8 to cause the plastic deformation of the flat joining portion 16 and to form the twisted portion 9. Particularly, the angular extension of such rotation may be substantially equal to a right angle. By this arrangement, the width N of the flat joining portion 16 may be so sized as to provide the desired strength and reliability and such width N may be even larger than the minimum width H of the elongate width H of the elongate aperture 5. In fact, the twisted portion 9 can pass through the elongate aperture 5 and allows proper positioning of the head 6 in a retaining seat 3 due to its own shape, although the flat joining portion 16 has a larger width N than that the elongate aperture 5.

[0035] Appropriately, the main body 8 of the locking member 2 may be drawn.

[0036] In a sixth step f), the locking member 2 is mounted onto on the frame S.

[0037] A seventh step g), as may be shown in FIGS. 9 and 10, includes the insertion of the head 6 in the boxlike shield 4, through the elongate aperture 5. In a subsequent step h), the boxlike shield 4 associated to each armrest B is rotated relative to the catch member 2 about the longitudinal axis L of the head 6, as shown in FIGS. 10 and 11.

[0038] Finally, in a further step i), each armrest B is connected to the backrest R.

[0039] The above description clearly shows that the device according to the invention fulfils the predetermined objects and particularly the possibility to select the proper width of the flat joining portion even though the widened aperture is relatively narrow, provides the catch member with the desired strength and reliability with time, without affecting other advantages, such as functionality and easy assembly.

[0040] The device of this invention is susceptible of numerous modifications and changes, all falling within the scope of the appended claims. All the details thereof may be replaced by other technically equivalent parts, and the materials may vary depending on different needs, without departure from the scope of the invention.

[0041] While the device has been described with particular reference to the accompanying figures, the numerals referred to in the disclosure and claims are only used for the sake of a better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

[0042] The instant application is based upon and claims priority of patent application no. VI2002A000221, filed on 18.10.2002 in Italy, the disclosure of which is hereby expressly incorporated in reference thereto.

Claims

1. An adjustment device for the armrests of a reclining like chair, comprising at least one locking member (2), which is engageable in a plurality of adjacent retaining seats (3), that may be associated to an armrest (B) of a chair (C) to selectively lock said armrest in predetermined positions, said retaining seats (3) being at least partly covered by a boxlike shield (4), which has an elongate aperture (5) for the passage of the locking member (2), to protect the hands of a user, **characterized in that** said locking member (2) has a platelike shape, its maximum thickness (M) being smaller than the minimum width (H) of said elongate aperture (5), and has an expanded head (6) which defines a longitudinal axis (L) and is designed for selective engagement in each of said retaining seats (3), said head (6) being joined to a main body (8) for connection to the frame (S) of the chair (C) by means of a twisted portion (9), which twisted portion (9) is adapted to allow the head (6) to be inserted in the elongate aperture (5) from below, by relative rotation about said longitudinal axis (L).
2. Device as claimed in claim 1, **characterized in that** said elongate aperture (5) extends substantially parallel to the armrest (B) and has such a maximum width (H') as to prevent any accidental introduction of users' fingers.
3. Device as claimed in claim 2, **characterized in that** the maximum width (H') of said elongate aperture (5) is equal to or less than 7 mm.
4. Device as claimed in claim 1, **characterized in that** the twisting angle of said twisted portion (9) is of about 90°.
5. Device as claimed in claim 1, **characterized in that** said plurality of retaining seats (3) is made of one piece with said boxlike shield (4).
6. Device as claimed in claim 5, **characterized in that** each of said retaining seats (3) comprises two substantially parallel and adjacent saw teeth (10), which are designed to interact with said head (6) to prevent any relative displacement between the armrest (B) and the frame (S) of the chair (C).
7. Device as claimed in claim 6, **characterized in that** each of said saw teeth (10) has a first edge (11), which is adapted to engage an end of said head (6) and a second edge (12), adjacent to said first edge (11), and having a different inclination.
8. Device as claimed in claim 2, **characterized in that** the inclination of said second edge (12) is smaller than that of the first edge (11), to assist the user in the passage of said head (6) from one of said retaining seats (3) to another seat adjacent thereto.
9. A reclining chair, comprising a frame (S) for supporting a seating surface, a movable backrest (R), hinged to said frame (S), a pair of armrests (B), linked to said backrest (R), **characterized in that** it comprises at least one adjustment device (1) as claimed in one or more preceding claims, mounted on said armrests (B).
10. A method of manufacturing and assembling an adjustment device for a reclining chair (C) or the like as claimed in one or more of claims 1 to 8, comprising the following steps:
 - a) providing a reclining chair (C), including a frame (S) for a seating surface, a movable backrest (R), hinged to said frame (S);
 - b) preparing at least one monolithic assembly (13), comprising a plurality of adjacent retaining seats (3) and a boxlike covering shield (4) which has an elongated aperture (5) of a predetermined maximum width (H');
 - c) providing up a pair of armrests (B);
 - d) mounting a one-piece assembly (13) on each of said armrests (B);
 - e) providing at least one locking member (2) with an expanded head (6) which defines a longitudinal axis (L) and at least one twisted portion (9) whereby it is joined to a main body (8) for connection to said frame (S);
 - f) mounting said locking member (2) on said frame (S);
 - g) inserting said head (6) in said boxlike shield (4) through said elongate aperture (5);
 - h) rotating said boxlike shield (4) associated to each armrest, relative to said catch member (2) about said longitudinal axis (L) of said head (6);
 - i) connecting said armrest (B) to said backrest (R).
11. Method as claimed in claim 10, **characterized in that** said step b) of preparing a one-piece assembly (13) is obtained by blanking a first plate of a metal material, to produce a flat blank and folding said flat blank.
12. Method as claimed in claim 11, **characterized in that** said step e) of providing a locking member (2) is obtained by blanking a second plate of a rigid material, to produce the flat blank (15) of said locking member (2), comprising said head (6) joined to said main body (8) by a flat joining portion (16).
13. Method as claimed in claim 12, **characterized in that** said step e) of providing a locking member (2)

comprises the drawing of said main body (8).

14. Method as claimed in claim 12, **characterized in that**, in said step e) of providing a locking member (2) said head (6) is rotated about said longitudinal axis (L) relative to said main body (8) to deform said flat joining portion (16) and to form said twisted portion (9). 5
15. Method as claimed in claim 14, **characterized in that** said head (6) is rotated relative to said main body (8) through a substantially right angle. 10

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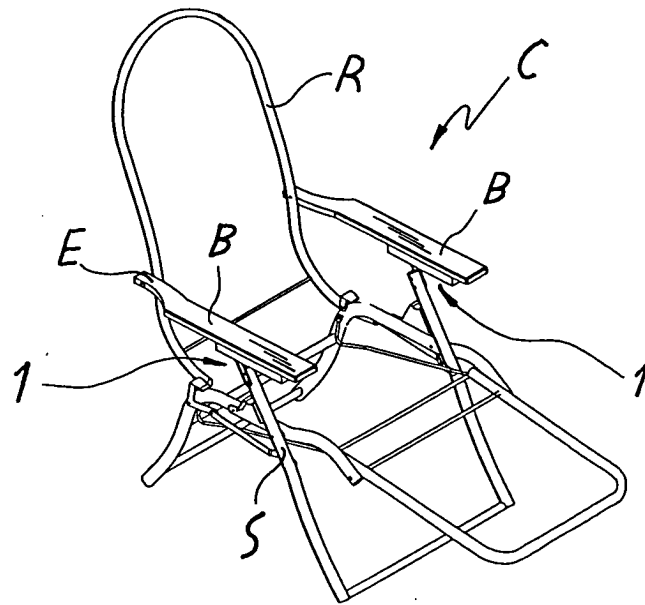


FIG. 1

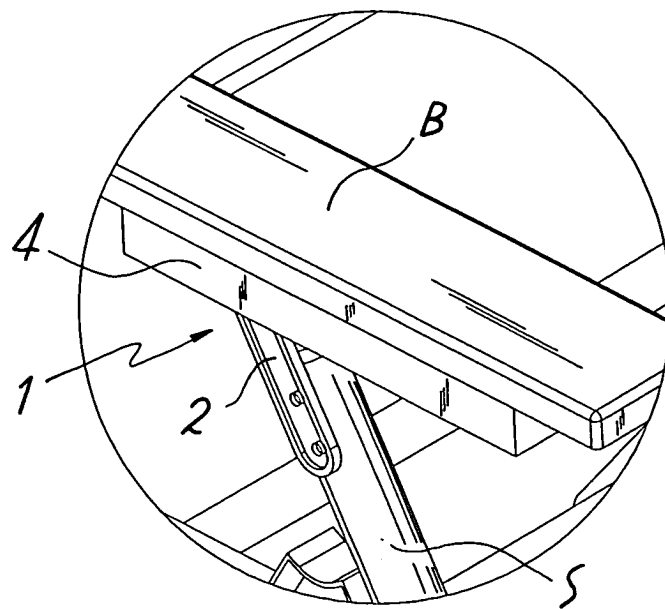


FIG. 2

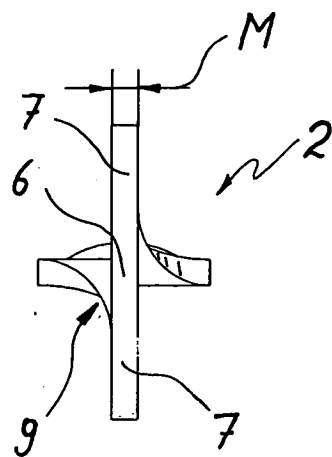


FIG. 3

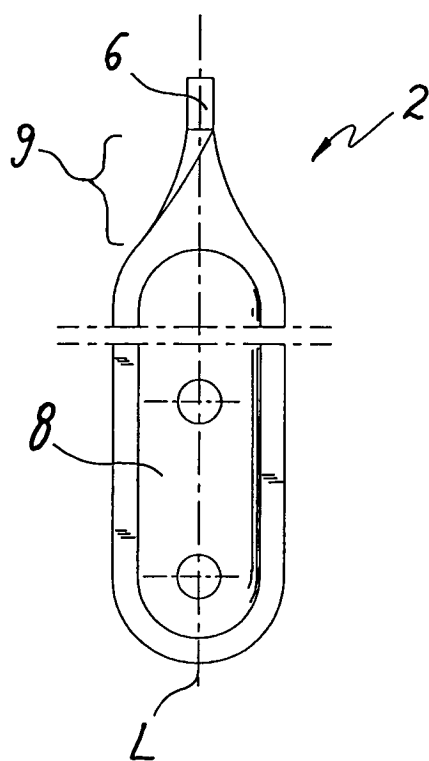


FIG. 4

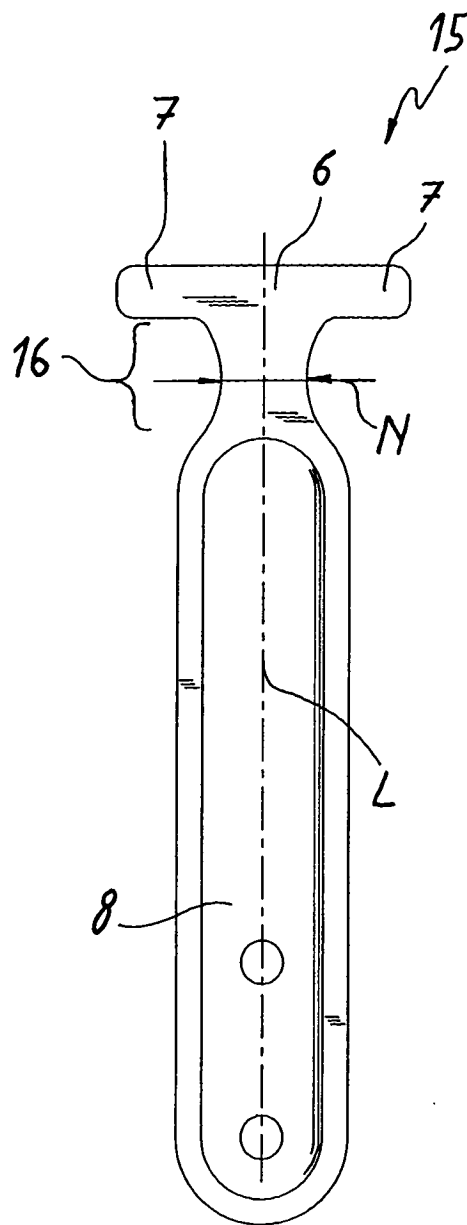


FIG. 5

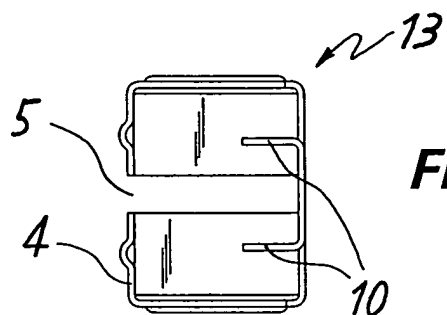


FIG. 7

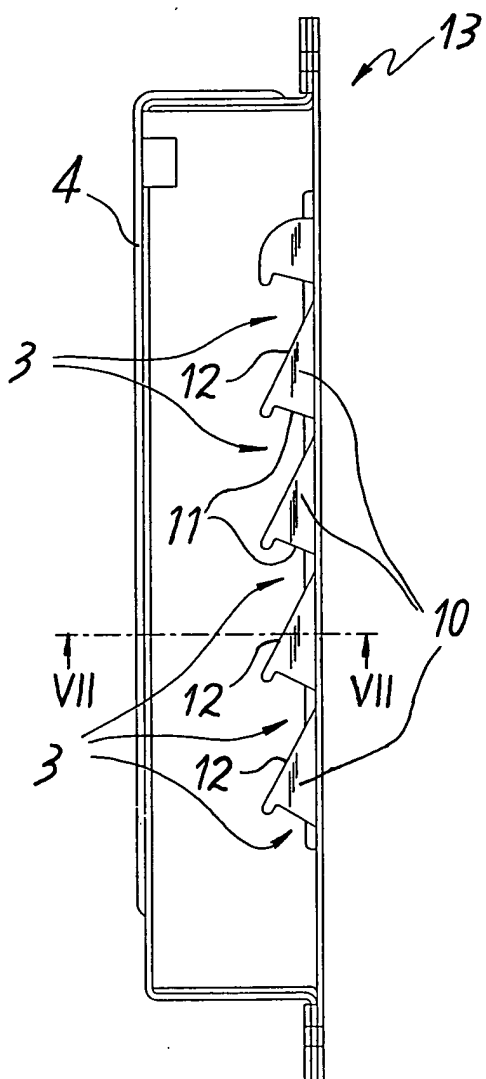


FIG. 6

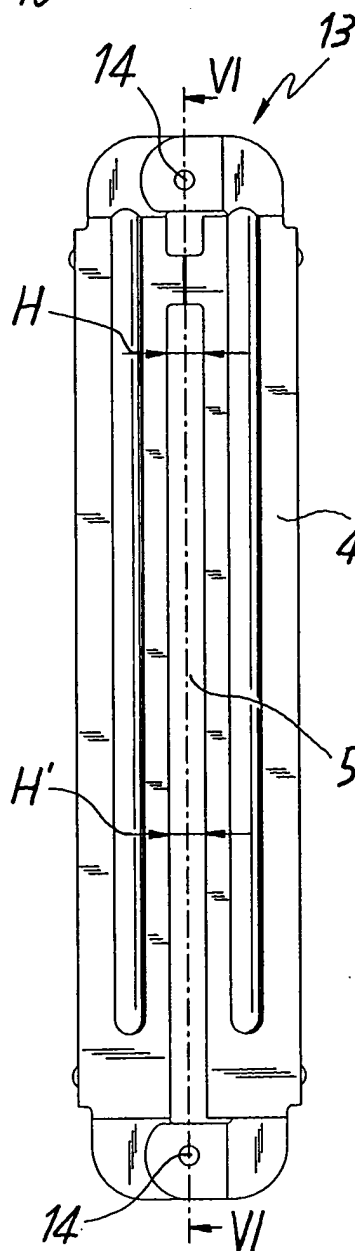
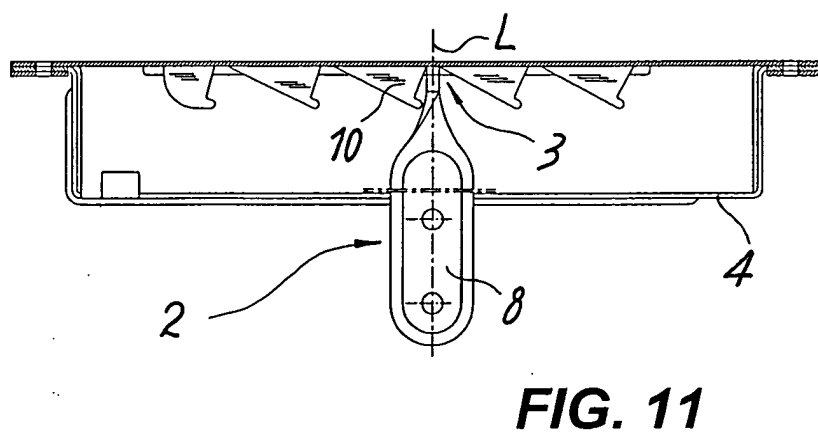
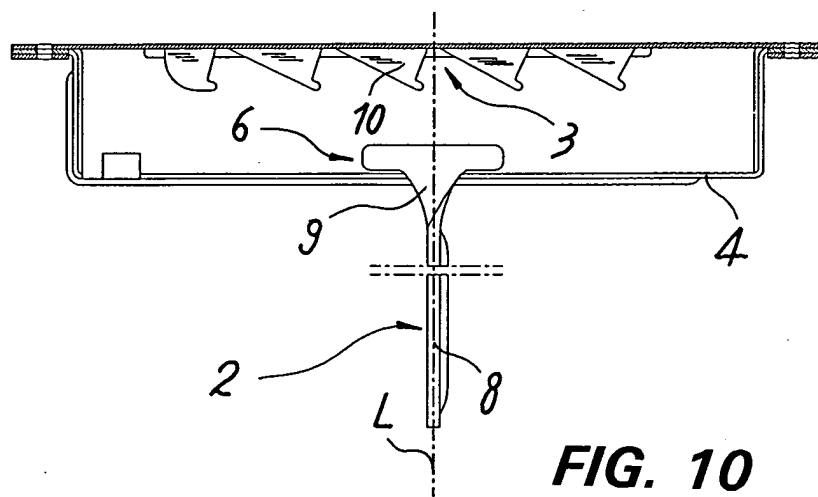
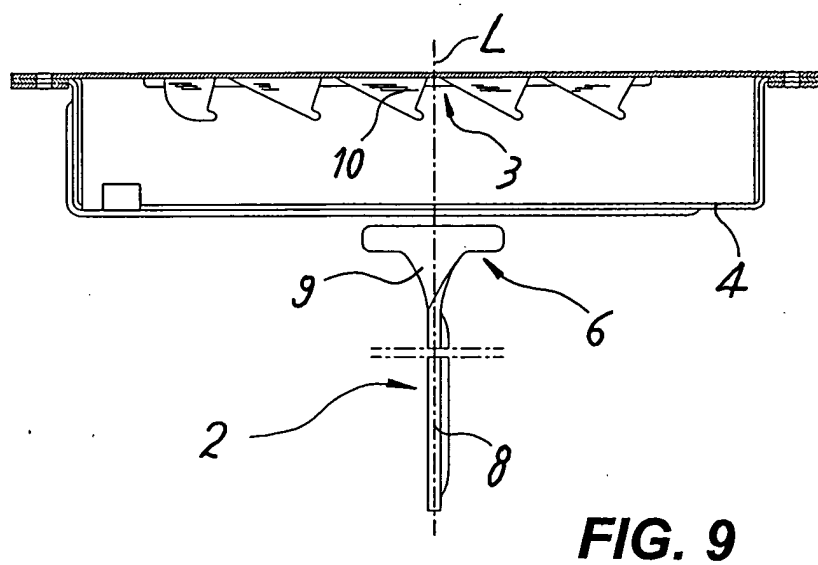


FIG. 8





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 02 3438

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)
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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 20 January 2004	Examiner MacCormick, D
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 & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

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

EP 03 02 3438

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
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