(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 787 273 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
08.10.2014 Bulletin 2014/41

(21) Application number: **14157309.7**

(22) Date of filing: **28.02.2014**

(51) Int Cl.:
F21S 8/02 *(2006.01)* ***F21V 21/04*** *(2006.01)*
F21V 21/108 *(2006.01)* ***F21V 21/28*** *(2006.01)*
F21Y 101/02 *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **04.04.2013 IT BS20130046**

(71) Applicant: **Flos S.P.A.**
25073 Bovezzo (Brescia) (IT)

(72) Inventor: **Gandini, Piero**
I-25073 Bovezzo, BRESCIA (IT)

(74) Representative: **Eterno, Enrico**
Jacobacci & Partners S.p.A.
Piazza della Vittoria, 11
25122 Brescia (IT)

(54) **Lighting device**

(57) Lighting device (1, 2, 3, 4) comprises at least one source-body (6), which extends in a tubular manner and which houses at least partially the components (8, 10) of a light source, a support element (12; 14; 16; 18) of the source-body (6), which delimits a hole for receiving (22) the body (6) in an orientable manner around two rotation axes (P, S) incident to each other, and a movement device (24) acting between the support element (12; 14; 16; 18) and the source-body (6) to allow the orientation of the latter.

The source-body (6) is further translatable along the body axis (X) to allow introductions/extractions thereof from the housing hole (22).

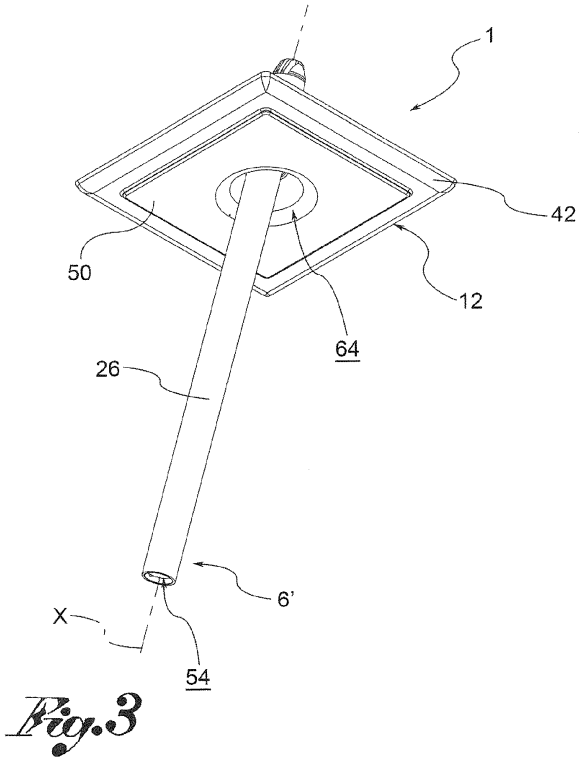


Fig.3

EP 2 787 273 A1

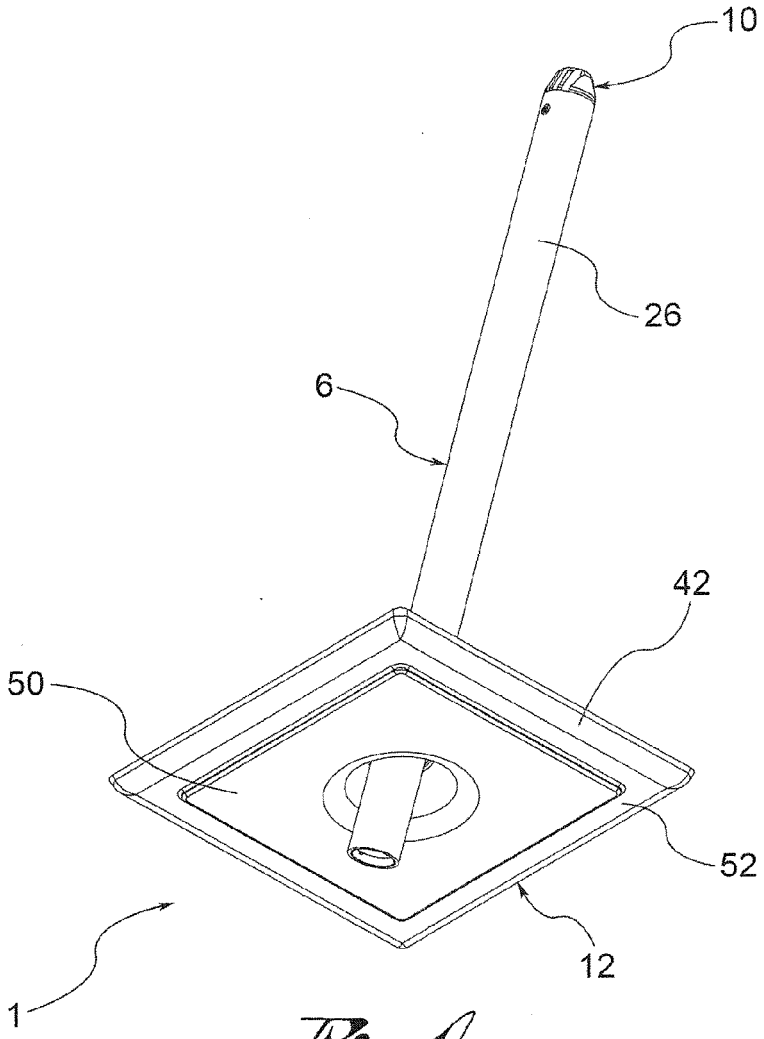


Fig. 4

Description

[0001] The present invention relates to a lighting device.

[0002] Over recent years, the development of new lighting appliances has focused both on increased use of LED technology, and to the creation of particularly desirable plays of light or effects to enhance objects and environments.

[0003] Within the scope of the above context, in the conviction of interpreting coming market trends, the inventors of the present invention have designed an innovative lighting device which, on the one hand is suitable for creating one or more orientable beams of light in a desired manner and on the other may be adapted as wished by the final user who, in simple and smooth gestures may make the device described adopt the conformation which adapts best to said user's taste.

[0004] Consequently, the objective according to the present invention is achieved by means of a device according to claim 1. The dependent claims show preferred embodiment variants.

[0005] The object of the present invention will now be described in detail, with the help of the appended drawings, wherein:

- figures 1a, 1b and 1c are respectively a perspective view, a side view and a view from below of the device according to the present invention , according to a possible embodiment, where figure 1b shows the insertion of such device in a support wall in a schematic manner;
- figures 2, 3 and 4 shows the device in figure 1, according to different functioning configurations which such device may adopt;
- figures 5, 6 and figures 7, 8a and 8b show a device for moving a source-body, for example such as that shown in figure 1b, in functioning positions corresponding to figures 2 and 4; and
- figures 9a, 9b, figure 10 and figures 11 show three further embodiments of the present device, using a plurality of light sources.

[0006] With reference to the aforementioned drawings, reference numerals 1, 2, 3, 4 globally denote a lighting device. Preferably, such device is flush-mounted, that is to say is substantially inserted in a support wall 20 so as to be invisible, except for the beam of light generated by it and by a reduced percentage of itself.

[0007] the lighting device 1, 2, 3, 4 comprises at least one source-body 6 which extends in a tubular manner around a body axis X and which houses at least partially the components 8, 10 of a light source.

[0008] In the embodiments shown, the cross-section of the source-body 6 orthogonal to the body axis is substantially circular. According to further embodiments, such cross-section may be ellipsoidal or polygonal.

[0009] Merely by way of example, the components 8, 10 of the light source which may be partially housed in the tubular compartment of the source-body are a diffuser 8, a dissipator 10, the source itself, preferably of the LED type, possibly lenses for such source, and optionally the electric cables and the wave guides needed for the functioning of the device.

[0010] According to one embodiment, the ratio of the height of the source body 6 and the outer diameter of such body is between 10 and 20, and preferably comprised between 12 and 16. In the case of source-bodies with a square or rectangular cross-section, the above ratio refers to the height and the side of the polygon, possibly the longest side.

[0011] Preferably, the aforesaid components are completely contained in the source-body 6 so that only a beam of light comes out from a free portion 6' of such body, for example at an emission aperture 54 provided.

[0012] The lighting device further comprises a support element 12, 14, 16, 18 of the source-body 6 in relation to the support wall 20, which delimits a hole for receiving 22 said body 6. This way, the body axis X can be oriented around two rotation axes P, S incident, preferably substantially perpendicular, to each other, that is to say in relation to a primary rotation axis P and to a secondary rotation axis S.

[0013] For example, the support wall 20 comprises a plasterboard wall, a counter-ceiling or similar architectural element in which a seat is made into to house support element and source-body.

[0014] In the embodiment shown for example in figures 1 and 2, in at least one functioning configuration of the device, the body axis X is positioned orthogonally to the rotation axes P, S. Otherwise, in the other functioning configurations, such rotation axes P, S converge on the body axis X.

[0015] Preferably, the support element 12, 14, 16, 18 comprises a plate 42, 44, 46, 48 with a primary surface 50 in which the housing hole 22 is inserted.

[0016] According to the embodiments shown in figures 1a, 9, 10 and 11, the support element comprises a plate with a hole or with a plurality of housing holes (for example respectively 3, 6 or 9) for housing relative source-bodies 6.

[0017] Consequently, preferred embodiments of the device provide that a plurality of source-bodies 6 are joined to a common support element 14, 16, 18.

[0018] Preferably, each of the source-bodies 6 can be regulated independently of the others, according to movement described below.

[0019] According to a particularly advantageous embodiment, the through cross-section of the housing hole 22 is tapered towards the inside of the support element 12, 14, 16, 18. This way, since the hole 22 has a distal mouth 64 wider than the proximal mouth, the support element (optionally the plate) does not constitute a mechanical hindrance to the movement of the source-body.

[0020] Within the present description, the term "distal" is taken to mean those components lying towards the

free end portion 6' of the source body, while the term "proximal" is taken to mean those components placed or lying in an opposite direction to such portion, for example facing a rear surface 60 of the plate.

[0021] Advantageously, the support element 14, 16, 18 has a density of source-bodies 6 of 20 - 30 source-bodies 6 per square metre, preferably 23 - 27 source-bodies 6 per square metre, even more preferably substantially 25 source-bodies 6 per square metre.

[0022] According to one embodiment, the support element 14, 16, 18 extends in a main direction C, preferably passing centrally on the plate 42, 44, 46, 48. According to said variant, the plurality of housing holes 22 may be distributed along the main direction C, for example at a varying pitch, preferably at both opposite sides of the plate.

[0023] As regards the conformation of the plate, it is preferably polygonal, for example square or rectangular.

[0024] According to a preferred variant, the primary surface 50, which is the surface visible from the side towards which the beam of light is projected, is raised in relation to a secondary surface 52 which defines it laterally, for example on one side only, or peripherally.

[0025] This way, a connection surface 56 is formed between the primary surface 50 and the secondary surface 52 which defines a space of predefined depth, preferably suitable to be filled with a finishing layer, such as plaster, to integrate the device into the support wall 20.

[0026] In other words, the space comprised between the secondary surface 52 as far as flush with the primary surface 50 can be filled with the aforesaid finishing layer to reduce the visual impact of the present device.

[0027] The lighting device further provides for a movement device 24 acting between the support element 12, 14, 16, 18 and the source-body 6 to allow the orientation of the latter.

[0028] For such reason, the movement device constitutes the functional connection for the articulation of the source-body.

[0029] Preferably, the movement device 24 comprises an anchorage portion 28 to the support element and a retention member 30, which co-operates with the source-body 6 and which is connected in a hinged manner to the anchorage portion 28.

[0030] Preferably, the anchorage portion 28 can be connected in a releasable manner to the support element. For example, such portion 28 may be provided with at least one blocking tongue 58, preferably with a plurality of opposite tongues, to interact with the support element 12, 14, 16, 18 and in particular with a rear surface 60 of the plate. Advantageously, the blocking tongue 58 may form a shaped coupling, for example dove-tailed, with the support element.

[0031] Preferably, the anchorage portion 28 and the retention member 30 are connected by means of an intermediate component 62 rotatable in relation to the anchorage portion 28 around the secondary rotation axis S, and suitable for realising the rotation of the retention member 30 around the primary rotation axis P.

[0032] In other words, the intermediate component 62 is placed between the anchorage portion 28 and the retention member 30 to allow a revolution of the primary rotation axis P around the secondary axis S.

[0033] In the embodiment shown, the intermediate component 62 is at least partially housed in a compartment 66 delimited by the anchorage portion 28, in a movable manner.

[0034] The source-body 6 is further translatable along the body axis X to allow introductions/extractions thereof from the housing hole 22.

[0035] This way, as for example may be inferred form a comparison of figures 1a-2 and 3-4, the source-body portion extending outside the aforesaid hole may be regulated as desired, preferably manually, acting on the free end portion 6' of the body.

[0036] Preferably, the translation occurs in a direction substantially parallel to the body axis X.

[0037] This proves equally possible when the body axis X lies substantially perpendicular to the primary surface 50 (figure 2), and when this is inclined instead (figure 4), so that the movement device 24 allows substantially contextual orientations and translations.

[0038] To such purpose, a preferred embodiment provides that, the movement device 24 acts elastically on an outer surface 26 of the source-body 6.

[0039] According to an advantageous embodiment, an abutment surface 32', 32" of the retention member 30 comprises at least one layer of polymer material to ensure sufficient friction on the source-body 6.

[0040] In the present description, "sufficient" friction is achieved when the force is sufficiently high to prevent unwanted translations of the source-body, but equally not so high as to complicate the desired conversions of the user during adjustment.

[0041] According to an advantageous embodiment, the retention member 30 comprises at least a first jaw 34 and a second jaw 36 which partially cover an outer surface 26 of the source-body 6, where at least the second jaw 36 is movable in relation to the first 34 to allow/prevent the translation of the source-body 6. Preferably, both jaws have a certain reciprocal mobility.

[0042] For such reason, the aforesaid jaw is elastically mobile to act on the outer surface 26.

[0043] To such purpose, the abutment surfaces 32', 32" are at least partially located on the jaws 34, 36 which advantageously bear the layer of polymer material.

[0044] According to an advantageous variant, at least one jaw 34, 36 is connected to the intermediate component 62, for example by means of a connection section 68', 68" so as to follow the movements thereof. Preferably, each jaw has its own connection section 68', 68" so that the sections act in opposite areas of the intermediate component 62. For example, the sections are axially distanced along the primary rotation axis P.

[0045] According to a preferred variant, the connection section forms a resilient portion for the movement of the

relative jaw. Consequently, at least the connection section may for example be made of metal for springs, but preferably the jaw and relative section are made in one piece.

[0046] According to one embodiment, one jaw 34, 36 comprises at least one guide projection 38 suitable for coupling with a recess 40 made in the other jaw 36 or 34, for the reciprocal radial movement in relation to the body axis X.

[0047] In other words, the jaws are mechanically coupled by means of a protrusion-recess interaction, so as to ensure the reliability of movement thereof.

[0048] According to an advantageous variant, the recess 40 is delimited by a pair of protrusions 38 located on the opposite jaw, so that the jaws may for example be made symmetrically.

[0049] Innovatively, the device according to the present invention is suitable for creating one or more beams of light orientable in the desired manner, and furthermore may be modified at will by the final user who by extracting the source-body, may make the device described adopt the conformation which adapts best to said user's taste or to the environment in which the device is placed.

[0050] In fact, preferably, the final effect which can be achieved by means of orientation and a different extraction of each source-body permits a practically infinite variety of possible combinations, so that the appearance of the device may be altered even after a time.

[0051] Advantageously, the movement of the components of the present invention is smooth, repeatable and precise.

[0052] In addition, advantageously, the angle of inclination of the source-body proves increased thanks to the technical solutions specially adopted.

[0053] Advantageously, the device according to the present invention is suitable to be perfectly integrated in a support wall, and is composed of materials specially designed to interact with materials traditionally used in the construction industry.

[0054] A person skilled in the art may make variations to the embodiments of the lighting device described above so as to satisfy specific requirements, replacing elements with others functionally equivalent.

[0055] Such variants are also contained within the scope of protection as defined by the following claims.

[0056] In addition, each variant described as belonging to a possible embodiment may be realised independently of the other embodiments described.

Claims

1. Lighting device (1, 2, 3, 4) comprising:

- at least one source-body (6) which extends in a tubular manner around a body axis (X) and which houses at least partially the components (8, 10) of a light source;
- a support element (12; 14; 16; 18) of the source-body (6), for example in relation to a support wall (20), which delimits a hole for receiving (22) said body (6) so that the body axis (X) can be oriented around two rotation axes (P, S) incident to each other; and
- a movement device (24) acting between the support element (12; 14; 16; 18) and the source-body (6) to allow orientations of the latter;

wherein the source-body (6) is further translatable along the body axis (X) to allow introductions/extractions thereof from the housing hole (22).

2. Device according to claim 1, wherein the translation occurs in a direction substantially parallel to the body axis (X).

3. Device according to claim 1 or 2, wherein the movement device (24) allows substantially contextual orientations and translations.

4. Device according to any of the previous claims, wherein the movement device (24) acts elastically on an outer surface (26) of the source-body (6).

5. Device according to any of the previous claims, wherein the movement device (24) comprises an anchorage portion (28) to the support element (12; 14; 16; 18) and a retention member (30), which co-operates with the source-body (6) and which is connected in a hinged manner to the anchorage portion (28).

6. Device according to claim 5, wherein the anchorage portion (28) and the retention member (30) are connected by means of an intermediate component (62) rotatable in relation to the anchorage portion (28) around a secondary rotation axis (S), and suitable for performing the rotation of the retention member (30) around a primary rotation axis (P).

7. Device according to claim 5 or 6, wherein an abutment surface (32', 32") of the retention member (30) comprises at least one layer of polymer material to ensure sufficient friction on the source-body (6).

8. Device according to any of the claims from 5 to 7, wherein the retention member (30) comprises at least a first jaw (34) and a second jaw (36) which partially cover an outer surface (26) of the source-body (6), at least the second jaw (36) being movable in relation to the first (34) to allow/prevent the translation of the source-body (6).

9. Device according to claim 8, wherein one jaw (34; 36) comprises at least one guide projection (38) suit-

able for coupling with a recess (40) made in the other jaw (36;, 34) for the reciprocal radial movement in relation to the body axis (X).

10. Device according to any of the previous claims, wherein the rotation axes (P, S) are substantially perpendicular to each other.

11. Device according to any of the previous claims, wherein the support element (12; 14; 16; 18) comprises a plate (42; 44; 46; 48) with a primary surface (50) in which the housing hole (22) is inserted, said surface (50) being raised in relation to a secondary surface (52) which defines it laterally or peripherally.

12. Device according to any of the previous claims, wherein the through cross-section of the housing hole (22) is tapered towards the inside of the support element (12; 14; 16; 18).

13. Device (2, 3, 4) according to any of the previous claims, comprising a plurality of source-bodies (6) joined to a common support element (14; 16; 18).

14. Device according to claim 13, wherein each of said source-bodies (6) is adjustable independently of the others.

15. Device according to claim 13 or 14, wherein the support element (14; 16; 18) has a density of source-bodies (6) of 20-30 source-bodies (6) per square metre, preferably 23-27 source-bodies (6) per square metre, even more preferably 25 source-bodies (6) per square metre.

16. Device according to any of the claims from 13 to 15, wherein the support element (14; 16; 18) extends along a main direction (C), and wherein the plurality of housing holes (22) is distributed along said main direction (C), for example at variable intervals.

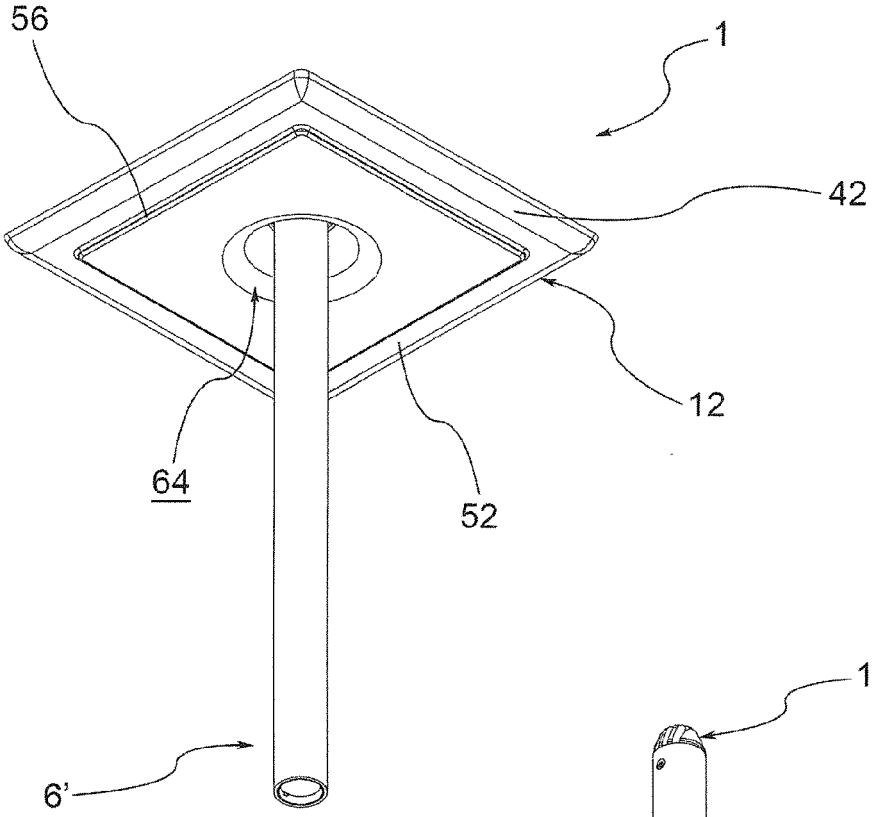


Fig. 1a

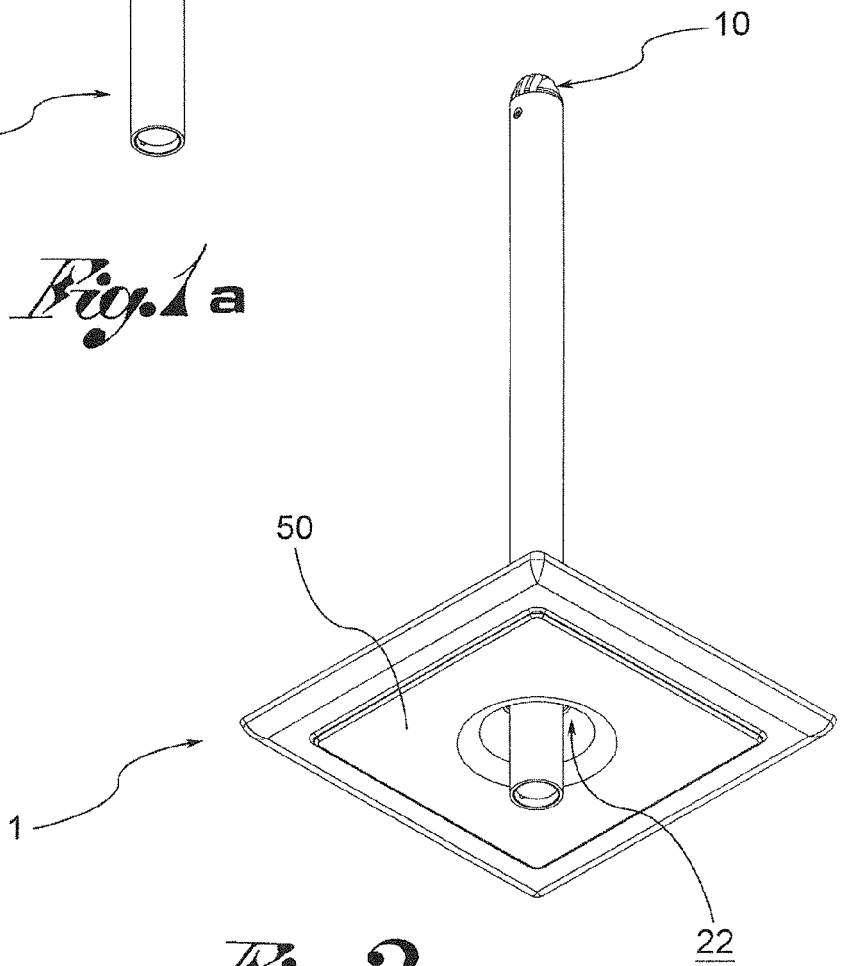


Fig. 2

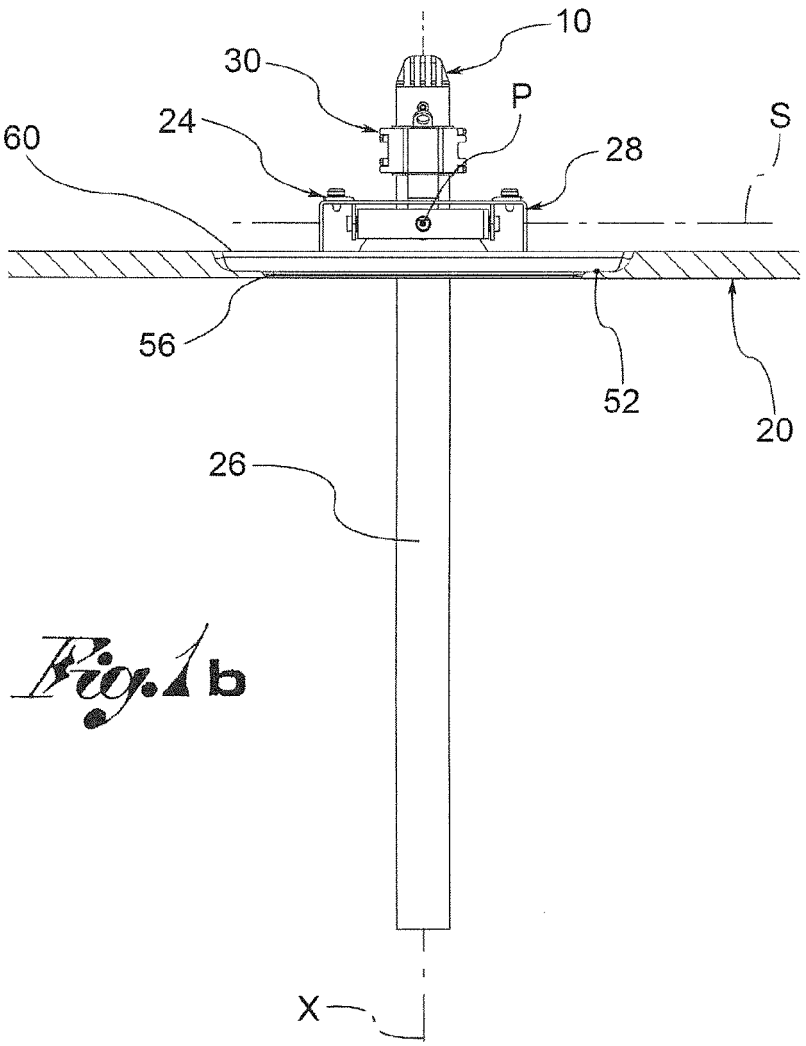


Fig.1b

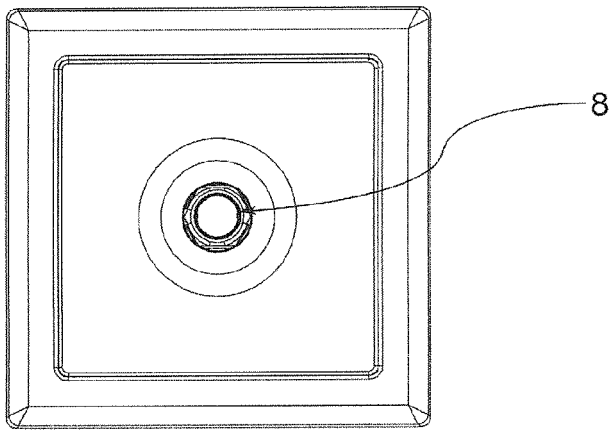


Fig.1c

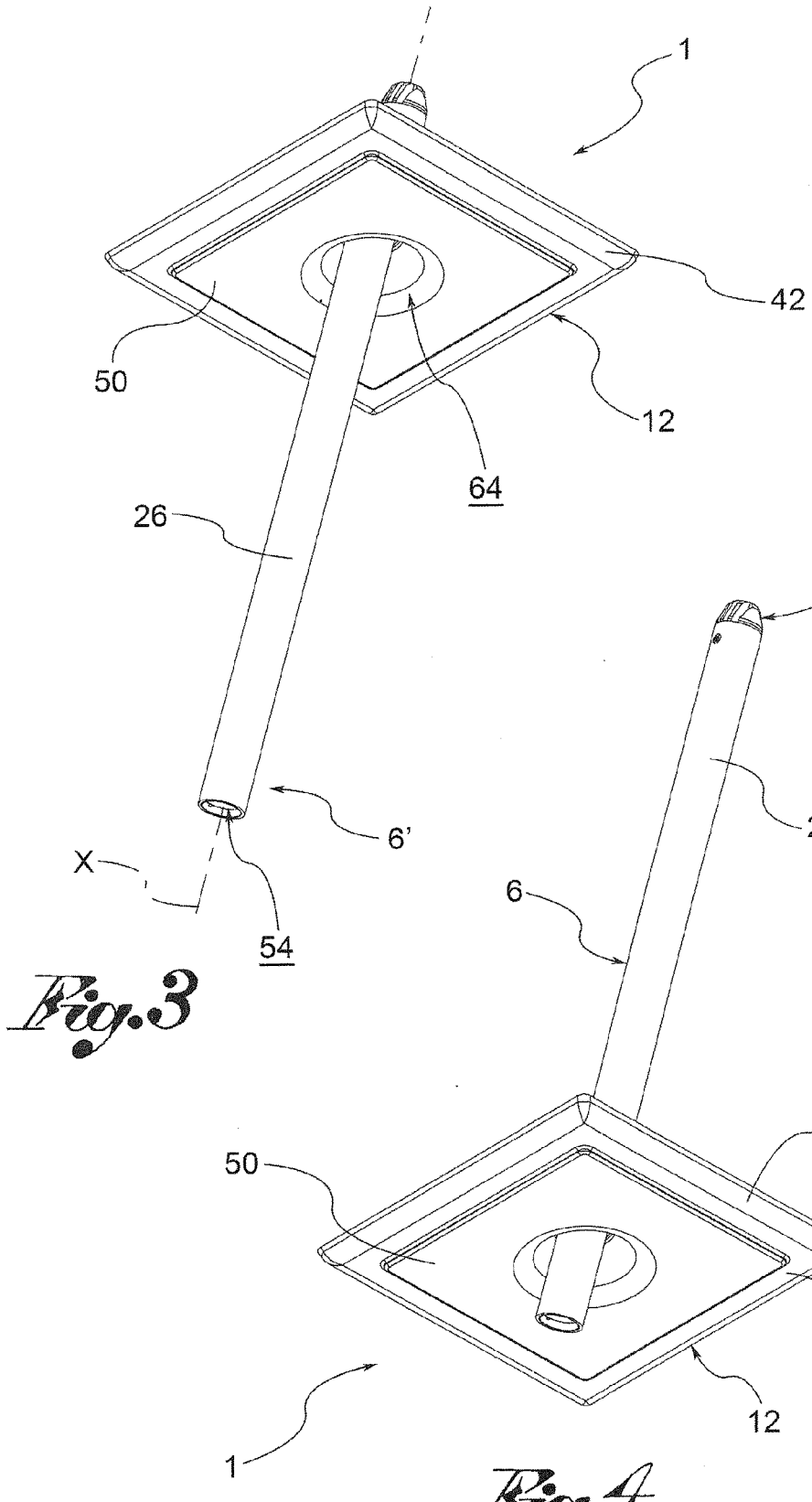


Fig.3

Fig.4

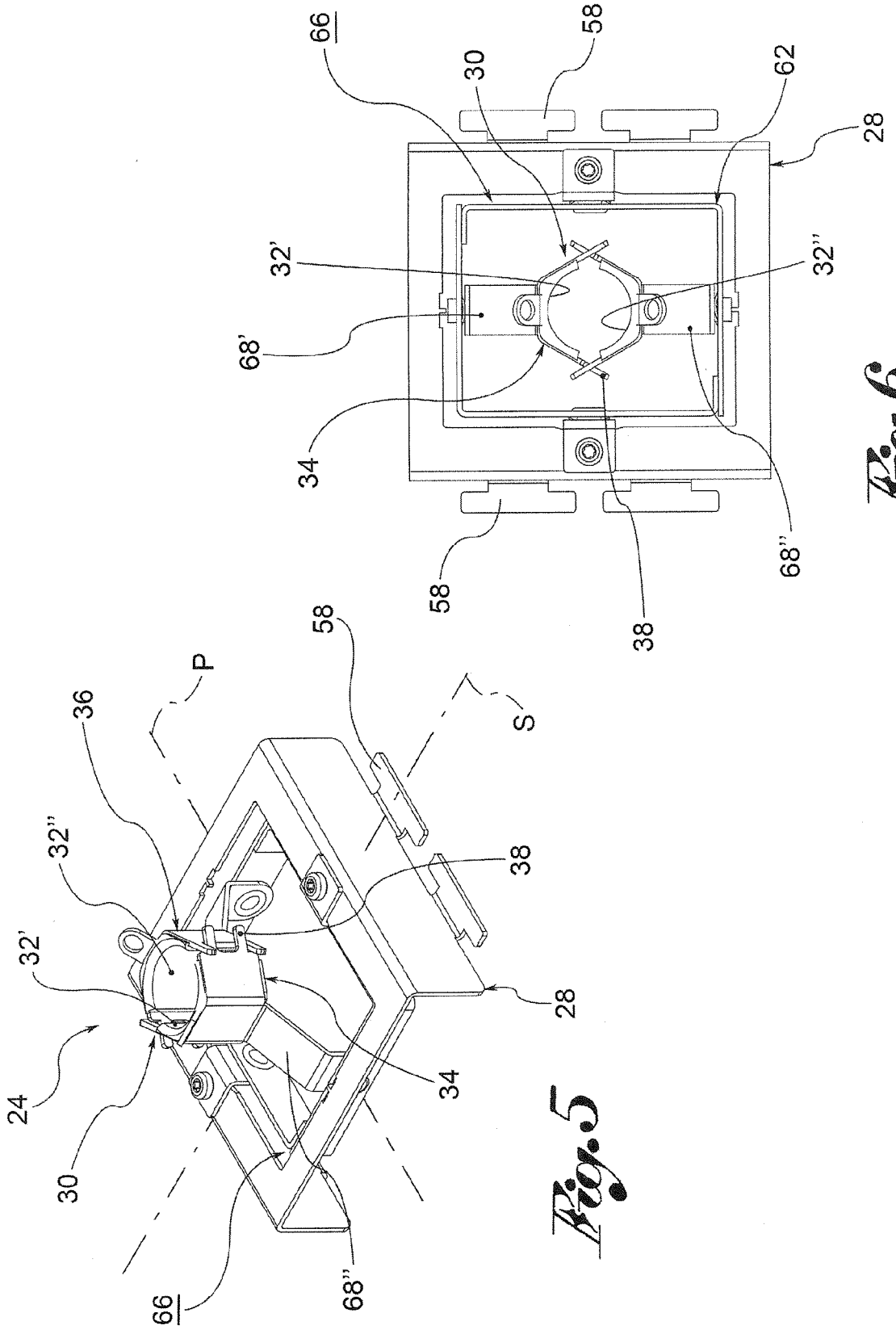


Fig. 6

Fig. 5

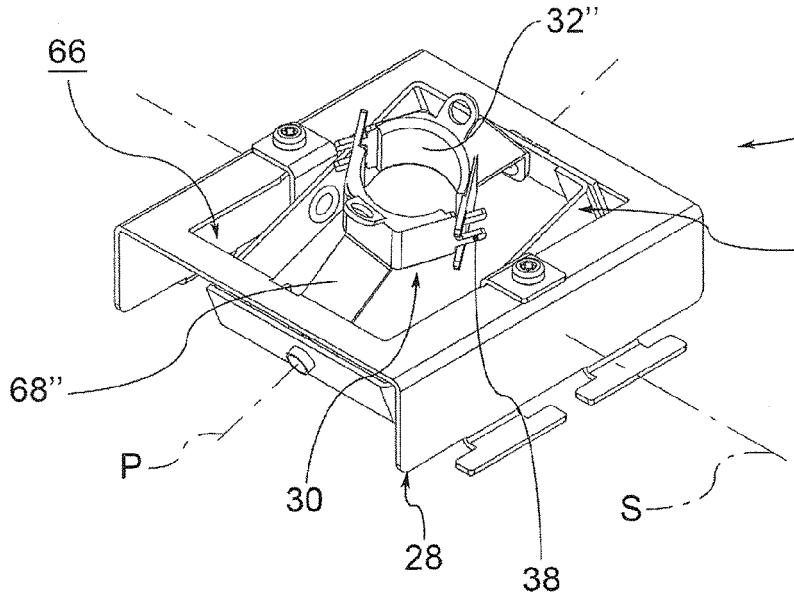


Fig. 7

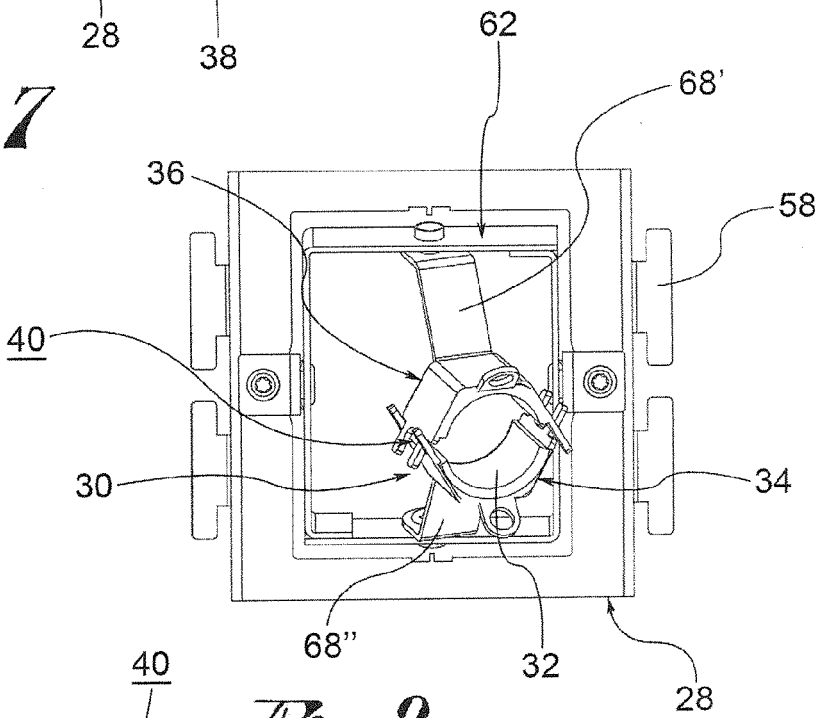


Fig. 8a

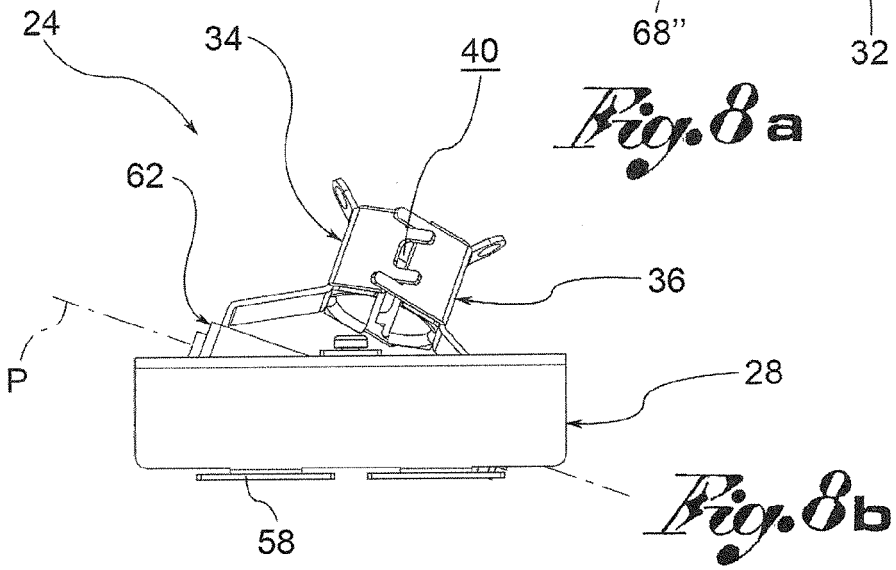


Fig. 8b

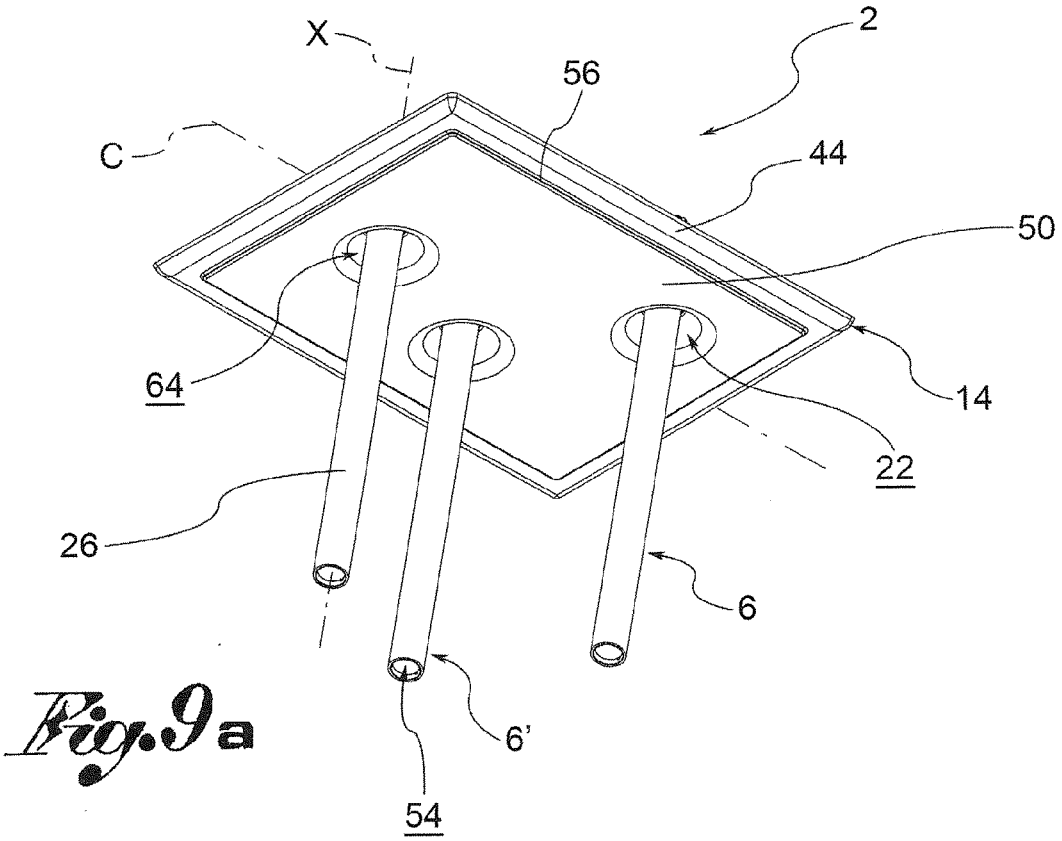


Fig.9a

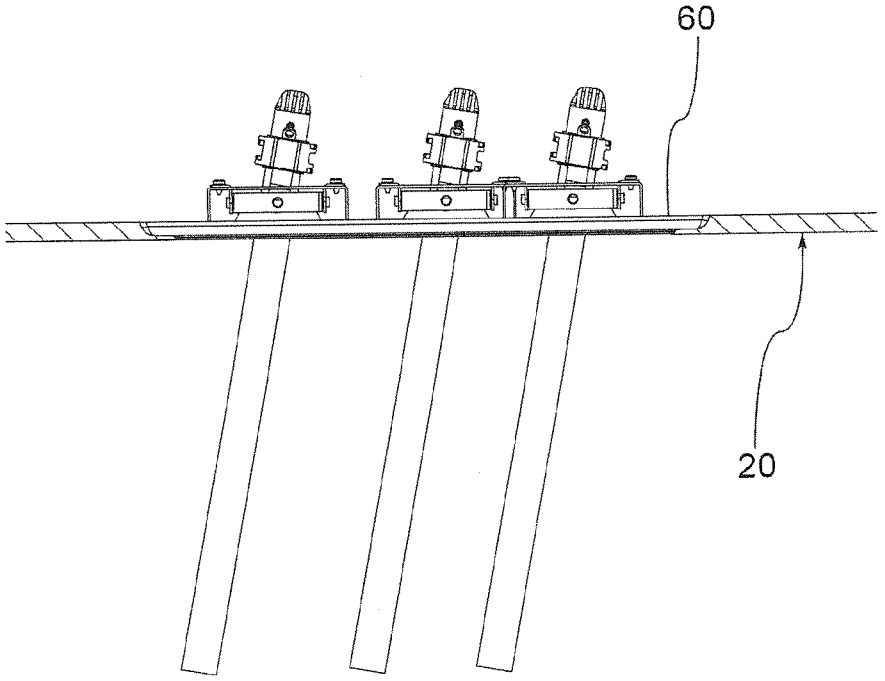


Fig.9b

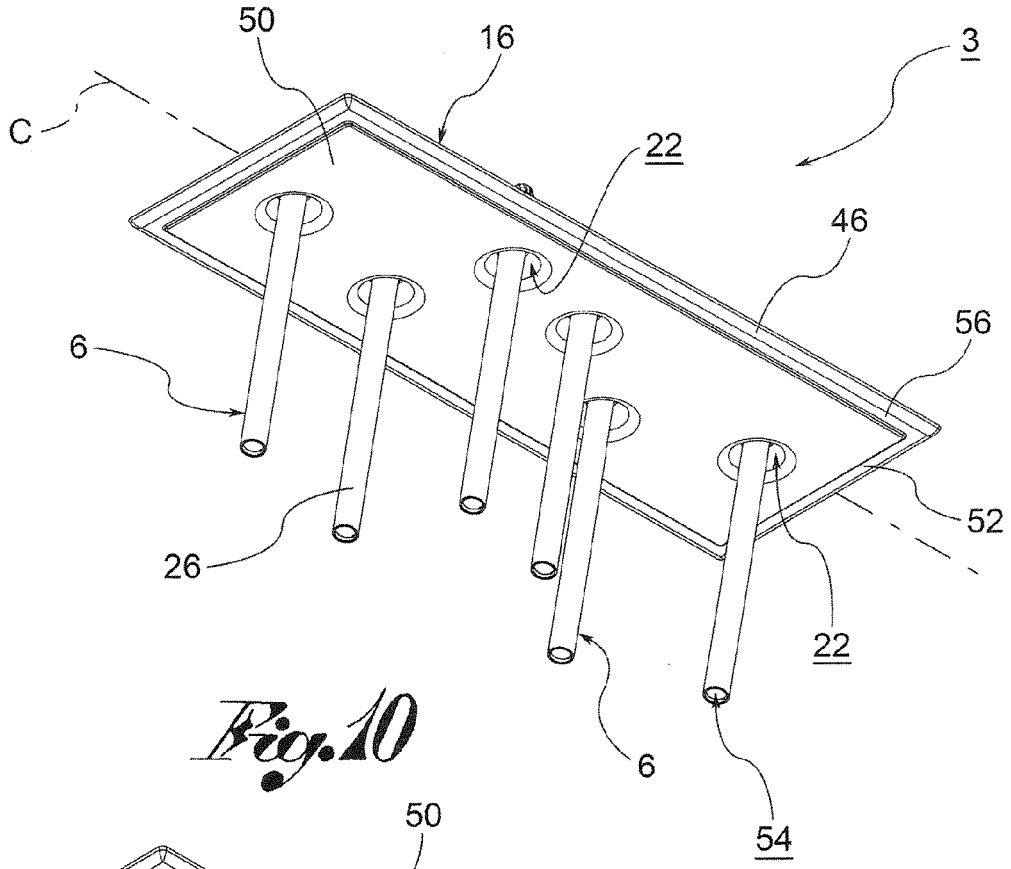


Fig.10

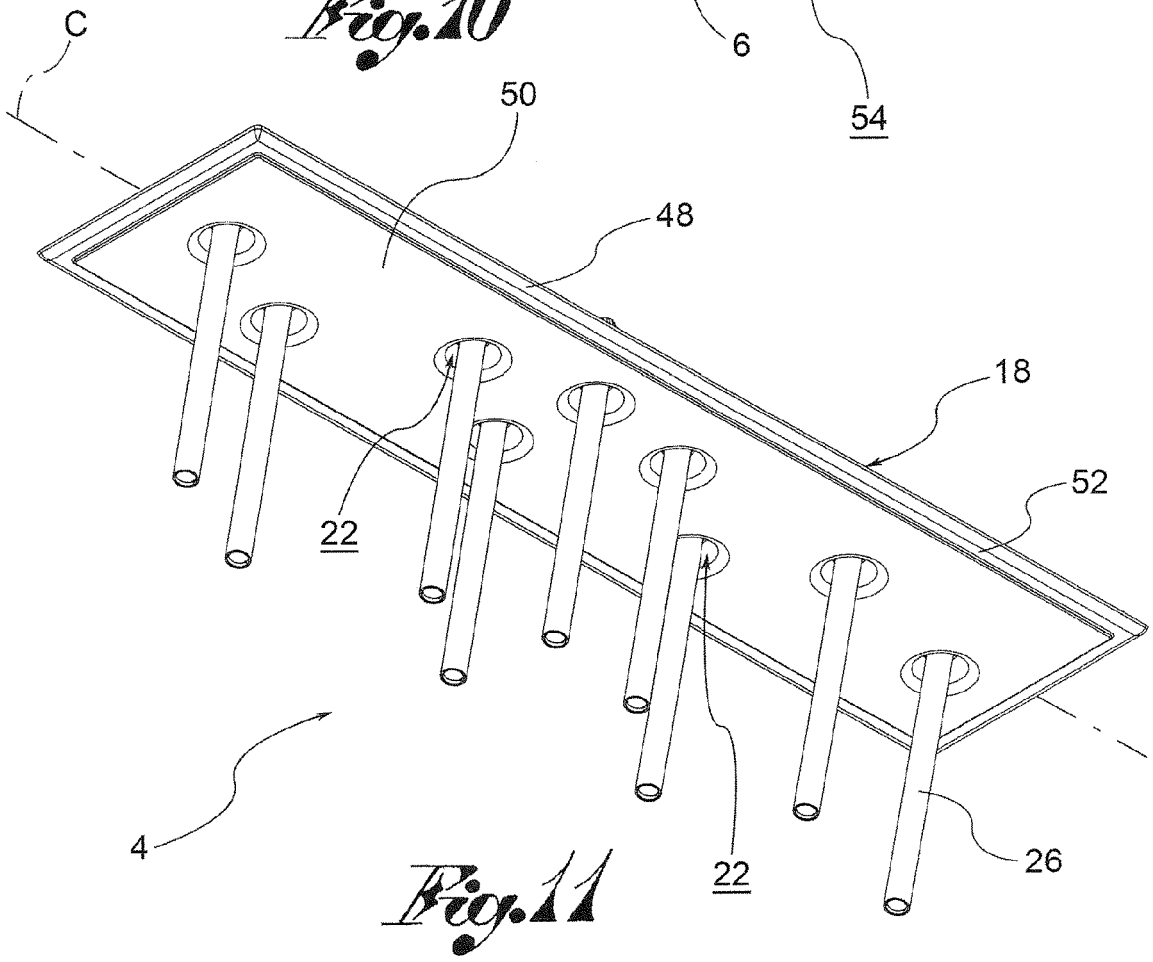


Fig.11

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 15 7309

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 420 726 A1 (ZUMTOBEL LIGHTING GMBH [AT]) 22 February 2012 (2012-02-22) * the whole document *	1-16	INV. F21S8/02 F21V21/04 F21V21/108 F21V21/28 ADD. F21Y101/02
A	DE 34 48 084 A1 (APEL VOLKER) 4 September 1986 (1986-09-04) * the whole document *	1-16	
A	US 2 667 323 A (MASON ROLAND G) 26 January 1954 (1954-01-26) * abstract; figures *	1-16	
A	DE 198 58 605 A1 (HALEMEIER ECKHARD [DE]) 29 June 2000 (2000-06-29) * the whole document *	1-16	
A	US 2012/287603 A1 (FORANT ROBERT G [US]) 15 November 2012 (2012-11-15) * abstract; figures *	1-16	
A	US 2011/103075 A1 (XHUNGA ILO KRISTO [US]) 5 May 2011 (2011-05-05) * abstract; figures *	1-16	TECHNICAL FIELDS SEARCHED (IPC) F21S F21V F21Y
A	US 501 502 A (ALENZA GIFFORD) 18 July 1893 (1893-07-18) * the whole document *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 May 2014	Berthommé, Emmanuel

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 14 15 7309

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-05-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2420726 A1	22-02-2012	NONE	
DE 3448084 A1	04-09-1986	NONE	
US 2667323 A	26-01-1954	NONE	
DE 19858605 A1	29-06-2000	NONE	
US 2012287603 A1	15-11-2012	NONE	
US 2011103075 A1	05-05-2011	NONE	
US 501502 A	18-07-1893	NONE	

EPO FORM P0459

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