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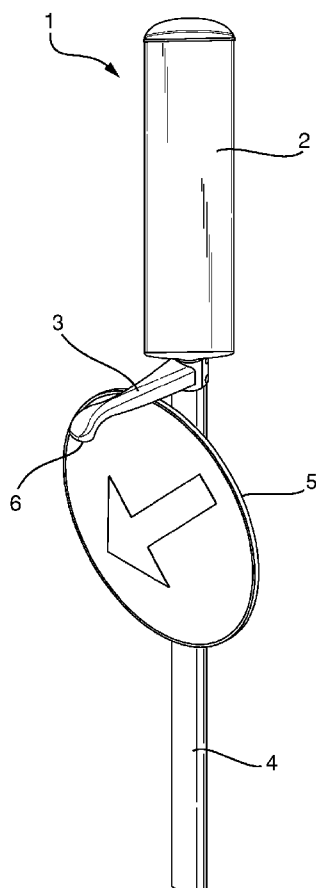
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(54) Title: SOLAR POWERED LIGHT ASSEMBLY

Fig. 1



(57) Abstract: Solar Powered Light Assembly. A solar powered light assembly for illuminating a road sign (5), comprising: a housing (1) having a solar panel (2) on one face; a mounting for mounting the housing (1) to a vertical post (4) so the solar panel (2) lies in a vertical plane but can face in any desired direction; an illumination arm (3) mounted on the mounting means or the post (4); a light (LED) mounted on the end of the illumination arm (3) for illuminating a road sign (5) mounted on the post (4). The arm (3) can be positioned to extend away from the post (4) in a any desired direction (independently of the solar panel orientation); a battery for storing electrical power generated by the solar panel (2); control means for controlling illumination of the light (LED) and electrical connections for connecting the control means to the battery and to the light (6).



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Solar Powered Light Assembly

FIELD OF THE INVENTION

5 This invention relates to a solar powered light assembly, eg for use in attaching to a post to illuminate a sign (such as a road sign) mounted on the post.

BACKGROUND ART

10 Solar panels and wind turbine generators that are mounted on or adjacent road signs are known to power internal illumination or other forms of illumination for a sign. Due to the arrangement used, these are often unsightly especially when used as a retro-fit to an existing sign. Problems can also be experienced with insufficient power being generated to illuminate the sign throughout the hours of darkness, especially in winter when the nights are longer.

The present invention seeks to address one or more of these problems and to provide an improved solar powered light assembly.

15 SUMMARY OF THE INVENTION

According to a first aspect of the invention, there is provided a solar powered light assembly for illuminating a sign, the assembly comprising: a housing having a solar panel on one face thereof; mounting means for mounting the housing to a substantially vertical post so the solar panel lies in a substantially vertical plane and can be orientated so that it faces
20 in a first desired direction; an illumination arm one end of which is arranged to be mounted on the mounting means and/or the post; at least one light mounted on the illumination arm at or towards a distal end thereof for illuminating a sign mounted on said post, the arm being mountable so that it can be positioned to extend away from the vertical axis of the post in a second desired direction; storage means for storing electrical power generated by
25 the solar panel, control means for controlling illumination of said at least one light and electrical connections for connecting the control means to the storage means and to the said at least one light.

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The assembly is preferably adapted to be mounted on an existing post, eg a tubular post, on which a sign (such as a road sign) is mounted. The solar panel and associated, storage means and control means are preferably mounted in a housing which extends substantially vertically above the pole. The solar panel can be orientated in the optimum
5 direction (eg South facing) but, unlike many known device, lies in a substantially vertical plane (rather than being tilted upwards according to its latitude to optimise the collection of solar energy). The area of the solar panel may be increased to make up for this small loss in efficiency.

The illumination arm is located immediately beneath the housing and preferably
10 carries a light (such as an LED) at its distal end which is positioned to illuminate the road sign. Preferably, the light has a lens arranged to provide a beam of the appropriate shape and size to illuminate the sign (eg whether this be circular, rectangular or triangular). The illumination arm can be rotated about the vertical axis so it extends in the appropriate direction to illuminate the sign (which direction may not be the same as the direction in
15 which the solar panel faces).

The control circuitry preferably controls illumination of the light so that it only illuminates the sign during hours of darkness. In a preferred arrangement, the brightness of the light can also be controlled in order to reduce power consumption so as to conserve energy and thus help ensure that there is sufficient energy to illuminate the sign in winter
20 (when the hours of darkness are longest).

The invention also relates to a kit of parts for providing a solar powered light assembly as described above.

According to a second aspect of the invention, there is provided solar powered assembly for providing power to illumination means of a sign and for controlling the
25 illumination thereof, the assembly comprising: a housing having a solar panel on one face thereof; mounting means for mounting the housing to a substantially vertical post so the solar panel lies in a substantially vertical plane and can be orientated so that it faces in a first desired direction; storage means for storing electrical power generated by the solar panel, control means for controlling operation of the illumination means of the sign and
30 electrical connections for connecting the control means to the storage means and to the illumination means.

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Preferred and optional features of the invention will be apparent from the following description and from the subsidiary claims of the specification.

BRIEF DESCRIPTION OF THE DRAWINGS

5 An embodiment of the present invention will now be described, merely by way of example, with reference to the accompanying figures in which:

Figure 1 is a perspective view of a solar powered light assembly according to an embodiment of the invention mounted on a pole to illuminate a road sign;

Figure 2 is a perspective view of a housing of the assembly and shows mounting means for mounting the housing to a post;

10 Figure 3 illustrates insertion of the mounting means into a tubular post;

Figure 4 is a side view of the assembly when mounted on the post with an illumination arm;

Figure 5A is an enlarged front view of the mounting means and Figure 5B is a view from beneath the mounting means;

15 Figure 6 is a sectional view of the illumination arm;

Figure 7A is front view, part cut-away, of the housing showing components thereof and Figure 7B is a sectional view thereof; and

Figure 8 is a schematic circuit diagram of the electrical components of the assembly.

DETAILED DESCRIPTION OF THE EMBODIMENTS

20 Figure 1 shows a solar powered light assembly comprising a housing 1 with a solar panel 2 on one face thereof and an illumination arm 3 mounted on a post 4 to illuminate a road sign 5.

The post 4 may be a tubular post of an existing road sign and extends in a substantially vertically. The housing is mounted to the top of the post and extends
25 substantially vertically therefrom with the solar panel lying in a substantially vertical plane.

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The illumination arm 3 is mounted beneath the housing 1 and above the sign 5 and extends substantially perpendicular to the vertical axis. It carries a light 6 at its distal end to illuminate the sign 5. The length of the arm 3, the angle of the light 6 and the shape of the beam emitted therefrom are arranged so as to illuminate an area corresponding closely to the area of the sign 5.

Figure 2 is a perspective view of the housing 1 and shows a spigot in the form of a mounting tube 7 extending from the base of the housing. The mounting tube 7 is shaped to fit within the upper end of the tubular post 4 and is provided with clamping means 8 for clamping it to the interior of the post 4.

Figure 3 illustrates insertion of the mounting tube 7 within a tubular post 4. As shown in Fig 5A, the clamping means comprises six adjustable devices which include wedge-shaped elements 8A which can be moved longitudinally (relative to the axis of the tube 7) by rotation of screws 8B extending therethrough so as to enlarge or reduce the effective width of the tube 7. By rotation the screws 8B, the clamping means can thus be used to clamp the mounting tube 7 within the tubular post 4. The mounting tube 7 is clamped in a position which leaves a portion 7A of the tube projecting from the top of the post 4 and the illumination arm 3 is secured thereto as shown in Fig 4.

Figure 6 shows the illumination arm 3 in greater detail. The arm itself may be a metal casting or a plastic moulding and a portion 3A at one end is detachable so the end of the arm can be secured about the mounting tube 7 and clamped thereto. A light in the form of an LED 6 is provided at the distal end of the arm 3 and is angled so, in use, it is directed towards the sign 5 to be illuminated. A lens 6A and lens cover 6B, eg of glass, are provided in front of the LED so as to form a beam of light of the appropriate shape and size to illuminate the sign 5. If the sign 5 is circular, they form a circular beam of light, if the sign is square or rectangular, they form a square or rectangular beam of light etc. An electrical cable 8 passes along the arm 3 to connect the LED 6 to control means (described further below) mounted within the housing 1.

The cable 8 is connected to an electrical connector in the housing 1 to connect the light 6 to the control circuitry. The arrangement is such that, once the arm 3 is secured in position, the electrical connections and cables are concealed.

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Figure 7A is a part cut-away view of the housing 1 and shows a support member 9 which extends along the centre-line of the housing 1. The support member 9 may be a continuation of the mounting tube 7 or it may be a separate tube to which the mounting tube 7 is secured. Batteries 10 which are arranged to be charged by the solar panel 2 are arranged in two columns, one each side of the support member 9 together with control circuitry 11 behind the solar panel 2. Figure 7B also illustrates this arrangement.

A particular advantage of the assembly described above is the configuration of the solar panel so that the assembly has an attractive appearance and appears as an integrated unit (rather than a contraption added to a signpost). An important feature of this design is the elongate shape of the solar panel. The solar panel preferably has a length at least three times its width and most preferably at least four times its width and is arranged so it lies in a substantially vertical plane.

A typical assembly has solar panel with a length of approx 820mm and a width of approx 180 mm. A 20 W photovoltaic solar panel can be used to power a 3 W LED during winter when there may be up to 16 hours of darkness and only 8 hours of light during which the batteries can be charged.

This arrangement also provides a compact and neat configuration with the solar panel, batteries and control circuitry all located within the housing 1. The arrangement is also centred about a vertical axis and this enables it to be constructed about a simple tubular support member running vertically through the assembly.

Figure 8 is a schematic circuit diagram of the assembly and shows the solar panel 1, first and second battery packs 10A and 10B, the LED light 6, a reed switch 12 and a PC connector 13 connected to the control circuitry 11.

The control circuitry 11 is arranged to be activated by actuation of the reed switch 12 which may be mounted within the housing 1 (see Fig 7A) and actuatable by holding a magnet against the exterior of the housing 1 in the vicinity of the switch 12.

The control circuitry can be programmed (via the PC connector 12) to control operation of the LED lamp according to a pre-determined algorithm. Typically, this will ensure that the LED lamp is only lit during hours of darkness (either according to a pre-set schedule or in response to a light sensor). The solar panel 2 inherently acts as a light sensor,

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as its output voltage will reduce, or fall to zero, as darkness falls. The LED lamp 6 used is of a type whose brightness can be adjusted and the algorithm also controls the brightness according to a pre-determined schedule. For example, where the sign is used in a location where traffic levels reduce as the night progresses, it can, for example, be set to reduce the brightness of the illumination part way through the night, eg after midnight, in order to conserve energy. The LED lamp may be operated between two or more levels of illumination and a reduced level of illumination is selected as and when required, eg in dependence upon the remaining length of the period of darkness and the energy remaining in the batteries, to ensure that there is sufficient energy to illuminate the sign throughout the night. This means that, at different times, the brightness of the illumination will vary. However, the lowest level of illumination is arranged to be adequate to illuminate the sign and brighter levels of illumination are used at times when traffic levels are higher. Typically, the lamp should provide an illumination level of at least 40 candelas/square meter at the lowest level of illumination.

Controlling the illumination in this manner provides an advantage over known arrangements which, while they function well from spring to autumn can suffer from a lack of power to illuminate a sign throughout the longest nights of the year (in winter) or have to use lower levels of illumination at all times of the year to achieve continuous illumination during the longest nights of the year.

Control of the illumination levels is preferably by means of pre-set control algorithms or may be adaptable according to sensed parameters (eg time, brightness, voltage etc) to provide 'intelligent' control of the lighting levels which is responsive to the conditions.

The control circuitry preferably stores data on its operation and the PC connection 13 used to capture this data from the assembly to enable diagnostic checks to be carried out. This data can then be used to alter or modify the control algorithms as required.

The illumination arm may carry more than one LED lamp or some other form of light that is arranged to illuminate the desired area of the sign.

If the sign is double-sided, or if two signs are provided on opposite sides of the post, a second illumination arm may be provided to illuminate the other side of the sign or the second sign.

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It will be appreciated that the assembly described above is suitable for retro-fitting to existing signs as well as new signs. The assembly can also be used with a free standing sign, eg that might be used in a pedestrian area, as well as with road signs.

5 The design of the assembly also enables the solar panel and the illumination arm to be independently rotated about the vertical axis so each can be oriented in the desired direction – the solar panel to maximise harvesting of solar energy and the illumination arm to illuminate the sign (the orientation of which is determined by the situation in which it is used).

10 The arrangement described may also be used to power and control other forms of illumination means in place of, or in addition to, the illumination arm described above. Such illumination means may, for example comprise one or more LEDs arranged to illuminate a translucent sign such as that described in EP2378327A. It will be appreciated that with this form of illumination, a separate illumination arm may not be required.

15 It will of course be understood that many variations may be made to the above-described embodiment without departing from the scope of the present invention.

CLAIMS

1. A solar powered light assembly for illuminating a sign, the assembly comprising: a housing having a solar panel on one face thereof; mounting means for mounting the housing to a substantially vertical post so the solar panel lies in a substantially vertical plane and can be orientated so that it faces in a first desired direction; an illumination arm one end of which is arranged to be mounted on the mounting means and/or the post; at least one light mounted on the illumination arm at or towards a distal end thereof for illuminating a sign mounted on said post, the arm being mountable so that it can be positioned to extend away from the vertical axis of the post in a second desired direction; storage means for storing electrical power generated by the solar panel, control means for controlling illumination of said at least one light and electrical connections for connecting the control means to the storage means and to the said at least one light.
2. An assembly as claimed in claim 1 in which the storage means and control means are mounted behind the solar panel within the housing.
3. An assembly as claimed in claim 1 or 2 in which the housing comprises an elongate support member which, when the assembly is mounted to the post, extends substantially vertically and said storage means comprises a plurality of units in one or more columns adjacent the elongate support member.
4. An assembly as claimed in any preceding claim in which the solar panel is substantially rectangular and has a length at least three times its width and, preferably, at least four times its width.
5. An assembly as claimed in any preceding claim in which the mounting means is adapted to be mounted to the top of said pole.
6. An assembly as claimed in claim 5 in which the mounting means comprises a spigot for inserting into the upper end of a tubular pole.
7. An assembly as claimed in claim 6 in which the mounting means comprises clamping means for clamping the spigot to the interior of a tubular pole.

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8. An assembly as claimed in claim 7 in which the clamping means comprises a plurality of axially moveable wedge-shaped elements mounted on the spigot which are adjustable so as to enlarge or reduce the width of the spigot within the tubular pole.
9. An assembly as claimed in any preceding claim in which the illumination arm
5 comprises a lens and/or light cover which are arranged to provide a beam of appropriate shape to match the shape of the sign.
10. An assembly as claimed in any preceding claim in which the control means comprises control circuitry which is arranged to control illumination of the light.
11. An assembly as claimed in claim 10 in which the control circuitry is arranged to
10 illuminate the light only during the hours of darkness.
12. An assembly as claimed in claim 10 or 11 in which the control circuitry is arranged to control the brightness of the light in order to reduce its power consumption.
13. An assembly as claimed in claims 11 and 12 in which the control circuitry is arranged to illuminate the light with a reduced brightness part way through the night.
- 15 14. An assembly as claimed in any of claims 10 to 15 in which the control circuitry stores data on its operation to enable diagnostic checks to be carried out.
15. A solar powered light assembly for illuminating a sign substantially as hereinbefore described with reference to and/or as shown in one or more of the accompanying drawings.
- 20 16. A kit of parts for providing a solar powered light assembly as claimed in any preceding claim.
17. A solar powered assembly for providing power to illumination means of a sign and for controlling the illumination thereof, the assembly comprising: a housing having a solar panel on one face thereof; mounting means for mounting the housing to a
25 substantially vertical post so the solar panel lies in a substantially vertical plane and can be orientated so that it faces in a first desired direction; storage means for storing electrical power generated by the solar panel, control means for controlling

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operation of the illumination means of the sign and electrical connections for connecting the control means to the storage means and to the illumination means.

18. A solar powered assembly as claimed in claim 17 in combination with illumination means arranged to illuminate a sign.

5 19. A solar powered assembly as claimed in claim 18 in which the illumination means comprises: an illumination arm one end of which is arranged to be mounted on the mounting means and/or the post; at least one light mounted on the illumination arm at or towards a distal end thereof for illuminating a sign mounted on said post, the
10 arm being mountable so that it can be positioned to extend away from the vertical axis of the post in a second desired direction.

20. A solar powered assembly as claimed in claim 18 or 19 in which the illumination means comprises one or more LEDs arranged to illuminate a translucent sign.

Fig. 1

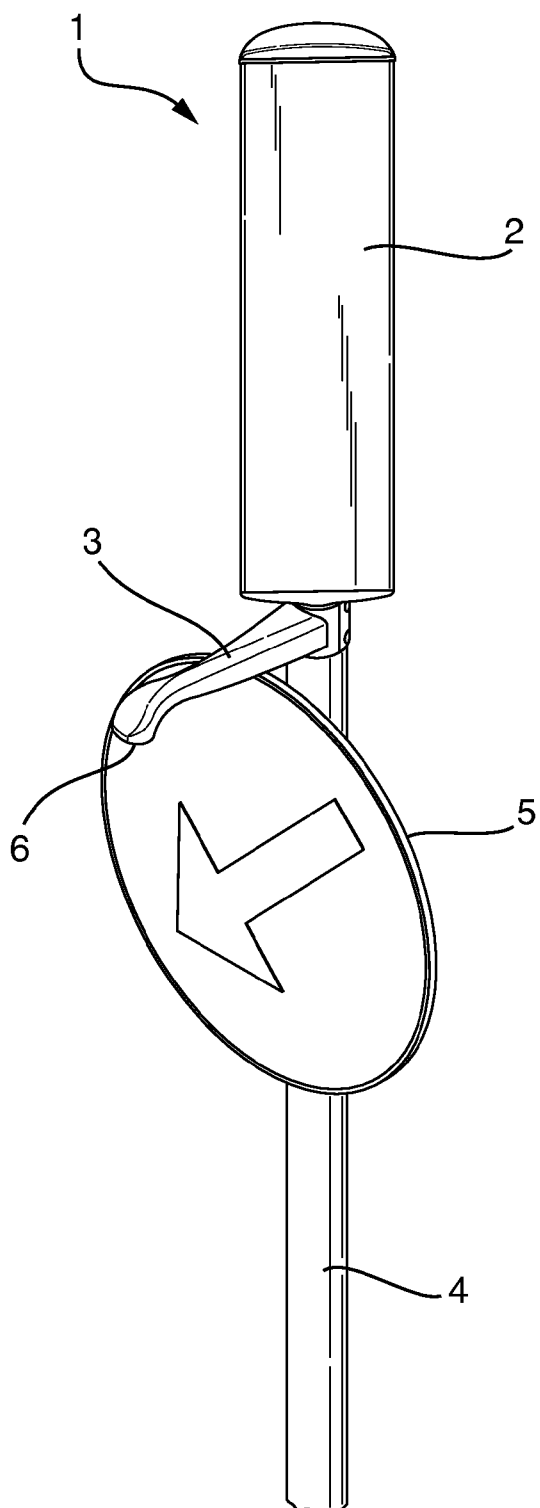


Fig. 2

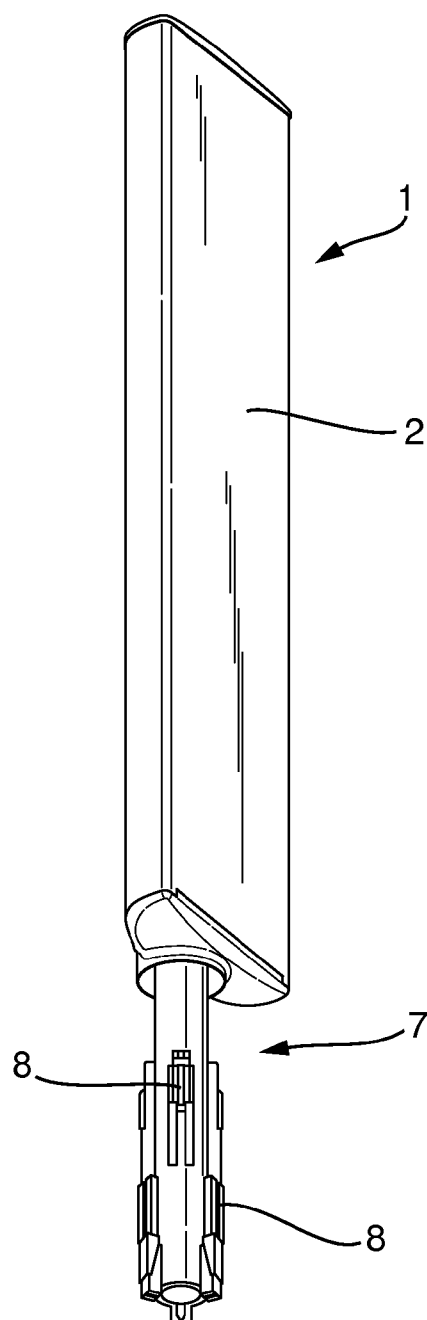


Fig. 3

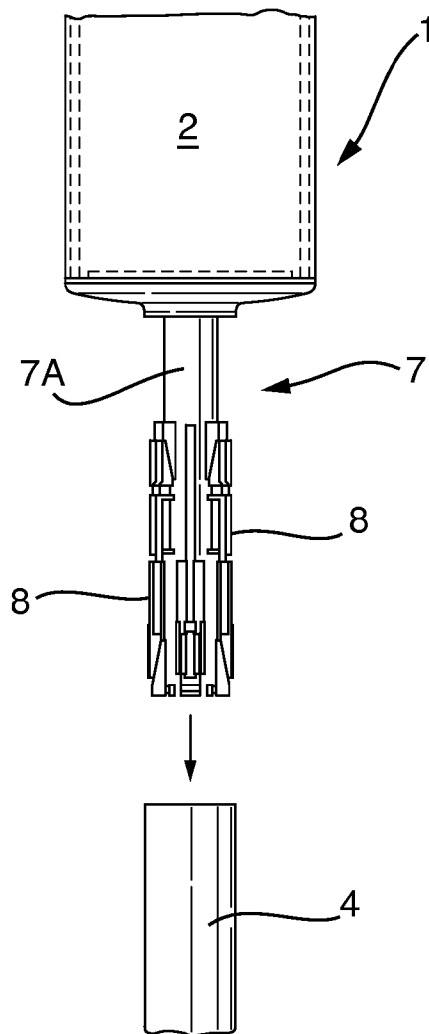
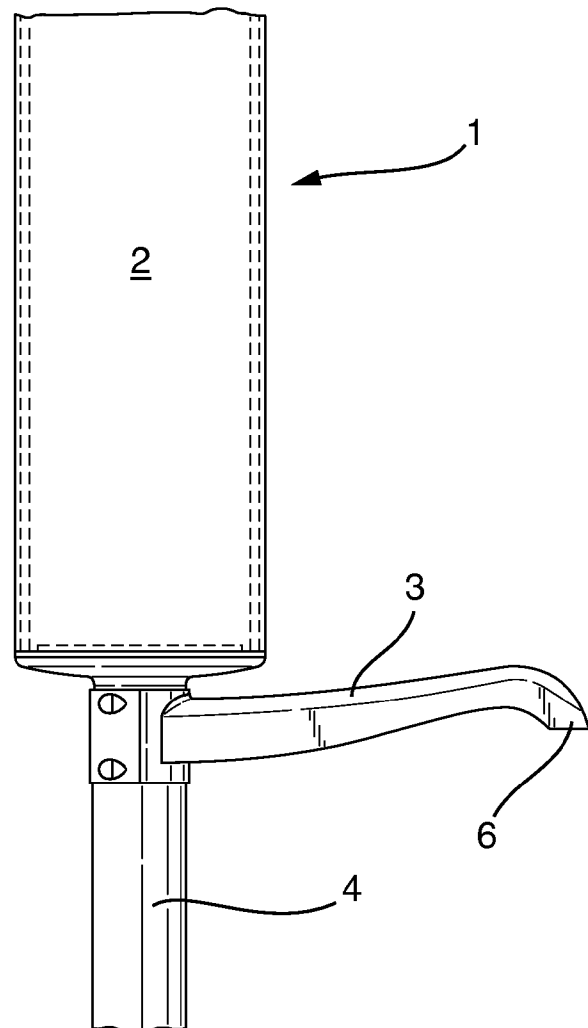


Fig. 4



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Fig. 5A

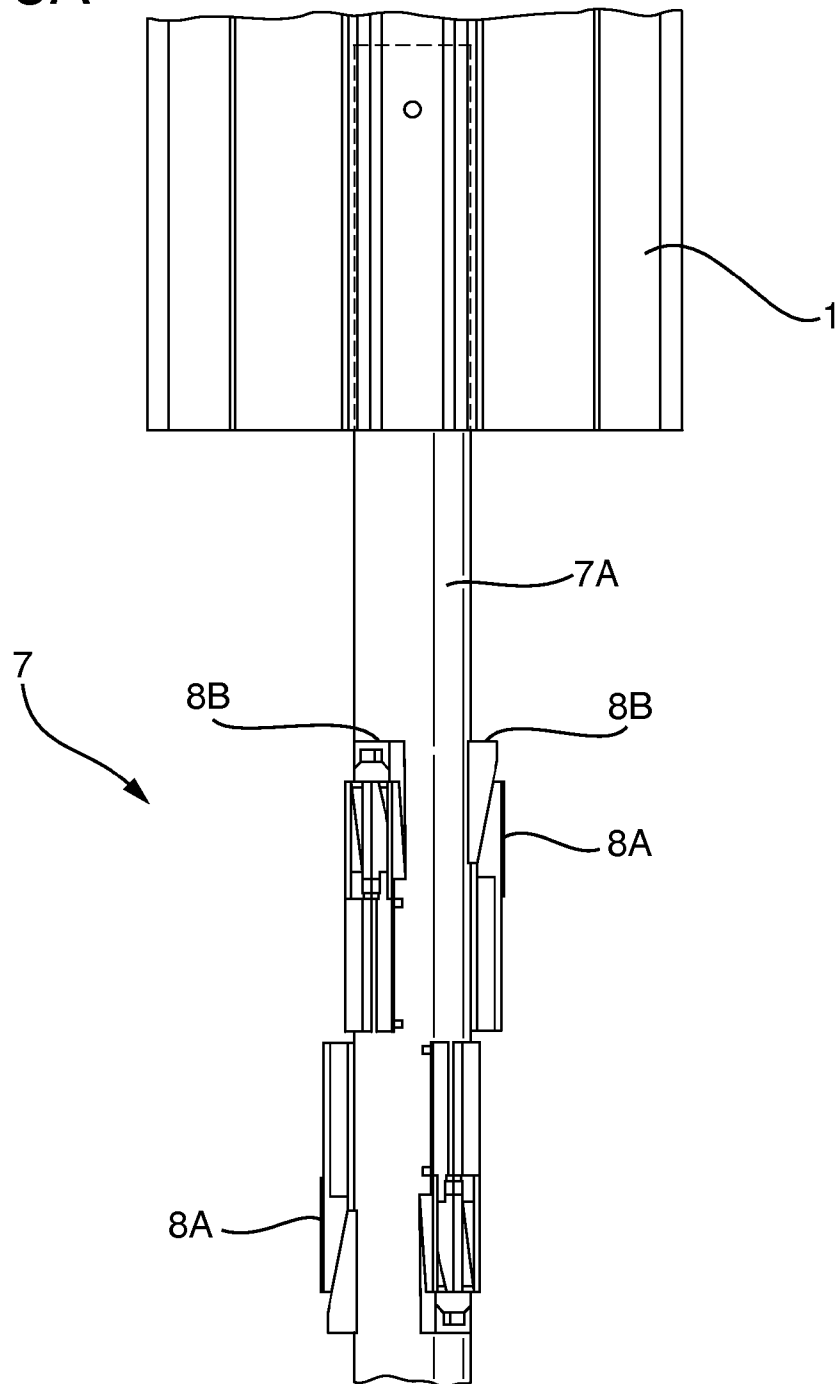


Fig. 5B

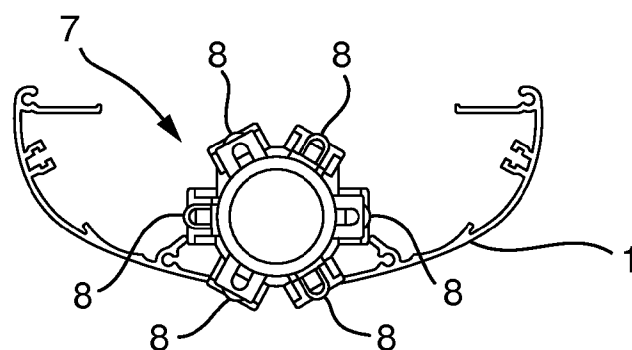
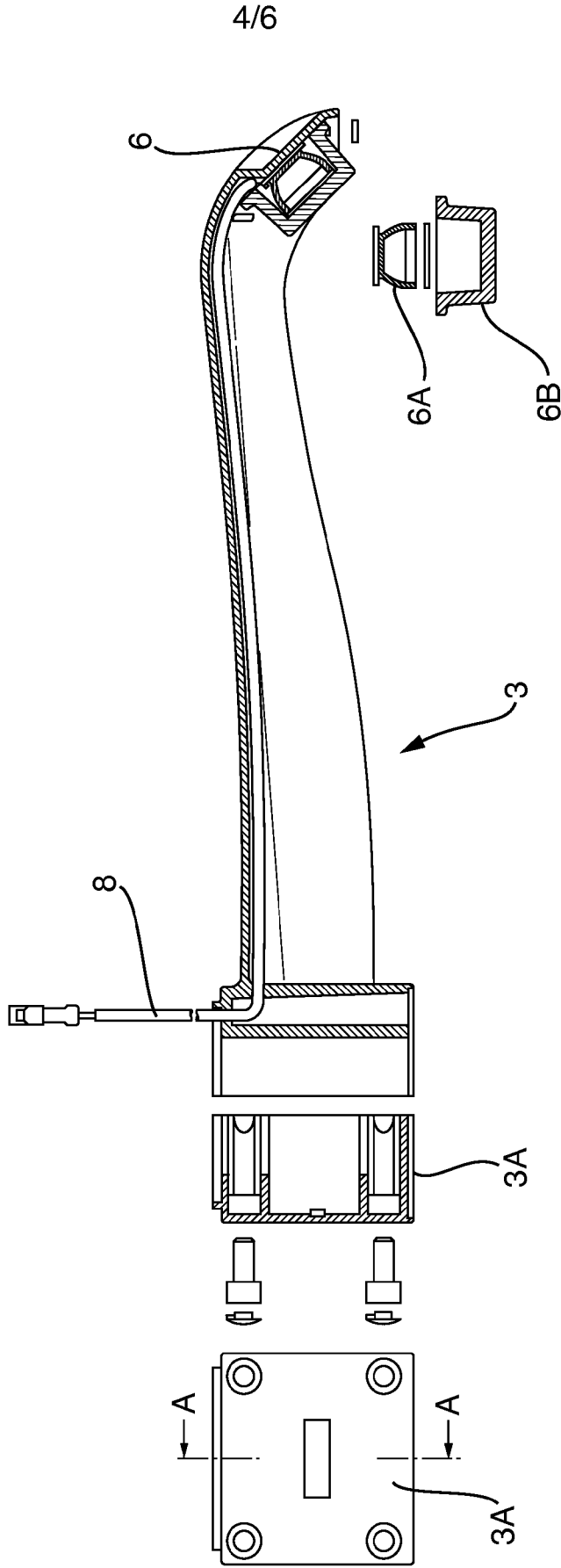


Fig. 6



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Fig. 7A

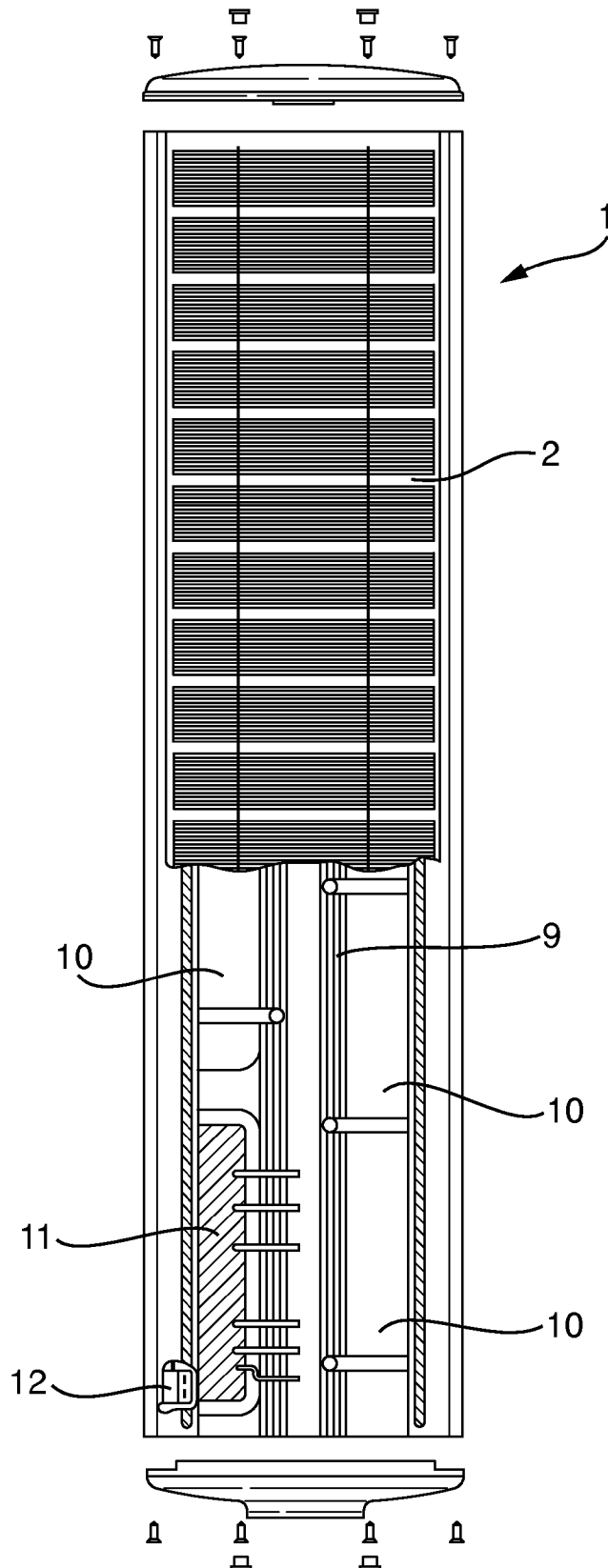


Fig. 7B

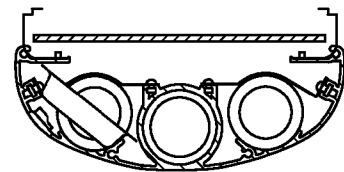
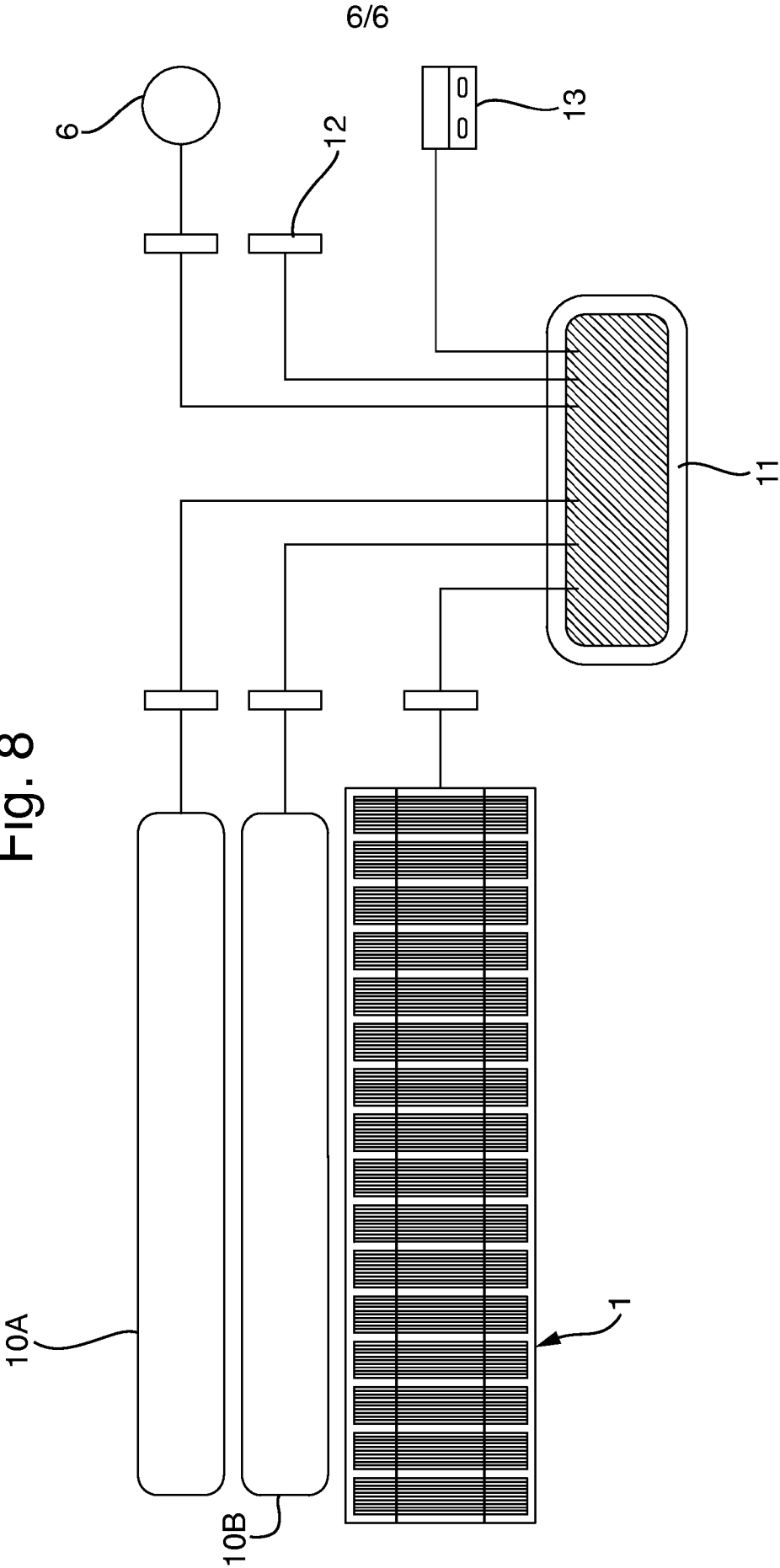


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2013/051840

A. CLASSIFICATION OF SUBJECT MATTER
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ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G09F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 20 2006 012244 U1 (MIRGEL GOTTFRIED [DE]) 14 December 2006 (2006-12-14)	1,15-19
Y	paragraphs [0001], [0014], [0017], [0018]	4-7,10,11,20
A	figures 1,4,5	2,3,8,9,12-14
Y	----- GB 2 464 288 A (ZETA CONTROLS LTD [GB]) 14 April 2010 (2010-04-14)	4-7,10,11
A	page 4, line 4 - page 5, line 2 page 5, line 9 - page 6, line 3 page 7, line 12 figures 1,4,19 ----- -/-	1-3,8,9,12-20



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See patent family annex.

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Date of the actual completion of the international search

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Name and mailing address of the ISA/

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Lechanteux, Alice

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2013/051840

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1 284 478 A1 (PROTAC AG [CH] RUTISHAUSER PRODUKTION AG [CH]) 19 February 2003 (2003-02-19)	20
A	paragraphs [0028], [0029] figures 1,2 -----	1-19
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2013/051840

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