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[Continued on next page]

(54) Title: LIGHT

(57) Abstract: A light (10) for use with a beverage bottle includes: (i) a hollow, elongate housing (12) for receiving a battery therein; (ii) at least one LED (16) at or near a first axis end of the housing; (iii) at least one photovoltaic panel (14) located within the housing or on the housing, the portion of the housing with the photovoltaic panel (14) and LED (16) being sized and shaped to fit through a bottle mouth 22 mm in diameter; and (iv) a head (22) at or near the second axial end of the housing that is greater than 22mm in diameter, such that the light (10), with the exception of the head (22), can be inserted through a threaded bottle mouth.

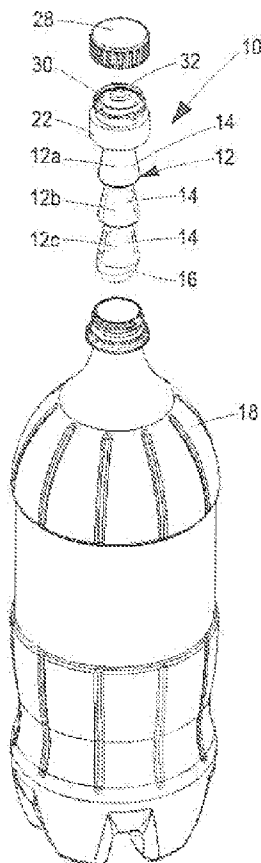


Figure 1



MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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- with international search report (Art. 21(3))
- with amended claims (Art. 19(1))

LIGHT

BACKGROUND

The present invention relates to a light. More specifically, the present invention relates to a light with a housing that is insertable within a bottle and that includes a photovoltaic panel on the radial outer surface of the housing.

Solar powered lights that are connectable to bottles are known. For instance, the SOLAR BULP LAMP manufactured by MiniWiz can be screwed to the mouth of a bottle. However, only the light emitting diode is designed to protrude into the bottle.

A drawback of known solar bottle lights is that the photovoltaic panel is located outside the bottle and therefore susceptible to damage.

The present invention aims to address this drawback and to locate the photovoltaic panel on a section of the light housing that is designed to locate within the protective environment of a bottle.

SUMMARY OF THE INVENTION

According to a preferred embodiment of the present invention, a light includes:

a hollow, elongate housing for receiving a battery therein;

at least one LED at or near a first axial end of the housing;

at least one photovoltaic panel located within the housing or on the housing;

the portion of the housing with the photovoltaic panel and LED being sized and shaped to fit through a bottle mouth 22mm in diameter; and

a head at or near the second axial end of the housing that is greater than 22mm in diameter,

such that the light, with the exception of the head, can be inserted through a threaded bottle mouth.

Typically, the at least one photovoltaic panel is on the radial outer surface of the housing.

Generally, the portion of the housing with the photovoltaic panel and LED is sized and shaped to fit within a virtual right circular cylinder 22mm in diameter.

Preferably, the head includes a female threaded portion for, in use, co-operating with the male threaded portion on a threaded bottle mouth to secure the light to the bottle.

Typically, the head includes a male threaded portion for, in use, co-operating with the female threaded portion on a threaded bottle cap to secure the cap to the light.

Generally, the housing is right circular cylindrical.

Preferably, the housing defines a series of co-axial frustoconical sections.

Typically, a photovoltaic panel is located on the radial outer surface of each frustoconical section.

Generally, the light further includes a switch at or near the second axial end of the housing.

Preferably, the switch includes an element that is movable along the axis of the housing between a retracted position and an extended position.

Typically, the switch element is biased towards the extended position.

Generally, in use, the action of screwing a cap onto the head causes the switch element to move from the extended to the retracted position.

Preferably, the switch circuit is closed when the switch element is in one of: (i) the retracted position; and (ii) the extended position.

Typically, the LED is oriented at an angle to the longitudinal axis of the housing.

Generally, the LED is angularly offset relative to the longitudinal axis of the housing by between 20 degrees and 70 degrees.

Preferably, at least a portion of the head in axial cross section is polygonal.

Typically, the photovoltaic in cross section: (i) forms an arc; or (ii) comprises at least two linear portions that are angularly offset relative to each other.

Generally, the light further includes a cord that is secured at one end to the light.

Preferably, the cord is attached at one end to the switch.

Typically, the head defines an annular groove for receiving the cord therein.

According to an alternative embodiment of the invention, there is provided a light according to the preferred embodiment of the invention located within a bottle with a bottle cap secured to the bottle or the head.

Typically, the housing is located within the bottle, the head is threadably secured to the bottle mouth and the bottle cap is threadably secured to the head.

Optionally, the bottle is charged with a liquid.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is an exploded perspective view of a light according to a preferred embodiment of the invention;

Figure 2 is a perspective view of the light in Figure 1 in an assembled state; and

Figure 3 is a cross-sectional side view of the light in Figure 1 and

Figure 4 is a perspective view of a light according to an alternative embodiment of the invention.

DESCRIPTIONS OF THE INVENTION

With reference to Figures 1 to 3, a light 10 according to a preferred embodiment of the invention includes a housing 12, photovoltaic panels 14, a light emitting diode (LED) 16 and bottle 18.

The housing 12 is elongate and hollow so as to receive rechargeable batteries 20 therein. The housing 12 defines a longitudinal axis with the LED 16 secured at a first axial end. A portion of the housing 12 is in shape formed from a series of co-axial frustoconical sections 12a-c, connected end-to-end with their bases proximal the first axial end. The portion of the housing 12 including the frustoconical sections 12a-c and the LED 16 is sized and shaped, in use, to fit through a mouth of a standard beverage bottle 18 (i.e. a bottle mouth with an inner diameter of 22mm). Preferably, the portion of the housing 12 including the frustoconical sections 12a-c and the LED 16 is sized and shaped to fit within a virtual right circular cylinder 22mm in diameter.

The housing 12 defines a head 22 at or near its second axial end. The head 22 is greater than 22mm in diameter, i.e. oversized relative to the mouth of a standard beverage bottle 18.

The head 22 includes a female thread portion 24, in use, threadably to secure the head 22 to the male thread portion proximal the mouth of a beverage bottle 18. The head 22 also includes a male threaded portion 26, in use, threadably to secure the head 22 to the female thread portion on the cap 28 of the beverage bottle 18.

It will be appreciated that a portion of the head 22 could be polygonal in cross-sectional shape (e.g. octagonal), as shown in Figure 4. This polygonal head 122 will prevent the light 10 from rolling when placed on a slightly inclined surface.

Returning to the preferred embodiment of the invention shown in Figures 1 to 3, a photovoltaic panel 14 is located on the radial outer surface of the housing 12. More

specifically, a photovoltaic panel 14 is located on the radial outer surface of each frustoconical section 12a-c. In use, the photovoltaic panels 14 charge the batteries 20.

It will be appreciated that the photovoltaic panel 14 could alternatively be located within a transparent housing. Such an arrangement is shown in Figure 4. In this embodiment, the housing 112 is half cylindrical and the photovoltaic panel 114 extends along the diameter of the housing 112.

Returning to the preferred embodiment of the invention illustrated in Figures 1 to 3, the photovoltaic panel 14 in cross section either forms an arc or comprises at least two linear portions that are angularly offset relative to each other. In other words, the photovoltaic panel could comprise a flat photovoltaic panel that is folded into an L, V, U or square shape. A benefit of such an arrangement is that, should the light 10 be placed on a horizontal surface, the curved shape of the photovoltaic panel 14 will maximise exposure to sunlight over a wider arc of the sun's travel.

A switch 30 is located at or near the second axial end of the housing 12. The switch 30 includes a switch element 32 that is movable along the axis of the housing 12 between a retracted position and an extended position (in which the switch element 32 is displaced from the first axial end). The switch element 32 is biased towards the extended position. In use, the action of threading a cap 28 onto the head 22 causes the cap 28 to push the switch element 32 towards the retracted position. The switch 30 can be configured to close the electrical circuit when the switch element 32 is in one of the extended position and the retracted position. Preferably, the circuit is closed when the switch element 32 is in the retracted position.

The LED 16 is oriented at an angle to the longitudinal axis of the housing 12 so as not to direct light axially. Preferably, the LED 16 is angularly offset relative to the longitudinal axis of the housing 12 by between 20 degrees and 70 degrees. As such, the LED 16, in use, directs light towards the side of the bottle 18, which may be more suitable should a user wish to use the light 10 to read. By rotating the bottle 18 (with light 10 inserted), the emitted light can be directed in different directions. A shroud around the LED 16 also assists in focusing the emitted light.

In use:

- rechargeable batteries 20 are inserted into the housing 12;

- the portion of the housing 12 with the photovoltaic panels 14 is inserted through the threaded mouth of a standard beverage bottle 18;
- the female threaded portion on the head 22 is threadably secured to the male threaded portion by the mouth of the beverage bottle 18, thereby to secure the light 10 to the bottle 18;
- the cap 28 of the beverage bottle 18 is threadably secured to the male threaded portion on the head 22, thereby forcing the switch element 32 towards the retracted position and closing the electrical circuit connecting the batteries 20 with the LED 16;
- the bottle 18 is then rotated to direct the light emitted by the LED 16, as required.

Optionally, the bottle 18 may be charged with a liquid (even, a coloured liquid) to alter the light characteristics (e.g. intensity and colour) of the light emitted by the LED 16.

It will be appreciated that, in use, the sun is generally oriented at an altitude to the light 10, and the longitudinal axis of the housing 12 is oriented substantially vertically with the head 22 above the LED 16. As such, the sloping sides of the frustoconical section 12a-c renders the photovoltaic panels more efficient to receive light rays and generate electricity.

However, it will be appreciated that the portion of the housing 12 with the photovoltaic panels 14 need not be formed from a series of frustocones. Alternatively, such portion of the housing 12 may be right circular cylindrical 22mm or less in diameter.

Furthermore, it will be appreciated that the head 22 need not include threaded portions. Instead, the head could be only slightly oversized relative to the mouth of the beverage bottle 18 so as to prevent the light 10 from being wholly inserted within the bottle 18. For instance, the head 22 could be 22.5mm in diameter. In this embodiment, the cap 28 could threadably be secured directly to the male threaded portion proximal the mouth of the bottle 18.

Even further, the head could define an annular groove (not shown) for receiving a cord (not shown) therein. The cord could be connected to the light 10 at one end and, when unwound from the annular groove, the cord could be used to hang the light 10. It is also envisaged that the cord could be connected at one end to the switch 30 so as to actuate the switch 30 between the on and off conditions by tugging at the cord.

CLAIMS

1. A light including:
 - a hollow, elongate housing for receiving a battery therein;
 - at least one LED at or near a first axial end of the housing;
 - at least one photovoltaic panel located within the housing or on the housing;
 - the portion of the housing with the photovoltaic panel and LED being sized and shaped to fit through a bottle mouth 22mm in diameter; and
 - a head at or near the second axial end of the housing that is greater than 22mm in diameter,such that the light, with the exception of the head, can be inserted through a threaded bottle mouth.
2. A light according to claim 1, wherein the at least one photovoltaic panel is on the radial outer surface of the housing.
3. A light according to claim 2, wherein the portion of the housing with the photovoltaic panel and LED is sized and shaped to fit within a virtual right circular cylinder 22mm in diameter.
4. A light according to claim 3, wherein the head includes a female threaded portion for, in use, co-operating with the male threaded portion on a threaded bottle mouth to secure the light to the bottle.
5. A light according to claim 4, wherein the head includes a male threaded portion for, in use, co-operating with the female threaded portion on a threaded bottle cap to secure the cap to the light.
6. A light according to claim 5, wherein the housing is right circular cylindrical.

7. A light according to claim 6, wherein the housing defines a series of co-axial frustoconical sections.
8. A light according to claim 7, wherein a photovoltaic panel is located on the radial outer surface of each frustoconical section.
9. A light according to either claim 6 or claim 8, further including a switch at or near the second axial end of the housing.
10. A light according to claim 9, wherein the switch includes an element that is movable along the axis of the housing between a retracted position and an extended position.
11. A light according to claim 10, wherein the switch element is biased towards the extended position.
12. A light according to claim 11, wherein, in use, the action of screwing a cap onto the head causes the switch element to move from the extended to the retracted position.
13. A light according to claim 12, wherein the switch circuit is closed when the switch element is in one of: (i) the retracted position; and (ii) the extended position.
14. A light according to claim 13, wherein the LED is oriented at an angle to the longitudinal axis of the housing.
15. A light according to claim 14, wherein the LED is angularly offset relative to the longitudinal axis of the housing by between 20 degrees and 70 degrees.
16. A light according to claim 15, wherein at least a portion of the head in axial cross section is polygonal.
17. A light according to claim 16, wherein the photovoltaic in cross section: (i) forms an arc; or (ii) comprises at least two linear portions that are angularly offset relative to each other.

18. A light according to claim 17 further including a cord that is secured at one end to the light.
19. A light according to claim 18, wherein the cord is attached at one end to the switch.
20. A light according to claim 19, wherein the head defines an annular groove for receiving the cord therein.
21. A light according to claim 20 located within a bottle with a bottle cap secured to the bottle or the head.
22. A light according to claim 21, wherein the housing is located within the bottle, the head is threadably secured to the bottle mouth and the bottle cap is threadable secured to the head.
23. A light according to claim 22, wherein the bottle is charged with a liquid.

AMENDED CLAIMS

received by the International Bureau on 27 March 2015(27.03.2015)

1. A light including:
 - a hollow, elongate housing for receiving a battery therein;
 - at least one LED at or near a first axial end of the housing;
 - at least one photovoltaic panel located on the radial outer surface of the housing;
 - the portion of the housing with the photovoltaic panel and LED being sized and shaped to fit through a bottle mouth 22mm in diameter; and
 - a head at or near the second axial end of the housing that is greater than 22mm in diameter,such that the light, with the exception of the head, can be inserted through a threaded bottle mouth.
2. A light according to claim 1, wherein the portion of the housing with the photovoltaic panel and LED is sized and shaped to fit within a virtual right circular cylinder 22mm in diameter.
3. A light according to claim 2, wherein the head includes a female threaded portion for, in use, co-operating with the male threaded portion on a threaded bottle mouth to secure the light to the bottle.
4. A light according to claim 3, wherein the head includes a male threaded portion for, in use, co-operating with the female threaded portion on a threaded bottle cap to secure the cap to the light.
5. A light according to claim 4, wherein the housing is right circular cylindrical.
6. A light according to claim 5, wherein the housing defines a series of co-axial frustoconical sections.

7. A light according to claim 6, wherein a photovoltaic panel is located on the radial outer surface of each frustoconical section.
8. A light according to either claim 5 or claim 7, further including a switch at or near the second axial end of the housing.
9. A light according to claim 8, wherein the switch includes an element that is movable along the axis of the housing between a retracted position and an extended position.
10. A light according to claim 9, wherein the switch element is biased towards the extended position.
11. A light according to claim 10, wherein, in use, the action of screwing a cap onto the head causes the switch element to move from the extended to the retracted position.
12. A light according to claim 11, wherein the switch circuit is closed when the switch element is in one of: (i) the retracted position; and (ii) the extended position.
13. A light according to claim 12, wherein the LED is oriented at an angle to the longitudinal axis of the housing.
14. A light according to claim 13, wherein the LED is angularly offset relative to the longitudinal axis of the housing by between 20 degrees and 70 degrees.
15. A light according to claim 14, wherein at least a portion of the head in axial cross section is polygonal.
16. A light according to claim 15, wherein the photovoltaic in cross section: (i) forms an arc; or (ii) comprises at least two linear portions that are angularly offset relative to each other.
17. A light according to claim 16 further including a cord that is secured at one end to the light.
18. A light according to claim 17, wherein the cord is attached at one end to the switch.

19. A light according to claim 18, wherein the head defines an annular groove for receiving the cord therein.
20. A light according to claim 19 located within a bottle with a bottle cap secured to the bottle or the head.
21. A light according to claim 20, wherein the housing is located within the bottle, the head is threadably secured to the bottle mouth and the bottle cap is threadable secured to the head.
22. A light according to claim 21, wherein the bottle is charged with a liquid.

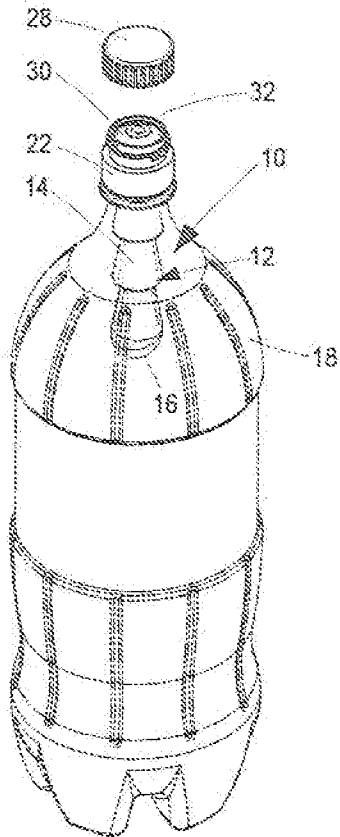
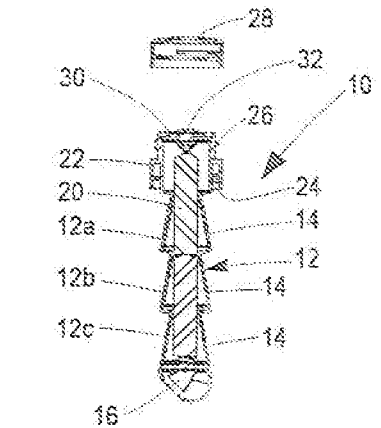
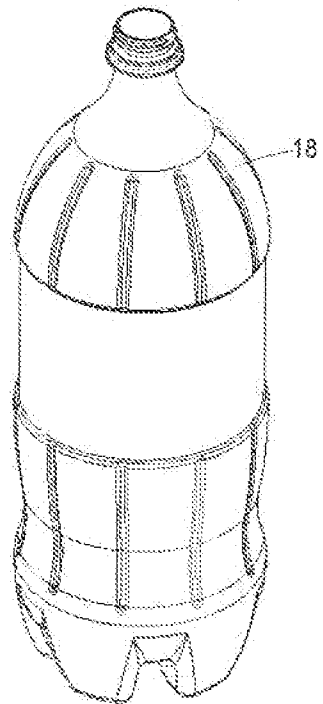
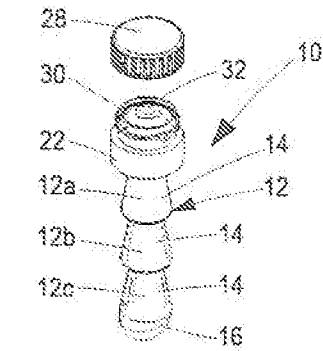


Figure 2

Figure 1

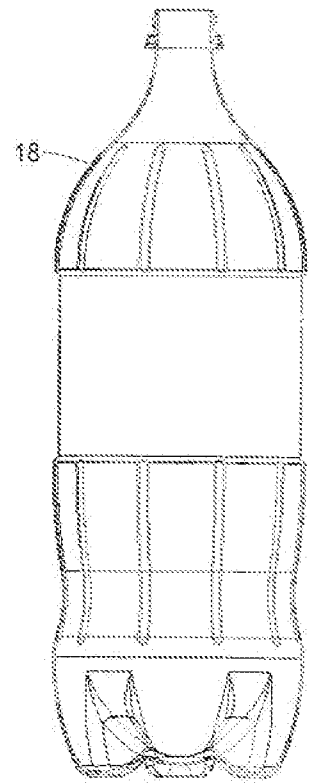


Figure 3

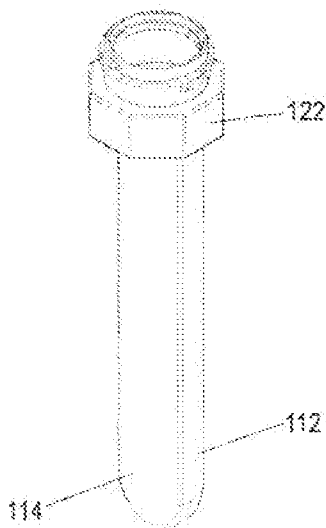


Figure 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT / ZA 2014/000056

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC: F21S 9/03 (2006.01); F21L 4/08 (2006.01); F21V 33/00 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC</p>		
<p>B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) F21L, F21S, F21V Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p>		
<p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPODOC, WPI, TXTnn</p>		
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 202118771 U (HANGZHOU WANGDOU DIGITAL TECHNOLOGY CO., LTD) 18 January 2012 (18.01.2012) (abstract). [online] [retrieved on 2013-03-17]. Retrieved from: EPOQUE, EPODOC and WPI Databases. Abstract, figures 1-3; english translation of description and claims from Database TXTCNS	1,4,6,9-13, 18,21
Y	DE 202008001443 U1 (TILGER, ERIK) 14 August 2008 (14.08.2008) Figure on page 7 "embodiment I/variant III."; paragraphs [0001]-[0006]; list of reference numerals; Figure on page 9 "embodiment III."; paragraph [0014]	1,4,6,9-13, 18,21
A	CN 202484839 U (PENG JIAN) 10 October 2012 (10.10.2012) (abstract). [online] [retrieved on 2013-03-17]. Retrieved from: EPOQUE, EPODOC and WPI Databases. Abstract, figures 1,2; english translation of description and claims from Database TXTCNS	1,6,9,21
<p><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.</p>		<p><input checked="" type="checkbox"/> See patent family annex.</p>
<p>* Special categories of cited documents:</p>		
<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p>		<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p>
<p>"E" earlier application or patent but published on or after the international filing date</p>		<p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p>
<p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p>		<p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p>
<p>"O" document referring to an oral disclosure, use, exhibition or other means</p>		<p>"&" document member of the same patent family</p>
<p>"P" document published prior to the international filing date but later than the priority date claimed</p>		
<p>Date of the actual completion of the international search 17 March 2015 (17.03.2015)</p>		<p>Date of mailing of the international search report 25 March 2015 (25.03.2015)</p>
<p>Name and mailing address of the ISA/AT Austrian Patent Office Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24-535</p>		<p>Authorized officer VELINSKY-HUBER I. Telephone No. +43 / 1 / 534 24-371</p>

INTERNATIONAL SEARCH REPORT

International application No.

PCT / ZA 2014/000056

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	WO 2014107621 A2 (MPOWERD, INC) 10 July 2014 (10.07.2014) Fig. 1-4; paragraphs [0002], [0005], [0011]-[0013], [0021]	1,4,6,9, 22,23

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT / ZA 2014/000056

Patent document cited in search report			Patent family member(s)			Publication date
CN	U	202118771	CN	U	202118771	2012-01-18
DE	U1	202008001443	DE	U1	202008001443	2008-08-14
CN	U	202484839	CN	U	202484839	2012-10-10
WO	A2	2014107621	WO	A2	2014107621	2014-07-10