WE CLAIM:

1. Ring spinning machine with a ring rail (1), on which spinning rings (2) are arranged, on which a ring traveller (3) is mounted in a sliding manner in each case, wherein a sensor (4, 5) is present to detect the movement of the ring traveller (3), wherein a separator (6) is arranged between two adjacent spinning rings (2) above the ring rail (1) in such a way that upon a ring rail lift, its spacing from the ring rail (1) remains constant and the sensor (4, 5)is arranged in the lower region of the separator (6),
characterised
in that the sensor is configured as a microphone (4, 5)) and is held by the separator (6),
in that the microphone (4, 5) is arranged on a printed circuit board (7), which is let into a slot of the separator (6),
in that a display means (8), which displays the discontinuation of the movement of the ring traveller (3), is arranged on the printed circuit board (7)and
in that the display means (8) is arranged on the side of the printed circuit board facing the operator

2. Ring spinning machine as claimed in claim 1, wherein a second microphone (4, 5), which detects the movement of the ring traveller of the adjacent spinning ring, is arranged on the printed circuit board (7).

3. Ring spinning machine as claimed in claim 2, wherein a display means (8), which displays the discontinuation of the movement of one of the two adjacent ring travellers (3), is arranged on the printed circuit board (7).

Dated this 20th day of June, 2014

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IN PA 325 AGENT FOR
SAURER GERMANY GMBH & CO. KG

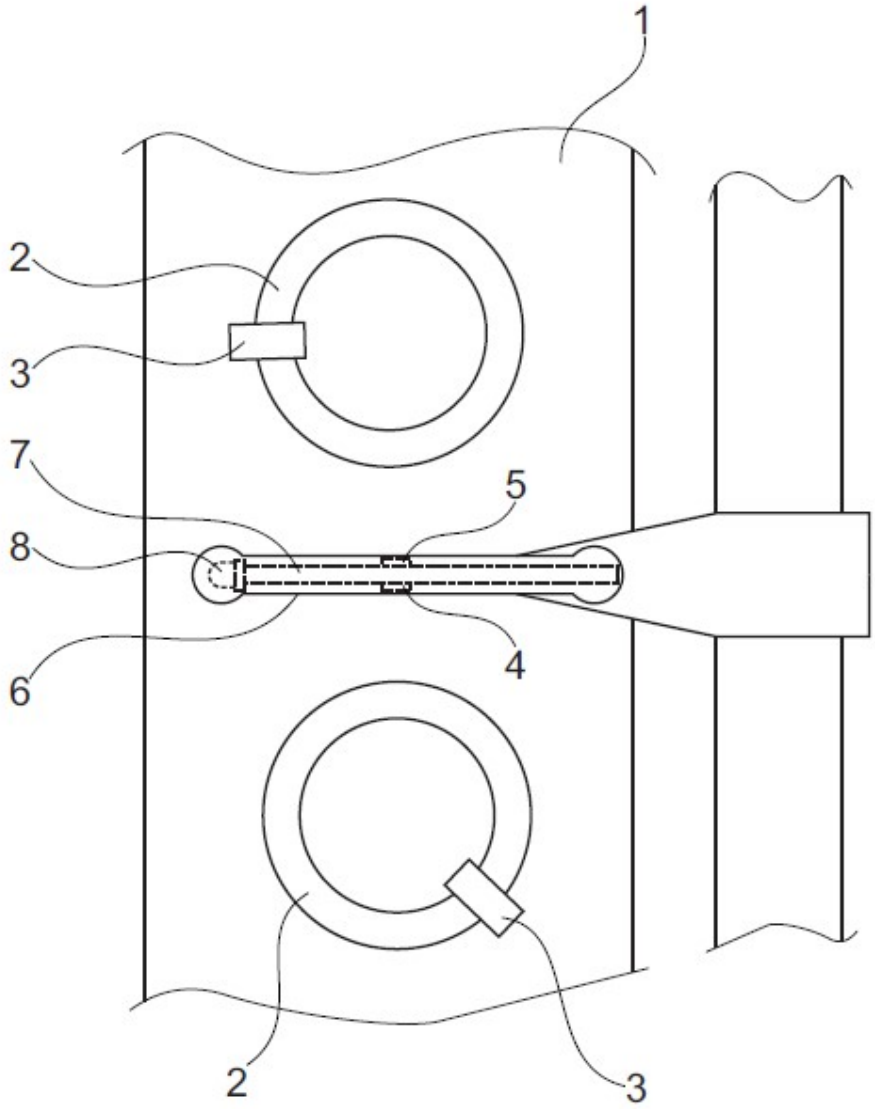

Fig. 1

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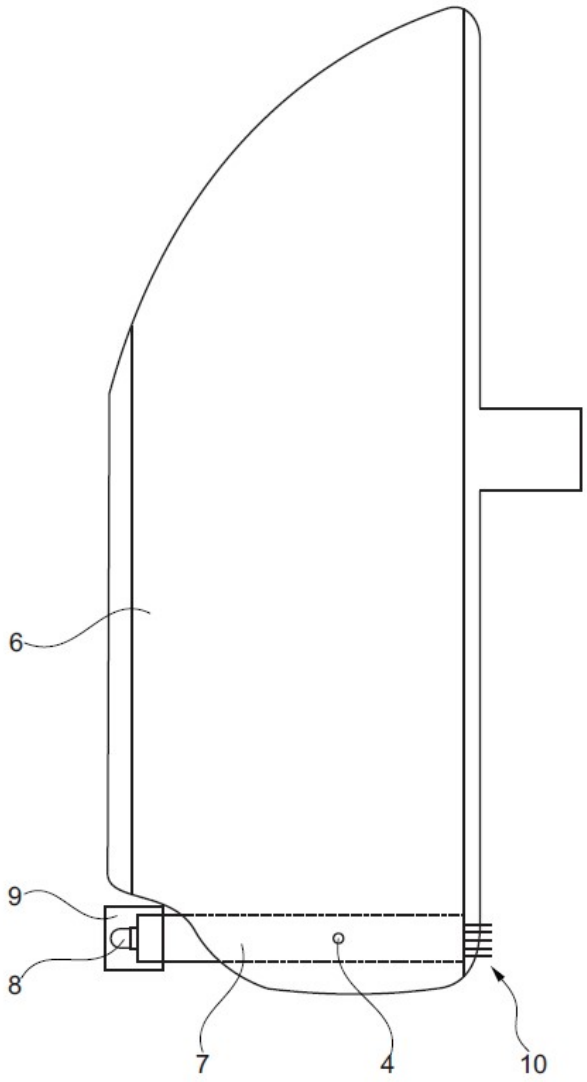

Fig. 2

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ENGLISH TRANSLATION VERIFICATION

CERTIFICATE u/r. 21(2)

I, **Mr. HIRAL CHANDRAKANT JOSHI,** an authorized agent for the applicant, **SAURER GERMANY GMBH & CO. KG** do hereby verify that the content of English translation of certified German Priority Application No. 10 2013 011 921.9 dated July 17, 2013 thereof is correct and complete.

HIRAL CHANDRAKANT JOSHI
AGENT FOR
SAURER GERMANY GMBH & CO. KG

==========

PATENTS ACT 1970

VERIFICATION OF TRANSLATION

I, ASTRID TERRY, translator of 11, Bounds Oak Way, Tunbridge Wells, Kent. TN4 OUB, England, confirm that I am conversant with the English and German languages and I am a competent translator from one to the other. I declare to the best of my knowledge and belief that the attached English translation is a true and correct translation re. DE 10 2013 011 921.9 dated the 17th July 2013

Astrid Terry

Dated this 20th day of May 2013.

FORM 2

THE PATENT ACT 1970
(39 of 1970)

&

The Patents Rules, 2003
COMPLETE SPECIFICATION
(See Section 10, and rule 13)

1. TITLE OF INVENTION

RING SPINNING MACHINE WITH A SENSOR TO DETECT THE MOVEMENT OF THE RING TRAVELLER

2. APPLICANT(S)

a) Name : SAURER GERMANY GMBH & CO. KG
b) Nationality : GERMAN Company
c) Address : LEVERKUSER STRASSE 65,
42897 REMSCHEID,
GERMANY

3. PREAMBLE TO THE DESCRIPTION

The following specification particularly describes the invention and the manner in which it is to be performed : -

The invention relates to a ring spinning machine with a ring rail, spinning rings, on which a ring traveller is mounted in each case in a sliding manner, being arranged on the ring rail. A sensor is present to detect the movement of a ring traveller. A separator is arranged between two adjacent spinning rings above the ring rail in such a way that the spacing from the ring rail remains constant upon a ring rail lift.

EP 1 052 314 A1 discloses a sensor system for a ring spinning machine. Spinning rings are fastened to the ring rail. The ring traveller runs on the spinning rings. During spinning, the ring traveller is driven by the thread and made to rotate. A sensor detects the movement of the ring traveller. Thread breaks can be detected in this manner. A display means, which displays the thread break to the operator, is arranged close to the spindle. The sensor is fastened to the ring rail. Various sensors that work according to various measuring principles are described. The most common method of contactlessly scanning the ring traveller movement is the use of a magnetic sensor. However, it is also possible to use vibration sensors, optical sensors or acoustic sensors.

According to CH 671 040 A5, inductive sensors to detect the movement of the ring travellers are arranged separately from the ring rail by means of a respective holder on an axle running parallel to the ring rail. The axle may be the axle which also mounts separators.

The separators are also called balloon separators or disc separators. These are separating plates made of metal or plastics material, which are arranged between two spindles arranged next to one another above the ring rail. The separators prevent thread balloons of two adjacent spindles, which form during spinning, from hindering one another. The disruption of the balloons by a thread broken at an adjacent spindle is also avoided.

By fastening the sensors on a separate axle, the accessibility of the ring rail is improved. The axle with the sensors can be folded back. The ring rail is thus

released, and the sensors cannot be damaged during work on the ring rail. As the sensors are fastened to holders, which are connected to the axle, the adjustment of the sensors is to be facilitated.

DD 293 152 A5 discloses a sensor unit with two inductive sensors to detect the ring traveller movement of two adjacent spindles. So that the sensors can reach the respective ring traveller, the housing of the sensor unit is arranged around the separator separating the spinning stations. This requires a corresponding complexity of the housing. The housing is fixed on to a slot on the ring rail or a cable channel along the length of the machine. The sensor is arranged close to the spinning ring. The accessibility of the spinning ring is at least restricted. The accessibility of the spinning ring is not only necessary during an exchange of the worn spinning ring or the ring traveller, but also at every thread interruption. For repiecing, the operator manually brings the ring traveller into a suitable position, for which he moves his finger along the spinning ring.

The object of the present invention is to further improve the accessibility of the spinning ring and the ring traveller and the protection of the sensors.

To achieve the object, the sensor is configured as a microphone, arranged in the lower region of the separator and held thereby.

Owing to the arrangement of the sensor on the separator, the sensor itself no longer hinders the accessibility of the spinning ring. The separators are generally necessary to limit the thread balloon and therefore present in any case. A separate holder for the sensor is dispensed with. However, the separators have a greater spacing from the spinning rings than the common inductive sensors. A certain spacing of the separators is required so that a thread balloon can be formed. The inductive sensors have to be arranged close to the spinning ring due to the measuring principle. Moreover, the spacing has to be adjusted very precisely. The inductive sensors furthermore have field-producing coils. A corresponding weight results from this.

An arrangement of the inductive sensors on the separators is not possible in conjunction with inductive sensors because the weight of the inductive sensors and spacing of the separators from the spinning rings are too great. The invention is based on the recognition that acoustic sensors are significantly lighter and can be arranged at a greater spacing from the spinning ring. The microphone therefore does not burden the separator either by its extent or by its weight. The greater spacing of the separators from the spinning rings is not a problem for acoustic sensors and at the same time provides protection for the sensor. Acoustic sensors also have the advantage that they are less sensitive to fluctuations of the spacing. The same arrangement can thus be used with spinning rings having a different size. Moreover, non-magnetic ring travellers can also be used. The measuring arrangement according to the invention thus additionally increases the flexibility of the ring spinning machine.

The microphone may be arranged under the separator or on the side face of the separator. It is also possible to let the microphone into the separator. In every case, the microphone points in the direction of the spinning ring.

The microphone may be arranged on a printed circuit board, which is let into a slot of the separator. The printed circuit board can furthermore be equipped with evaluation electronics for the microphone.

If the microphone or the printed circuit board with the microphone is let into the separator, the separator is simultaneously used as a housing and thus protects the sensor from contact. An arrangement of the microphone under the separator also brings about contact protection.

A second microphone, which detects the movement of the ring traveller of the adjacent spinning ring, may be arranged on a printed circuit board let into the separator. With a configuration of this type, only every second separator has a

printed circuit board. The two microphones do not only share the printed circuit board but can also together use evaluation electronics, the power supply etc.

A display means, which displays the discontinuation of the movement of the ring traveller, is preferably arranged on the printed circuit board. It is thus easy for the operator to recognise the spinning station with a thread interruption amongst the large number of spinning stations of a ring spinning machine and to carry out the repiecing.

If two microphones are arranged on the printed circuit board, a display means can display the discontinuation of the movement of one of the two ring travellers. In other words, two spinning stations share one display means. In this manner, the total number of display means of the ring spinning machine that display a thread interruption can be halved. For the operator's orientation, one display means for two spinning stations is absolutely sufficient. When the operator has reached the region of the display means, the workstation in need of attention can easily be recognised.

The invention also relates to a separator for a ring spinning machine, in the lower region of which is arranged a microphone to detect the movement of a ring traveller. The microphone is held here by the separator.

The invention will be described in more detail below with the aid of an embodiment shown in the drawings, in which:

Fig. 1 shows a schematic detail of a ring spinning machine according to the invention;

Fig. 2 shows a separator with integrated microphones.

Fig. 1 shows a plan view of a ring rail 1 of a ring spinning machine. The ring rail 1 has spinning rings 2, on which a ring traveller 3 is rotatably mounted in each case. Separators 6 are arranged above the ring rail 1. The separators 6 are arranged between two spinning rings 2 or between two spinning stations of the ring spinning machine in order to limit the thread balloon forming during ring spinning and to avoid contact of the thread balloons of adjacent spinning stations. The separators 6 are moved up and down together with the ring rail 1 during spinning operation.

The separator 6, as can be seen in Figs. 1 and 2, has a printed circuit board 7. Fig. 2 shows the separator in a side view. The printed circuit board 7 is arranged in the lower region of the separator 6. In other words, the printed circuit board 7 is located at the end of the separator 6 facing the ring rail 1. The arrangement in the lower region of the separator 6 is due to the required closeness to the spinning ring 2. The printed circuit board 7 has two microphones 4 and 5, which are in each case arranged in such a way that they point in the direction of a spinning ring. The microphones 4, 5 detect the movement of the ring traveller 3. When the movement signal is absent, a thread break can be inferred. As the movement of two adjacent ring travellers can be detected by means of the printed circuit board shown, only every second separator 8 is equipped with a printed circuit board 7 in the embodiment shown.

The printed circuit board 7 furthermore has an evaluation unit, not shown. The printed circuit board 7 can be connected by connections 10 to a power supply and to the central control unit of the ring spinning machine. Furthermore, an LED 8, which is used as the display means, is arranged on the side of the printed circuit board facing the operator. The evaluation unit evaluates the signals of the two microphones 4 and 5. When the discontinuation of the movement of one of the two ring travellers is detected, the LED is illuminated and indicates a thread break to the operator. In the present embodiment, two spinning stations thus share one LED 8.

The printed circuit board 7 is let into a slot of the separator 6. The separator 6 is thus used simultaneously as a housing for the printed circuit board 7 and therefore protects the microphones 4 and 5. A small opening, through which the sound can pass, is provided in each case for the microphones 4 and 5 on the side faces of the separator 6. On the front side of the separator facing the operator there is an opening for the LED 8. A transparent cover 9 is provided for the LED 8. The connections 10 of the printed circuit board 7 exit on the opposing side, in other words on the rear side remote from the operator.

Owing to the arrangement according to the invention, maintenance work on the spinning ring 2 is not hindered. The ring traveller 3 can be exchanged without problems or thread breaks can be carried out without affecting the sensor 4, 5. The sensor 4, 5 is protected by the separators 6.

The figures show only one possible embodiment of the present invention. However, a large number of variants are possible. Thus only the microphone 4, 5 may be arranged on or in the separator 6. Each separator 6 may also have only one microphone 4, 5. The microphone 4, 5 may also be arranged under the separator, in other words in the region between the separator 6 and the ring rail 1.

WE CLAIM:

1. Ring spinning machine with a ring rail (1), on which spinning rings (2) are arranged, on which a ring traveller (3) is mounted in a sliding manner in each case, wherein a sensor (4, 5) is present to detect the movement of the ring traveller (3), wherein a separator (6) is arranged between two adjacent spinning rings (2) above the ring rail (1) in such a way that upon a ring rail lift, its spacing from the ring rail (1) remains constant, characterised in that the sensor is configured as a microphone (4, 5), is arranged in the lower region of the separator (6) and is held thereby.

2. Ring spinning machine according to claim 1, characterised in that the microphone (4, 5) is arranged under the separator (6).

3. Ring spinning machine according to claim 1, characterised in that the microphone (4, 5) is arranged on the side face of the separator (6).

4. Ring spinning machine according to claim 1, characterised in that the microphone (4, 5) is let into the separator (6).

5. Ring spinning machine according to claim 1, characterised in that the microphone (4, 5) is arranged on a printed circuit board (7), which is let into a slot of the separator (6).

6. Ring spinning machine according to claim 5, characterised in that a second microphone (4, 5), which detects the movement of the ring traveller of the adjacent spinning ring, is arranged on the printed circuit board (7).

7. Ring spinning machine according to claim 5, characterised in that a display means (8), which displays the discontinuation of the movement of the ring traveller (3), is arranged on the printed circuit board (7).

8. Ring spinning machine according to claim 6, characterised in that a display means (8), which displays the discontinuation of the movement of one of the two adjacent ring travellers (3), is arranged on the printed circuit board (7).

9. Separator (6) for a ring spinning machine, in the lower region of which is arranged a microphone (4, 5) to detect the movement of a ring traveller (3), and the microphone is held by the separator (6).

Dated this 20th day of June, 2014

HIRAL CHANDRAKANT JOSHI
AGENT FOR
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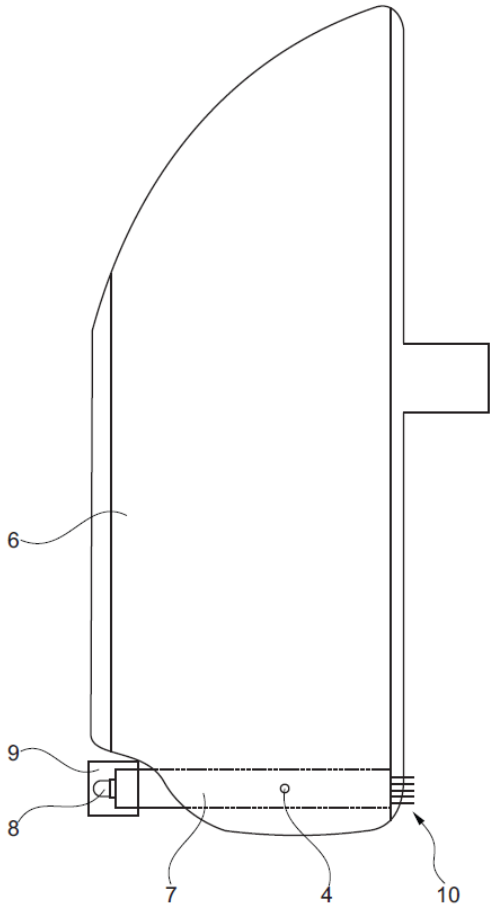
ABSTRACT

Title: Ring spinning machine with a sensor to detect the movement of the ring traveller

The invention relates to a ring spinning machine with a ring rail (1), spinning rings (2), on which a ring traveller (3) is rotatably fastened in each case, being arranged on the ring rail (1), wherein a sensor (4, 5) is present to detect the movement of a ring traveller (3)and wherein a separator (6) is arranged between two adjacent spinning rings (2) above the ring rail (1) in such a way that upon a ring rail lift, the spacing from the ring rail (1) remains constant. According to the invention, the sensor is configured as a microphone (4, 5), is arranged in the lower region of the separator (6) and is held thereby. The invention furthermore related to the separator (6).

To,
The Controller of Patents,
The Patent Office,
Mumbai

(Fig. 2)



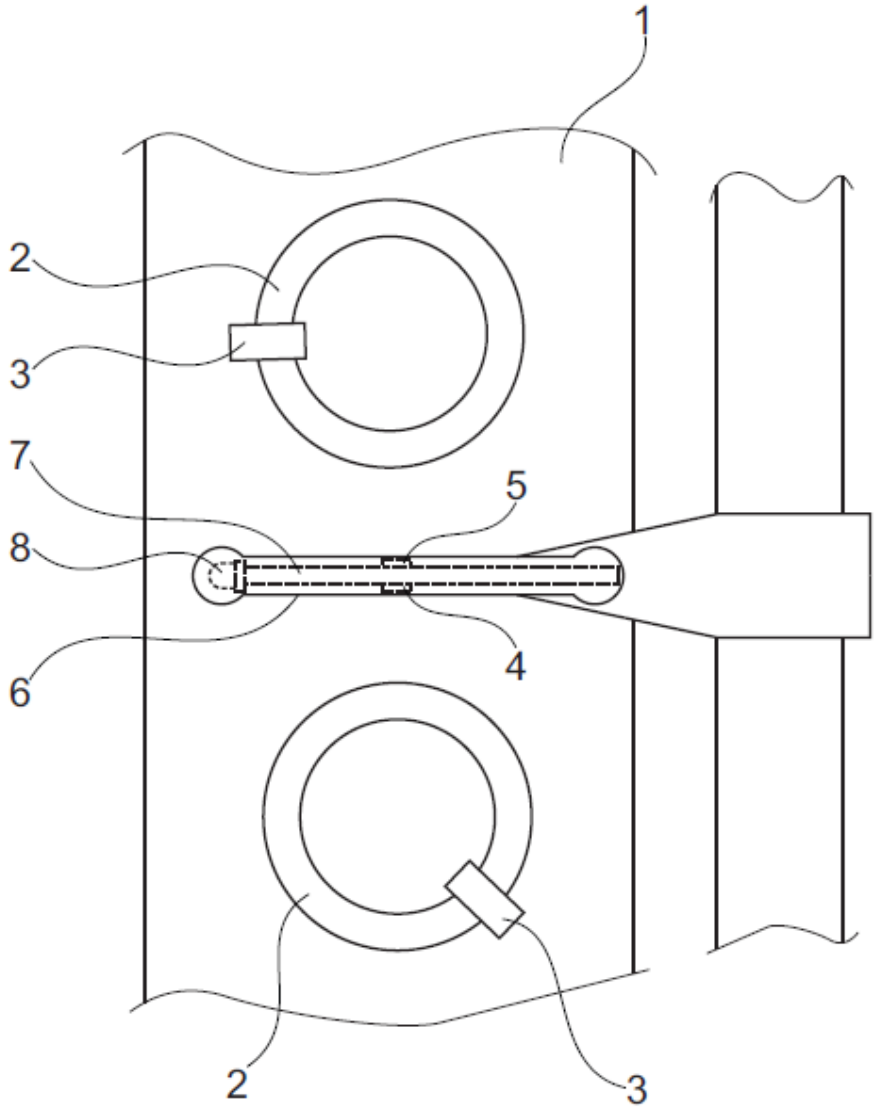


Fig. 1

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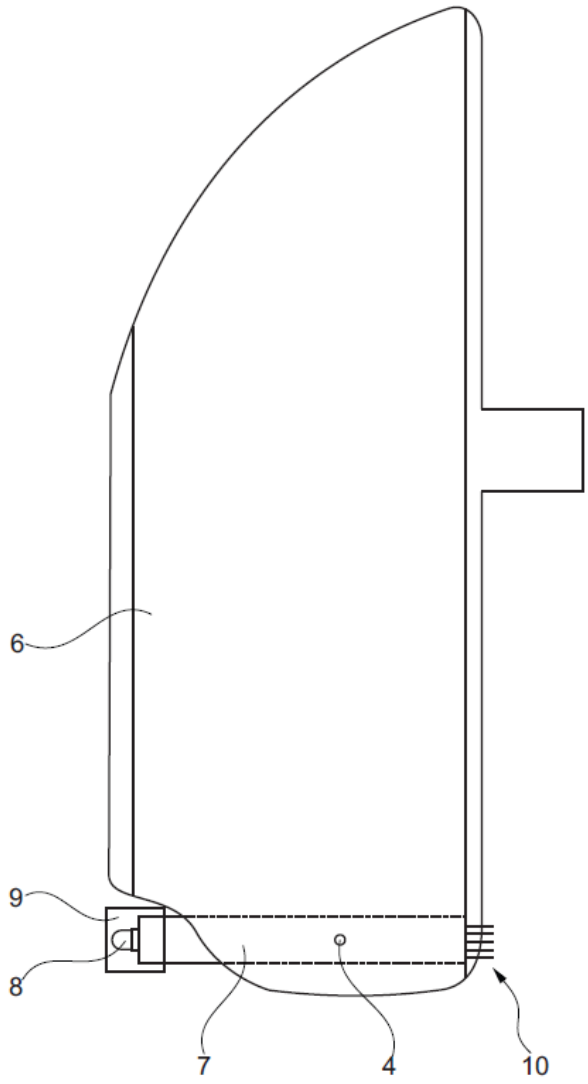

Fig. 2

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