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(54) **AN ADJUSTABLE LUMINAIRE**

(57) The present invention is related to an adjustable luminaire. The present invention provides screwing in and out a lamp module from the front side of a luminaire by means of two laterally protruding bosses on the rim side of the lamp module which can be bayonet twisted in a luminaire by means of a mechanical feature integrat-

ed in the two leave springs. The axis through the protruding bosses serves as a pivot rotation axis to allow tilting of the lamp module. In fact the mechanical feature in the leave spring has two functions i.e. bayonet feature and rotation axis for tilting.

EP 2 927 565 A1

Description**FIELD OF INVENTION**

[0001] The present invention relates to an adjustable luminaire. Particularly, present invention relates to twisting in and out a lamp module from the front side of a luminaire by means of two laterally protruding bosses on the rim side of the lamp module which can be bayonet twisted in a luminaire by means of a mechanical feature integrated in the two leave springs.

DESCRIPTION OF THE RELATED ART

[0002] In conventional lamps, the cap usually performs both the electrical and mechanical roles, or in case only electrical then the mechanical interface (e.g. the mounting rim of a PAR or MR lamp) does not permit tilting. Tilting mechanisms are provided by the luminaire itself, not by an interface between the lamp and the luminaire.

[0003] Further, some types of traditional luminaires function with an additional metal flexible clip which squeezes the lamp module rim between a surface of the luminaire and the clip. The metal clip snaps in a sideways groove in the luminaire. It is somehow difficult to replace the lamp module from the front side. Other types of luminaires need to be taken out of the ceiling for replacement of the lamp at the end of lifetime. Another kind of luminaire uses a combination of a spring system to push the lamp against a luminaire front part which can be removed from the front of the luminaire.

[0004] All above luminaire types are very unhandy to remove the lamp from the front side or in some cases it is required to take out the full luminaire out of the ceiling which is not user friendly. In all these traditional luminaires the tilting aspect is completely done by some part of the luminaire itself based on friction. The tilting is not carried out by an interface between the luminaire and the lamp module.

[0005] There is also a color mismatch between the lamp module and the luminaire from the front side (which is the most esthetical part of the luminaire). There is always a color difference between the so called retrofit lamp and the luminaire which is in many cases not desirable in more professional applications.

[0006] Most luminaires currently available are made out of metal (inclusive the front side) which are painted or anodized or brushed or chromed, and has less finish possibilities.

Reference may be made to the following prior arts:

[0007] US 7559677: An adjustment mechanism for a recessed light fixture comprises a housing, a first pivoting mechanism connected to the housing, a slotted pivot member connected to the first pivoting mechanism, an articulating lamp support movably connected to the slotted pivot member for translation and pivoting of the articulating lamp support, the slotted pivot member having two non-parallel slots for moving the articulating lamp support about a variable pivot point.

[0008] WO 2011148294: The invention is a support for LED lighting bodies comprising a containment frame for an orientable body suited to support LED lighting bodies and to swing with respect to said frame around at least one rotation axis (X), varying the inclination of the focal axis of the LEDs with respect to the normal (Y) to the support, through a means suited to adjust the position of said orientable body. Said adjusting means comprises a pin or screw directly resting on said orientable body.

[0009] WO 2004076918: A lighting apparatus with variable orientation in particular for street lighting comprises a lighting body, provided with at least one light source, applied to a support element, such as a post or an arm, through a support which comprises a first portion or outer shell, suitable for engaging with the lighting body, and a second inner portion or locking sleeve, suitable for being stably applied to an end of the support element, the first and second portion being hinged together at a fixed point, or pivot, as well as adjustment means of the relative inclination between said two portions.

[0010] US 7311422: An angle-adjustable recessed lamp structure comprises: a lamp bulb, a lamp holder, a rotatory carrier, and a mounting base. The rotatory carrier is securely screwed onto a track frame, which has a hollow sliding slot on the center of the arc-shaped body. The track frame is securely screwed on the fixing base via a fixing plate that locates on the rearward of the track frame. The fixing plate has two holding notches extending downward from both ends thereof for holding and positioning a rotation shaft. The rotation shaft is securely coupled with the coupling portion to enable the lamp holder to be rotatable by using pivotal connection between the rotatory carrier and the lamp holder. The lamp holder is upwards/downwards rotatable along the sliding slot within approximate 70 angles.

[0011] EP 1860369: A recessed light fixture including a base plate mountable in an opening in a room ceiling or wall, with the base plate having a front surface substantially flat and aligned with the ceiling or wall surface when mounted thereon, and a light opening through the base plate wherein the edge of the light opening is a sharp edge with the back surface tapering away from the front surface around the light opening at an angle of less than 45 degrees. A curved dome is adjacent the base plate back surface and centered on the light opening. A ring is mounted to the base plate for

selected rotation around the light opening, and a support track between the curved dome and the base plate is secured on its lower end to the ring and curved up and toward the light opening from its lower end. A socket support is mounted for adjustable movement on the support track, and a light socket is mounted to the socket support whereby a lamp in the socket emits light through the light opening.

[0012] US 20030007354: An adjustable light fixture includes a fixture assembly, a rotation adjustment assembly, and an angle adjustment assembly. The rotation adjustment assembly is configured to receive a lamp, orient the lamp relative to the fixture assembly, and maintain the orientation of the lamp relative to the fixture assembly when the lamp is removed and replaced. The angle adjustment assembly is movably connected to the fixture assembly and is configured to adjust the angle between the fixture assembly and the rotation adjustment assembly. A method of relamping an adjustable light fixture includes providing an adjustable light fixture, installing a lamp in the rotation adjustment assembly from above or below the adjustable light fixture, and adjusting the rotational or angular orientation of the fixture.

[0013] Thus there is a need to develop an improved lamp module and luminaire system which can overcome the drawbacks associated with the above prior arts.

OBJECTS OF THE INVENTION

[0014] Primary object of the present invention is to provide a lamp module that can be easily removed at the end of lifetime without replacing the whole luminaire

[0015] Another object of the present invention is to provide an adjustable luminaire, which facilitates replacement of the lamp module from the front side of the luminaire by means of an interface between the lamp module and luminaire.

[0016] Yet another object of the present invention is to provide separation of the electrical and mechanical interfaces of the lamp with the luminaire for additional functionality.

[0017] Still another object of the present invention is to provide an adjustable luminaire which facilitates installation and replacement of the lamp module.

[0018] Further another object of the present invention is to provide modular approach of screwing or twisting different shapes of decoration rings on the same fixation ring to personalize luminaire to specific needs.

[0019] Another object of the present invention is to make possible replacement of damaged building block without replacing the whole luminaire making recyclability much easier.

SUMMARY OF THE INVENTION

[0020] According to this invention there is provided twisting in and out a lamp module from the front side of a luminaire by means of laterally protruding bosses on the rim side of the lamp module which can be bayonet twisted in a luminaire with the help of a mechanical component preferably integrated in the two leave springs. The axis through the protruding bosses serves as a pivot rotation axis to allow tilting of the lamp module. The mechanical feature in the leave spring has two functions i.e. bayonet feature and rotation axis for tilting.

[0021] The combination of two features into the laterally protruding bosses on the side of the lamp module serve not only to fix the lamp into the luminaire by bayonet action, but also the dual function of acting as the pivot of rotation for the tilting mechanism.

[0022] In a preferred embodiment of the present invention, a new integrated downlight LED system comprising of a lamp module with a base preferably a GU10 socket is provided, that comprises integrated LED emitters, led board, electrical components (preferably including electronic driver), secondary optics, heatsink, base, connectors and a luminaire which has the components such as a fixation ring, two leave springs, atleast one tilt spring (preferably two) and a decoration ring.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0023] Further objects and advantages of this invention will be more apparent from the ensuing description when read in conjunction with the accompanying drawings and wherein:

FIG. 1 shows:	Exemplary embodiment of complete system according to the present invention;
FIG. 2A, 2B and 2C shows:	Front, back and isometric view of lamp module of present invention respectively;
FIG. 3 shows:	Indent grooves of heatsink;
FIG. 4 shows:	Luminaire in accordance with the present invention;
FIG. 5 shows:	Lamp module screwed in the luminaire (arrows on the fixation ring indicate the screw in direction);
FIG. 6 shows:	Twist and lock feature integrated in the leave spring (cut section view);
FIG. 7 shows:	Tilt spring in detail (left) and detail protruding section which interacts with the heatsink

FIG. 8 shows: grooves (right);
Tilt springs making contact with heatsink (left) and detail protruding section which interacts with the heatsink grooves (right);

FIG. 9 shows: cut section through the tilt spring and heatsink grooves (showing overlap region between protruding spring section and heatsink grooves);

Figure 10 shows: tilt position lamp module at 0° (left upper picture), at 10° (right upper picture) and 17.5° (left bottom picture).

DETAIL DESCRIPTION OF THE PRESENT INVENTION WITH REFERENCE TO THE ACCOMPANYING DRAWINGS

[0024] The present invention is directed to an adjustable recessed luminaire. The invention facilitates replacement of the lamp module from the front side of the luminaire by means of a mechanical interface between the lamp module and the luminaire. The interface comprises of pivot rotation interface and rotating interface. The pivot rotation interface constitutes two laterally protruding bosses of the lamp module and a mechanical lock-in slot created in the leave spring to handle two functions (bayonet screw in and out and rotation axis). The rotating interface is created by an additional tilt spring which is mounted on the fixation ring of the luminaire and preferably snaps in the grooves of the heatsink.

[0025] Now, reference may be made to Fig. 1 showing an integrated downlight LED system according to the present invention comprising of a lamp module with a base preferably with a GU10 socket (S₁) having LED emitters, led board, electrical components preferably including electronic driver, secondary optics, heatsink (1), base, connectors and a luminaire. The invention of Proposed Application focuses on luminaire, which is adjustable having atleast one fixation ring, at least two leave springs, atleast one tilt spring (preferably two) (2) and a decoration ring (3) of any shape for example round, square without restricting scope of the invention to the same.

[0026] The pivot rotation interface is created by atleast two laterally protruding bosses preferably on the rim of the lamp module and the mechanical lock-in slot is provided in the leave spring to handle the functions of bayonet screw in and out and rotation axis.

[0027] The pivot rotation interface is created by atleast two laterally protruding bosses preferably on the rim of the lamp module and the mechanical lock-in slot created in the tilt spring to handle the function of bayonet screw in and out and rotation axis.

[0028] The present invention provides separation of the electrical and mechanical interfaces of the lamp with the luminaire so as to add extra functionality. Tilting can be performed by creating a mechanical interface between the lamp module and the luminaire. The pivot rotation axis is created by the two laterally protruding bosses of the lamp module together with the mechanical feature integrated in the leave spring. The lamp module can rotate in preferably discrete steps by an additional tilt spring which is mounted on the fixation ring and which snaps in the indent grooves in the heatsink outer surface. A smooth rotation of the lamp module is of course also possible with the removal of the indents in the heatsink area as the interface is based on friction between the tilt spring and the heatsink surface.

[0029] Fig. 2 indicates front, back and iso view of the lamp module. The lamp module has a special designed heatsink which has two flat planes and is optionally provided with indent grooves. As seen in fig. 2C, the heat sink is a cylindrical body with a plurality of fins (F) on its outer surface, number of which is according to the requirement. The indent grooves (I) are positioned in the upper part of the heat sink on both sides. The indent grooves are preferably (but not necessarily) needed for interaction with the tilt spring to rotate the lamp module.

[0030] Now, reference may be made to fig. 3 showing indent grooves on the lamp module that have a triangular extruded shape, which is located on both side surface of the heat sink. This feature allows interaction with the tilt spring which has the same triangular extruded shape which snaps in these indent grooves.

[0031] The indent grooves could have also any other shape such as protruding slots or spherical bumps or spherical indents to perform the same tilting mechanism. The indent grooves are patterned around the lamp module rotation axis. In this configuration each slot is patterned over a particular step angle. However, it is obvious to a person skilled in the art that depending on the patterning radius, finer or wider step angles are possible and also the number of stands can be increased or decreased. The heatsink can also be snap fitted to a front ring on the front side of the module wherein the ring is preferably made of plastic. This feature allows the customer to choose the finish of the front ring (e.g. white matt, brushed alu or chrome or any other customized finish). Perfect color matching can be done between the front and decoration ring. The aspect that the color of the front and decoration ring can be played with has a more stylish approach as compared to conventional luminaires.

[0032] The leave springs serve two functions. First function is to fixate the luminaire in the ceiling by bending the springs to a circular shape as shown in fig. 4. It can work in concrete as well as in wooden ceilings without restricting scope of the invention to the same. The second function integrated in the spring is a twist and lock feature for aligning and fixating the lamp module in the luminaire as shown in fig. 6.

[0033] As shown in Fig. 5, the fixation ring has a multitude of slots (1) on the outer edge to screw the decoration ring thereon. This modular approach of screwing different shapes of decoration rings on the same fixation ring makes it

possible to personalize luminaire to one's specific needs. As the decoration and front ring is preferably made out of plastic (PC or ABS or PC/ABS blend) therefore different coatings or paintings or plastic foils can be applied to it, making almost every finish possible. Most luminaires currently available are made out of metal (inclusive the front side) which are painted or anodized or brushed or chromed having less finish possibilities than according to new approach of present invention.

[0034] The lamp module has two cylindrical pins which act as the rotation axis for tilting and fixation in the luminaire. The cylindrical pins require to be inserted in the slots (preferably two) (2) of the fixation ring. By twisting the lamp module clockwise, the lamp module is fixated by the two twist and lock features (T) in the two leave springs as in fig. 6. The lamp module can be easily taken out by twisting it in the reverse direction, which makes it possible to remove the lamp module at the end of lifetime without replacing the whole luminaire.

[0035] As shown in fig. 6 and 7, the tilt spring can be snap fitted on the fixation ring by two sideways snap fit lugs(S). It is held in position by a plurality of middle lugs (M) which make contact with the vertical walls of the chamber of the fixation ring to avoid movement in the horizontal plane.

[0036] Now referring to FIG. 8, in which tilt springs making contact with heatsink (left) and detail protruding section interacting with the heatsink grooves (right). The tilt lug (L, fig.6) snaps in the indents of the heatsink. It has a counterpart protruding section mostly identical to the shape of the heatsink groove. It is obvious that in case the shape of the heatsink grooves is changed, the shape of the protruding section of the tilt lug also needs to be adapted. The tilt spring is made preferably out of spring steel. The lamp module can be rotated around the cylindrical pins as it is locked in by the shape of the twist and lock feature after twisting it. During rotation of the lamp module around the rotation axis, the two tilt springs move a little sideways making it possible to jump from groove to groove on the heatsink area. The tilt lugs exert continuously a sideways force on both sides of the heat sink. The protruding section of the tilt springs are positioned in this example in the same plane as the rotation axis of the lamp. However, it is apparent to a person skilled in the art that this system could also work if the tilt springs are positioned perpendicular or at any other angle to the rotation axis of the lamp module.

[0037] Fig. 9 shows a cut section through the indents of the heatsinks grooves and tilt spring showing the overlap.

[0038] In figure 10, tilt position of the lamp module is displayed at 17.5°. In this example 15 stands are provided between -17.5 and 17.5° (step angle of 2.5°).

[0039] Thus, in the present invention, combination of two features into the laterally protruding bosses on the side of the lamp module serve not only to fix the lamp into the luminaire by bayonet action, but also the dual function of acting as the pivot of rotation for the tilting mechanism. Due to the laterally protruding bosses on the rim side of the lamp module and a special bended feature on the leave springs it is possible to twist and lock the lamp module in the luminaire easily from the front side of the luminaire. The leave spring serve two functions i.e. fixation of the luminaire in false and concrete ceilings but it has also a bended feature to twist and lock the lamp module.

[0040] The tilting of the lamp module is realized by a flexible, mechanical interface i.e. tilting spring between the luminaire and the lamp module itself.

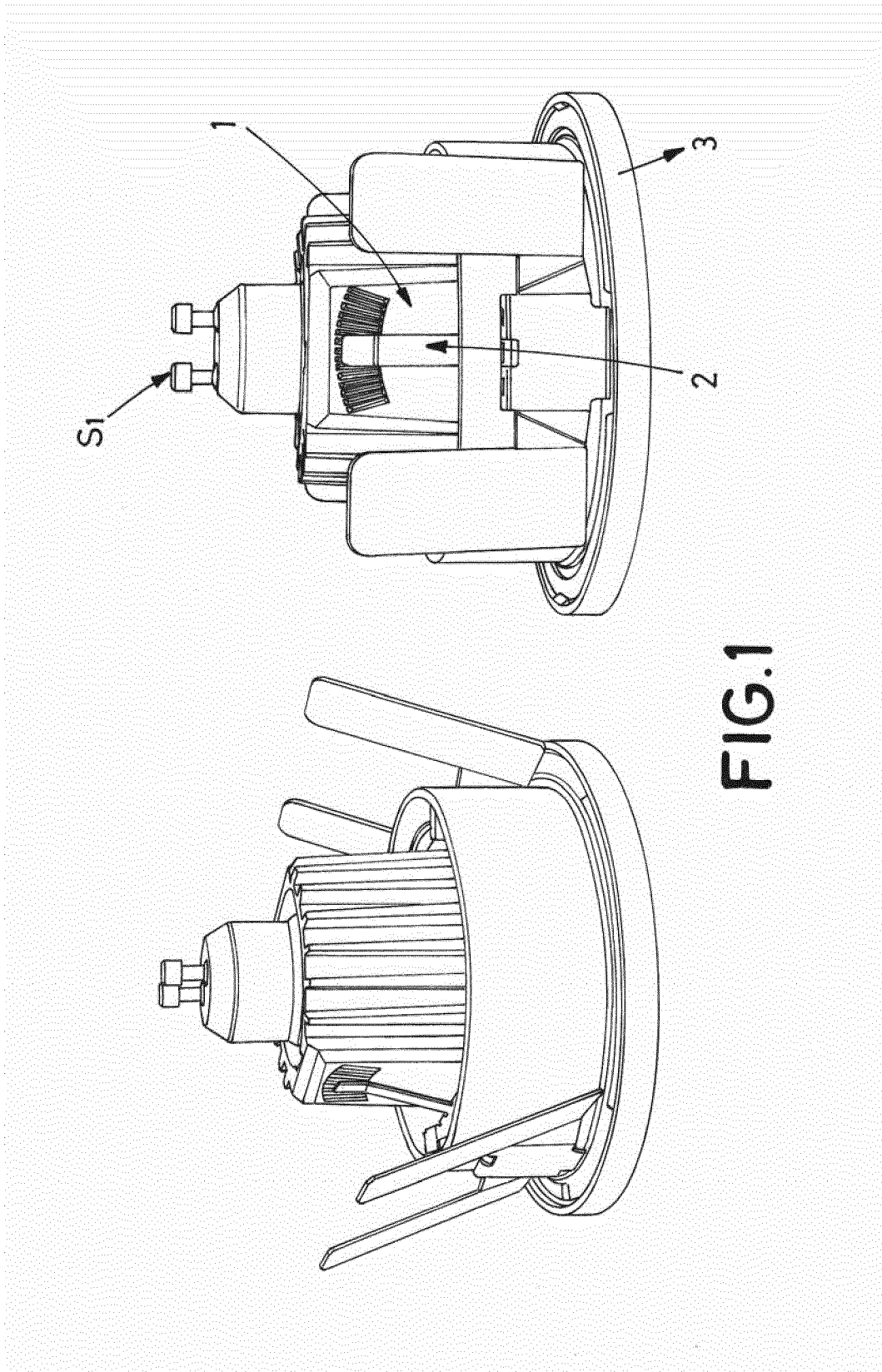
[0041] Also the invention provides a modular approach of screwing different shapes of decoration rings (preferably made from plastic) on the same fixation ring (preferably made out of plastic) to make it possible to personalize the luminaire to specific needs. The lamp module has a special front ring cover (preferably made out of plastic) which can be snap fitted to the heatsink. The decoration and front ring may have the same colour finish making a perfect colour match between lamp module and luminaire from the front side.

[0042] It is to be noted that the present invention is susceptible to modifications, adaptations and changes by those skilled in the art. Such variant embodiments employing the concepts and features of this invention are intended to be within the scope of the present invention, which is further set forth under the following claims:-

Claims

1. An adjustable recessed luminaire comprising an interface between lamp module and the luminaire in which the lamp module comprises integrated LED emitters, led board, electrical components, secondary optics, heat sink, base, connectors, wherein the interface comprising of pivot rotation interface and rotating interface.
2. An adjustable recessed luminaire as claimed in claim 1, wherein the pivot rotation interface constitutes a plurality of bosses of the lamp module with leave spring and the rotating interface comprises tilt spring.
3. An adjustable recessed luminaire as claimed in claim 1 or 2, wherein the pivot rotation interface is created by atleast two laterally protruding bosses preferably on the rim of the lamp module and the mechanical lock-in slot is provided in the leave spring to handle the functions of bayonet screw in and out and rotation axis.

4. An adjustable recessed luminaire as claimed in any of the preceding claims, wherein the pivot rotation interface is created by at least two laterally protruding bosses preferably on the rim of the lamp module and the mechanical lock-in slot created in the tilt spring to handle the function of bayonet screw in and out and rotation axis.
- 5 5. An adjustable recessed luminaire as claimed in any of the preceding claims, wherein the tilt spring is mounted on the fixation ring of the luminaire, which interacts with grooves in the heat sink during rotation of the lamp module to tilt the lamp module in discrete steps.
- 10 6. An adjustable recessed luminaire as claimed in any of the preceding claims, wherein the tilt spring interacts with smooth surface of the heat sink during rotation of the lamp module to tilt the lamp module smoothly.
- 15 7. An adjustable recessed luminaire as claimed in any of the preceding claims, wherein the screwing in and out a lamp module from the front side of a luminaire is provided by means of said laterally protruding bosses on the rim side of the lamp module which can be bayonet twisted in a luminaire by means of a mechanical means integrated preferably in the two leave springs.
- 20 8. An adjustable recessed luminaire as claimed in any of the preceding claims, wherein the twist and lock feature integrated in the leave springs of the luminaire comprises two cylindrical bosses on the outer front diameter for twisting and locking the module in the fixation ring of the luminaire.
- 25 9. An adjustable recessed luminaire as claimed in any of the preceding claims, wherein the fixation ring can be mounted with a decoration ring.
- 30 10. An adjustable recessed luminaire as claimed in any of the preceding claims, wherein the lamp module has a front ring snap fitted on the heat sink to personalize the front look of the luminaire.
- 35 11. An adjustable recessed luminaire as claimed in any of the preceding claims, wherein the luminaire comprising of at least one fixation ring, two leave springs, a tilt spring preferably two and a decoration ring.
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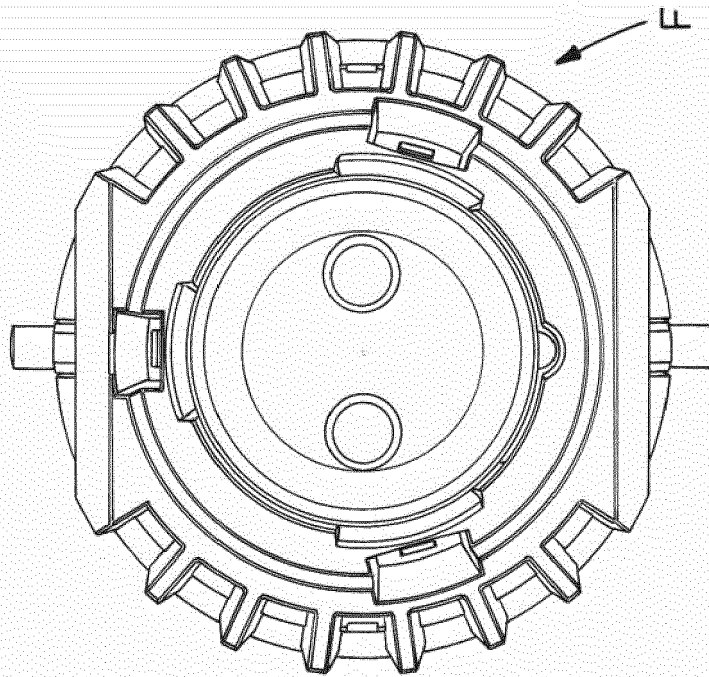


FIG. 2A

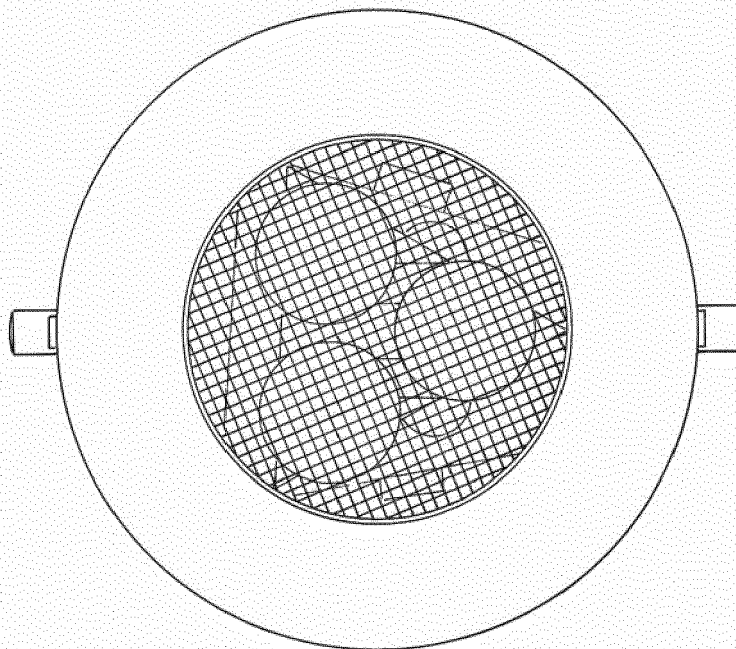


FIG. 2B

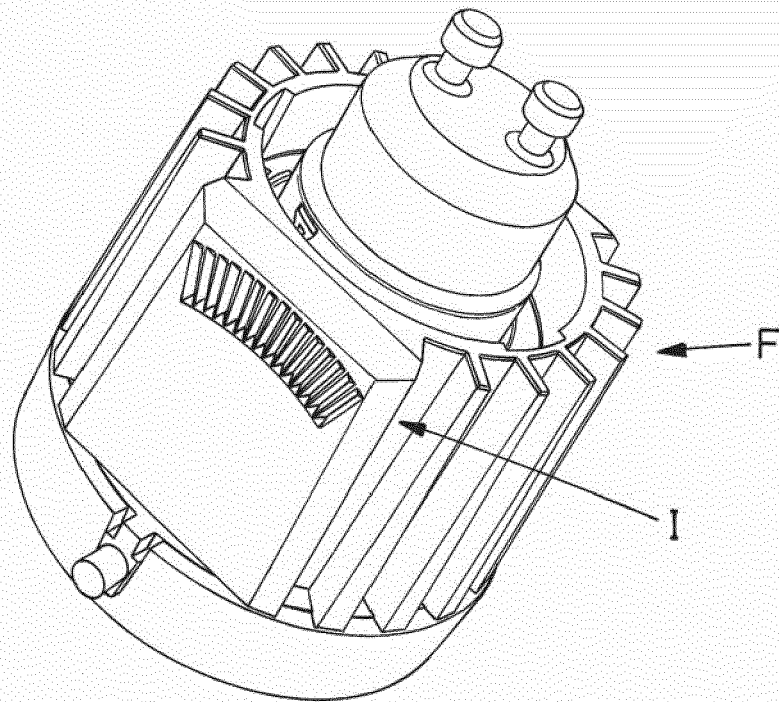


FIG. 2C

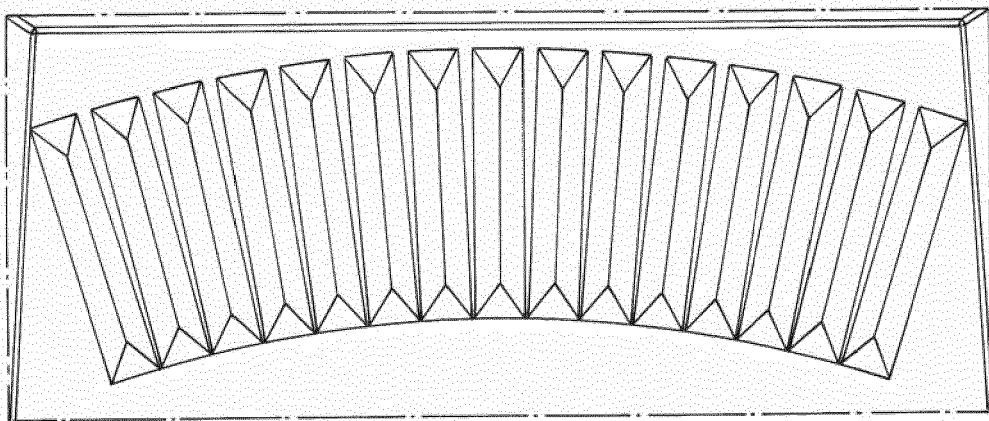


FIG. 3

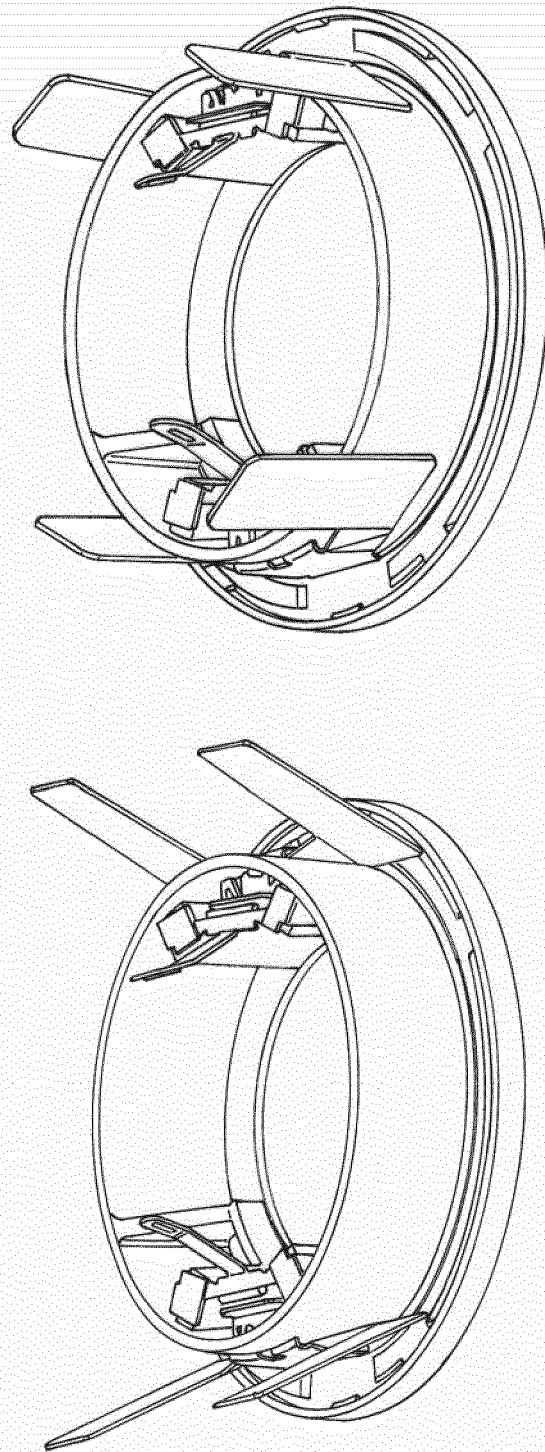


FIG. 4

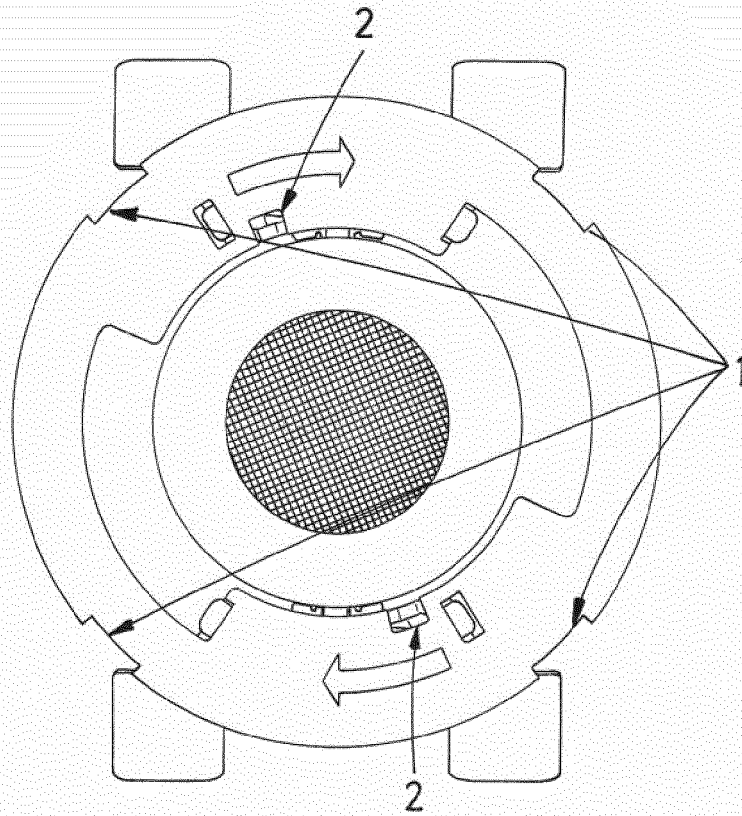


FIG. 5

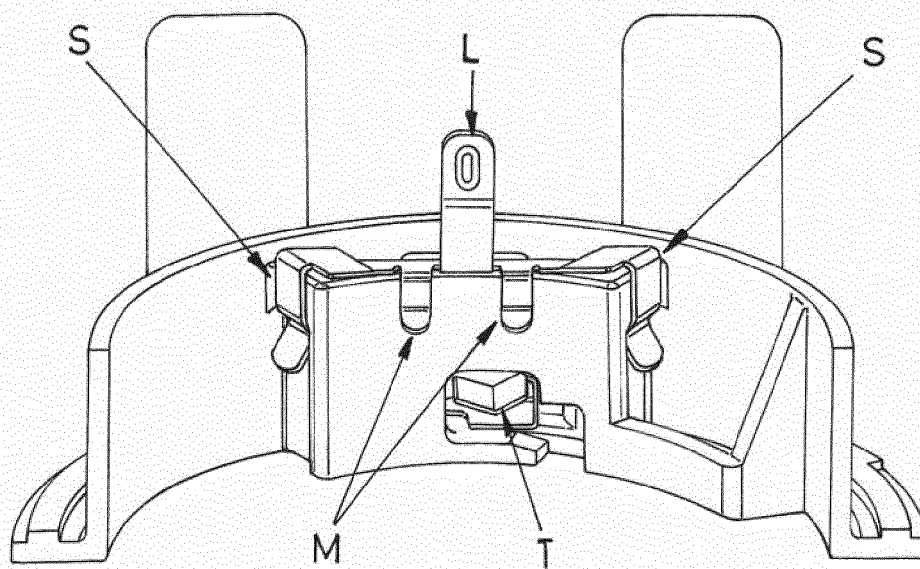


FIG. 6

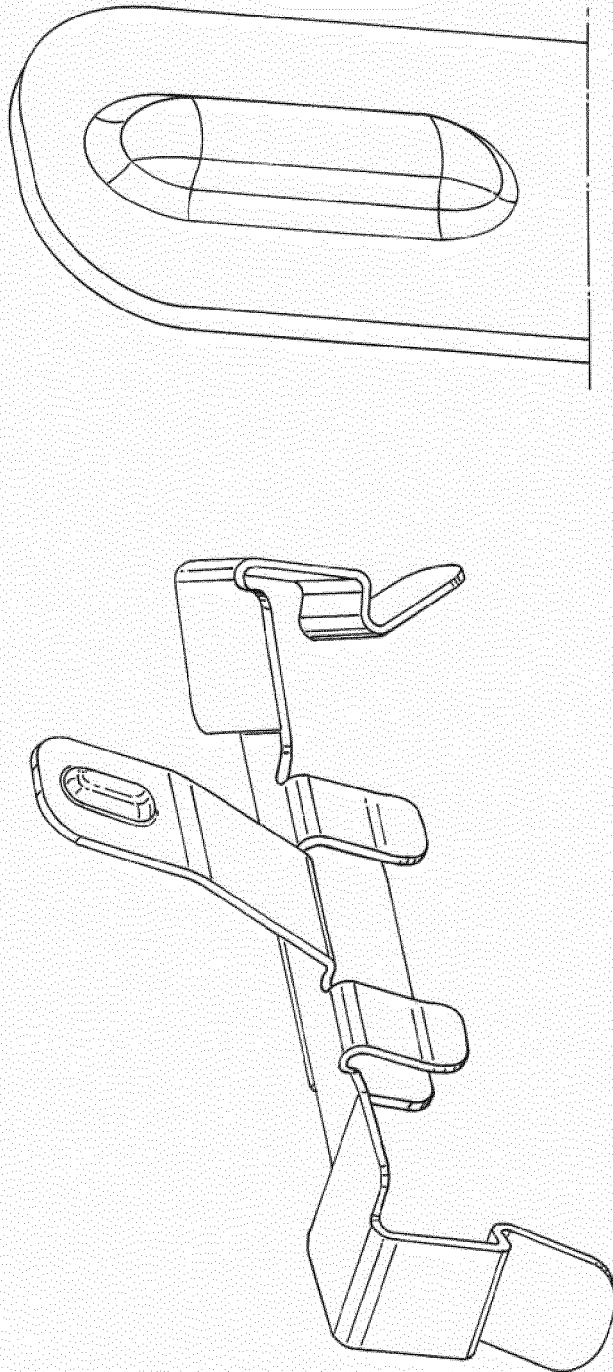


FIG.7

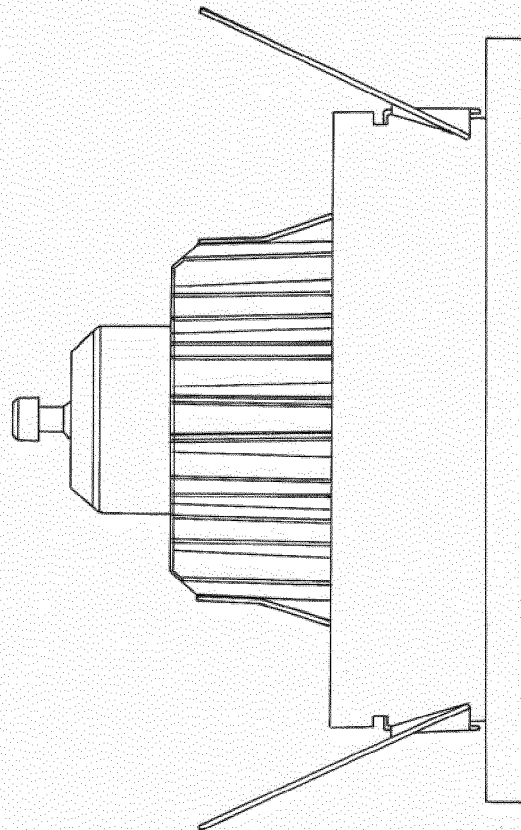
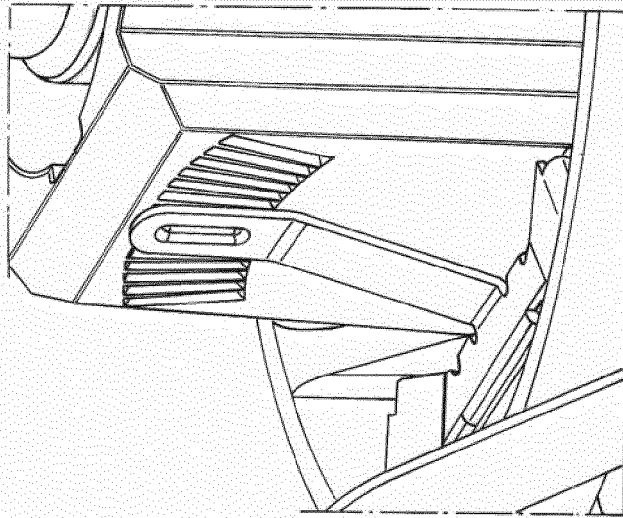


FIG.8

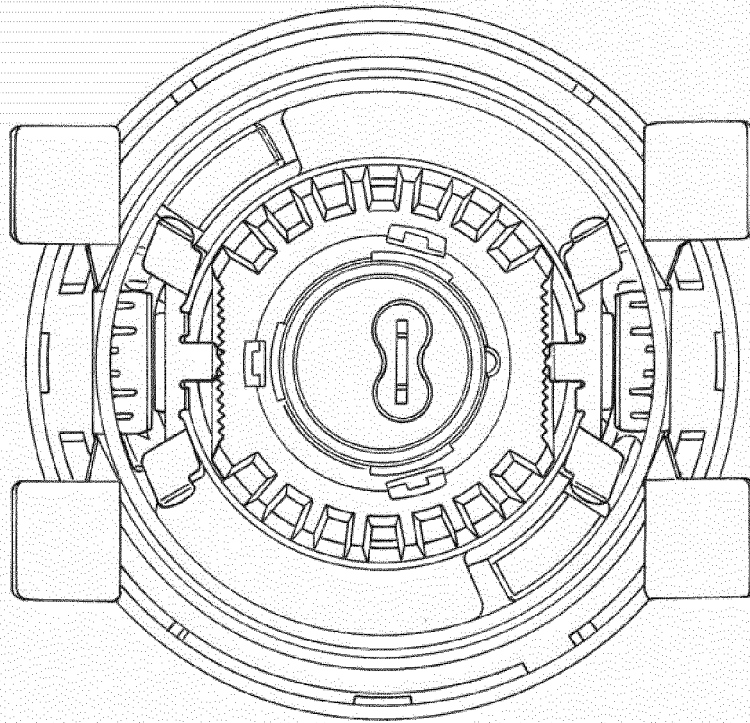


FIG. 9

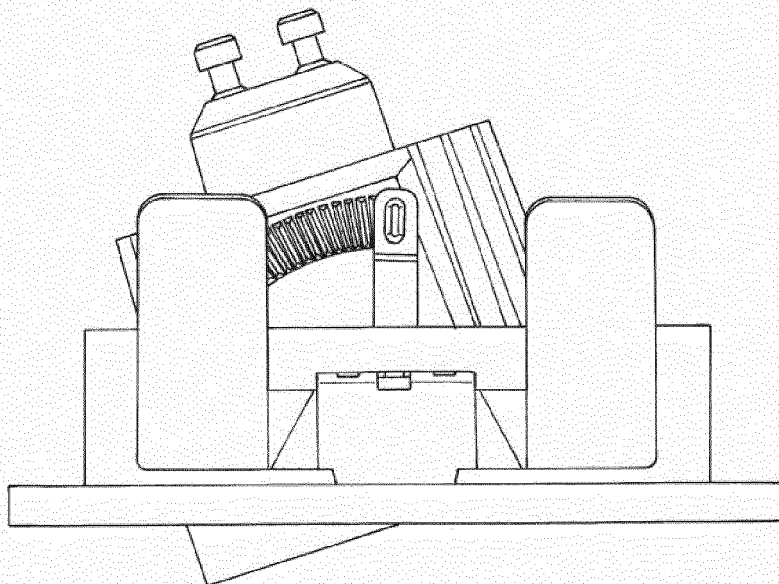


FIG. 10



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Application Number
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Place of search The Hague		Date of completion of the search 20 July 2015	Examiner Sacepe, Nicolas
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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