



(11)

EP 3 404 319 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.11.2018 Bulletin 2018/47

(51) Int Cl.:
F21V 21/30^(2006.01) F21V 21/34^(2006.01)

(21) Application number: **18173014.4**

(22) Date of filing: **17.05.2018**

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

(30) Priority: **18.05.2017 CN 201710353966**

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(54) **A ROTATING STRUCTURE OF LED TRACK LIGHTS**

(57) A rotating structure of LED track lights comprises a downlight (10) with a through hole (11), a boom mechanism (30), and a limiting mechanism (40). The boom mechanism comprises a bearing (31), a elastic member, and a nut. The limiting mechanism comprises a rotating gear plate and an elastic abutting member. The rotating gear plate is located between the elastic member and the sidewall of the downlight, the nut drives the elastic member towards the rotating gear plate and presses the elastic member against the rotating gear plate. A plurality of cogs are arranged on a radial side wall of the rotating gear plate, and the elastic abutting member comprises a abutting head which is pressed against a cog of the rotating gear plate and rotates along the cog movement track fixed on the rotating gear plate. The rotating structure of LED track lamps can make the rotation of the downlight around the boom mechanism smoother and at the same time the rotation of the downlight is very rhythmical due to the cooperation of the cog on the rotating gear plate and the elastic abutting member. The application increases the user experience.

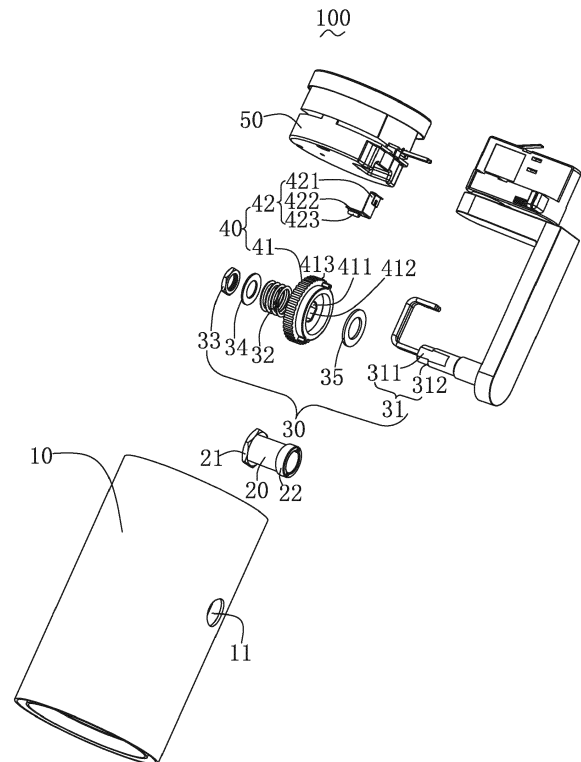


FIG. 1

Description

CROSS-REFERENCE TO A RELATED APPLICATION

[0001] This application claims priority to a Chinese Patent Application No. CN 201710353966.7, filed on May 18, 2017.

FIELD OF THE TECHNOLOGY

[0002] The invention relates to the lighting device field, in particular to a rotating structure of LED track lights.

BACKGROUND

[0003] Since the application of lighting technology towards the direction of development of energy saving and environmental protection, and LED lamps have low energy consumption, high luminous efficiency and wide application advantages, LED lamps can be quickly promoted. In the prior art, the structure for adjusting the illumination range in lamps and lanterns is generally more complicated, which increases the manufacturing cost and the installation difficulty. However, in modern architecture, the orbital system slowly merges the buildings themselves and serves as a permanent function of local functions, with seldom moving locations. However, the articles in the building will be placed in different positions according to different requirements. Because the track power supply system can't move, the irradiation direction of the track light changes according to the position of the articles, preferably, the irradiation direction can rotate by 180 degrees in the horizontal direction and 350 degrees in the vertical direction, in order to achieve dark area lighting design requirements.

[0004] For the 180 degree rotation in the horizontal direction, in the prior art many similar track lights are available to meet the above requirements. However, in the vertical direction, due to the structure involved is more and more complex, and at the same time, in use, its vertical direction of the radiation direction needs to be adjusted, so the user's experience of rotation in the vertical direction is more important.

SUMMARY OF THE INVENTION

[0005] Therefore, it is necessary to provide a rotating structure of LED track lights that can improve the user experience of rotation in the vertical direction.

[0006] A rotating structure of LED track lights, comprising: a downlight with a through hole, a boom mechanism penetrating the through-hole, and a limiting mechanism disposed on the boom mechanism; the boom mechanism comprising a bearing penetrating the through-hole, a elastic member sleeved on the outer side of the bearing and a nut screwed on the free end of the bearing; the limiting mechanism comprising a rotating gear plate fixedly sleeved on the bearing, and an elastic abutting mem-

ber fixedly arranged in the downlight; the rotating gear plate located between the elastic member and the side-wall of the downlight, the nut driving the elastic member towards the rotating gear plate and pressing the elastic member against the rotating gear plate, a plurality of cogs arranged on a radial side wall of the rotating gear plate, and the elastic abutting member comprising a abutting head which is pressed against a cog of the rotating gear plate and rotates along the cog movement track fixed on the rotating gear plate.

[0007] Advantageously, the rotating structure further comprises a sleeve fixedly disposed in the through hole of the downlight, the sleeve is located between the the through hole of the downlight and the bearing, the axial length of the bearing is greater than the axial length of the through hole, one end of the sleeve has a flange one side the flange towards the downlight is a cambered surface, the radius of the arc surface is equal to the external diameter of the downlight, and the end face of the flange is flat and abuts against the boom mechanism.

[0008] Advantageously, the boom mechanism further comprises a damping spacer sleeved on the bearing and located between the end face of the flange of the sleeve and the boom mechanism.

[0009] Advantageously, the boom mechanism further comprises a spacer disposed between the nut and the elastic member, and the diameter of the spacer is greater than the diameter of the elastic member.

[0010] Advantageously, the bearing is provided with a positioning portion whose diameter is larger than the inner diameter of the nut, and when the nut is attached to the positioning portion, the axial length of the elastic member is greater than the axial length of the elastic member when compressed to a minimum.

[0011] Advantageously, the elastic abutting member comprises an accommodating chamber, a compressive elastic member disposed in the accommodating chamber, and a abutting head disposed on the open end of the accommodating chamber and is abutted by the compressive elastic member.

[0012] Advantageously, the rotating structure further comprises a power supply bracket fixed in the downlight, the accommodating chamber is fixedly disposed on the side of the power supply bracket towards to the rotating gear plate.

[0013] Advantageously, the elastic abutting member comprises a hook, a plate extending from the hook to the direction of the rotating gear plate, and an elastic piece bended from the hook to the direction of the cog of the rotating gear plate.

[0014] Advantageously, the downlight further comprises a retaining wall, one side of the rotating gear plate is arranged on the retaining wall, and the hook of elastic abutting member hangs on the retaining wall.

[0015] Advantageously, the contour line of the cross section of each cog teeth in the radial direction of the rotating ring gear is arcuate.

[0016] Compared with the prior art, the rotation struc-

ture of LED track lights provided by the present invention comprises the boom mechanism and the limiting mechanism, and through the cooperation between the boom mechanism and the limit mechanism, the rotation angle of the downlight is limited by the rotating gear plate and the elastic abutting member. The rotation of the downlight is very rhythmical due to the cooperation of the cog on the rotating gear plate and the elastic abutting member. The application increases the user experience.

DETAILED DESCRIPTION OF THE DRAWINGS

[0017] The drawings described herein are intended to promote a further understanding of the present invention, as follows:

FIG. 1 is an exploded structure diagram of a rotating structure of LED track lights according to the present invention.

FIG. 2 is a structure diagram of the downlight of the rotating structure of the LED track lights of FIG. 1.

FIG. 3 is a cross-sectional structure diagram of the rotating structure of the LED track lights of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] The present application is illustrated by way of the following detailed description based on of the accompanying drawings. It should be noted that illustration to the embodiment in this application is not intended to limit the invention.

[0019] Please referring to FIG.1 to FIG.3, FIG.1 is an exploded structure diagram of a rotating structure 100 of LED track lights according to the present invention. The rotating structure of LED track lights comprises: a downlight 10, a sleeve 20 fixedly disposed in the downlight 10, a boom mechanism 30 penetrating the through-hole, and a limiting mechanism 40 disposed on the boom mechanism, and a power supply holder 50 disposed in the downlight 10. It can be understood that the LED track light further comprises other functional modules such as a track plug, a horizontal rotating mechanism, a light emitting module, a heat dissipating module, and a power module, which are well-known in the art and are not the innovation of the present invention and will not be described in detail here. The boom mechanism 30 is connected with the horizontal rotation mechanism and the track plug.

[0020] The downlight 10 is configured to accommodate the light emitting module, the heat dissipating module, the power supply module, and the like as described above, and it is also used to set the above-mentioned sleeve 20, the boom mechanism 30, and the like. The downlight 10 may be a circular cylinder, a square cylinder, or any other cylinder with any shape. In order to facilitate

the heat dissipation, the downlight 10 is made of metal. In this embodiment, the downlight 10 is a circular cylinder and comprises a through hole 11 for inserting the sleeve 20 and the boom mechanism 30.

[0021] Because the downlight 10 is a circular cylinder, in order to make the sleeve 20, the boom mechanism 30 and the limiting mechanism 40 provided have a stable structure, the downlight further comprises a retaining wall 12 disposed on the internal downlight 10. The retaining wall 12 is a flat plate, and is used for fixing the boom mechanism 30 and the limiting mechanism 40. Of course, it is conceivable that the retaining wall 12 may not be provided if the downlight 10 is a square cylinder. The specific function and connection of the retaining wall 12 will be described in more detail below.

[0022] The sleeve 20 is sleeved in the through hole 11. Since the downlight 10 is made of metal and the side walls thereof are usually thinner so that when the boom mechanism 30 is provided, sound is generated during rotation and is difficult to fix due to the thin wall, it is necessary to provide sleeve 20. It is therefore also conceivable that when the side walls of the downlight 10 are sufficiently thick or otherwise formed to eliminate the sound generated by the rotation such as when the lubricating oil or downlight 10 is made of a softer material such as plastic, the sleeve 20 may not be sleeved. In order to fix the sleeve 20, one end of the sleeve 20 is provided with a first nut 21 and the other is provided with a flange 22. The side wall of the downlight 10 is sandwiched between the first nut 21 and the flange 22. For fixing, the flange 22 is a cambered surface, the radius of the arc surface is equal to the external diameter of the downlight so that the flange is fixed to the side wall of the downlight 10, and the end face of the flange is flat and abuts against the boom mechanism 30. The sleeve 20 can be made of plastic material to reduce the noise during rotation.

[0023] The boom mechanism 30 comprises a bearing 31 penetrating the through-hole 11, an elastic member 32 sleeved on the outer side of the bearing 31 and a nut 33 screwed on the free end of the bearing 31 and a damping spacer 34 disposed between the nut 33 and the elastic member 32. It is conceivable that the boom mechanism 30 further comprises other components fixedly connected with the bearing 31, such as a connecting rod connected with the flat rotating mechanism and the like, which are components known to those skilled in the art and will not be described in detail here. In this embodiment, the bearing 31 is inserted in the sleeve 20. The free end of the bearing 31 is provided with a screw thread to screw the nut 33. The bearing 31 is also provided with two rib stop positions 311 and a positioning portion 312. The two rib stop positions 311 are configured to cooperate with the below-mentioned rotating gear plate 41 of the limiting mechanism 40 to fix the relative positions of the rotating gear plate 41 and the bearing 31. The diameter of positioning portion 312 is larger than the inner diameter of the nut 33, and when the nut 33 is attached

to the positioning portion 312, the axial length of the elastic member 32 is greater than the axial length of the elastic member 32 when compressed to a minimum so as to prevent the rotation of the rotating gear plate 41 from being locked, that is, due to the elastic member 32 against the rotation of the rotating gear plate 41, if the nut 33 is too tight, it will lock the rotation of the rotating gear plate, and thus the positioning portion 312 is provided. At the same time, when the nut 33 is locked on the positioning portion 312, the nut 33 can be prevented from loosening. The elastic member 32 may be a spring, one side of which is pressed against the rotating gear plate 41 to transmit the force against the rotating gear 41, and the side wall of the downlight 10 is sandwiched between the rotating gear plate 41 and the end of the bearing 31, specifically, it is the sleeve 20. The partial limiting capability of the rotating gear plate 41 is formed by the frictional force between the rotating gear plate 41 and the connected components, such as the elastic member 32 and the sleeve 20. The nut 33 is a standard part screwed on the bearing 31 to apply a pressing force to the elastic member 32 and drive the elastic member 32 towards the rotating gear plate 41 to press the elastic member 32 against the rotating gear plate 41. The spacer 34 can facilitate the rotation of the nut 33 and at the same time the spacer 34 can block the elastic member 32 when the maximum diameter of the nut 33 is smaller than the minimum diameter of the elastic member 32. The spacer 34 may be made of metal to reduce its volume. The boom mechanism 30 further comprises a damping spacer 35 sleeved on the bearing 31 and located between the end face of the flange of the sleeve 20 and the boom mechanism 30. The damping spacer 35 may be made of nylon. The first purpose of the damping spacer 35 is to increase the friction; the second is to prevent the cradle mechanism 30 from being damaged by the friction with the flange 22 of the sleeve 20 for a long time.

[0024] The limiting mechanism 40 comprises a rotating gear plate 41 fixedly sleeved on the bearing 31, and an elastic abutting member 42 fixedly arranged in the downlight 10; the rotating gear plate 41 is located between the elastic member 32 and the sidewall of the downlight 10. Certainly, for the circular cylinder 10 in this embodiment, in order to facilitate the rotation of the rotating gear plate 41, the downlight has the retaining wall 12 thereon. When the downlight 10 is square cylinder, the side wall thereof is a flat plate, the downlight 10 may not be provided with the retaining wall 12. The rotating gear plate 41 is fixed on the bearing 31. In order to fix the rotating tooth plate 41 on the bearing 31, the rotating gear plate 41 comprises a central hole 411 penetrating the bearing 31 and two ribs 412 disposed along the axial center of the central hole 411. In order to cooperate with the rib 412, the bearing 31 is provided with two rib stop positions 311, which has been described above. A plurality of cogs 413 are provided on a radial side wall of the rotating gear plate 41. In order to make the rotation of the rotating gear plate 41 smooth, the outline of each of the cogs 413 in the

radial direction of the rotating gear 41 is arc-shaped. The number of teeth 413 can be any number, which is set according to actual needs, such as the speed of rotation. The faster the rotation, the fewer the number of cogs 413 should be. Preferably, the plurality of cogs 413 are continuous curves so as to form the track of movement of the elastic abutting member 42 so that the downlight 10 can move smoothly. The elastic abutting member 42 can be an elastic piece or an elastic mechanism. In this embodiment, since the retaining wall 12 is disposed in the downlight 10, the resilient abutting member 42 is an elastic piece. The elastic abutting member 42 comprises a hook 421 hung on the retaining wall 12, a plate 422 extending from the hook 421 to the rotating gear plate 41, and an elastic piece 423 bended from the hook to the direction of the cog 413 of the rotating gear plate 41. The elastic piece 423 is V-shaped. In order to make the rotation smooth, the bottom of the V shape is curved, and when one of the plurality of cogs 413 abuts the rotating gear plate 41 and rotates along the track of the movement of the rotation of the cogs 413. When no external force is applied to the downlight 10, the elastic piece 423 limits the rotating gear plate 41 to prevent it from rotating freely. When the downlight 10 is not provided with the retaining wall 12 and the elastic abutting member 42 is an elastic mechanism, the elastic abutting member 42 comprises an accommodating chamber, a compressive elastic member disposed in the accommodating chamber, and an abutting head disposed on the open end of the accommodating chamber and is abutted by the compressive elastic member. The abutment head abuts against the cog of the rotating gear plate. The accommodating chamber may be cylindrical, which may be fixed on the power bracket 50 described below. The compressive elastic member may be a rubber rod or a spring, which is accommodated in the accommodating chamber. The abutment head may be a ball, which is accommodated in the open end of the accommodating chamber. The ball may be sandwiched between the accommodating chamber after the ball is received in the accommodating chamber and then compressed to reduce the diameter of the opening end to be smaller than the diameter of the ball. The abutting head abuts on one of the plurality of cogs 413 and moves along the track of the teeth 413 when the rotating gear 41 rotates.

[0025] The power supply bracket 50 is configured to receive a power source for providing compliant power to the LED chip and is fixed in the downlight 10. The fixing manner may be that a plurality of screw hole posts are provided on the sidewall of the downlight 10 and then the power bracket 50 is fixed to the screw hole post through screw. In this embodiment, since the downlight 10 is provided with the retaining wall 12, the screw hole post can be disposed on the retaining wall 12. When the power supply bracket 50 is fixed, the hook 421 of the elastic abutting member 42 is pressed against the retaining wall 12. Of course, it is also conceivable that the hook 421 can also be fixed on the retaining wall 12 by a fastener

such as a screw. When the downlight 10 is not provided with the retaining wall 12, the accommodation chamber of the elastic abutting member 42 may be directly embedded on the side of the power supply bracket 50 facing the rotating gear 41.

[0026] Compared with the prior art, the rotation structure 100 of LED track lights provided by the present invention comprises the boom mechanism 30 and the limiting mechanism 40, and through the cooperation between the boom mechanism 30 and the limit mechanism 40, the rotation angle of the downlight 10 is limited by the rotating gear plate 41 and the elastic abutting member 42. The rotation of the downlight 10 is very rhythmical due to the cooperation of the cog 413 on the rotating gear plate 41 and the elastic abutting member 42. The application increases the user experience.

[0027] The above disclosure has been described by way of example and in terms of exemplary embodiment, and it is to be understood that the disclosure is not limited thereto. Rather, any modifications, equivalent alternatives or improvement etc. within the spirit of the invention are encompassed within the scope of the invention as set forth in the appended claims.

Claims

1. A rotating structure of LED track lights, comprising: a downlight with a through hole, a boom mechanism penetrating the through-hole, and a limiting mechanism disposed on the boom mechanism; the boom mechanism comprising a bearing penetrating the through-hole, a elastic member sleeved on the outer side of the bearing and a nut screwed on the free end of the bearing; the limiting mechanism comprising a rotating gear plate fixedly sleeved on the bearing, and an elastic abutting member fixedly arranged in the downlight; the rotating gear plate located between the elastic member and the sidewall of the downlight, the nut driving the elastic member towards the rotating gear plate and pressing the elastic member against the rotating gear plate, a plurality of cogs arranged on a radial side wall of the rotating gear plate, and the elastic abutting member comprising a abutting head which is pressed against a cog of the rotating gear plate and rotates along the cog movement track fixed on the rotating gear plate.
2. The rotating structure of LED track lights as claimed in claim 1, wherein the rotating structure further comprises a sleeve fixedly disposed in the through hole of the downlight, the sleeve is located between the through hole of the downlight and the bearing, the axial length of the bearing is greater than the axial length of the through hole, one end of the sleeve has a flange one side the flange towards the downlight is a cambered surface, the radius of the arc surface is equal to the external diameter of the downlight,

and the end face of the flange is flat and abuts against the boom mechanism.

3. The rotating structure of LED track lights as claimed in claim 1 or 2, wherein the boom mechanism further comprises a damping spacer sleeved on the bearing and located between the end face of the flange of the sleeve and the boom mechanism.
4. The rotating structure of LED track lights as claimed in claim 1 or 2, wherein the boom mechanism further comprises a spacer disposed between the nut and the elastic member, and the diameter of the spacer is greater than the diameter of the elastic member.
5. The rotating structure of LED track lights as claimed in claim 3, wherein the bearing is provided with a positioning portion whose diameter is larger than the inner diameter of the nut, and when the nut is attached to the positioning portion, the axial length of the elastic member is greater than the axial length of the elastic member when compressed to a minimum.
6. The rotating structure of LED track lights as claimed in claim 4, wherein the elastic abutting member comprises an accommodating chamber, a compressive elastic member disposed in the accommodating chamber, and a abutting head disposed on the open end of the accommodating chamber and is abutted by the compressive elastic member.
7. The rotating structure of LED track lights as claimed in claim 6, wherein the rotating structure further comprises a power supply bracket fixed in the downlight, the accommodating chamber is fixedly disposed on the side of the power supply bracket towards to the rotating gear plate.
8. The rotating structure of LED track lights as claimed in claim 1 or 2, wherein the elastic abutting member comprises a hook, a plate extending from the hook to the direction of the rotating gear plate, and an elastic piece bended form the hook to the direction of the cog of the rotating gear plate.
9. The rotating structure of LED track lights as claimed in claim 8, wherein the downlight further comprises a retaining wall, one side of the rotating gear plate is arranged on the retaining wall, and the hook of elastic abutting member hangs on the retaining wall.
10. The rotating structure of LED track lights as claimed in claim 1 or 2, wherein the contour line of the cross section of each cog teeth in the radial direction of the rotating ring gear is arcuate.

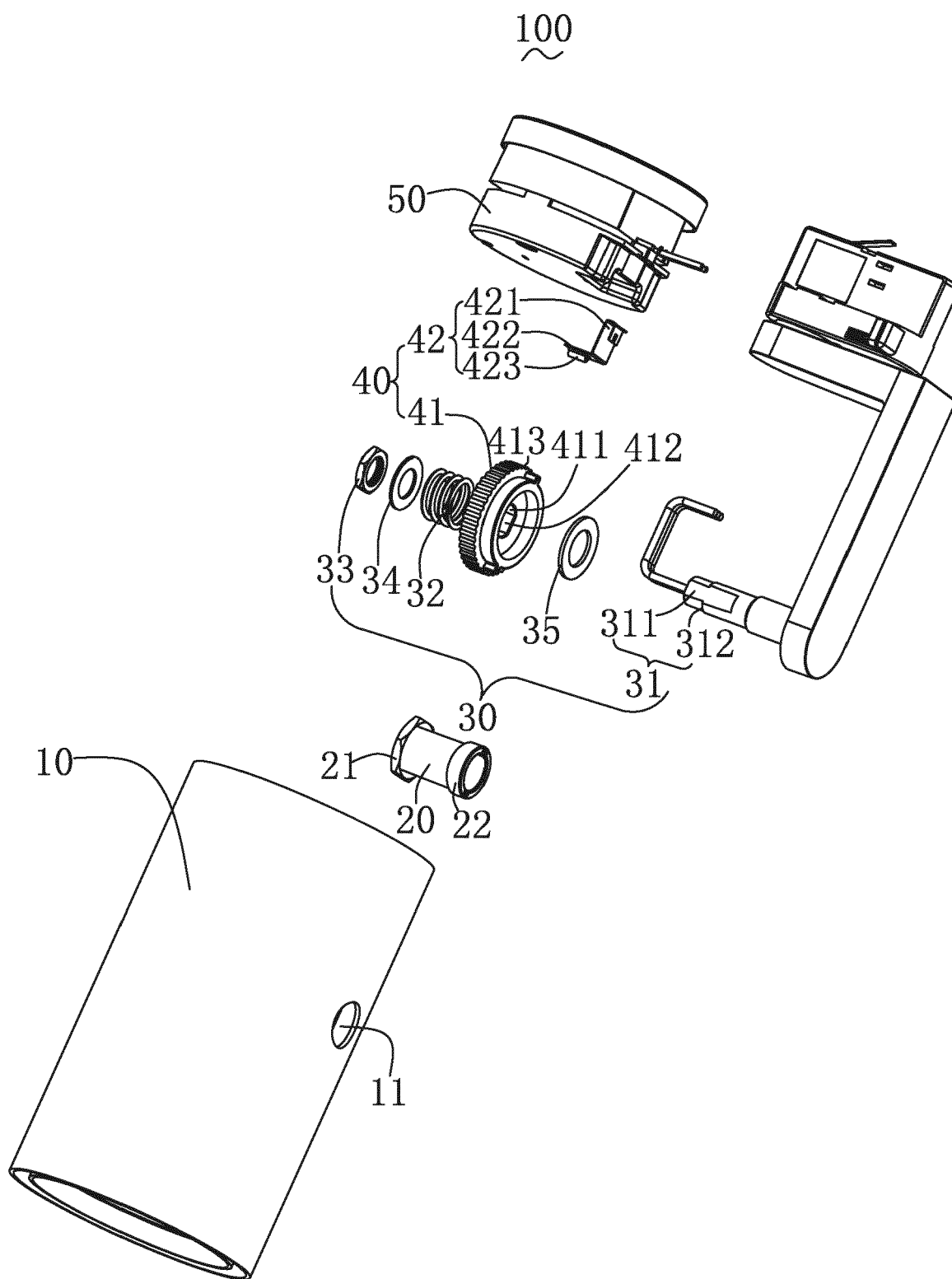


FIG. 1

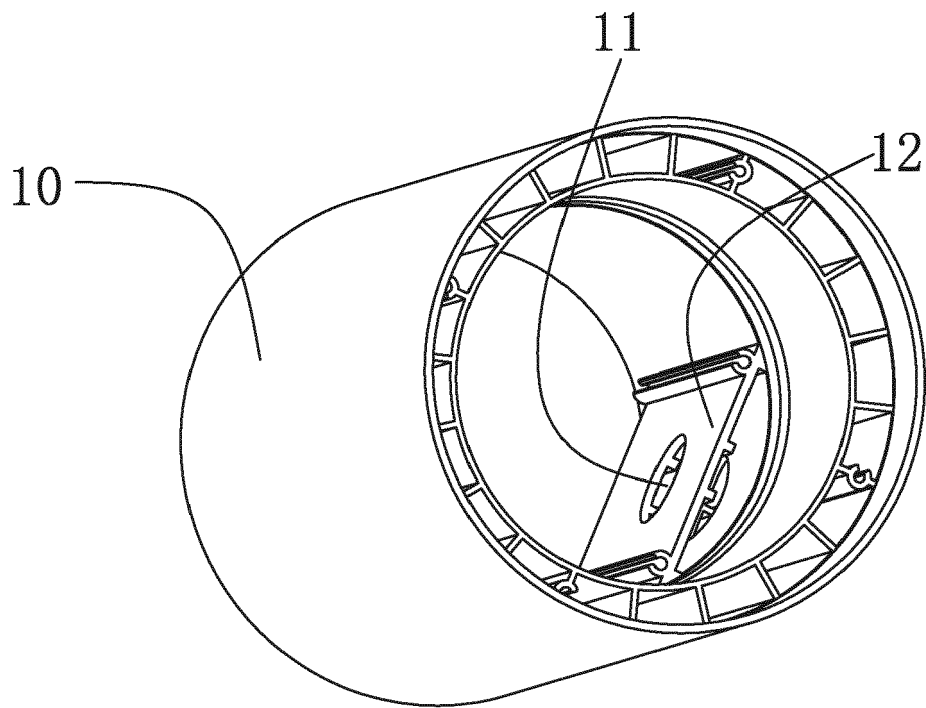
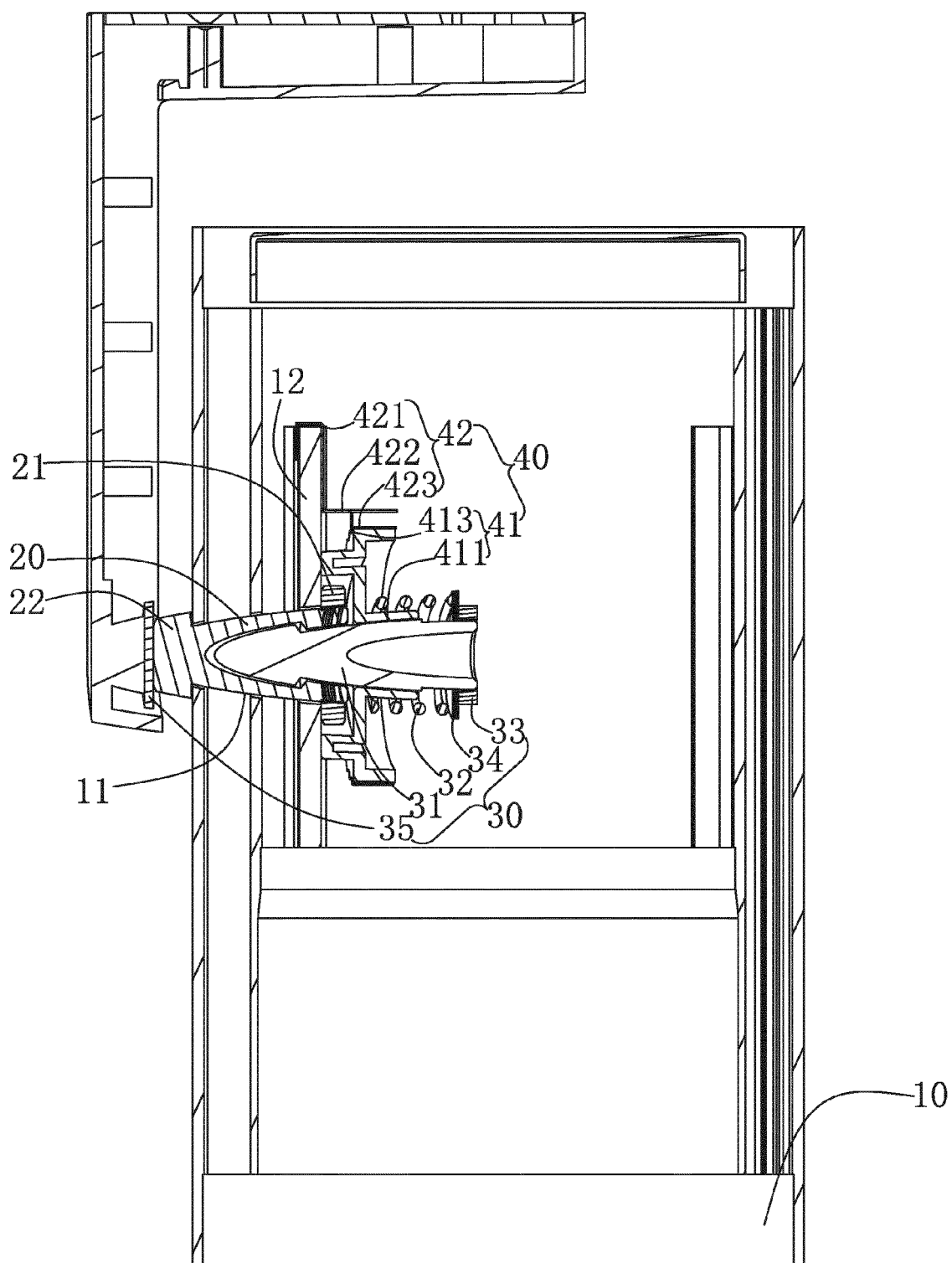


FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 18 17 3014

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 10 2012 205237 A1 (HIERZER ANDREAS [AT]) 2 October 2013 (2013-10-02) * paragraph [0025] - paragraph [0050] * * figures 1-5 *	1	INV. F21V21/30 F21V21/34
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			TECHNICAL FIELDS SEARCHED (IPC)
			F21V F21Y
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 August 2018	Examiner Blokland, Russell
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 17 3014

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

REFERENCES CITED IN THE DESCRIPTION

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