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PROJECTOR OF LIGHT BEAMS

- (57)

Described is a projector of light beams comprising a containment and support frame (1), having a main extension along the axis (F) of emission of a light beam; a light source (2) for projecting the light beam housed at a first end of the frame (1); a first lens (3) for emitting the light beam associated with the second end of the frame (1), opposite the first end; a second lens (4) configured for modifying, in amplitude, the light beam generated, positioned inside the frame (1), interposed between the light source (2) and the first lens (3); a unit (5) for powering and controlling the light source (1) and the movement of the second lens (4) housed in a compartment (6) of the frame
- (1);

a plurality of rotatable control means (7), connected to the power supply and control unit (5), and configured for activating and/or adjusting the light source (2) and the movement of the second lens (4); the plurality of control means (7) having a rotatable cylindrical portion (8) positioned, at least partly, protruding outside the frame (1); each control means (7) is provided, in use, with at least a first sealing ring (9) interposed between the cylindrical portion (8) and an annular protruding flange (10) of the frame (1) and enclosing, in use, a part of the cylindrical portion (8) in such a way as to isolate in a sealed manner an inner part of each control means (7).

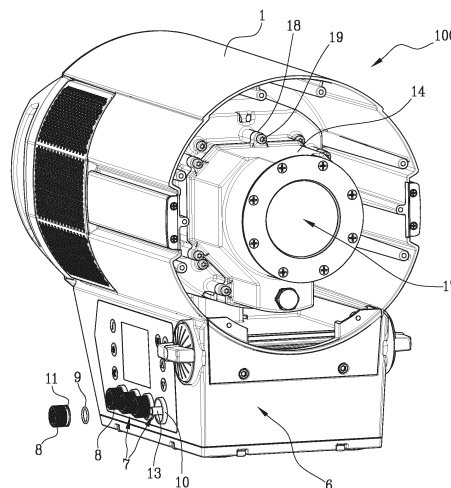


Fig.3

## Description

**[0001]** This invention relates to a projector of light beams.

**[0002]** One of the various types of projectors present on the market are those provided with a "Fresnel" type lens for theatrical use or for video shots used for interiors, as they are usually structured with a relatively low degree of sealing to external agents (for example, IP20 grade).

**[0003]** In their more general form, these projectors comprise a containment and support frame (or housing), having a main extension along the axis of emission of the light beam and containing inside it at least the following components:

- a controlled source for the projection of a light beam (for example LED type sources) at a first end of the frame;
- a simple glass lens for the outlet of the light beam associated with the other end of the frame;
- a Fresnel lens configured to modify (in amplitude) the beam of light generated, positioned inside the frame, interposed between the light source and the end glass and movable towards and away from the light source;
- a unit for powering and controlling the light source and the movement of the Fresnel lens housed in a compartment inside the frame and connected to control means configured for activating and adjusting the light source and the movement of the Fresnel lens connected to the frame and protruding externally from the frame.

**[0004]** This type of projector can be used in outdoor installations only if the weather conditions allows it.

**[0005]** Otherwise if you want to use these type of projectors in any weather condition, the projectors must necessarily be protected with water protection systems (for example, covers, canopies, sheets, etc.) to prevent contact with the water from adversely affecting the operation and to exclude safety problems for the technicians who normally manoeuvre the projectors also when they are powered.

**[0006]** This type of situation therefore limits the possibility of a correct and optimum efficiency of this projector outdoors and often makes it necessary to use other types of suitable projectors outdoors which have higher costs.

**[0007]** The aim of this invention is to provide a projector of light beams which overcomes the drawbacks of the prior art described above.

**[0008]** In particular, the aim of this invention is to provide a projector of light beams which is able to be used both in outdoor environments and outdoors without the need for guards.

**[0009]** A further aim of this invention is to provide a projector of light beams which is able to increase the watertight seal of the structure and the same functions without adding external components and without modify-

ing the dimensions and shape of the projector.

**[0010]** Said aims are fully achieved by a projector of light beams according to the invention as characterised in the appended claims.

**[0011]** The main features of the invention will become more apparent from the following detailed description of a preferred, non-limiting embodiment, illustrated purely by way of example in the accompanying drawings, in which:

- Figure 1 is a perspective view of a projector of a light beams according to this invention;
- Figure 2 is a partly perspective exploded view of the projector of light beams of Figure 1;
- Figure 3 is a perspective view, with some parts cut away and others exploded, of the projector of light beams of the preceding drawings;
- Figure 4 is an enlarged detail and cross section of Figure 1;
- Figure 5 is a partial lateral cross section view of the projector of light beams of the preceding drawings with some parts cut away;
- Figure 6 illustrates a first detail A in enlarged scale of Figure 5;
- Figure 7 illustrates a second detail B in enlarged scale of Figure 5.

**[0012]** With reference to the accompanying drawings, and with particular reference to Figures 1 to 3 and 5, the projector of light beams according to the invention, labelled 100 in its entirety, can be used, for example, for theatrical use or for video shots in both inside and outside environments.

**[0013]** The projector 100 comprises a containment and support frame 1 (with a cylindrical shape and divided in two parts), having a main extension along the axis F of emission of a light beam.

**[0014]** The projector comprises a light source 2 for projecting the light beam housed at a first end of the frame 1 (for example of the LED type and indicated with a block in Figure 5).

**[0015]** The projector 100 also comprises a first lens 3 for the outlet of the light beam associated with the second end of the frame 1, opposite the first end.

**[0016]** The projector 100 also comprises a second lens 4 configured for modifying, in amplitude, the beam of light generated, positioned inside the frame 1 and interposed between the light source 2 and the first lens 3 (for example, a "Fresnel" type lens).

**[0017]** The second lens 4 is movable towards and away from the light source 2. The projector 100 also comprises a unit 5 for powering and controlling the light source 1 and the movement of the second lens (4) housed in a compartment 6 of the frame 1.

**[0018]** The projector 100 also comprises a plurality of rotatable control means 7, connected to the power supply and control unit 5, and configured for activating and/or adjusting the light source 2 and the movement of the second lens 4.

**[0019]** The plurality of control means 7 has a rotatable cylindrical portion 8 positioned, at least partly, protruding outside the frame 1.

**[0020]** As illustrated (see also Figure 4), each control means 7 is provided, in use, with at least a first sealing ring 9 interposed between the cylindrical portion 8 and an annular protruding flange 10 of the frame 1 and enclosing, in use, a part of the cylindrical portion 8 in such a way as to isolate in a sealed manner an inner part of each control means 7.

**[0021]** In other words, each control unit comprises a knob (four knobs are shown in the drawings) with which it is possible to activate and/or adjust by means of rotary encoders the operating parts of the projector such as the light source and the second movable Fresnel lens.

**[0022]** These knobs are isolated in a sealed manner from the inside of the control means (encoders) to avoid the passage of water from the outside.

**[0023]** In light of this, each control means 7 comprises a rotatable external knob, defining the cylindrical portion 8, having an annular groove 11 made on a relative end to form an annular collar for housing the first sealing ring 9 (O-ring) interposed, in use, between the groove 11 and the inner surface of the annular flange 10 of the frame 1 in such a way as to allow a isolation in a sealed manner between the outside of the frame 1 and an inner part of each control means 7.

**[0024]** It should be noted that each protruding annular flange 10 is made as a single part (by shaping of the frame) on the frame 1 in such a way as to form a seat 12 for housing a rotatable pin 13, defining one of the internal parts of the control means 7, which can be coupled coaxially and by pressure with the corresponding cylindrical portion or knob 8 and connected to the power supply and control unit 5.

**[0025]** The projector 100 (see also Figures 6 and 7) comprises a covering guard 14 with a tubular cross-section enclosing the second lens 4 inside the frame 1 and a portion of the compartment 6 for housing the power supply and control unit 5 (open in the inner part of the guard 1).

**[0026]** In light of this, the second lens 4 is provided, along its outer perimeter, with a perimeter housing 15 of a second sealing ring 16 surrounding, in use, the second lens 4 and the edges of an upper portion of the compartment 6 for housing the power supply and control unit 5.

**[0027]** The second sealing ring 16 can be coupled by pressure with the outer frame of the covering guard 14 defining its proximal end.

**[0028]** The outer frame of the guard 14 is shaped to match the perimeter housing seat 15 of the second sealing ring 16 enclosing, in use, the second lens 4 and the edges of the upper portion of the compartment 6 for housing the power supply and control unit 5, in such a way as to isolate in a sealed manner the second lens 4 and the housing compartment 6.

**[0029]** In light of this, the covering guard 14 has a circular opening 17 made on a relative distal end for

the free passage of the light beam.

**[0030]** It should be noted that the guard 14 has a cross section shaped to match the second lens 4 and a projection defining an inlet of the compartment 6 housing the power supply and control unit 5.

**[0031]** In this way, the projector/compartment zone is completely isolated and sealed also inside the frame.

**[0032]** Moreover, the guard 14 has a perimeter dimension greater than the dimension of the second lens 4 in such a way as to allow a free axial movement in both directions of the second lens 4.

**[0033]** The guard 14 is also provided, at the relative end proximal to the second lens 4, with a plurality of radial flanges 18 each having a seat for the passage of screw means 19 for fixing to the second lens 4.

**[0034]** Thanks to this projector structure the preset aims are achieved thanks to the presence of sealing elements in the zones or components which are most at risk of the passage of water or other extraneous agents (such as, for example, dust).

**[0035]** Thanks to the sealed knobs and the isolated inner guard, this projector can be used outside without the need for covering components and with a high level of safety on the part of the operator.

## Claims

### 1. A projector of light beams comprising:

- a containment and support frame (1), having a main extension along the axis (F) of emission of a light beam;
- a light source (2) for projecting the light beam housed at a first end of the frame (1);
- a first lens (3) for the outlet of the light beam associated with the second end of the frame (1), opposite the first end;
- a second lens (4) configured to modify, in amplitude, the beam of light generated, positioned inside the frame (1), interposed between the light source (2) and the first lens (3); the second lens (4) being movable towards and away from the light source (2);
- a unit (5) for powering and controlling the light source (1) and the movement of the second lens (4) housed in a compartment (6) of the frame (1);
- a plurality of rotatable control means (7), connected to the power supply and control unit (5), and configured for the activation and/or the adjustment of the light source (2) and the movement of the second lens (4); the plurality of control means (7) having a rotatable cylindrical portion (8) positioned, at least partly, protruding outside the frame (1); **characterised in that** it comprises a covering guard (14) with a tubular cross section enclosing the second lens (4) inside the frame (1) and a portion of the compart-

- ment (6) for housing the power supply and control unit (5) and wherein each control means (7) is provided, in use, with at least a first sealing ring (9) interposed between the cylindrical portion (8) and an annular flange (10) protruding from the frame (1) and surrounding, in use, a part of the cylindrical portion (8) in such a way as to isolate in a sealed manner an inner part of each control means (7).
2. The projector according to claim 1, wherein each control means (7) comprises a rotatable external knob, defining the cylindrical portion (8), having an annular groove (11) made on a relative end to form an annular collar for housing the first sealing ring (9) interposed, in use, between the groove (11) and the inner surface of the annular flange (10) of the frame (1) in such a way as to allow a isolation in a sealed manner between the outside of the frame (1) and an inner part of each control means (7).
  3. The projector according to claim 2, wherein each protruding annular flange (10) is made as a single part on the frame (1) in such a way as to form a seat (12) for housing a rotatable pin (13), defining one of the internal parts of the control means (7), which can be coupled coaxially and by pressure with the corresponding cylindrical portion or knob (8) and connected to the power supply and control unit (5).
  4. The projector according to any one of the preceding claims, wherein the second lens (4) is provided, along its outer perimeter, with a perimeter housing (15) of a second sealing ring (16) surrounding, in use, the second lens (4) and the edges of an upper portion of the compartment (6) for housing the power supply and control unit (5);
  5. The projector according to claim 4, wherein the second sealing ring (16) can be coupled by pressure with the outer frame of the covering guard (14) defining its proximal end.
  6. The projector according to claim 4 or 5, wherein the outer frame of the guard (14) has a shape matching the perimeter seat (15) for housing the second sealing ring (16) enclosing, in use, the second lens (4) and the edges of the portion of the compartment (6) for housing the power supply and control unit (5), in such a way as to isolate in a sealed manner the second lens (4) and the housing compartment (6).
  7. The projector according to any one of the preceding claims, wherein the covering guard (14) has a circular opening (17) made on a relative distal end for the free passage of the light beam.
  8. The projector according to any one of the preceding claims, wherein the guard (14) has a cross section shaped to match the second lens (4) and a projection defining an inlet of the compartment (6) housing the power supply and control unit (5).
  9. The projector according to any one of the preceding claims, wherein the guard (14) has a perimeter dimension greater than the dimension of the second lens (4) in such a way as to allow a free axial movement in both directions of the second lens (4).
  10. The projector according to any one of the preceding claims, wherein the guard (14) is provided, at the relative end proximal to the second lens (4), with a plurality of radial flanges (18) each having a seat for the passage of screw means (19) for fixing to the second lens (4).

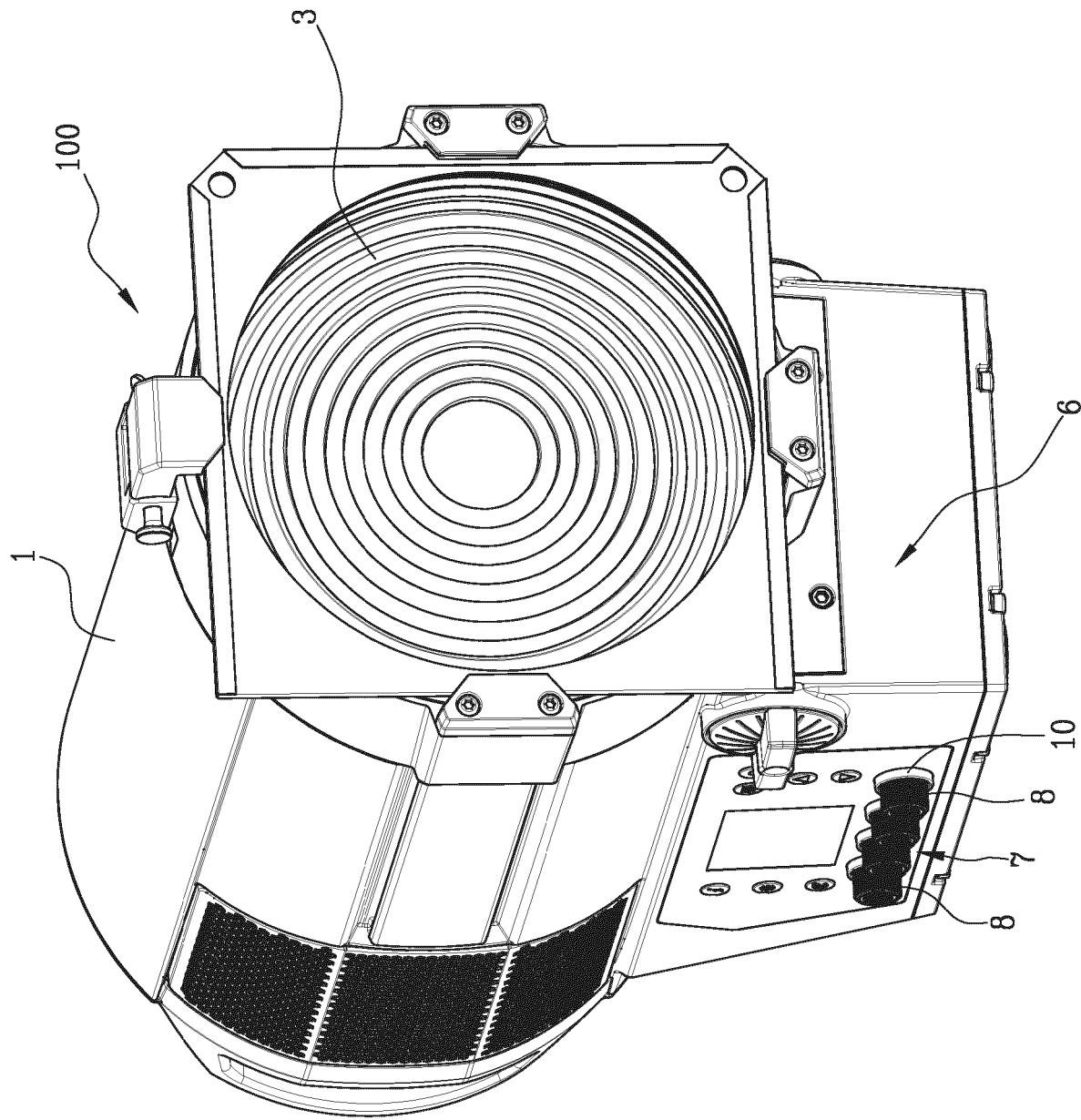


Fig.1

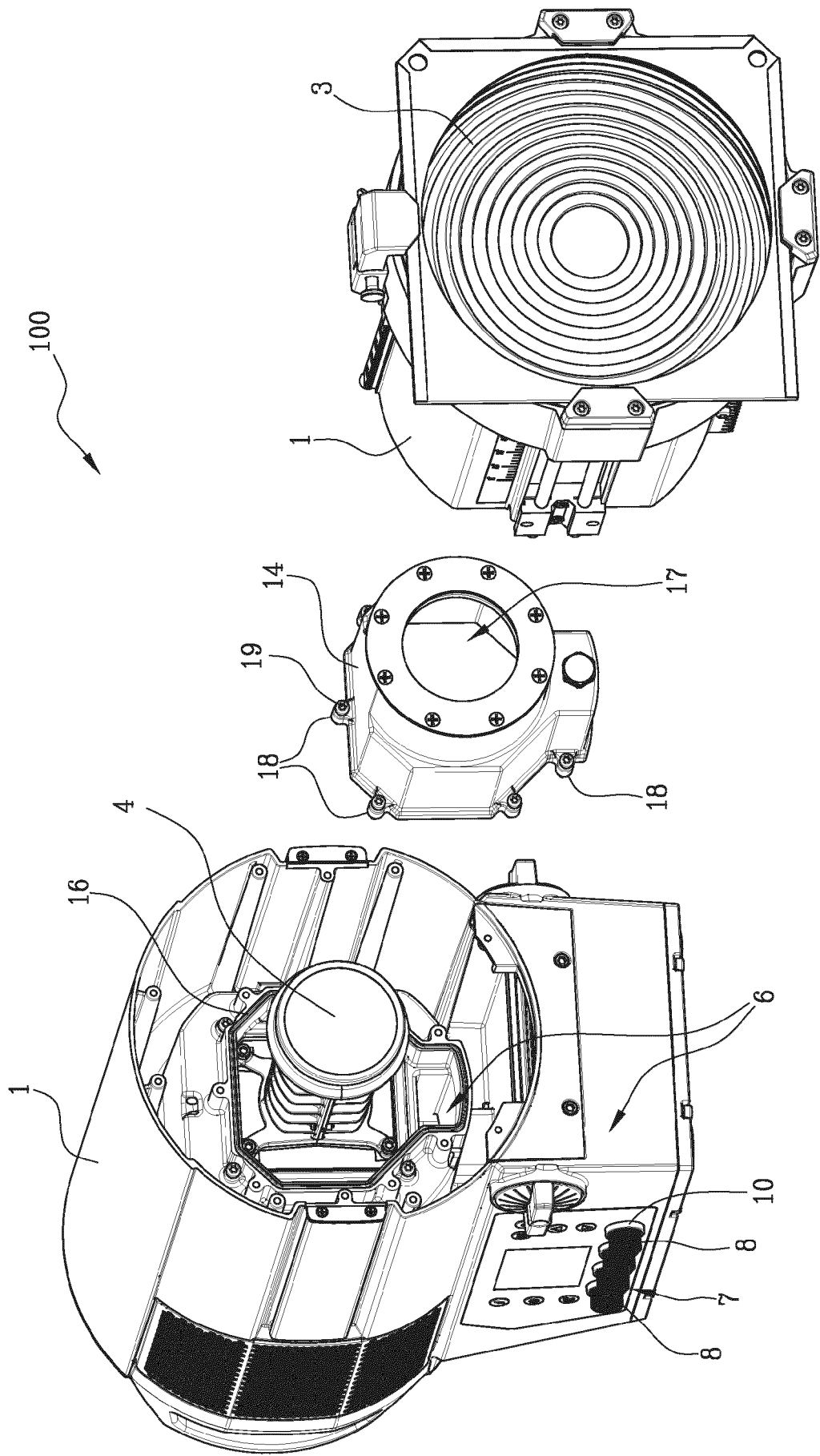


Fig.2

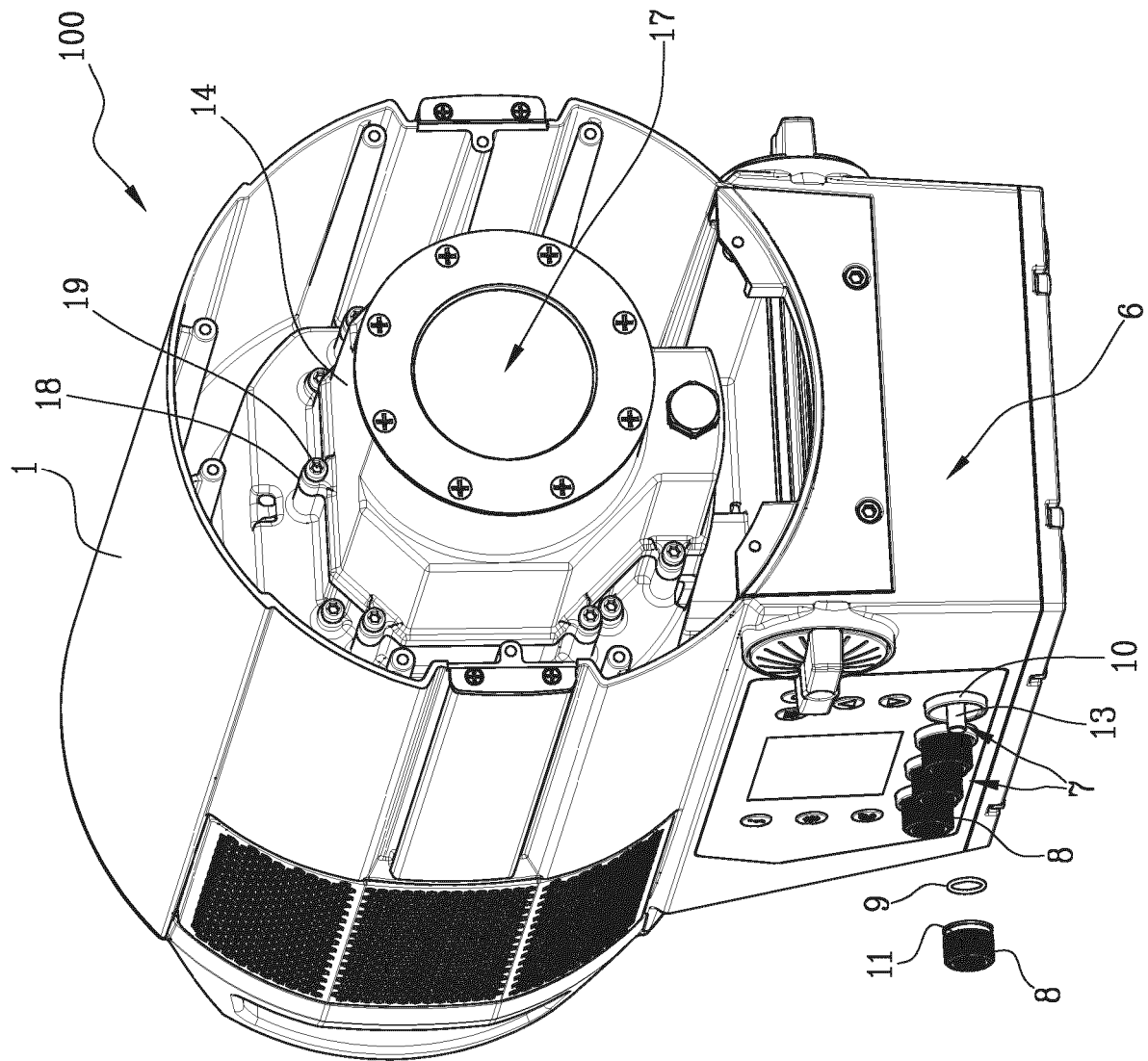


Fig.3

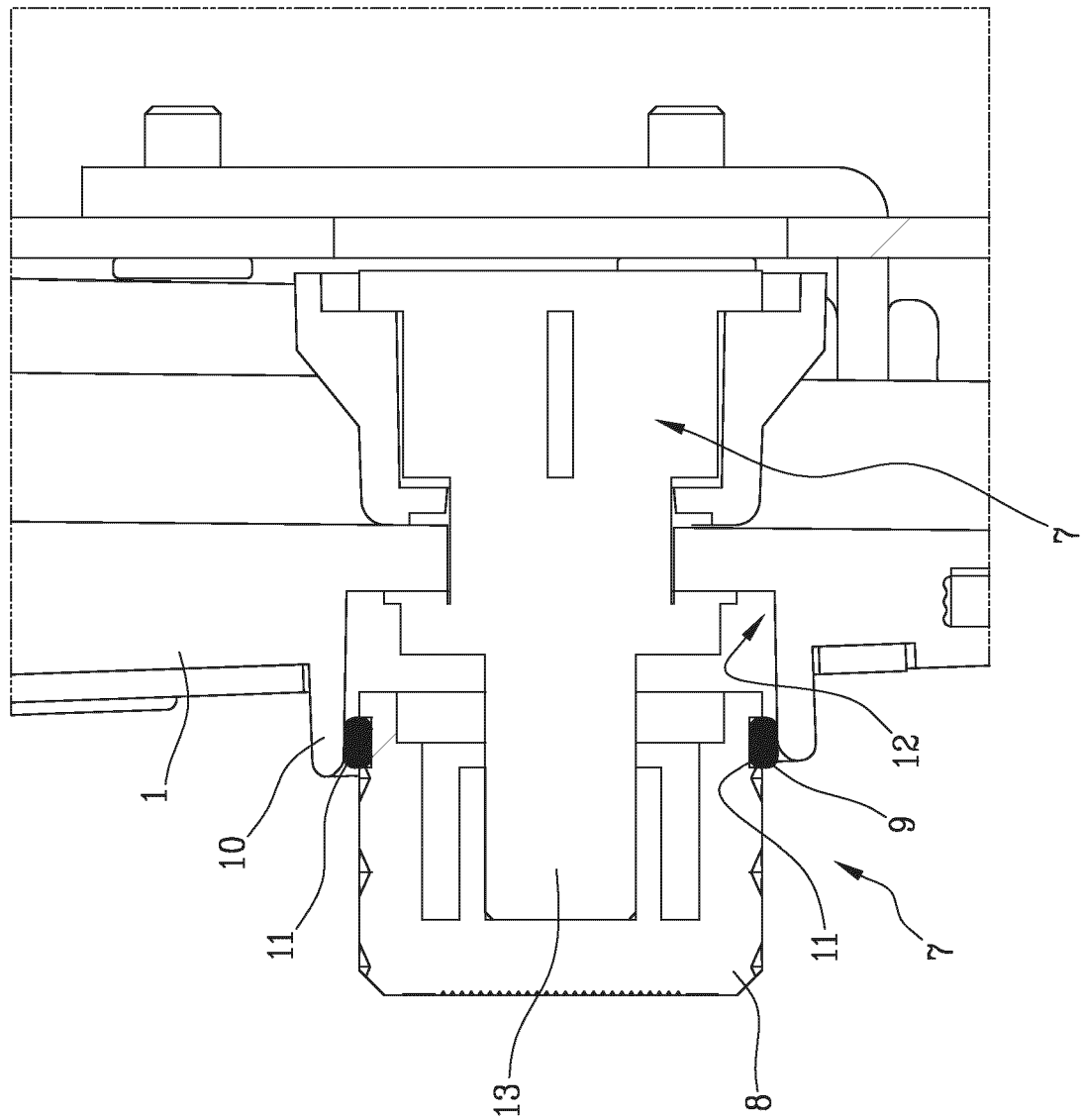


Fig. 4



Fig.6

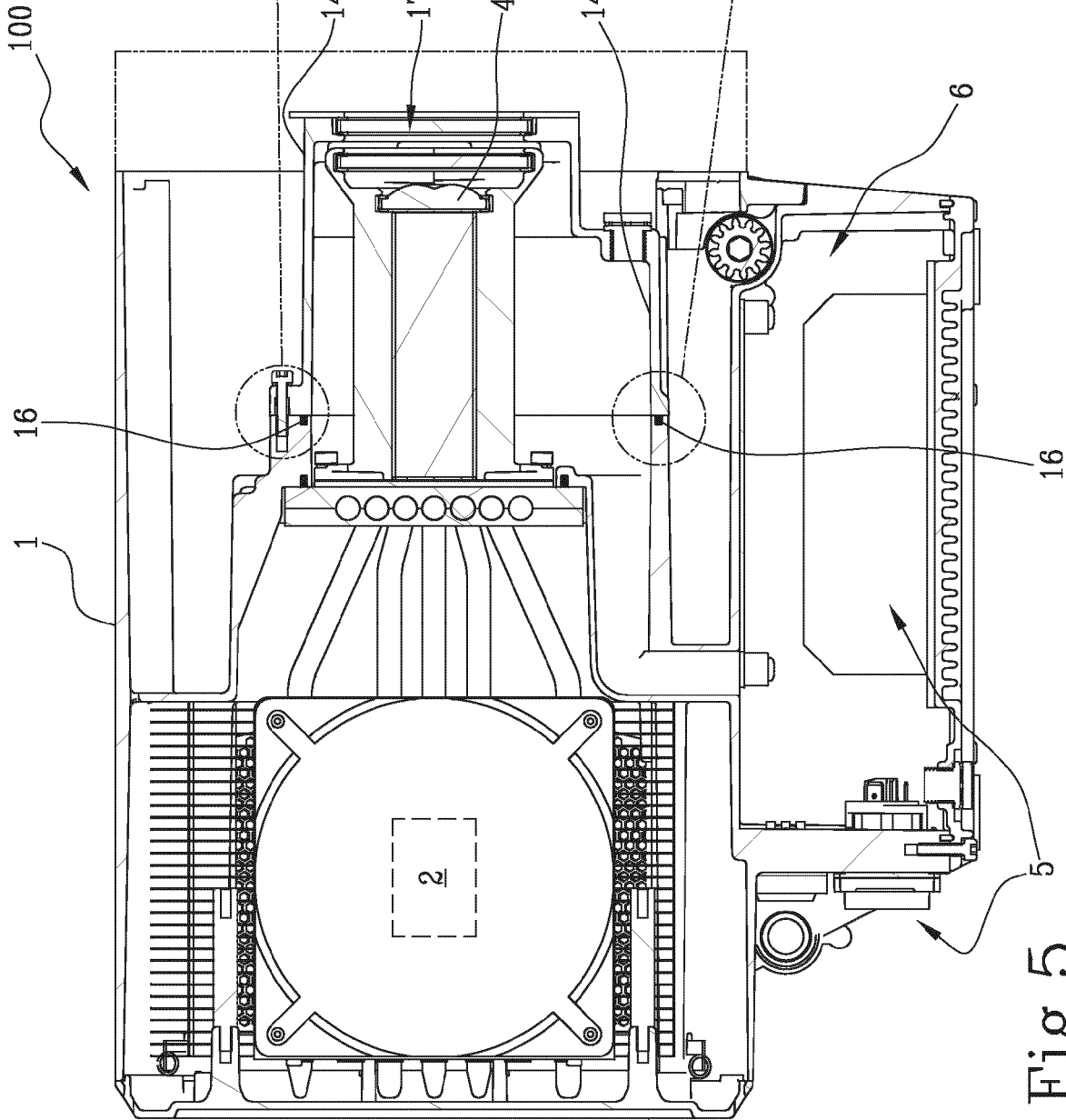


Fig.7

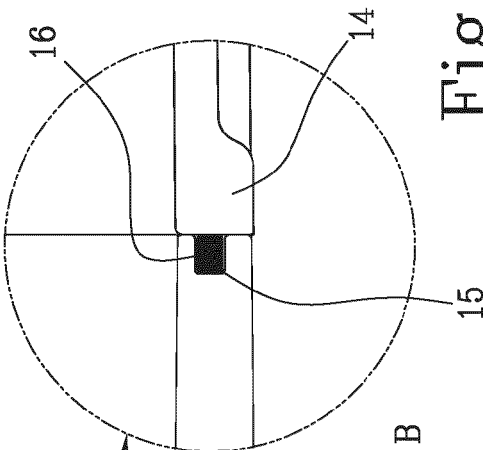
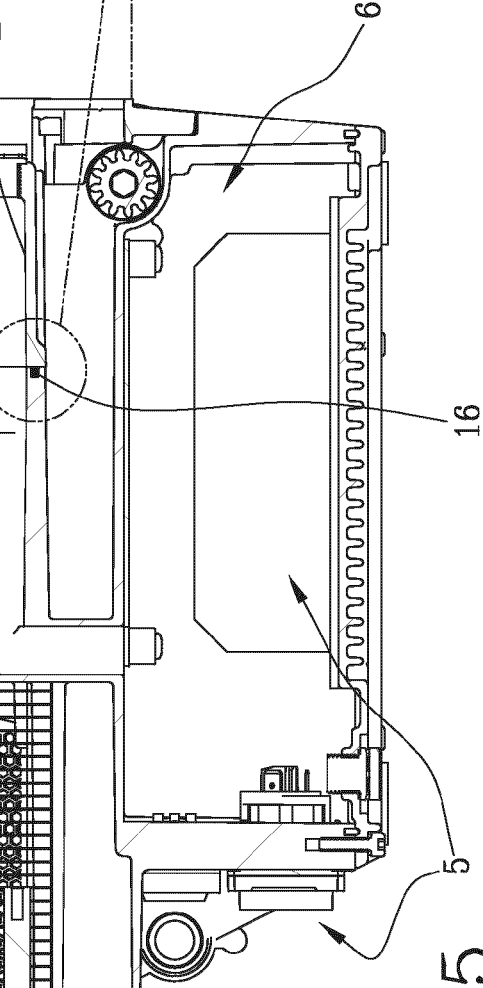


Fig.5





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Application Number

EP 24 20 5814

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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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