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(54) **SEAL FOR A FIRE OR A SMOKE DAMPER**

(57) The subject of invention is a sealing of fire damper (1) or smoke control damper (1A) of circular cross-section characterized in that it comprises an additional flange installed on the outer part of the body, which consists of four semi-rings (2) made of fire protective material fixed on the body of the damper (1) by means of a rim (3), the connection of semi-rings is covered by an additional fire protective element (18) installed in the bracket (19), while a flexible intumescent seal (11) is placed between the damper (1, 1A) and the flange, and in addition the rim (3) is equipped with bendable brackets (12) used to install the fire damper or ventilation body to the structural com-

partment (13). Another subject of invention is a fire damper (1) or smoke control damper (1A) comprising the body of circular cross-section equipped with a flange and with a compartment, characterized in that it comprises an additional flange installed on the outer part of the body, which consists of four semi-rings (2) made of fire protective material fixed on the body of the damper (1, 1A) by means of a rim (3), the connection of semi-rings (2) is covered by an additional fire protective element (18) installed in the bracket (19), between the damper (1, 1A) and the flange there is sealing according to invention.

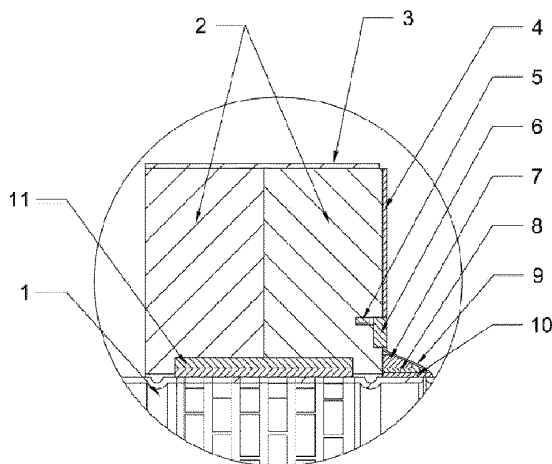


Fig. 2

Description

[0001] The object of the invention is sealing of fire damper or smoke control damper installed on the surface of structural compartment (without mortar and/or any auxiliary sealing materials) and dampers comprising this sealing.

[0002] Application EP10156593 A1 reveals a shut-off damper comprising a body of rectangular cross-section with shut-off compartment installed in it and sealing of the said shut-off compartment, provided that all four side walls of the body are equipped with fire protective spacers, outer surfaces of which adhere the side walls of compartment in close position, provided that the seals are located on the fire protective spaces in a way that they protrude to the inside of the shut-off fire damper outside the outline of the body of the shut-off fire damper characterized in that the seal has the O-profile.

[0003] Application DE2523322 A1 reveals the fire damper of circular cross-section, intended for the air-conditioning system ducts crossing the fire wall. In the revealed damper, a section of casing of the air duct comprises a rotary fire valve. In addition, in its closed position, a section of damper casing comprises the holes distributed peripherally within the valve area. There are several rows of peripheral holes displaced against each other by a half of a distance between the hole centres. The holes in each row are distributed in equal distances, are round or angular with straight edges and formed by punching.

[0004] The purpose of the invention is to provide the new effective sealing for fire dampers or smoke control damper installed on the surface of structural compartment (without mortar and/or any auxiliary sealing materials) and dampers comprising this sealing, which is simple and easy to install.

[0005] The essence of the invention is sealing of fire damper or smoke control damper of circular cross-section characterized in that it comprises an additional flange installed on the outer part of the body, which consists of four semi-rings made of fire protective material fixed on the body of damper using a rim, provided that the connection of semi-rings is covered by an additional fire protective element installed in the bracket, while a flexible intumescent seal is placed between the damper and flange, and in addition the rim is equipped with bendable brackets used to install the fire damper or ventilation body to the structural compartment.

[0006] Preferably, the flange rim is made of steel.

[0007] Preferably, the rim is installed using at least one bracket.

[0008] Preferably, the sealing is equipped in at least one rim bracket.

[0009] Preferably, the fire damper or ventilation body is installed to the structural compartment using steel anchors and screws with washers.

[0010] Preferably, the sealing according to the invention covers the area of adhesion of the flange to the structural compartment and consists of three seals: outer seal

made of flexible material intumescent and stuck onto the flange surface, inner seal made of flexible intumescent material, installed in the groove of semi-rings made of fire protective material, and auxiliary seal made of intumescent material and placed under the inner seal.

[0011] Wherein, the intumescent material is defined as a material swelling under the influence of temperature.

[0012] Preferably, the sealing according to the invention covers the area of adhesion of the damper body to the mounting hole of the structural compartment and consists of three seals: the first seal made of flexible intumescent material and stuck onto the damper body at the connection with the flange, the second seal made of flexible intumescent material and stuck onto the first seal and the third seal made of flexible intumescent material and stuck onto the second seal, provided that the first, second and third seal stuck onto each other are deflected in a wedge shape using the electrical insulating self-extinguishing adhesive tape wound over the seals.

[0013] Another object of the invention is the fire damper or smoke control damper comprising a body of circular cross-section equipped with a flange and with a compartment, characterized in that it comprises an additional flange installed on the outer part of the body, which consists of four semi-rings made of fire protective material fixed on the outer part of the body using a rim, provided that the connection of semi-rings is covered by an additional fire protective element installed in the bracket, while the sealing according to the invention is placed between the damper and flange.

[0014] Preferably, the driving axle of the damper according to the invention passes through the flange made of semi-rings and the damper according to the invention is equipped in axle sealing in the form of a sleeve made of flexible intumescent material.

[0015] Preferably, the damper compartment is equipped in additional washers made of intumescent material,

[0016] Wherein according to the invention, the fire dampers are the shut-off fire dampers compliant with the requirements of the harmonized standard EN 15650, "Ventilation for buildings - fire dampers". Fire dampers are installed in the ventilation and air-conditioning systems at the passages of ventilation ducts through the fire compartments. The fire dampers, used in combination with the fire compartments, aim at division of the building into fire zones.

[0017] These dampers remain open during standard operation of the installation. In case of fire in at least one zone, in which the fire hazard was detected, the fire dampers close in order to separate the zone at risk, in effect of activation of the thermal trigger (fuse) or remote control signal, if the damper is equipped in the remotely controlled closing mechanism e.g. a rotary actuator.

[0018] The smoke control damper according to the invention are the dampers compliant with the requirements of the harmonised standard EN 12101-8, "Smoke and heat control systems - Part 8: Smoke control dampers".

These dampers are used in the fire ventilation systems and cannot be equipped with thermal trigger. During standard operation of the building, the dampers can be opened or closed, while during fire they change their position depending on the fire event scenario adopted for a given building.

[0019] The invention provides the following benefits:

- The damper according to the invention is installed on the surface of structural compartment without mortar and other auxiliary sealing materials - it is drywall installed using only 4 anchors - without any additional sealing mass or mineral wool fillings;
- Installation time of damper according to the invention does not exceed 10 minutes.
- High fire resistance of damper according to the invention, where in the case of shut-off fire dampers, the fire resistance meets the requirements of EI 120 (ve - ho - i ↔ o) S, while in the case of smoke control dampers of EI 120 ($v_{edw} - h_{odw} - i \leftrightarrow o$) S1500 AA;
- Application of additional overlays made of intumescent materials in the damper according to the invention is an alternative for using more expensive fire protective boards and higher fire insulation parameters on one hand, and enables obtaining of higher fire resistance with a thinner compartment in effect of which the damper has lower airflow resistance and generates less noise on the other hand.

[0020] The invention is presented in the embodiment in the drawing, in which fig. 1 presents the side view of fire damper according to the invention in the first variant of the invention; fig. 2 presents sealing according to the invention installed in the fire damper from fig. 1; fig. 3 presents the damper from fig. 1 in the front view; with particular focus on the fire protective element and bracket (detail A-A); fig. 4 presents the side view of fire damper from fig. 1 with particular focus on the elements of damper installation with sealing according to the invention to the structural compartment; fig. 5 presents the side view of fire damper according to the invention in the second variant of the invention, where its driving axle passes through the flange made of semi-rings; fig. 6 presents sealing according to the invention installed in the fire damper from fig. 5; fig. 7 presents the side view of fire damper from fig. 5 with particular focus on the elements of damper installation with sealing according to the invention to the structural compartment; fig. 8 presents a section of fire damper according to the invention from fig. 7, which presents the sealing of axle of this damper; fig. 9 presents the installation elements of damper from fig. 7 and fig. 17 in the structural compartment in detail; fig. 10 presents the damper from fig. 5 in the front view with particular focus on the fire protective element and bracket (detail B-B); fig. 11 presents the side view of the first variant of the smoke control damper according to the invention; fig. 12 presents a section of smoke control damper according to the invention from fig. 11, which presents the sealing

of axle of the said damper; fig. 13 presents the front view of smoke control damper from fig. 11 with particular focus on the fire protective fire protectiveelement and bracket (detail A-A); fig. 14 presents the side view of smoke control damper from fig. 11 with particular focus on the installation elements of damper with sealing according to the invention to the structural compartment; fig. 15 presents the side view of smoke control damper according to the invention in the second variant of the invention, where its driving axle passes through the flange made of semi-rings; fig. 16 presents the sealing according to the invention installed on the smoke control damper from fig. 15; fig. 17 presents the side view of smoke control damper from fig. 15 with particular focus on the installation elements of damper with sealing according to the invention to the structural compartment; fig. 18 presents a section of smoke control damper from fig. 17, which presents the sealing of axle of the said damper; fig. 19 presents the smoke control damper from fig. 15 in the front view with particular focus on the fire protectiveelement and bracket (detail B-B).

Example 1.

[0021] The damper according to the invention comprising the sealing according to the invention is presented in the drawing, in which **1** - is fire damper; **1A** - is smoke control damper; **2** - is semi-rings; **3** - is rim; **4** - is outer seal; **5** - is auxiliary seal; **6** - is inner seal; **7** - is third seal; **8** - is second seal; **9** - is tape; **10** - is first seal; **11** - is intumescent seal **12** - is bendable bracket; **13** - is structural compartment; **14** - is screw; **15** - is washer; **16** - is steel anchors; **17** - is axle sealing; **18** - is fire protective fire protectiveelement; **19** - is bracket; **20** - is second bracket; **21** - is washers.

[0022] In this embodiment, the damper according to the invention comprising the sealing according to the invention is fire damper **1** of circular cross-section in the variant presented in fig. 1-4, which is installed on the surface of structural compartment **13** without mortar an/or any other auxiliary sealing materials.

[0023] Fire damper **1** is equipped with additional flange installed on its body. In this embodiment, the flange consists of four semi-rings **2** made of fire protective fire protectiveelement installed on the body of fire damper **1** using rims **3** made e.g. of steel. The semi-rings connection is covered by an additional fire protectiveelement **18** installed in the bracket **19** (fig. 3 detail; A-A), provided that this bracket **19** plays also a retaining function for the body of fire damper **1**, semi-rings **2** and rim **3**. The similar function is played by the second bracket **20**. The steel rim **3** is equipped with bendable brackets **12** (fig. 3) used to install the whole set (i.e. damper with sealing) using steel anchors **16** and screws **14** with washers **15** to structural compartment **13**, which is presented in fig. 4 and fig. 9.

[0024] In this embodiment, the sealing according to the invention located between the fire damper **1** and flange is ensured by flexible intumescent seal **11** and two sets

of seals installed from the side of structural compartment 13.

[0025] As stated above, the fire damper according to the invention is equipped, along with the flange, with two sets of seals installed from the side of structural compartment 13, provided that the first one from the two sets of seals is used for sealing the area of adhesion of flange to the structural compartment 13 and consists of three seals:

- outer seal 4 made of flexible material intumescent under the influence of temperature stuck onto the surface of the flange;
- inner seal 6 also made of flexible intumescent material, installed in the groove of semi-rings 2 made of fire protective material;
- third auxiliary seal 5 made of material intumescent under the influence of temperature, which is located under the inner seal 6 and embedded in the groove.

[0026] The second set of seals is used to seal the body of fire damper 1 in the mounting hole of structural compartment 13 and consists of three seals:

- first seal 10 made of intumescent flexible material under the influence of temperature and stuck onto the body of fire damper 1 at the connection with flange;
- second seal 8 made of intumescent flexible material under the influence of temperature is stuck onto the first seal 10;
- third seal 7 is also made of intumescent flexible material under the influence of temperature and is stuck onto the second seal 8;

[0027] Provided that, as illustrated in fig. 2, the whole second set of seals stuck onto each other (i.e. the set comprising the first seal 10, second seal 8 and third seal 7) deflected in a wedge shape using the electrical insulating self-extinguishing tape wound over the seals 9.

Example 2.

[0028] The fire damper 1 as in example 1, provided that it is equipped with additional washers 21 made of intumescent material, which is an alternative for using more expensive fire protective fire protective boards and higher fire insulation parameters on one hand, and enables obtaining of higher fire resistance with a thinner compartment in effect of which the damper has lower airflow resistance and generates less noise on the other hand.

Example 3.

[0029] The fire damper 1 as in example 1, provided that its driving axle passes through the flange made of semi-rings 2. The damper according to this embodiment is presented in fig. 5-10. In this embodiment, the fire

damper 1 comprises additional sealing of axle 17 (as presented in fig. 8) made in the form of sleeve of intumescent flexible material under the influence of temperature, ensuring tightness in normal conditions and during fire (in effect of thermal triggering).

Example 4.

[0030] The fire damper 1 as in example 3, provided that it is equipped with additional washers 21 made of intumescent material (fig. 5), which is an alternative for using more expensive fire protective boards and higher fire insulation parameters on one hand, and enables obtaining of higher fire resistance with a thinner compartment in effect of which the damper has lower airflow resistance and generates less noise on the other hand.

Example 5.

[0031] In this embodiment, the damper according to the invention comprising the sealing according to the invention is smoke control damper 1A of circular cross-section of the structure presented in fig. 11-14, which is installed on the surface of structural compartment 13 without mortar an/or any other auxiliary sealing materials. Similarly to fire damper 1, the smoke control damper 1A is equipped with additional flange installed on its body. In this embodiment, the flange consists of four semi-rings 2 made of fire protective material installed on the body of smoke control damper 1A using rims 3 made e.g. of steel. The semi-rings connection is covered by an additional fire protective element 18 installed in the bracket 19 (fig. 13 detach; A-A) provided that this bracket 19 plays also a retaining function for the body of smoke control damper 1A, semi-rings 2 and rim 3. The similar function is played by the second bracket 20. The steel rim 3 is equipped with bendable brackets 12 (fig. 13) used for installation of the whole set (i.e. damper and sealing) using steel anchors 16 and screws 14 with washers 15 to the structural compartment 13, which are presented in fig. 14 and fig. 9. In this embodiment, the sealing according to the invention located between the smoke control damper 1A and the flange is ensured by flexible intumescent seal 11 and two sets of seals installed from the side of structural compartment 13 as presented in example 1 and in fig. 12.

Example 6.

[0032] The smoke control damper 1A as in example 5, provided that it is equipped with additional washers 21 made of intumescent material, which is an alternative for using more expensive fire protective boards and higher fire insulation parameters on one hand, and enables obtaining of higher fire resistance with a thinner compartment in effect of which the damper has lower airflow resistance and generates less noise on the other hand.

Example 7.

[0033] The smoke control damper **1A** as in example 5, provided that its driving axle passes through the flange made of semi-rings **2**. The structure of this variant of smoke control damper is presented in fig. 15-19. In this embodiment, the smoke control damper **1A** comprises additional sealing of axle **17** (as shown in fig. 18) made in the form of sleeve of flexible material intumescent under the influence of temperature, ensuring tightness in normal conditions and during fire (in effect of thermal triggering).

Example 8.

[0034] The smoke control damper **1A** as in example 7, provided that it is equipped with additional washers **21** made of intumescent material (as presented in fig. 15), which is an alternative for using more expensive fire protective boards and higher fire insulation parameters on one hand, and enables obtaining of higher fire resistance with a thinner compartment in effect of which the damper has lower airflow resistance and generates less noise on the other hand.

Claims

1. A sealing of fire damper (**1**) or smoke control damper (**1A**) of circular cross-section **characterized in that** it comprises an additional flange installed on the outer part of the body, which consists of four semi-rings (**2**) made of fire protective material fixed on the body of the damper (**1**) by means of a rim (**3**), the connection of semi-rings is covered by an additional fire protective element (**18**) installed in the bracket (**19**), while a flexible intumescent seal (**11**) is placed between the damper (**1, 1A**) and the flange, and in addition the rim (**3**) is equipped with bendable brackets (**12**) used to install the fire damper or ventilation body to the structural compartment (**13**).
2. The sealing of fire damper (**1**) or smoke control damper (**1A**) according to claim 1 **characterized in that** the rim (**3**) fixing the flange is made of steel.
3. The sealing of fire damper (**1**) or smoke control damper (**1A**) according to claim 1 or 2 **characterized in that** the rim (**3**) is fixed by means of at least one bracket (**20**).
4. The sealing of fire damper (**1**) or smoke control damper (**1A**) according to any of the preceding claims from 1 to 3, **characterized in that** the body of the fire damper or the smoke control damper is installed to the structural compartment (**13**) by means of steel anchors (**16**) and screws (**14**) with washers (**15**).

5. The sealing of fire damper (**1**) or smoke control damper (**1A**) according to any of the preceding claims from 1 to 4, **characterized in that** it covers the area of adhesion of the flange to the structural compartment (**13**) and consists of three seals: outer seal (**4**) made of flexible material intumescent under the influence of temperature and stuck onto the flange surface, inner seal (**6**) made of flexible intumescent material, installed in the groove of the semi-rings made of fire protective material (**2**), and auxiliary seal (**5**) made of a intumescent material and placed under the inner seal (**6**).
6. The sealing of fire damper (**1**) or smoke control damper (**1A**) according to any of the preceding claims from 1 to 4, **characterized in that** it covers the area of adhesion of the body of damper (**1**) to the mounting hole of the structural compartment (**13**) and consists of three seals: first seal (**10**) made of flexible intumescent material and stuck onto the body of damper (**1, 1A**) at the connection with the flange, second seal (**8**) made of flexible intumescent material and stuck onto the first seal (**10**) and third seal (**7**) made of flexible intumescent material and stuck onto the second seal (**8**), the first (**10**), second (**8**) and third seal (**7**) stuck onto each other are deflected in a wedge shape by means of the electrical insulating self-extinguishing tape (**9**) wound over the seals.
7. A fire damper (**1**) or smoke control damper (**1A**) comprising the body of circular cross-section equipped with a flange and with a compartment, **characterized in that** it comprises an additional flange installed on the outer part of the body, which consists of four semi-rings (**2**) made of fire protective material fixed on the body of the damper (**1, 1A**) by means of a rim (**3**), the connection of semi-rings (**2**) is covered by an additional fire protective element (**18**) installed in the bracket (**19**), between the damper (**1, 1A**) and the flange there is sealing according to any of the preceding claims from 1 to 6.
8. The damper according to claim 7, **characterized in that** its driving axle passes through the flange made of semi-rings (**2**) and it is equipped in sealing of the axle (**17**) in the form of a sleeve made of flexible intumescent material.
9. The damper according to claim 7 or 8, **characterized in that** damper compartment is equipped in additional washers (**21**) made of intumescent material.

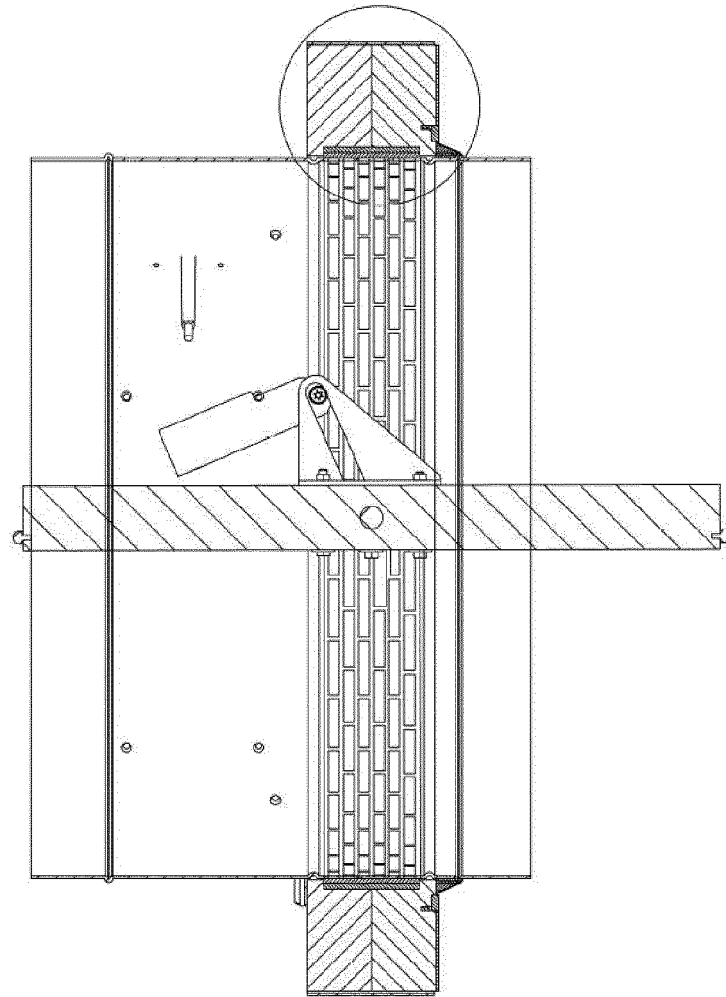


Fig. 1

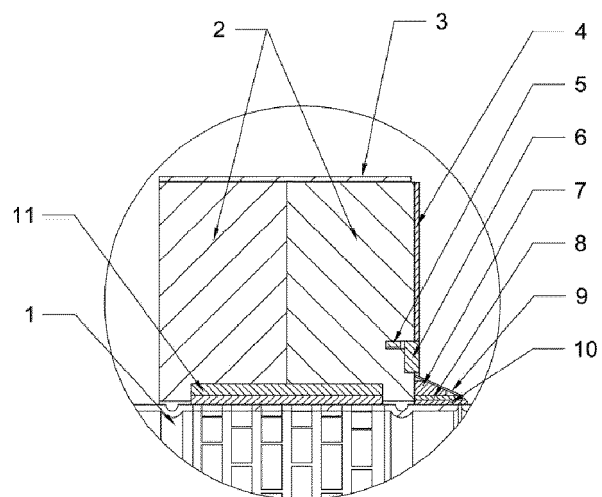


Fig. 2

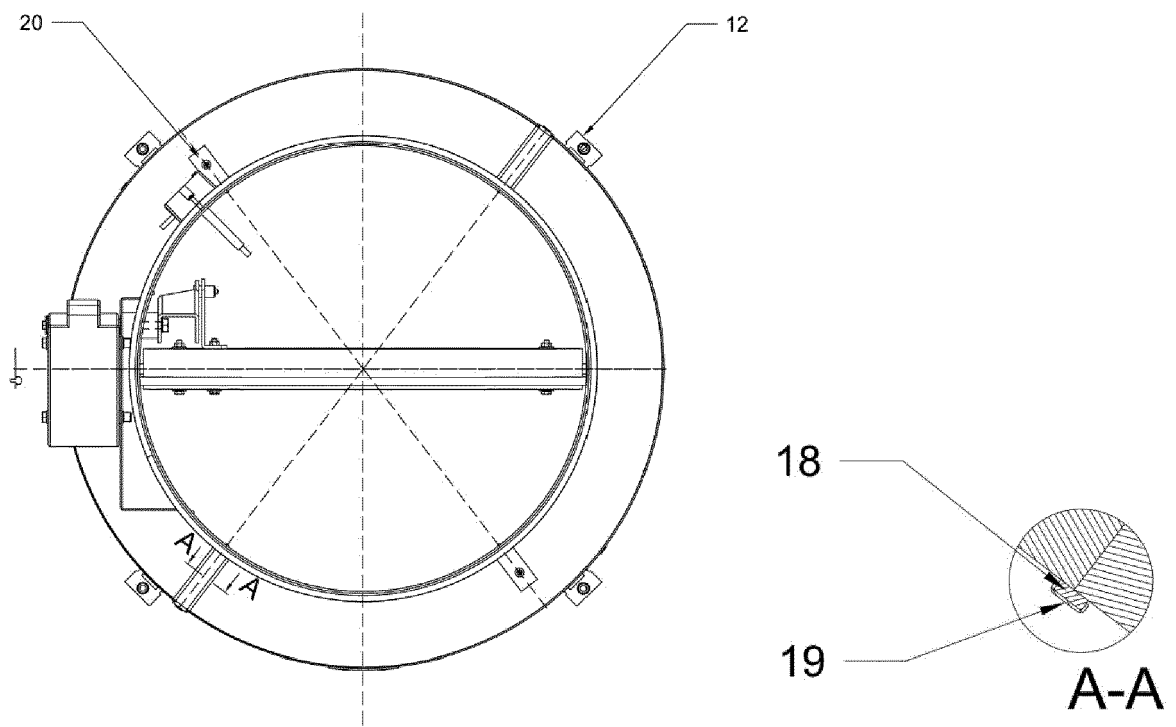


Fig. 3

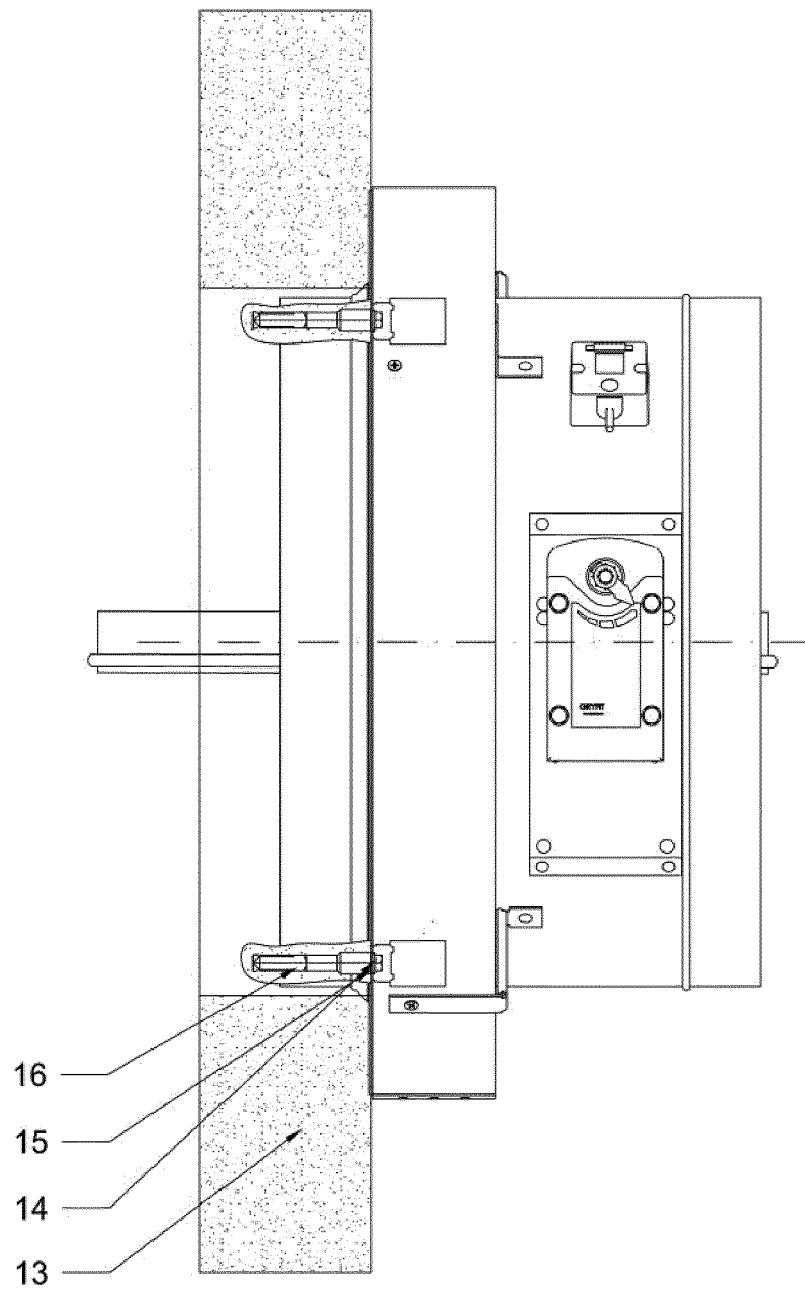


Fig. 4

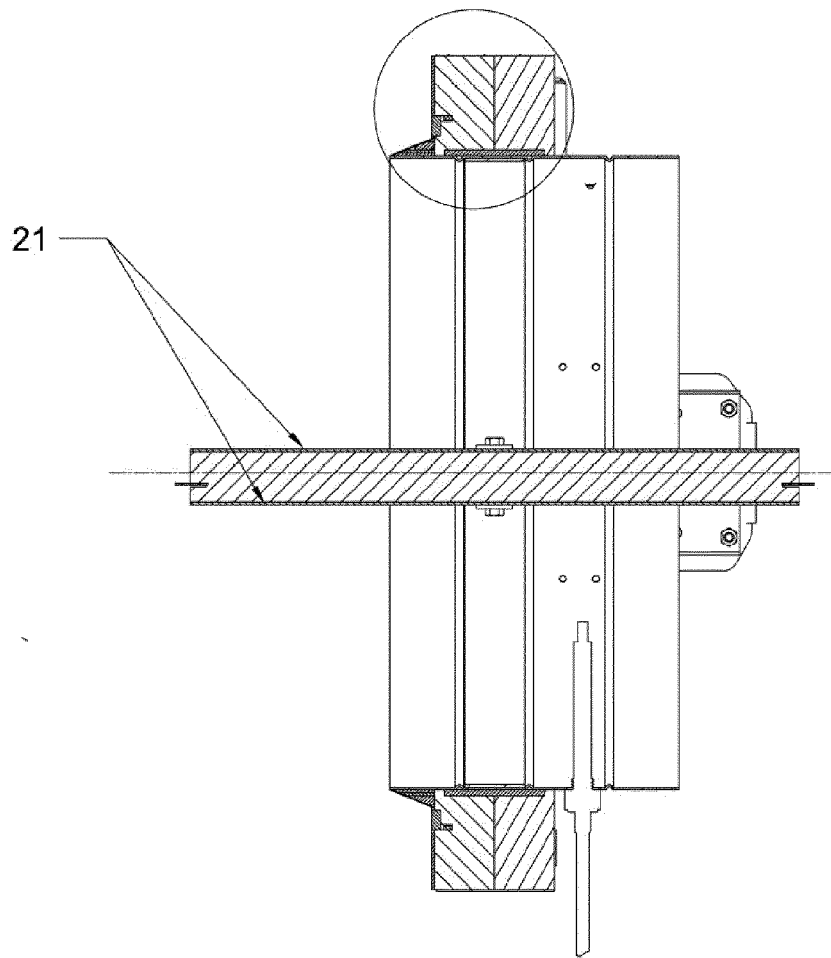


Fig. 5

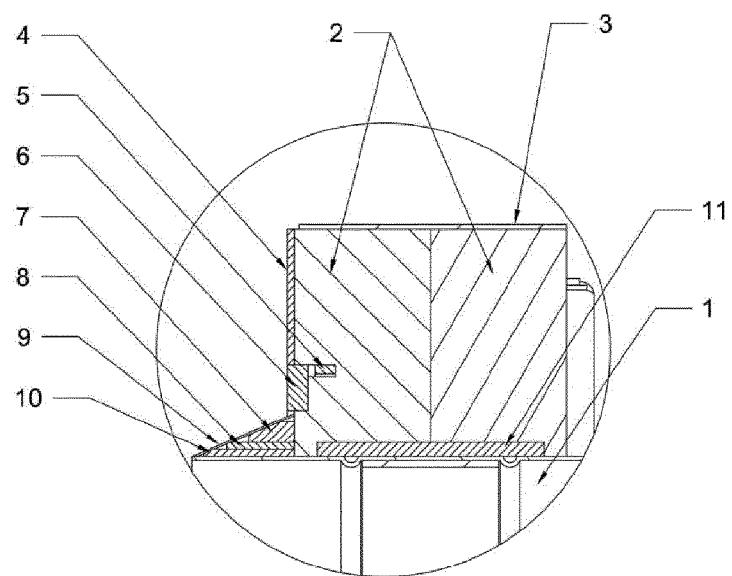


Fig. 6

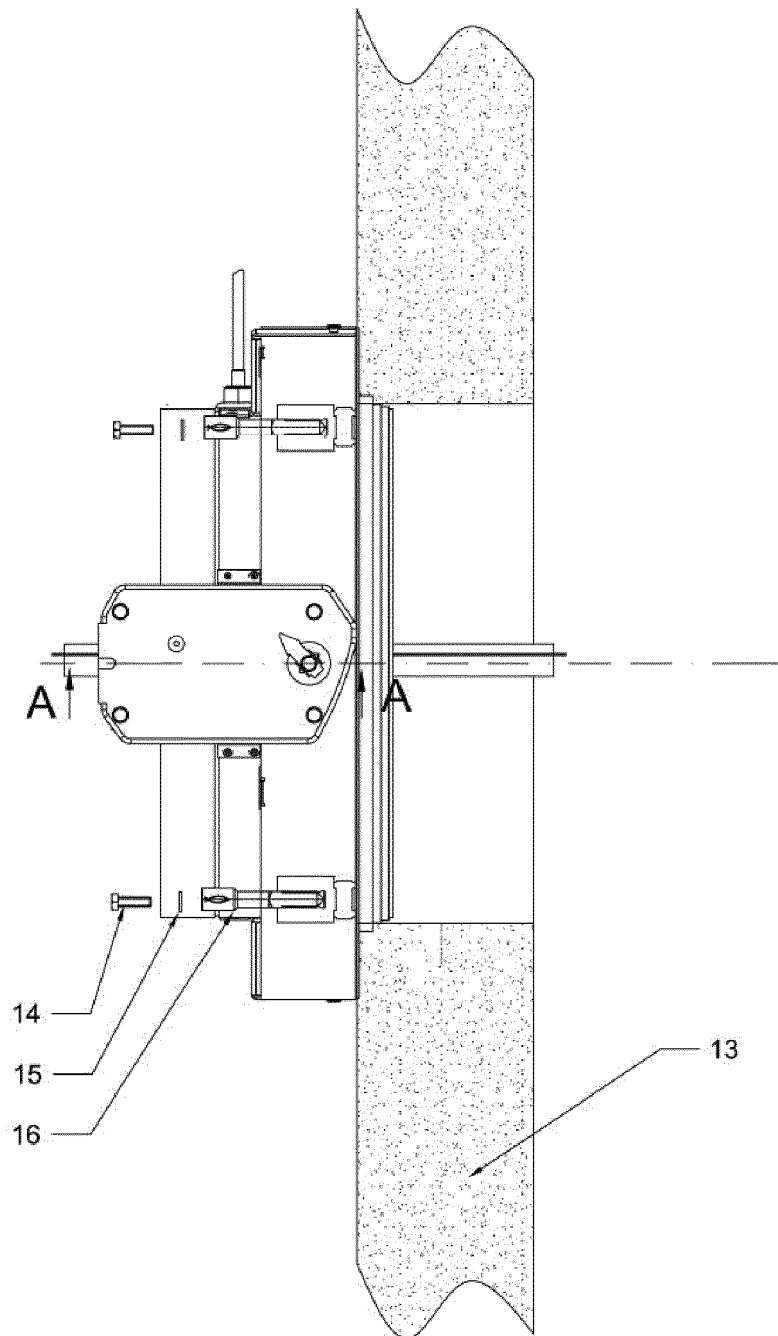


Fig. 7

A-A

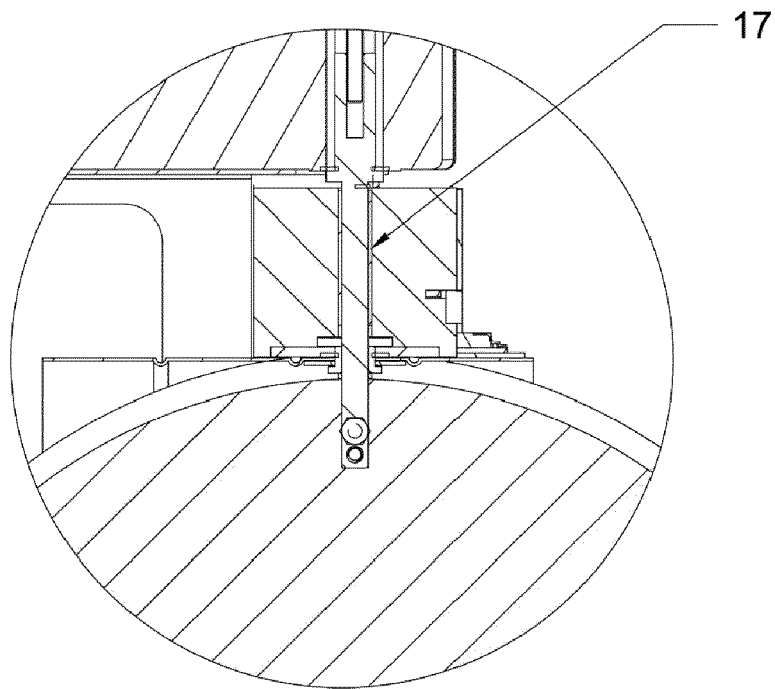


Fig. 8

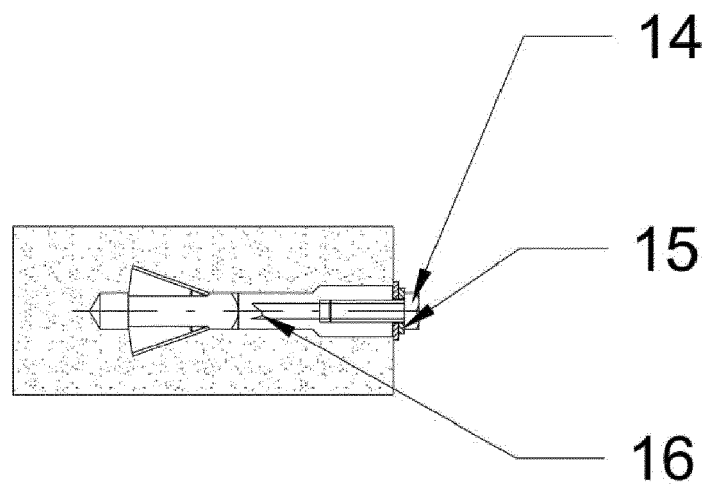


Fig. 9

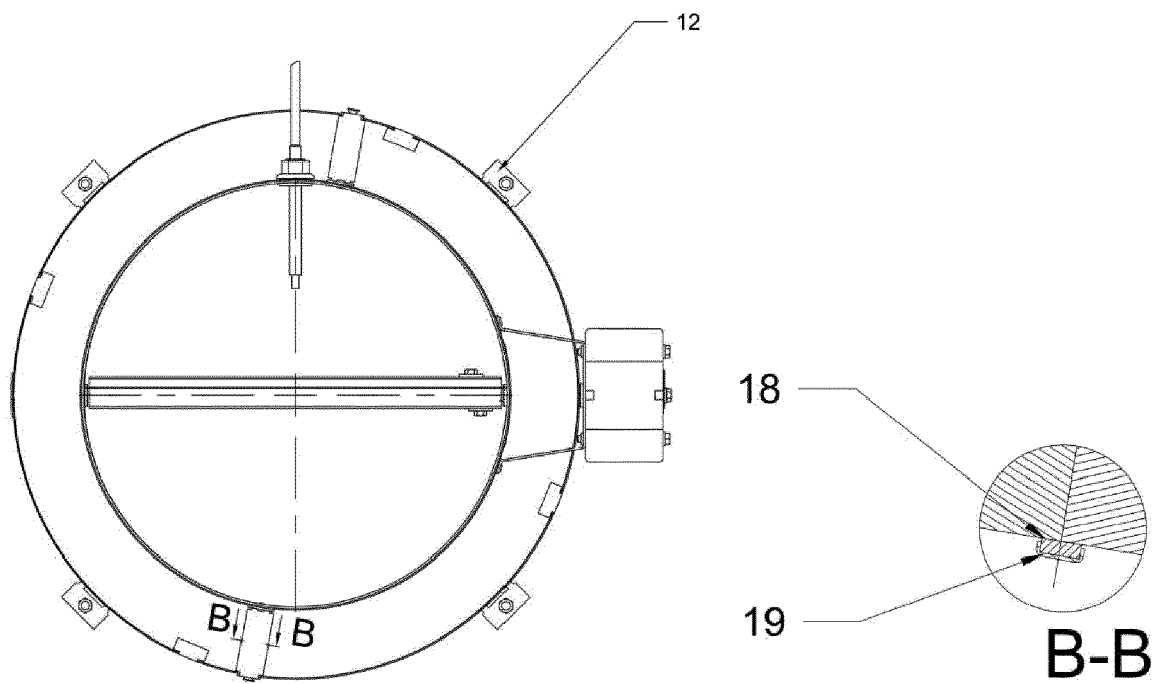


Fig. 10

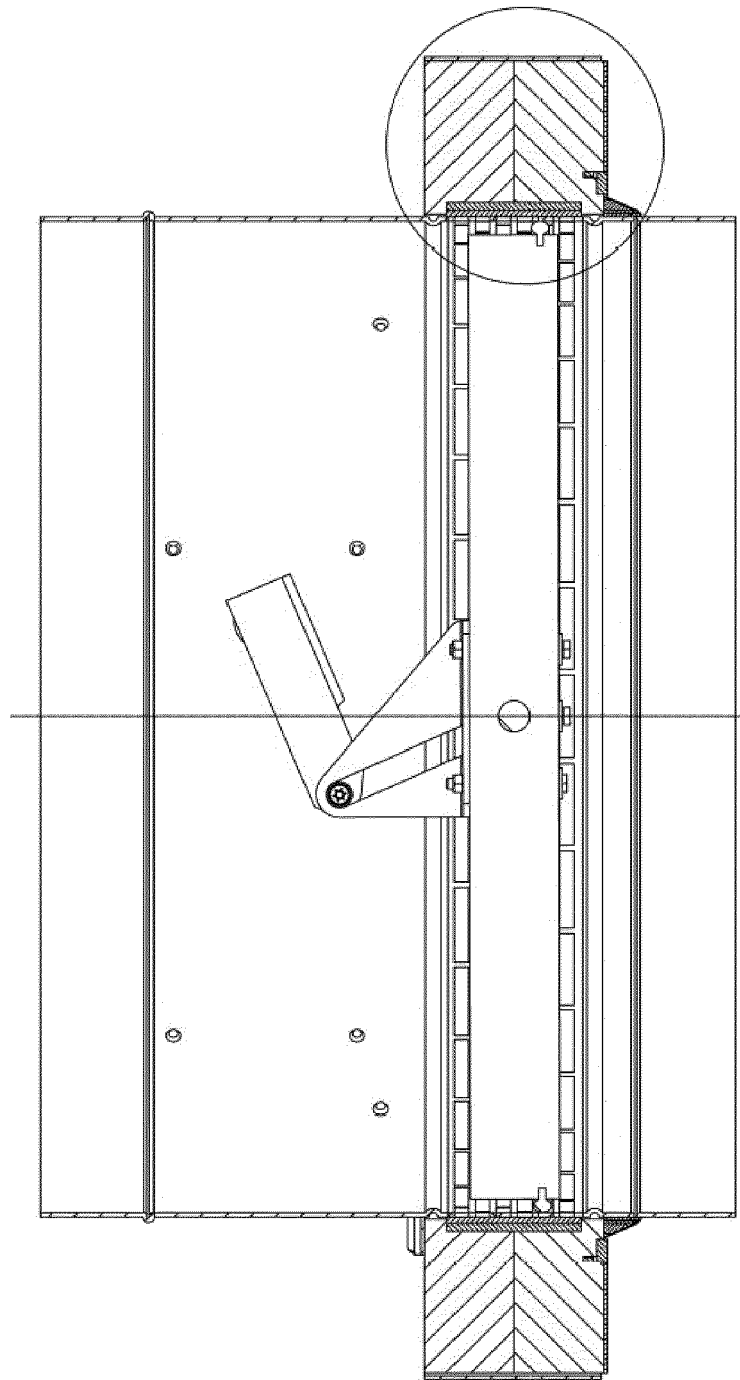


Fig. 11

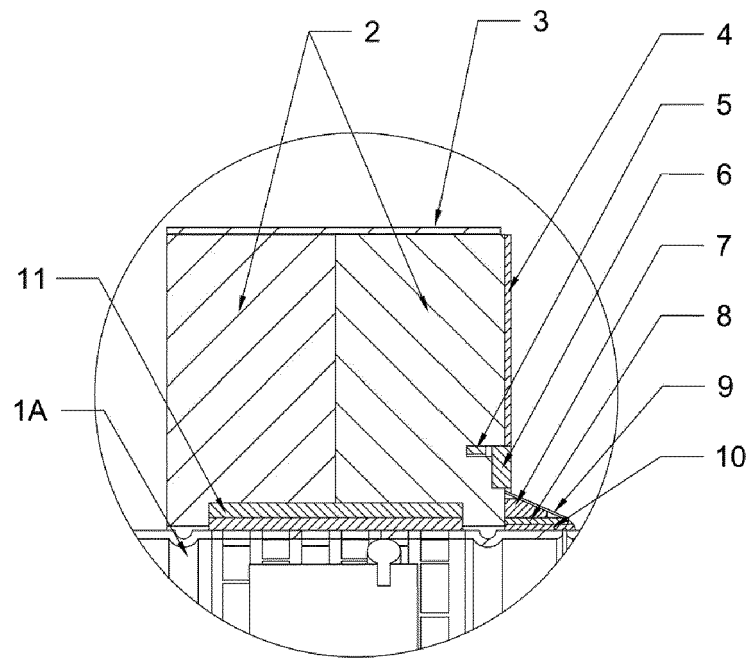


Fig. 12

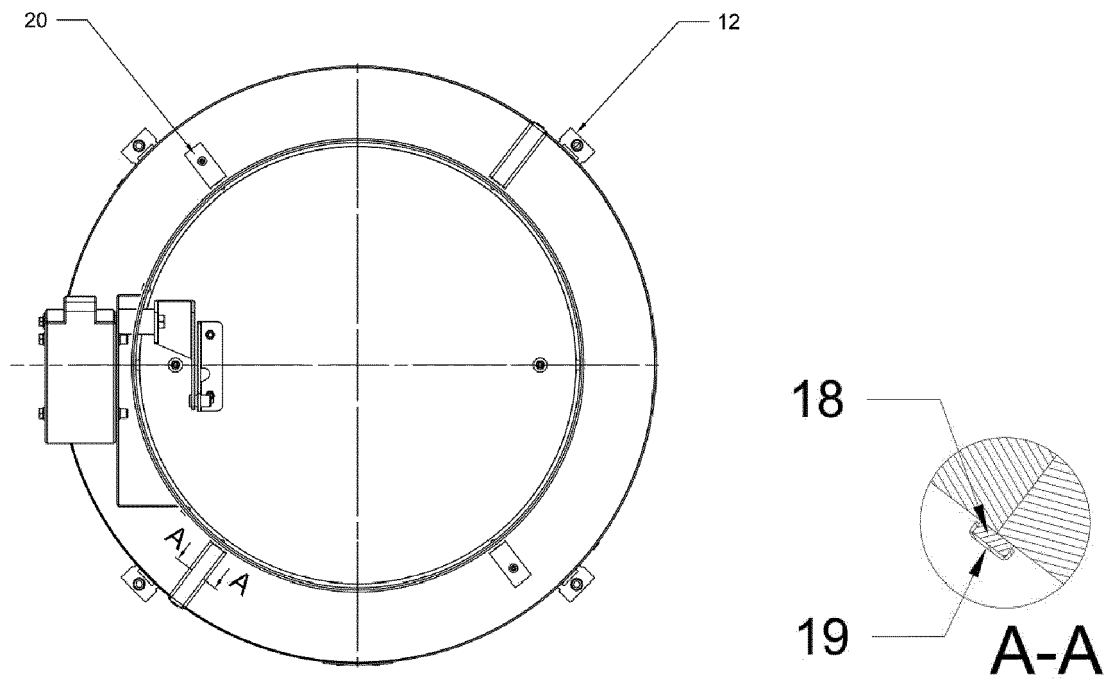


Fig. 13

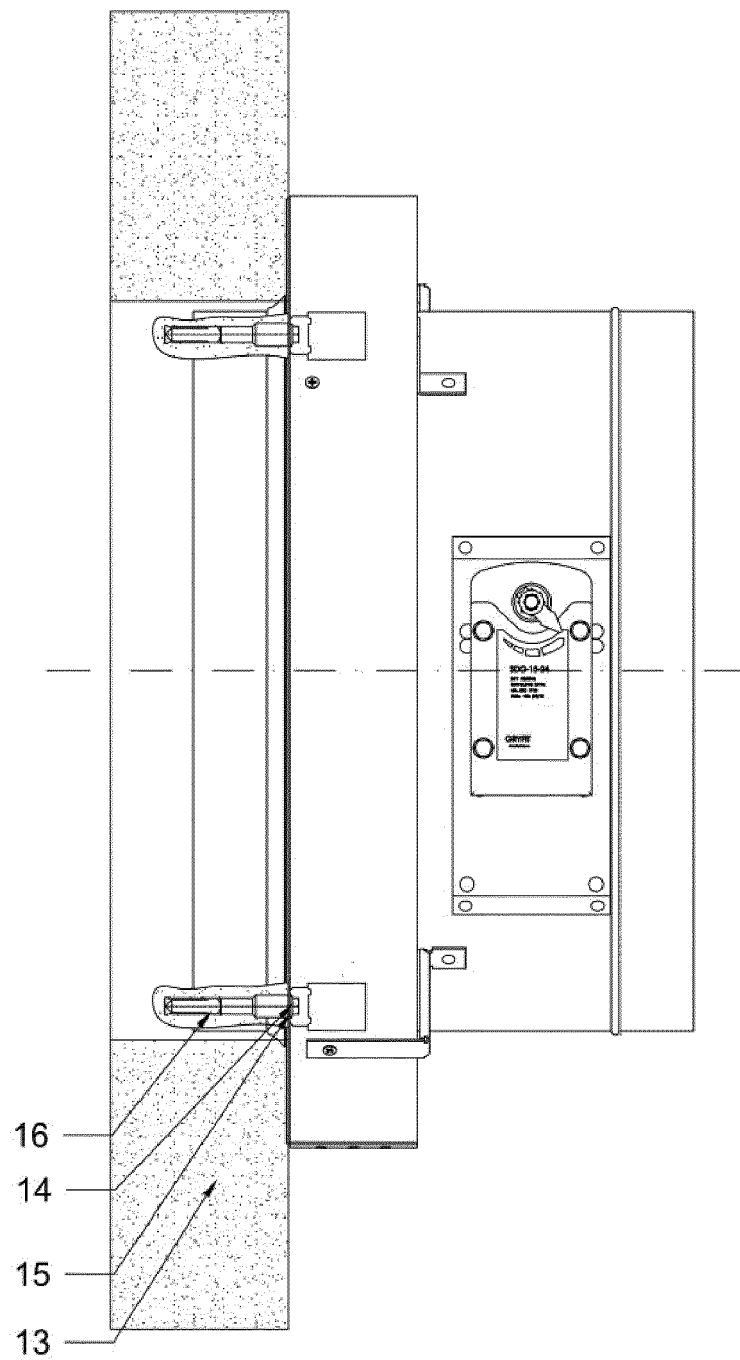


Fig. 14

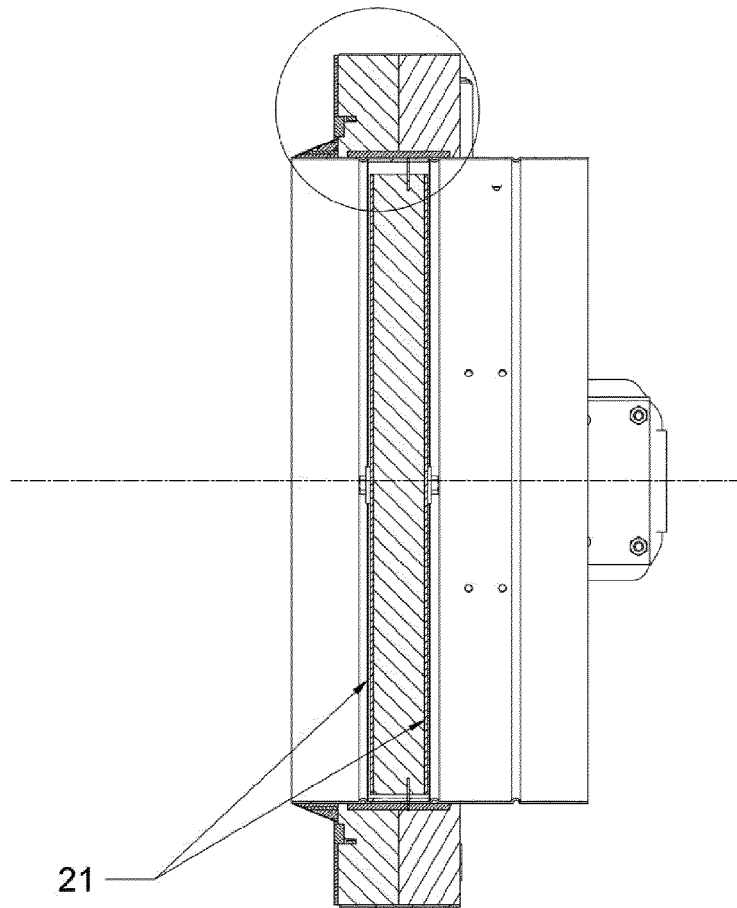


Fig. 15

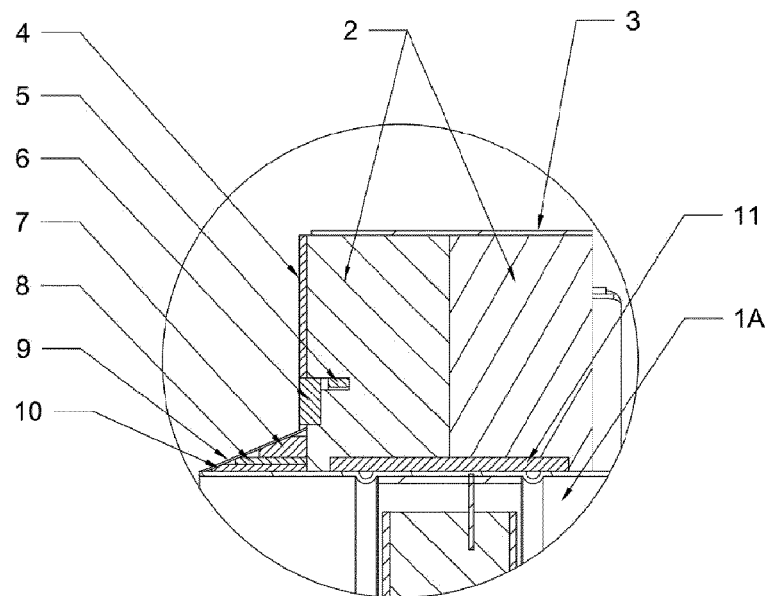


Fig. 16

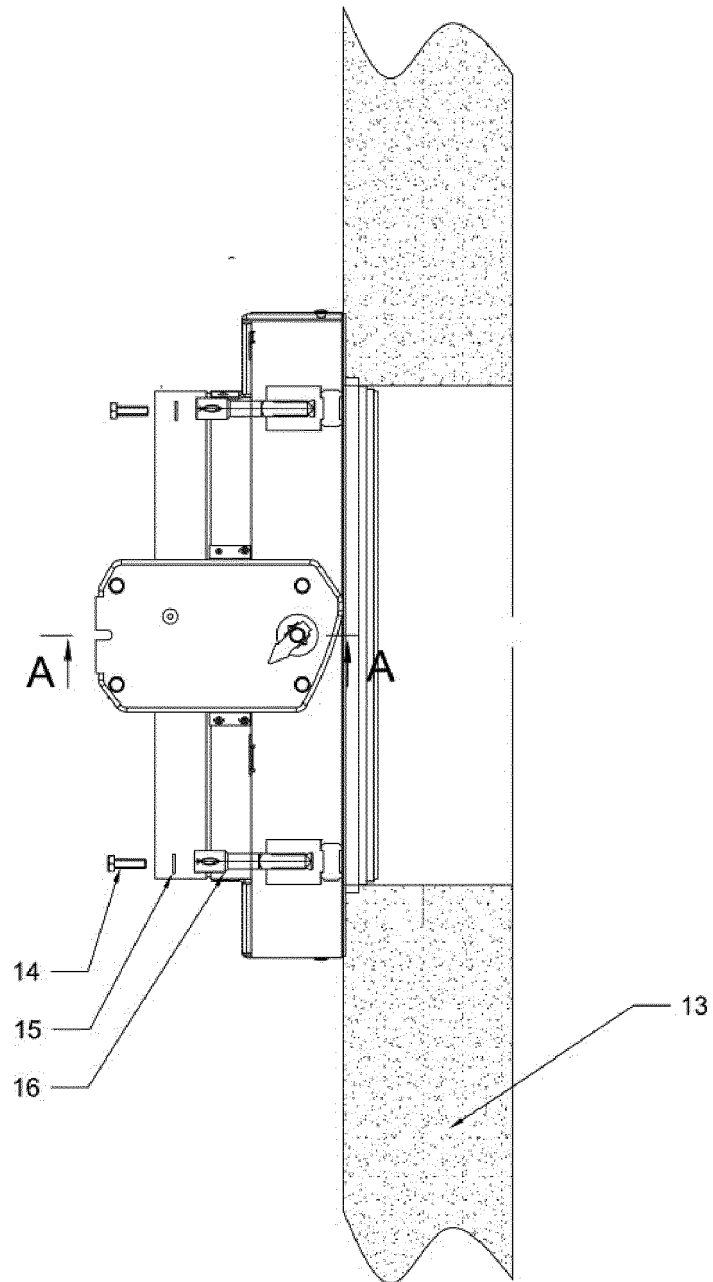


Fig. 17

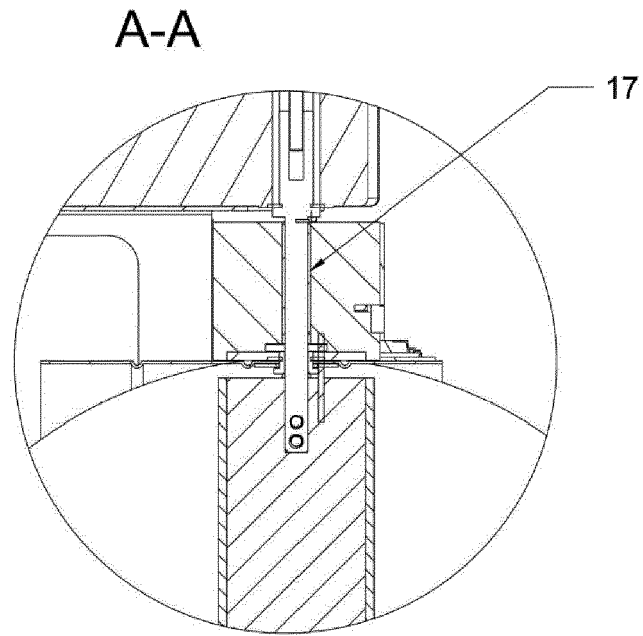


Fig. 18

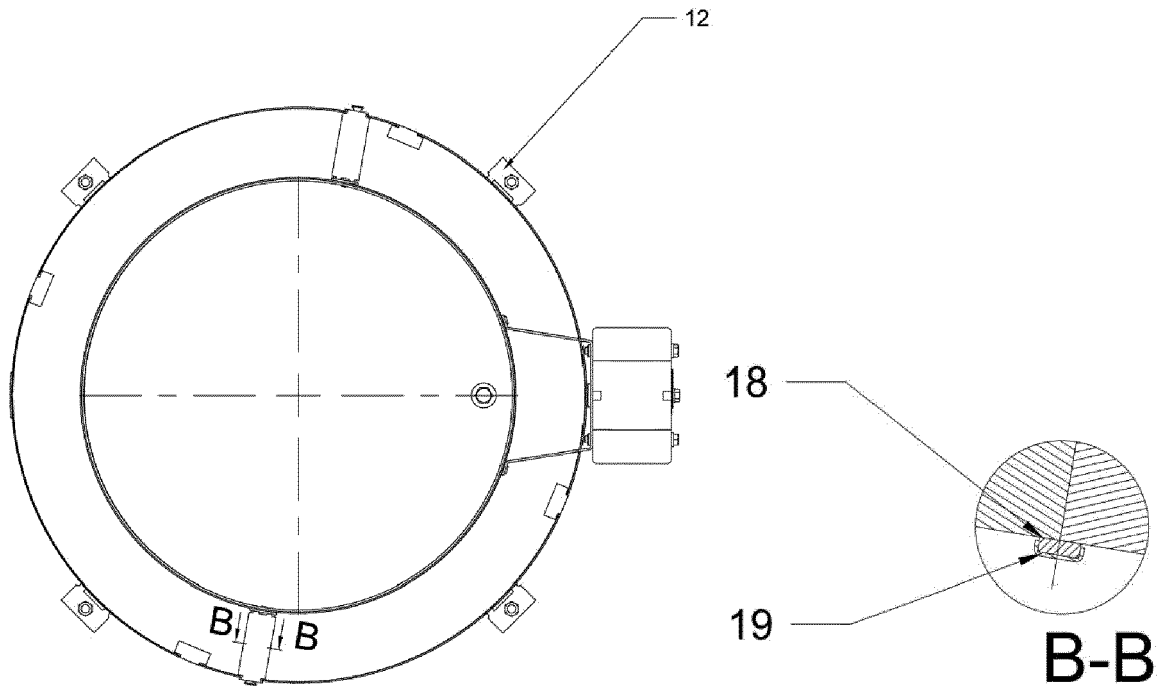


Fig. 19



EUROPEAN SEARCH REPORT

Application Number

EP 22 15 1377

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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)
Y	GB 2 281 859 A (DUFAYLITE DEV LTD [GB]) 22 March 1995 (1995-03-22)	1-4, 7	INV. A62C2/06
A	* page 1, lines 3-6 * * page 1, line 13 - page 2, line 1 * * page 2, line 21 - page 4, line 4 * * page 5, lines 11-15 * * figures 1-3 *	5, 6, 8, 9	A62C2/12
Y	EP 1 960 058 B1 (FLAECT WOODS AB [SE]) 23 June 2010 (2010-06-23)	1-4, 7	
A	* paragraph [0001] * * paragraphs [0005] - [0008] * * paragraphs [0010] - [0014] * * figures 1-5 *	5, 6, 8, 9	
A	DE 10 2013 013209 A1 (KAMLEITHNER UTA [AT]) 6 March 2014 (2014-03-06) * paragraph [0052] * * paragraph [0056] * * figures 3, 6 *	1-9	
A	GB 2 334 770 A (KOVACS LAURENCE KEITH [GB]) 1 September 1999 (1999-09-01) * page 1, paragraph 3 - page 2, paragraph 3 * * page 3, paragraph 1 - page 4, paragraph 2 * * figures 1-4 *	1-9	TECHNICAL FIELDS SEARCHED (IPC) A62C
The present search report has been drawn up for all claims			

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Place of search

Date of completion of the search

Examiner

The Hague

21 June 2022

Zupancic, Gregor

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
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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

EPO FORM 1503 03/82 (P04C01)

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

EP 22 15 1377

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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21-06-2022

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