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(54) **Damper assembly for ventilation system**

Dämpferanordnung für Belüftungssystem

Ensemble amortisseur pour système de ventilation

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Description

TECHNICAL FIELD

[0001] The present invention relates to fire damping in ventilation systems, and more precisely the invention concerns a fire damper having a movable fire damper blade

BACKGROUND

[0002] Various kinds of fire dampers are used in ventilation systems in order to prevent fire and flue gases to spread in the ventilation system. A common type of fire damper has a circular damper body defining a flow path in which is accommodated a circular fire damper blade which in its open position allows air flow through the damper body and which in its closed position closes the flow path. The fire damper plate is pivotable about a central axis which extends across the flow path. The periphery of the fire damper blade has seal means which in the closed position seals against the inner wall of the damper body.

[0003] An example of a fire damper of this kind is disclosed in GB-A-2,350,295. A fire damper blade with a peripheral seal is known from WO 2007/068786. Furthermore, a fire damper including intumescent material is disclosed in EP-A-2,239,014.

[0004] When a fire occurs in a ventilation system which includes a fire damper, the fire damper blade is closed in order to prevent fire and flue gases to spread in the system. In the closed position, the damper blade is stopped by two diametrically opposed stopping pins which project from the inner wall of the damper body and which abut against one side of the peripheral portion of the damper blade.

[0005] Closing of the damper blade is triggered by sensor means which detect a rise of temperature and/or smoke in the system. In order to avoid leaks in the closed position, it is important that the interface between the periphery of the damper blade and the inner wall of the damper body is properly sealed.

[0006] During fire conditions negative air pressures or vacuum of the order 300 Pa occur on one side of the closed damper blade. Since most damper blades consists of rather thin sheet metal, this vacuum strives to push the damper blade to its open position which may lead to leakage. Furthermore, large diameter fire dampers often have damper blades with a diameter of about 500 mm or more. In such fire dampers the vacuum tends to bend that peripheral portion of the damper blade which is not held by the stopping pins. This problem is accentuated by the fact that the strength of the fire blade material is weakened by the heat of the fire, which increases the risk of bending of the damper blade which in turn may lead to leakage. For instance, a commonly used type of damper blade sheet metal has a modulus of elasticity (E-module) of 200 N/mm² at room temperature but only 100

N/mm² at a temperature of about 1000 C which can occur at fire conditions. Then the risk of undesired bending of the damper blade is considerable.

[0007] Attempts have been made by fire damper designers to solve this problem, but hitherto no realistic solution has been developed. One simple way of dealing with the problem is to increase the wall thickness of the damper blade. However, this is not a commercially acceptable solution since it increases the overall weight of the fire damper and it also adds on costs, which leads to a price the market cannot afford. In another attempt to find a solution, stiffening ribs have been provided on either or both sides of the damper blade. However, this attempt has failed for the same reason since the stiffening ribs add on to weight and costs.

[0008] From the above it is understood that there is room for improvements.

SUMMARY

[0009] An object of the present invention is to provide a new type of fire damper which is improved over prior art and which eliminates or at least mitigates the drawbacks discussed above.

[0010] This object has now been achieved by a fire damper which is defined in appended claim 1 and with preferred embodiments set forth in the dependent claims 2-8. The object is also achieved by a ventilation system set forth in appended claim 9.

[0011] In one aspect of the invention, a fire damper for ventilation system comprises: a damper body defining an air flow channel; a fire damper blade movable between a first position in which the air flow channel is open, and a second position in which the air flow channel is closed; and an arrangement configured to stop and lock the fire damper blade in the closed position so that movement of the fire damper blade towards the open position is prevented. The stopping and locking arrangement comprises at least one stationary stopping means configured to stop the damper blade in the closed position. The fire damper blade has seal means configured to seal against the inner wall of the damper body in the closed sealed position. The stopping and locking arrangement further comprises a least one locking means which is arranged in the wall of the damper body and which is configured to be activated by a rise of temperature triggering a portion of the locking means to move outwards from the inner wall of the damper body into locking engagement with the closed fire damper blade. The locking means comprises a thermally swelling material configured to move said portion of the locking means into locking engagement with the closed fire damper blade. Furthermore, the locking means portion comprises a tongue which upon activation of the thermally swelling material is configured to be bent out from the inner surface of the damper body and inwardly towards the air flow channel. The thermally swelling material is disposed in a recess of the damper body wall and covered by the locking portion of the lock-

ing means. Hereby the blade locking means can be efficiently integrated in the damper body.

[0012] Thus, the fire damper has means configured to stop and lock the fire damper blade in the closed, sealed position so that movement of the fire damper blade towards the open position is prevented. Since the fire damper blade is locked in this position, the risk of flue gas leakage is eliminated or at least reduced to acceptable levels. The idea behind the invention is thus to not only stop the damper blade in the closed position, but also to lock the same so that leakage is prevented.

[0013] Since the stopping and locking arrangement comprises at least one locking means which is arranged in the wall of the damper body and which is configured to be activated by a rise of temperature triggering a portion of the locking means to move out from the inner wall of the damper body into locking engagement with the closed fire damper blade, there is achieved a combined stopping and locking feature which makes it possible to mechanically lock the fire damper blade in a secure manner so that bending of the blade is avoided and thereby leakage.

[0014] By providing the blade locking means, which includes a thermally swelling material configured to move said portion of the locking means into locking engagement with the closed fire damper blade, a favourable temperature sensitivity is achieved. Most preferred is the use of intumescent material.

[0015] The blade locking portion comprises a tongue which upon activation of the thermally swelling material is configured to be bent out from the inner surface of the damper body and inwardly towards the air flow channel, and this tongue may be defined by a slotted section of the damper body wall. This type of blade locking means can efficiently be formed in the manufacturing process of the fire damper, which is cost efficient.

[0016] In a preferred embodiment, a number of blade locking means are disposed around the inner periphery of the damper body at locations where the fire damper blade is closed.

[0017] In all embodiments of the invention, the stopping and locking arrangement comprises at least one stationary stopping means configured to stop the fire damper blade in the closed position. Each stationary stopping means preferably comprises a protrusion from the inner damper body wall, and the protrusion is directed towards the air flow channel and configured to abut against and stop the fire damper blade in the closed position. This blade stopping means are favorable in that they are easy to provide in the manufacturing process.

[0018] Preferably, the seal means of the fire damper blade extends around the periphery of the damper blade and is configured to seal against the inner wall surface of the damper body in the closed and locked position. Hereby efficient sealing is achieved in the interface between the inner surface of the damper body and the periphery of the damper blade which prevents leakage.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Embodiments of the invention will be described in the following; references being made to the appended diagrammatic drawings which illustrate non-limiting examples of how the inventive concept can be reduced into practice.

Fig. 1 is a perspective view of a fire damper which is designed in accordance with an embodiment of the present invention and which is shown in open position.

Fig. 2 is an end view of the fire damper of Fig. 1.

Fig. 3 shows the open fire damper on a larger scale and in a section along line III-III in Fig. 2.

Fig. 4 corresponds to the end view of Fig. 2 but shows a closed position of the fire damper.

Fig. 5 corresponds to Fig. 3 but shows the fire damper in a closed position in a section along line V-V in Fig. 4.

Fig. 6 corresponds to Figs 3 and 5 but shows the fire damper in a closed and locked position.

Fig. 7 shows on larger scale and in partial cross section a damper blade before the closed and locked position of Fig. 6 is established (cf. Fig. 5).

Fig. 8 shows on a larger scale the closed and locked position illustrated in Fig. 6.

Fig. 9 is a schematic view of an alternative fire damper which is shown in closed position and which illustrates an embodiment not forming part of the invention.

DETAILED DESCRIPTION OF EMBODIMENTS

[0020] With reference to Fig. 1 a fire damper 1 in accordance with an embodiment of the invention is shown in its open position, that is when the ventilation system is in its normal mode of operation. The fire damper 1 - also referred to as fire gas damper or flue gas damper - has a tubular damper body 2, a mounting bracket 3 and a pivotable fire damper blade 4. Either end portion of the damper body 2 is equipped with an annular seal lip 5, 6 for sealing against the inside of ventilation ducts (not shown) of the ventilation system. Hence, the damper body 2 defines an air flow path or flow channel between the ventilation ducts. The tubular body 2 also has an annular reinforcement plate 7 in connection with an annular bead 8.

[0021] The damper blade 4 is pivotable about an axis A perpendicular to and intersecting the center axis of the

damper body 2 as is best seen in Fig. 2 illustrating the open position. Two opposite pivot means 9 and 10 secure the pivoting movement of the damper blade 4, and the rotation thereof is accomplished by a rod or shaft portion 11 journaled in the mounting bracket 3.

[0022] On the inside of the damper body 2, there are two opposite, stationary pins 12, 13 which are directed towards the center axis C of the damper body 2 and which are configured to stop the damper blade 4 in the closed position (see Figs 4-5). In this closed position, the blade stopping pins 12, 13 are in engagement with and abutting against either side of the damper blade 4 at its periphery.

[0023] Seal means 14 is provided on the periphery of the damper blade 4 in order to seal against the inner wall surface of the damper body 2 in the closed position. The seal means 14 may consist of a cloth of glass fibre or silicate material sandwiched between two sheet metal plates building up the fire damper blade 4. Alternatively, the seal means may comprise thermally swelling material, like intumescent material.

[0024] In Figs 4-5 the fire damper 1 is shown in its closed position where the fire damper blade 4 closes the flow channel of the damper body 2. For better understanding of this example of how the inventive concept works, let's assume that this closed position has been triggered by a fire which has sent flue gases into the ventilation system. The sensor system (not shown) has detected the fire and/or smoke and triggered closing of the damper blade 4 by pivoting movement about the axis A. The stopping pins 12, 13 have stopped the movement of the damper blade 4 in this position and the peripheral seal means 14 of the blade 4 seals against the inside of the damper body 2. In the closed position of shown in Fig. 5 and as the temperature rises due to the fire, an increasing pressure is built up on one side of the damper blade 4 which pulls the blade 4 back from the closed position (that is clockwise about the axis A in Fig. 5). If this movement of the blade 4 towards open position continues, the sealing effect in the interface between the peripheral seal means 14 and the inner surface of the damper body 2 is lost and leakage will occur.

[0025] Thanks to mechanical locking means depicted 15, 15' in the Figures leakage can be avoided in the way illustrated in Fig. 6. Each locking means 15, 15' comprises a portion or tongue 16 of the duct body wall accomplished by a U-shaped slot 17 in the same. In a recess 18 of the duct body 2 there is provided a thermally swelling material 19 which is disposed radially outside the tongue 16 with respect to the center axis of the duct body 2 (see Fig. 7). When the temperature rises in the flow channel of the duct body 2, the swelling material 19 is activated and expanded which pushes the tongue 16 to an inclined position where it abuts against one side of the damper blade 4 at its peripheral portion. Thus, the tongue 16 is bent from its idle position flush with the inner surface of the duct body 2 to an active position where the free end of the tongue 16 is configured to engage and lock the damper blade 4. In this way, the damper

blade 4 is not only stopped by the stopping pins 12, 13 in this position, but also mechanically locked by the tongue 16. In other words, the fire damper 1 is equipped with a combined blade stopping and blade locking arrangement (pins 12, 13 and tongues 16).

[0026] The damper blade 4 is locked between the stopping means 12, 13 and the locking means 15, 15' at two opposite locations of the periphery of the closed damper blade 4. At either side, the stopping means 12, 13 and the locking means 15, 15' are axially spaced a certain distance on the inner surface of the duct body 2 in parallel with the center axis C of the same. As can be seen in Fig. 6, the damper blade 4 can be slightly tilted in the closed and locked position but still maintained between the axially spaced stopping and locking means. The peripheral seal means 14 of the damper blade 4 secures efficient sealing also in the tilted position, so that flue gas leakage is prevented.

[0027] In its closed and locked position, the blade 4 cannot move and the risk of leakage in the gap between the periphery of the blade 4 and the inner wall of the damper body 2 is prevented. This means that the damper blade 4 is permanently locked. After a fire has occurred triggering a locking operation of this kind, the fire damper 1 is always removed and replaced by a new one.

[0028] Although not illustrated here, there may be further blade locking means 15 arranged on the inside of the damper body 2; depending for instance on the diameter of the fire damper 1. Preferably, there are at least two locking means 15, 15' arranged in diametrically opposite position in connection with the two stopping pins 12, 13.

[0029] Preferably, the thermally swelling material 19 accommodated in the recess 18 comprises an intumescent material having suitable swelling properties with respect to different temperature and fire condition which may occur.

[0030] In Fig. 9 there is schematically shown an alternative fire damper 100. The main components of this fire damper 100 are basically the same as described above, namely a damper body 200 and a fire damper blade 400 pivotably movable about an axis A. The damper blade 400 is shown somewhat thicker in Fig. 9 and it consists of two sheet metal plates 401 and 402 between which a peripheral seal element 403 is sandwiched. The seal element 403 may consist of a cloth of glass fibre or silicate material.

[0031] The fire damper 100 has blade stopping means in the shape of pins 120, 130 of the same type as in the embodiment earlier described. However, in the alternative fire damper the blade locking means 150, 151 are provided at the peripheral portion of the damper blade 400. The locking means 150, 151 are disposed on either side of the blade 400 and in opposite positions. As in the previous embodiment, each locking means 150, 151 contains a thermally swelling material which - when the temperature rises due to a fire - either pushes a tongue of blade material (not shown) into locking engagement with

the inner surface of the damper body 200 or is expanded directly against this surface for locking purposes. The favorable combined stopping and locking of the damper blade 400 in the closed position is achieved also with this structure. In an embodiment (not shown), there may be recesses or shoulders on the inner wall of the damper body 200 which match the expanding portion of the blade periphery.

[0032] It should be appreciated that the inventive concept is by now means limited to the embodiments described herein, but modification are feasible without departing from the inventive idea defined in the appended claims. Although the invention is in particular applicable to large diameter ventilation systems (say 500 mm diameter and above), it is also applicable to smaller diameters. Furthermore, the invention is not limited to circular ventilation duct system but the inventive principles can be applied also to other kinds of ventilations systems; for instance rectangular. Although the examples herein concern damper blades pivotable about a central axis perpendicular to the center axis of the fire damper, the invention is not limited to that structure. Rather the inventive concept is generally applicable to different kinds of damper assemblies having a damper blade movable from an open position, which is the normal mode of operation, and a closed portions triggered by a fire or the like in the ventilation system. As mentioned above, the number of stopping and locking means can vary depending on the size and design of the fire damper.

Claims

1. A fire damper for ventilation system, comprising a damper body (2) defining an air flow channel; a fire damper blade (4) movable between a first position in which the air flow channel is open, and a second position in which the air flow channel is closed; and an arrangement configured to stop and lock the fire damper blade (4) in the closed position so that movement of the fire damper blade (4) towards the open position is prevented; said stopping and locking arrangement comprising at least one stationary stopping means (12) configured to stop the fire damper blade (4) in the closed position by abutment against a side of the fire damper blade at its periphery; wherein said fire damper blade (4) has seal means (14) configured to seal against the inner wall of the damper body (2) in the closed sealed position; and wherein said stopping and locking arrangement comprises at least one locking means (15-19) which is arranged in the wall of the damper body (2) and which is configured to be activated by a rise of temperature; **characterized in that** said locking means comprises a thermally swelling material (19) which is disposed in a recess (18) of the damper body wall and which is covered by a portion of the locking means; wherein said portion of the locking means

comprises a tongue (16) which upon activation of the thermally swelling material (19) is triggered to be bent out from the inner wall of the damper body (2) inwardly towards the air flow channel into locking engagement with the closed fire damper blade (4) and into abutment against a side of the fire damper blade (4) at its peripheral portion; and wherein a peripheral portion of the fire damper blade (4) is positioned between said stationary stopping means (12) and said bent tongue (16), in said closed sealed position.

2. The fire damper as claimed in claim 1, wherein the thermally swelling material (19) comprises an intumescent material.
3. The fire damper as claimed in claim 1 or 2, wherein said tongue (16) is defined by a slotted section (17) of the damper body wall.
4. The fire damper as claimed in any one of preceding claims, comprising a number of said locking means (15-19) disposed around the inner periphery of the damper body (2) at locations where the fire damper blade (4) is closed.
5. The fire damper as claimed in any one of the preceding claims, comprising a number of said stationary stopping means (12, 13) disposed around the inner periphery of the damper body (2) at locations where the fire damper blade (4) is closed.
6. The fire damper as claimed in any one of the preceding claims, wherein each of said stationary stopping means comprises a protrusion (12, 13) from the inner damper body wall, said protrusion (12, 13) being directed towards the air flow channel and configured to abut against and stop the fire damper blade (4) in the closed position.
7. The fire damper as claimed in any one of the preceding claims, wherein said stopping and locking arrangement is configured to permanently stop and lock the fire damper blade (4) in closed position in case of a fire in the ventilation system.
8. The fire damper as claimed in any one of the preceding claims, wherein said seal means (14) extends around the periphery of the fire damper blade and is configured to seal against the inner wall surface of the damper body (2) in said closed and locked position.
9. A ventilation system comprising at least one fire damper (1) as claimed in any one of the preceding claims.

Patentansprüche

1. Brandschutzklappe für ein Lüftungssystem, umfassend einen Klappenkörper (2), welcher einen Luftströmungskanal definiert; ein Brandschutzklappenblatt (4), welches zwischen einer ersten Position, in welcher der Luftströmungskanal offen ist, und einer zweiten Position, in welcher der Luftströmungskanal geschlossen ist, bewegbar ist; und eine Anordnung, welche konfiguriert ist, das Brandschutzklappenblatt (4) in der geschlossenen Position zu halten und zu verriegeln, so dass eine Bewegung des Brandschutzklappenblatts (4) in Richtung der offenen Position verhindert wird; wobei die Halte- und Verriegelungsanordnung zumindest ein stationäres Haltemittel (12) umfasst, welches konfiguriert ist, das Brandschutzklappenblatt (4) in der geschlossenen Position durch Anlage an einer Seite des Brandschutzklappenblatts an seinem Rand zu halten; wobei das Brandschutzklappenblatt (4) Dichtungsmittel (14) aufweist, welche konfiguriert sind, gegen die Innenwand des Klappenkörpers (2) in der geschlossenen abgedichteten Position abzudichten; und wobei die Halte- und Verriegelungsanordnung mindestens ein Verriegelungsmittel (15-19) umfasst, welches in der Wand des Klappenkörpers (2) angeordnet und konfiguriert ist, bei einer Erhöhung der Temperatur aktiviert zu werden; **dadurch gekennzeichnet, dass** das Verriegelungsmittel ein thermisch aufquellendes Material (19) umfasst, welches in einer Ausnehmung (18) der Klappenkörperwand angeordnet und durch einen Abschnitt des Verriegelungsmittels verdeckt ist; wobei der Abschnitt des Verriegelungsmittels eine Zunge (16) aufweist, welche bei Aktivierung des thermisch aufquellenden Materials (19) getriggert wird, von der Innenwand des Klappenkörpers (2) nach innen in Richtung des Luftströmungskanals in Verriegelungseingriff mit dem geschlossenen Brandschutzklappenblatt (4) und zur Anlage an einer Seite des Brandschutzklappenblatts (4) an seinem Randbereich herausgebogen zu werden; und wobei ein Randbereich des Brandschutzklappenblatts (4) in der geschlossenen abgedichteten Position zwischen dem stationären Haltemittel (12) und der gebogenen Zunge (16) positioniert ist
2. Brandschutzklappe nach Anspruch 1, wobei das thermisch aufquellende Material (19) ein intumeszentes Material umfasst.
3. Brandschutzklappe nach Anspruch 1 oder 2, wobei die Zunge (16) durch einen geschlitzten Abschnitt (17) der Klappenkörperwand definiert ist.
4. Brandschutzklappe nach einem der vorhergehenden Ansprüche, umfassend eine Mehrzahl der Verriegelungsmittel (15-19), welche um den Innenumfang des Klappenkörpers (2) an Stellen, an denen

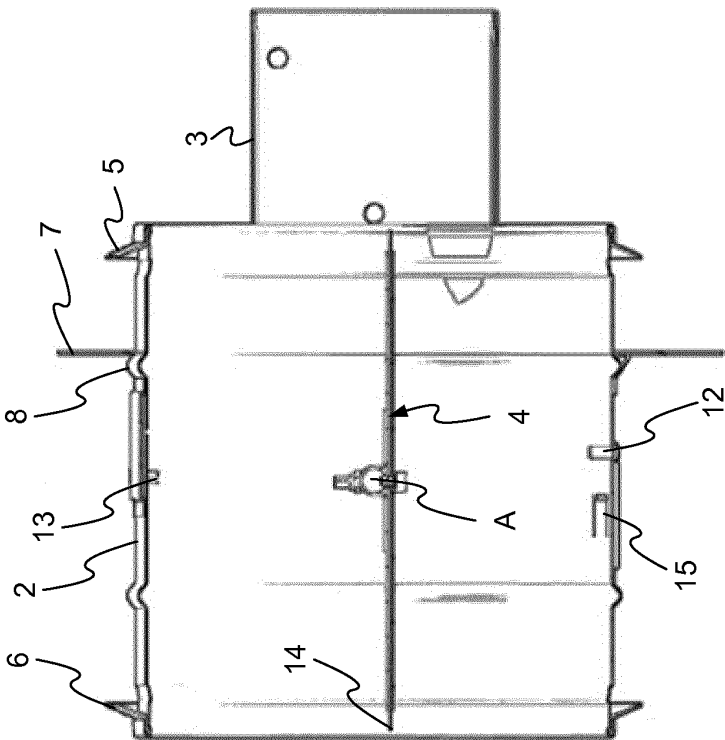
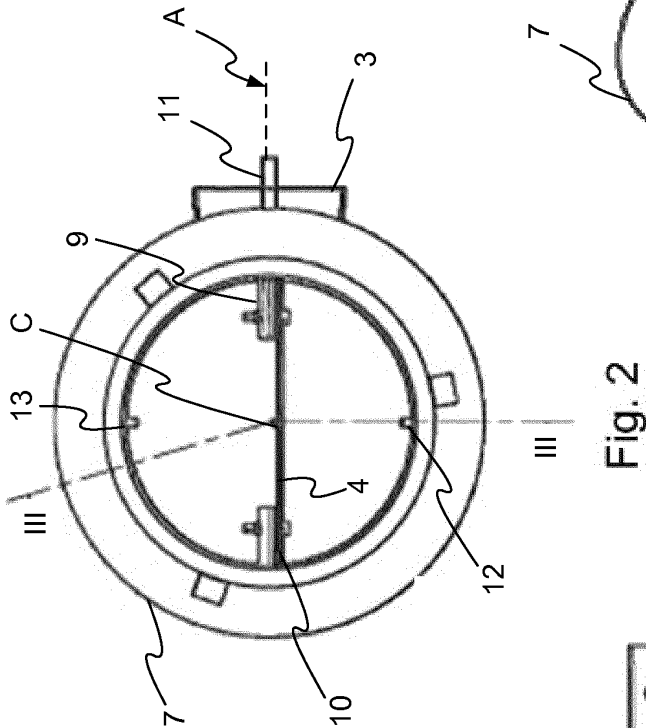
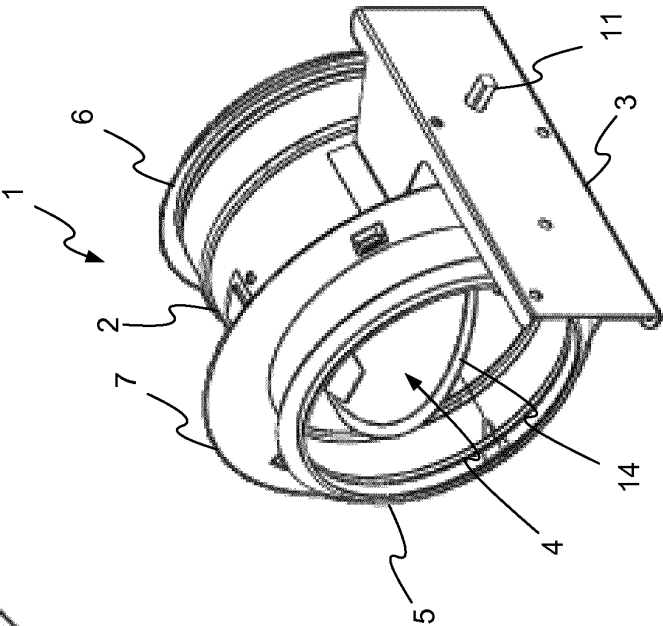
das Brandschutzklappenblatt (4) geschlossen ist, angeordnet sind.

5. Brandschutzklappe nach einem der vorhergehenden Ansprüche, umfassend eine Mehrzahl der stationären Haltemittel (12, 13), welche um den Innenumfang des Klappenkörpers (2) an Stellen, an denen das Brandschutzklappenblatt (4) geschlossen ist, angeordnet sind.
6. Brandschutzklappe nach einem der vorhergehenden Ansprüche, wobei jede der stationären Haltemittel einen Vorsprung (12, 13) von der inneren Klappenkörperwand umfasst, wobei der Vorsprung (12, 13) in Richtung des Luftströmungskanals gerichtet und konfiguriert ist, in der geschlossenen Position gegen das Brandschutzklappenblatt (4) anzuschlagen und dieses zu halten.
7. Brandschutzklappe nach einem der vorhergehenden Ansprüche, wobei die Halte- und Verriegelungsanordnung konfiguriert ist, im Falle eines Brands in der Lüftungsanlage das Brandschutzklappenblatt (4) in der geschlossenen Position dauerhaft zu halten und zu verriegeln.
8. Brandschutzklappe nach einem der vorhergehenden Ansprüche, wobei sich das Dichtungsmittel (14) entlang des Umfangs des Brandschutzklappenblatts erstreckt und konfiguriert ist, gegen die Innenwandoberfläche des Klappenkörpers (2) in der geschlossenen und verriegelten Stellung abzudichten.
9. Belüftungssystem umfassend zumindest eine Brandschutzklappe (1) nach einem der vorhergehenden Ansprüche.

Revendications

1. Registre coupe-feu pour système de ventilation, comprenant un corps (2) de registre coupe-feu définissant un canal de flux d'air, une pale (4) de registre coupe-feu mobile entre une première position dans laquelle le canal de flux d'air est ouvert, et une deuxième position dans laquelle le canal de flux d'air est fermé, et un agencement configuré pour arrêter et verrouiller la pale (4) du registre coupe-feu dans la position fermée de sorte qu'un déplacement de la pale (4) du registre coupe-feu vers la position ouverte est empêché, ledit agencement d'arrêt et de verrouillage comprenant au moins un moyen d'arrêt fixe (12) configuré pour arrêter la pale (4) du registre coupe-feu dans la position fermée en étant en butée contre un côté de la pale du registre coupe-feu à sa périphérie, ladite pale (4) du registre coupe-feu présentant des moyens d'étanchéité (14) configurés pour assurer une étanchéité contre la paroi intérieure

- du corps (2) du registre coupe-feu dans la position étanchéifiée fermée, et ledit agencement d'arrêt et de verrouillage comprenant au moins un moyen de verrouillage (15-19) qui est agencé dans la paroi du corps (2) du registre coupe-feu et qui est configuré pour être activé par une augmentation de température, **caractérisé en ce que** ledit moyen de verrouillage comprend un matériau (19) gonflant thermiquement qui est disposé dans un évidement (18) de la paroi du corps du registre coupe-feu et qui est recouvert par une partie du moyen de verrouillage, ladite partie du moyen de verrouillage comprenant une languette (16) qui, lors de l'activation du matériau (19) gonflant thermiquement, est actionnée pour être fléchie à partir de la paroi intérieure du corps (2) de registre coupe-feu vers l'intérieur en direction du canal de flux d'air en prise de verrouillage avec la pale (4) fermée du registre coupe-feu et en butée contre un côté de la pale (4) du registre coupe-feu à sa périphérie extérieure, et une partie périphérique de la pale (4) du registre coupe-feu étant positionnée entre ledit moyen d'arrêt fixe (12) et ladite languette (16) fléchie, dans ladite position étanchéifiée fermée.
2. Registre coupe-feu selon la revendication 1, le matériau (19) gonflant thermiquement comprenant un matériau intumescent.
3. Registre coupe-feu selon la revendication 1 ou 2, ladite languette (16) étant définie par une section fendue (17) de la paroi du corps du registre coupe-feu.
4. Registre coupe-feu selon l'une quelconque des revendications précédentes, comprenant un certain nombre desdits moyens de verrouillage (15-19) disposés autour de la périphérie intérieure du corps (2) du registre coupe-feu aux endroits où la pale (4) du registre coupe-feu est fermée.
5. Registre coupe-feu selon l'une quelconque des revendications précédentes, comprenant un certain nombre desdits moyens d'arrêt fixes (12, 13) disposés autour de la périphérie intérieure du corps (2) du registre coupe-feu aux endroits où la pale (4) du registre coupe-feu est fermée.
6. Registre coupe-feu selon l'une quelconque des revendications précédentes, chacun desdits moyens d'arrêt fixes comprenant une partie saillante (12, 13) faisant saillie de la paroi intérieure du corps du registre coupe-feu, ladite partie saillante (12, 13) étant dirigée vers le canal de flux d'air et configurée pour être en butée contre la pale (4) du registre coupe-feu et l'arrêter dans la position fermée.
7. Registre coupe-feu selon l'une quelconque des revendications précédentes, ledit agencement d'arrêt et de verrouillage étant configuré pour arrêter et verrouiller en permanence la pale (4) du registre coupe-feu en position fermée dans le cas d'un incendie dans le système de ventilation.
8. Registre coupe-feu selon l'une quelconque des revendications précédentes, lesdits moyens d'étanchéité (14) s'étendant autour de la périphérie de la pale du registre coupe-feu et étant configurés pour assurer une étanchéité contre la surface de paroi intérieure du corps (2) du registre coupe-feu dans ladite position fermée et verrouillée.
9. Système de ventilation comprenant au moins un registre coupe-feu (1) selon l'une quelconque des revendications précédentes.



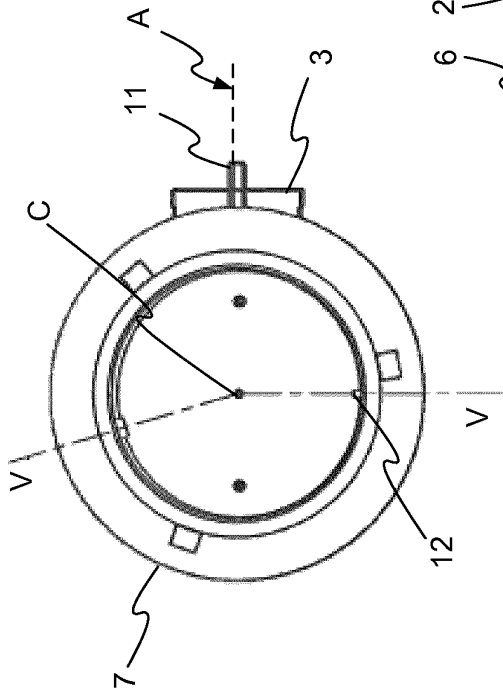


Fig. 4

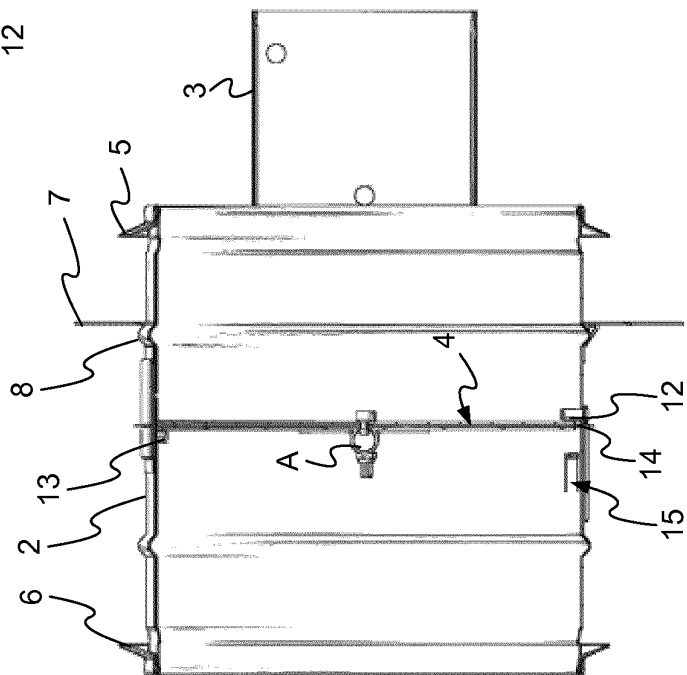


Fig. 5

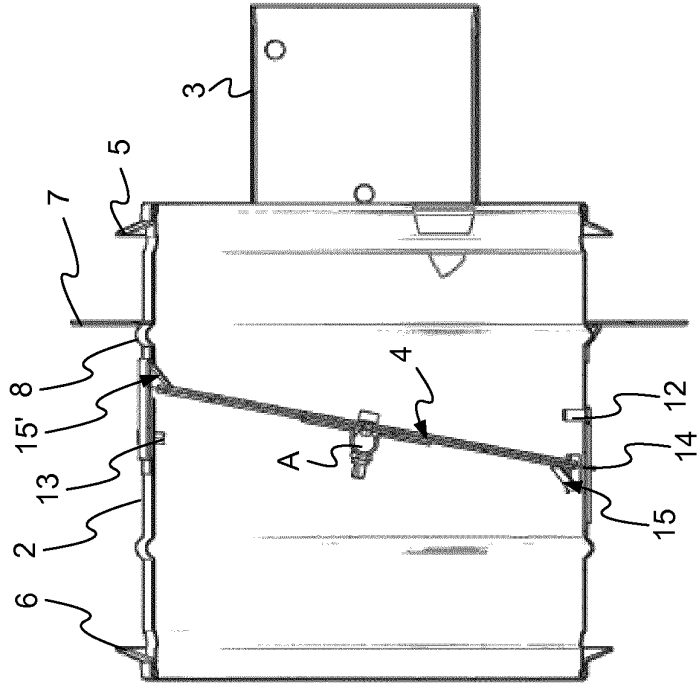


Fig. 6

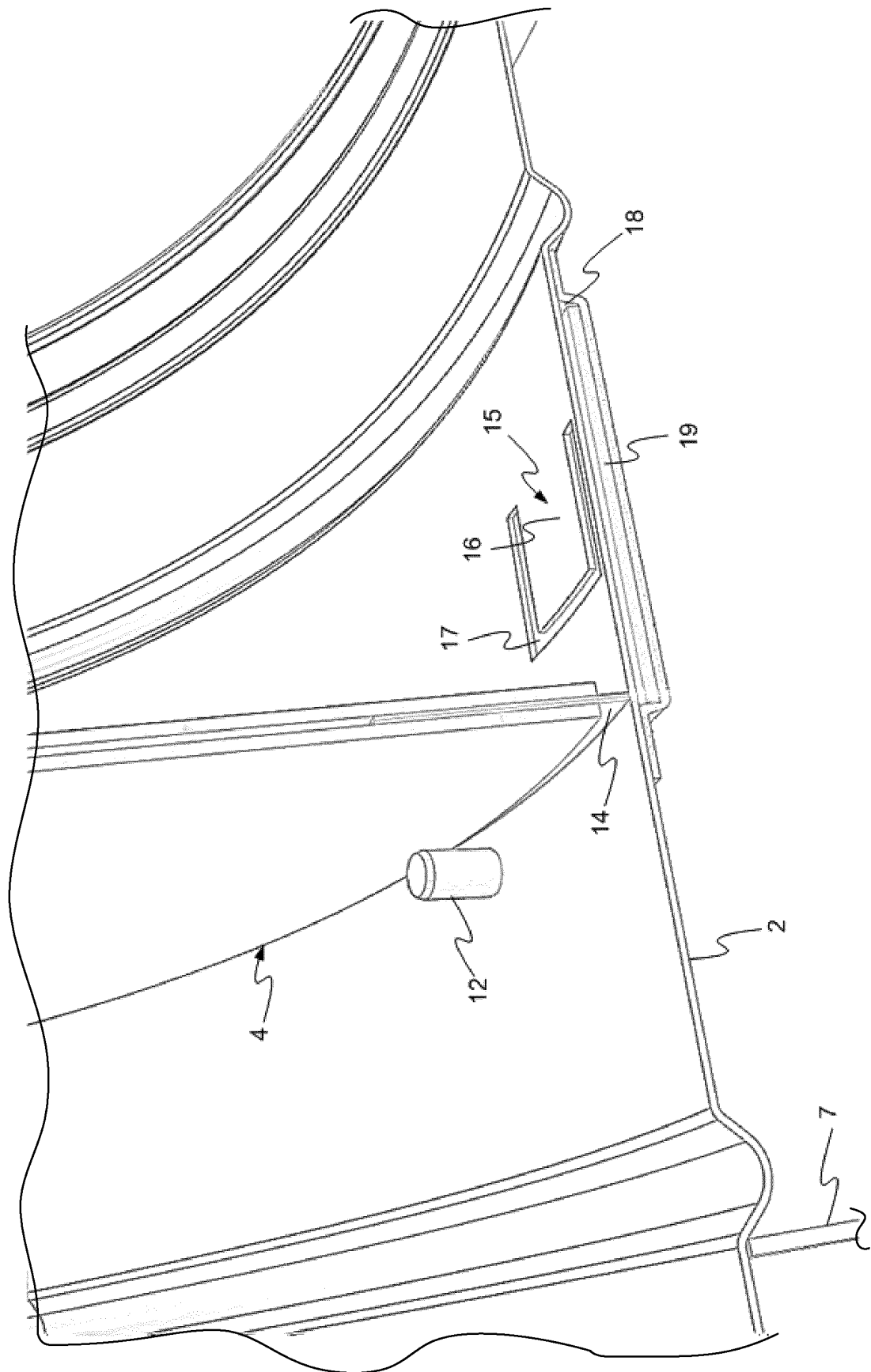


Fig. 7

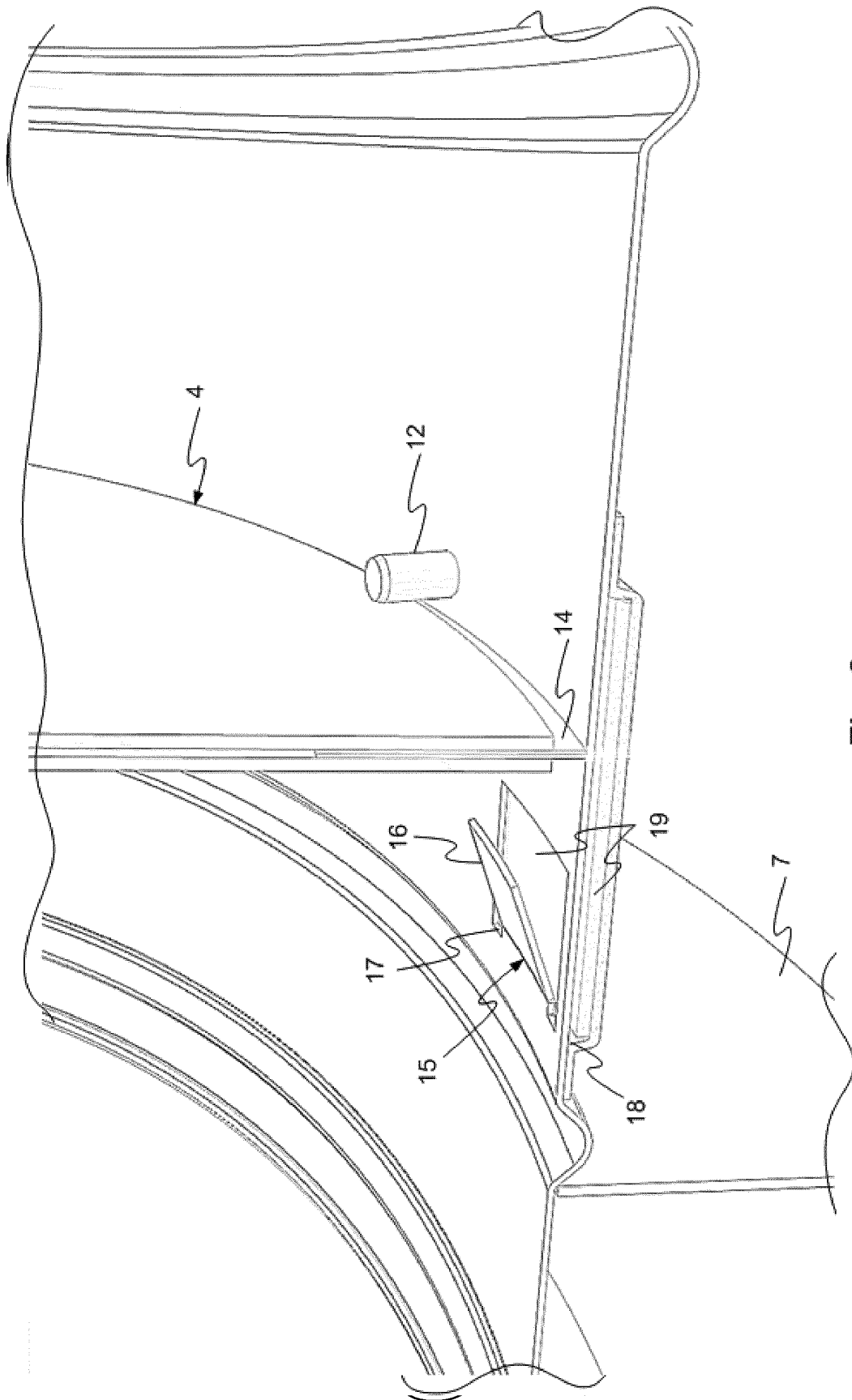


Fig. 8

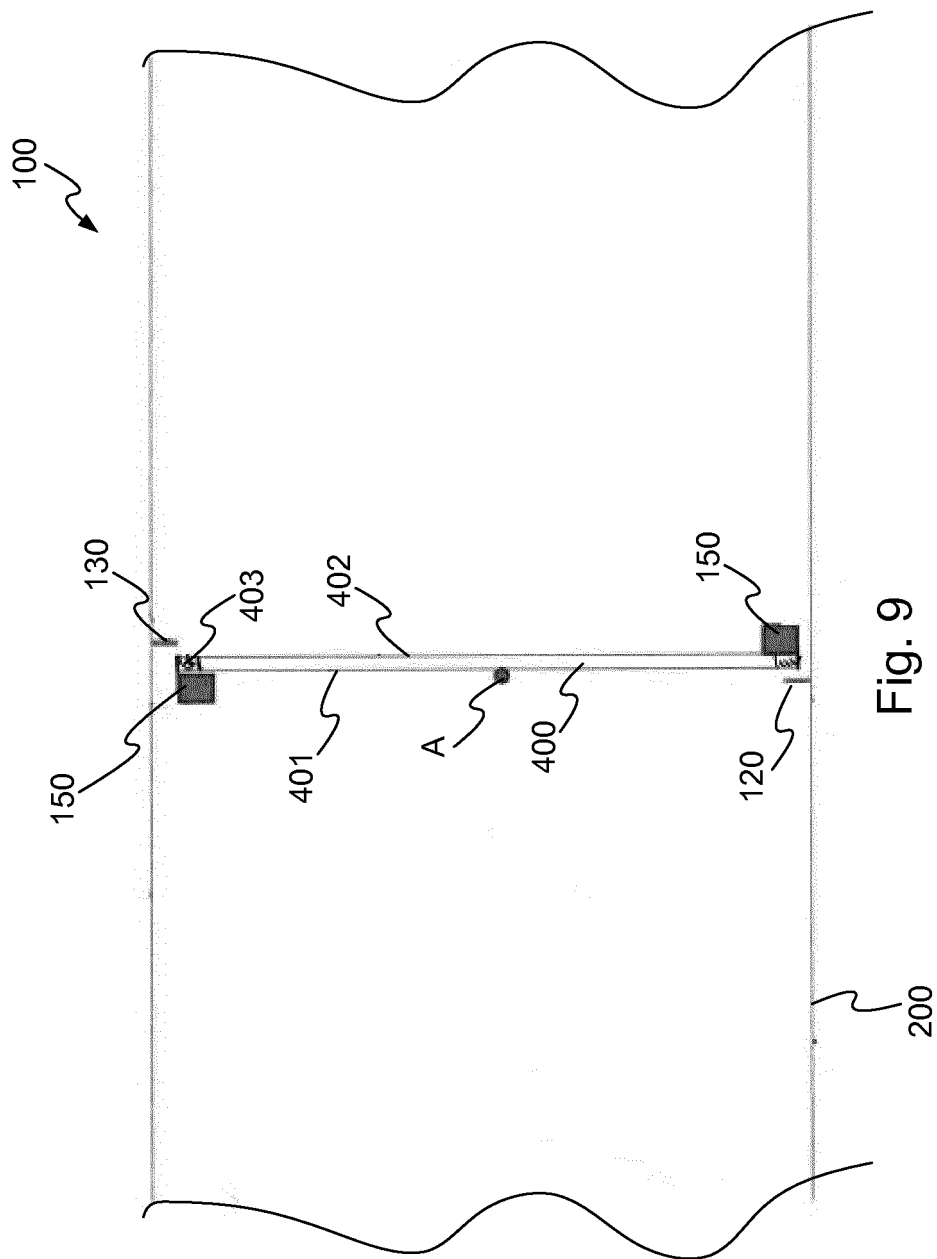


Fig. 9

REFERENCES CITED IN THE DESCRIPTION

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