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(54) **IMPROVEMENTS IN OR RELATING TO SMOKE AND FIRE BARRIERS**

VERBESSERUNGEN AN RAUCH- UND BRANDSCHUTZABSCHLÜSSEN

AMELIORATIONS APPORTEES A DES BARRIERES ANTIFUMEE ET ANTIFEU OU LES
CONCERNANT

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Description

[0001] This invention relates to a smoke and fire barrier for preventing the passage of smoke through an opening such as an opening in a wall or panel, or through ducting, e.g. ducting of the type used in ventilation or air-conditioning systems.

[0002] A smoke barrier is disclosed in our earlier published Application GB-A-2272836 which comprises an apertured plate movable vertically relative to a complementary apertured grill to open and close the air openings of the grill. The plate is held by an electromagnet or solenoid in its open position and falls under gravity to its closed position when the electromagnet or solenoid is rendered inactive in the event of fire or smoke. One disadvantage of this earlier barrier is the requirement to hold the vertically movable plate in its other unsupported position while the grill is open. The present invention is an improvement to this smoke barrier.

[0003] GB-A-2213719 discloses a smoke and fire damper which comprises a vertically slidable plate loaded by springs into a position in which the plate shuts off the passage of air through the damper on operation of a thermal actuator and/or fusible link. As for GB-A-2272836, a disadvantage of this damper is the requirement to hold the plate in its unsupported position when the grill is open.

[0004] In a first aspect the invention provides a smoke and fire barrier for installation in or over an opening and operable selectively to prevent the passage therethrough of smoke, the smoke barrier comprising a stationary grill having apertures through which air can flow and sealing means operable to seal the apertures against the passage of smoke therethrough, the sealing means being in the form of a sliding plate positioned adjacent the grill and having apertures which register with the apertures of the grill when the smoke barrier is in an open configuration and lands between the apertures which register with the apertures of the grill when the smoke barrier is in closed configuration, the plate being movable horizontally relative to the grill automatically in response to the presence of smoke and/or heat between a first position in which the smoke barrier is in its open configuration and a second position in which the smoke barrier is in its closed configuration the barrier being characterised in that the plate includes wheels which track within horizontally extending guideways of the grill or a frame thereof.

[0005] In a preferred embodiment, the sealing means is operable in response to the detection of smoke and/or heat by an associated detection means such as a smoke detector. For example, a solenoid can be provided which is de-energised in response to a signal from the detection means. In this arrangement, the solenoid plunger engages the sliding plate in the absence of smoke or fire, to hold the plate in its "open" position against the action of a spring, but which upon receipt of a signal from the detection means to de-energise the

solenoid retracts to cause the plate to move to its sealing or "closed" position under the action of the spring. A latch may be provided to hold the sliding plate against the action of the spring when the smoke barrier is in its open position. This latch may comprise an electromagnet.

[0006] The lands of the sliding plate can comprise or have disposed thereon one or more sealing elements for sealing the apertures in the stationary grill.

[0007] In one embodiment, the sealing element(s) can take the form of brush seals or blade seals, for example blade seals formed from an elastomeric material such as neoprene.

[0008] In another embodiment, the sealing element can comprise a portion (e.g. a strip) of an intumescent material. The intumescent material can optionally be coated, treated or otherwise covered by a covering material or covering layer. For example, the intumescent material may have a smooth facing material laminated thereto. The intumescent material can be bonded to the sliding plate, for example by means of an adhesive, or it can be held within a holder or other mounting means, for example a holder formed of plastics material.

[0009] An advantage of using an intumescent material as the sealing element is that in a fire situation, the intumescent agent expands to provide an even more secure seal against the passage of smoke through the grill.

[0010] For plates which are intended to lie in a generally vertical plane, wheels need only be provided along the lowermost edge of the plate. For plates which are intended to lie in a generally horizontal plane, however wheels may be provided along each side edge of the plate.

[0011] It is to be understood that the term "signal" as used herein includes the simple case wherein an applied voltage between the detection means and the latch is cut off.

[0012] The invention will now be described by way of example only with reference to the accompanying diagrammatic drawings, in which:-

Figure 1 is a front elevation of a smoke barrier according to the invention;

Figure 2 is a sectional side elevation along line I-I of Figure 1; and

Figure 3 is a front elevation of the barrier shown in Figure 1 with its cover removed.

[0013] Turning now to the drawings, it can be seen that the smoke barrier comprises an outer grill 1 having a plurality of rows of elongate slots 2 through which air can normally pass. In Figure 1, the elongate slots 2 are shown as being sealed by brush seals 3, the tips of which protrude slightly through the slots 2. When in use, the grill is placed in or over an opening in a door, ceiling or wall and is fixed by means of suitable securing ele-

ments such as screws (not shown).

[0014] Connected to the rear of grill 1 is a sliding plate 4 which is held in contact with the grill 1 by means of screws located in slots of the sliding plate 4. The plate 4 is slidable to and fro in substantially horizontal directions with respect to grill 1 by virtue of the slots. The sliding plate 4 is provided with elongate apertures 6 which allow the passage of air therethrough. Along one edge of each aperture 2, the grill has outstanding flanges 8. Affixed to the sliding plate 4 between each pair of adjacent elongate apertures 6, are the brush seals 3 (depicted as cross-hatched areas in Figure 1), the filaments or bristles of which are generally directed outwardly of the plate. The brush seals 3 conveniently are affixed to the sliding plate 4 by means of a suitable adhesive. As an alternative to the brush seals 11, blade seals, eg formed of a resilient elastomeric material such as neoprene can be used.

[0015] Affixed to the inner surface of a side wall of the inner frame 9 of the grill 1 is a solenoid 10 which operates from a 12v or 24v power supply (not shown) and whose plunger 11 is attached to or bears against the plate 4. A coil spring 12 is connected at one end to the grill frame 9 and at its other end to the plate 4. An electro magnet 14 is mounted on the grill and co-operates with a latch 15 on the plate. When energised, the solenoid plunger engages the plate to hold it in its open position against the action of the coil spring 12 with the assistance of the electro magnet 14.

[0016] The plate 7 has wheels 16 which run in guideways 17 of the grill frame 9 for ease of movement. The plate illustrated is intended to be mounted in a vertical door or wall. For plates which are intended to be flat (e. g. when positioned in a ceiling) wheels may be provided along each side edge of the plate.

[0017] In use, when the solenoid and electro magnet are energised the sliding plate 4 is held in its open position in which the slots 2 in the grill 1 are aligned with the apertures 6 in the sliding plate 4 to allow air to flow through the grill. If the solenoid is de-energised, for example in response to the detection of smoke by an associated smoke detector the solenoid plunger 11 moves out of engagement with the plate 4 to cause it to be propelled by the coil spring 12 to its closed position in which the brush seals 11 come into register with and seal the elongate slots 2 against smoke penetration. Instead of the brush seal 11, a blade seal can be used, but in one preferred alternative embodiment, a strip of intumescent material is used as the sealing element in place of the brush seal. The strip of intumescent material can be a plain uncoated strip of intumescent material or it can be provided with a generally smooth facing strip which can be, for example, laminated to the intumescent material. The intumescent material can be bonded to the sliding plate 4 by means of an adhesive, or it can be held within a suitably shaped holder formed from, for example, a plastics material.

[0018] In order to reset the device, the solenoid and

electro magnet are re-energised and the sliding plate 4 returns against the action of the spring into its open position. A switch, not shown, is advantageously provided which is actuated by the sliding plate as it is moved into the open position. The switch, when actuated, cuts off the power supply to the solenoid thereby leaving the electromagnet to hold the sliding plate in place against the restoring force of the coil spring.

[0019] Thus, the power required to hold the sliding plate in the open position of the barrier is significantly reduced.

[0020] The smoke barrier of the invention may optionally incorporate a fire barrier, including an intumescent block grill of the type described in our British Patent Application No. 9207659.5. In this illustrated embodiment, the intumescent mixture is encased in aluminium foil in order to prevent moisture penetration which could adversely affect the intumescent properties of the grill.

[0021] In the case of the smoke barrier device being subject to the elevated temperatures associated with fire, the grill intumesces and rapidly swells to fill completely the width of the opening in or over which the smoke barrier device is located.

[0022] Instead of, or in addition to, the block grill, a double plate arrangement coated with or containing intumescent material can be employed.

[0023] The smoke barriers of the type illustrated can be used to cover ducting in *inter alia* fire walls, doors, glazed partitions, windows or ceilings, and can be provided with deep side, upper and lower walls to enable them to act as covers for ventilation fans.

[0024] It will be appreciated that the foregoing is merely exemplary of smoke and fire barriers in accordance with the invention and that modifications can readily be made thereto without departing from the scope of the claims appended hereto.

Claims

1. A smoke and fire barrier for installation in or over an opening and operable selectively to prevent the passage therethrough of smoke, the smoke barrier comprising a stationary grill (1) having apertures (2) through which air can flow and sealing means operable to seal the apertures against the passage of smoke therethrough, the sealing means being in the form of a sliding plate (4) positioned adjacent the grill (1) and having apertures (6) which register with the apertures (2) of the grill when the smoke barrier is in an open configuration and lands between the apertures which register with the apertures of the grill when the smoke barrier is in closed configuration the plate being movable horizontally relative to the grill automatically in response to the presence of smoke and/or heat between a first position in which the smoke barrier is in its open configuration and a second position in which the smoke barrier is

in its closed configuration the barrier being characterised in that the plate (4) includes wheels (16) which track within horizontally extending guideways (17) of the grill (1) or a frame (9) thereof.

2. A barrier as claimed in claim 1 wherein the plate (4) is moved in response to the detection of smoke and/or heat by an associated detection means such as a smoke detector.
3. A barrier as claimed in claim 2 wherein a solenoid (10) is provided which is de-energised in response to a signal from the detection means.
4. A barrier as claimed in claim 3 wherein the solenoid (10) has a plunger (11) which engages the plate (4) in the absence of smoke or fire, to hold the plate in its "open" position against the action of a spring (12), but which upon receipt of a signal from the detection means to de-energise the solenoid retracts to cause the plate (4) to move to its sealing or "closed" position under the action of the spring (12).
5. A barrier as claimed in any one of the preceding claims wherein a latch (15) is provided to hold the plate (4) against the action of a spring (12) when the smoke barrier is in its open position.
6. A barrier as claimed in claim 5 wherein the latch (15) comprises an electromagnet (14).
7. A barrier as claimed in any one of the preceding claims wherein wheels (16) are provided along the lowermost edge of the plate (4).
8. A barrier as claimed in any one of the preceding claims wherein wheels (16) are provided along each side edge of the plate (4).
9. A barrier as claimed in any one of the preceding claims wherein lands of the plate (4) comprise or have disposed thereon one or more sealing elements (3) which seal the apertures in the grill when the smoke barrier is in closed configuration.
10. A barrier as claimed in claim 9 wherein the sealing element or elements is or are selected from blade seals and brush seals.
11. A barrier as claimed in claim 9 wherein the or each sealing element comprises a portion of intumescent material.
12. A barrier as claimed in claim 11 wherein the intumescent material is provided with a covering or facing layer.
13. A barrier according to claim 12 wherein the covering

or facing layer is a smooth surfaced facing which is laminated to the intumescent material.

5 Patentansprüche

1. Rauch- und Brandschutzabschluß zur Installation in oder über einer Öffnung, welcher selektiv betätigbar ist, um den Durchtritt von Rauch zu verhindern, wobei der Rauchschutzabschluß einen stationären Grill (1) mit Öffnungen (2) aufweist, durch die Luft hindurchströmen kann, wobei Dichtungsmittel die Öffnung gegen den Durchtritt von Rauch abdichten und die Dichtungsmittel in Form einer Schieberplatte (4) ausgebildet sind, die benachbart zum Grill (1) angeordnet ist und Öffnungen (6) aufweist, die auf die Öffnungen (2) des Grills ausgerichtet sind, wenn der Rauchschutzabschluß in Öffnungsstellung befindlich ist und wobei Felder zwischen den Öffnungen vorgesehen sind, die auf die Öffnungen des Grills ausgerichtet sind, wenn der Rauchschutzabschluß in Schließstellung befindlich ist und wobei die Platte in Horizontalrichtung relativ zu dem Grill automatisch gemäß dem Vorhandensein von Rauch und/ oder Hitze zwischen einer ersten Stellung, in der der Rauchschutzabschluß geöffnet ist, und einer zweiten Stellung verschiebbar ist, in der der Rauchschutz in Schließstellung befindlich ist, dadurch gekennzeichnet, daß die Platte (4) Räder (16) aufweist, die auf horizontal verlaufenden Führungen (17) des Grills (1) oder einem Rahmen hiervon ablaufen.
2. Schutzabschluß nach Anspruch 1, bei welchem die Platte (4) gemäß der Feststellung von Rauch und/ oder Hitze durch einen zugeordneten Detektor, beispielsweise einen Rauchdetektor, bewegt wird.
3. Schutzabschluß nach Anspruch 2, bei welchem ein Solenoid (10) vorgesehen ist, welcher gemäß einem Signal entregt wird, das vom Detektor geliefert wird.
4. Schutzabschluß nach Anspruch 3, bei welchem der Solenoid (10) einen Anker (11) aufweist, der beim Fehlen von Rauch oder Feuer an der Platte (4) angreift, um die Platte in ihrer Öffnungsstellung gegen die Wirkung einer Feder (12) zu halten, der jedoch nach Empfang eines Signals vom Detektor, welches den Solenoid entregt, zurückgezogen wird, um die Platte (4) zu veranlassen, sich in ihre Dichtungsstellung oder Schließstellung unter der Wirkung der Feder (12) zu bewegen.
5. Schutzabschluß nach einem der vorhergehenden Ansprüche, bei welchem eine Klinke (15) vorgesehen ist, um die Platte (4) gegen die Wirkung einer

Feder (12) festzuhalten, wenn der Rauchschutzabschluß in Öffnungsstellung befindlich ist.

6. Schutzabschluß nach Anspruch 5, bei welchem die Klinken (15) einen Elektromagneten (14) aufweist. 5
7. Schutzabschluß nach einem der vorhergehenden Ansprüche, bei welchem die Räder (16) entlang des untersten Randes der Platte (4) vorgesehen sind. 10
8. Schutzabschluß nach einem der vorhergehenden Ansprüche, bei welchem die Räder (16) entlang eines jeden Seitenrandes der Platte (4) angeordnet sind. 15
9. Schutzabschluß nach einem der vorhergehenden Ansprüche, bei welchem Felder der Platte (4) ein Dichtungselement (3) oder mehrere Dichtungselemente aufweisen, die die Öffnungen im Grill abdichten, wenn der Schutzabschluß sich in Schließstellung befindet. 20
10. Schutzabschluß nach Anspruch 9, bei welchem das Dichtungselement oder die Dichtungselemente ausgewählt sind aus Dichtungsschiebern und Bürstendichtungen. 25
11. Schutzabschluß nach Anspruch 9, bei welchem jedes Dichtungselement einen Teil aus einem anschwellenden Material aufweist. 30
12. Schutzabschluß nach Anspruch 11, bei welchem das anschwellende Material mit einer Abdeckschicht oder einer Belagsschicht versehen ist. 35
13. Schutzabschluß nach Anspruch 12, bei welchem die Abdeckschicht oder Belagsschicht eine glatte Oberfläche besitzt, die auf dem anschwellenden Material laminiert ist. 40

Revendications

1. Une barrière anti-fumée et anti-feu pour une installation dans ou au-dessus d'une ouverture et pouvant fonctionner sélectivement pour empêcher le passage au travers de celle-ci de la fumée, la barrière anti-fumée comprenant une grille stationnaire (1) comportant des ouvertures (2) au travers de laquelle de l'air peut passer et des moyens d'étanchéité servant à obturer les ouvertures contre le passage au travers de celles-ci de la fumée, le moyen d'étanchéité étant sous forme d'une plaque coulissante (4) positionnée adjacente à la grille (1) et comportant des ouvertures (6) qui sont alignées avec les ouvertures (2) de la grille lorsque la barrière anti-fumée est dans une configuration ouverte et des parties pleines entre les ouvertures qui sont ali-

gnées avec les ouvertures de la grille lorsque la barrière anti-fumée est dans une configuration fermée, la plaque étant mobile horizontalement par rapport à la grille automatiquement en réaction à la présence de fumée et/ou de chaleur entre une première position dans laquelle la barrière anti-fumée est dans sa configuration ouverte et une seconde position dans laquelle la barrière anti-fumée est dans sa configuration fermée, la barrière anti-fumée étant caractérisée en ce que la plaque (4) comprend des roues (16) qui suivent des rails de guidage (17) s'étendant horizontalement sur la grille ou un châssis (9) de celle-ci.

2. Une barrière selon la revendication 1 dans laquelle la plaque (4) se déplace en réaction à la détection de la fumée et/ou la chaleur au moyen d'un dispositif de détection associé tel qu'un détecteur de fumée.
3. Une barrière selon la revendication 2 dans laquelle un solénoïde (10) est prévu qui est désexcité en réaction à un signal provenant du dispositif de détection.
4. Une barrière selon la revendication 3 dans laquelle le solénoïde (10) comprend un piston (11) qui vient contre la plaque (4) en l'absence de fumée ou de feu, pour maintenir la plaque dans sa position "ouverte" contre l'action d'un ressort (12), mais qui en réponse d'un signal provenant du dispositif de détection pour désexciter le solénoïde, celui-ci se retire de sorte que la plaque (4) se déplace vers sa position d'étanchéité ou "fermée" sous l'action du ressort (12).
5. Une barrière selon l'une quelconque des revendications précédentes dans laquelle un loquet (15) est prévu pour maintenir la plaque (4) contre l'action d'un ressort (12) lorsque la barrière anti-fumée est dans sa position ouverte.
6. Une barrière selon la revendication 5 dans laquelle le loquet (15) comprend un électro-aimant (14).
7. Une barrière selon l'une quelconque des revendications précédentes dans laquelle les roues (16) sont prévues le long du bord le plus bas de la plaque (4).
8. Une barrière selon l'une quelconque des revendications précédentes dans laquelle les roues (16) sont prévues le long de chaque bord de la plaque (4).
9. Une barrière selon l'une quelconque des revendications précédentes dans laquelle les parties pleines de la plaque (4) comprennent ou comportent

sur celle-ci un ou plusieurs éléments d'étanchéité (3) qui obturent les ouvertures dans la grille lorsque la barrière anti-fumée est dans une configuration fermée.

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10. Une barrière selon la revendication 9 dans laquelle l'élément ou les éléments d'étanchéité est ou sont choisi(s) parmi les moyens d'étanchéité à lames et les moyens d'étanchéité à balais.

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11. Une barrière selon la revendication 9 dans laquelle le ou chaque élément d'étanchéité comprend une partie en matière intumescence.

12. Une barrière selon la revendication 11 dans laquelle la matière intumescence est pourvue d'une couche de recouvrement ou de finition.

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13. Une barrière selon la revendication 12 dans laquelle la couche de recouvrement ou de finition est une couche de finition lisse qui est enduite dans la matière intumescence.

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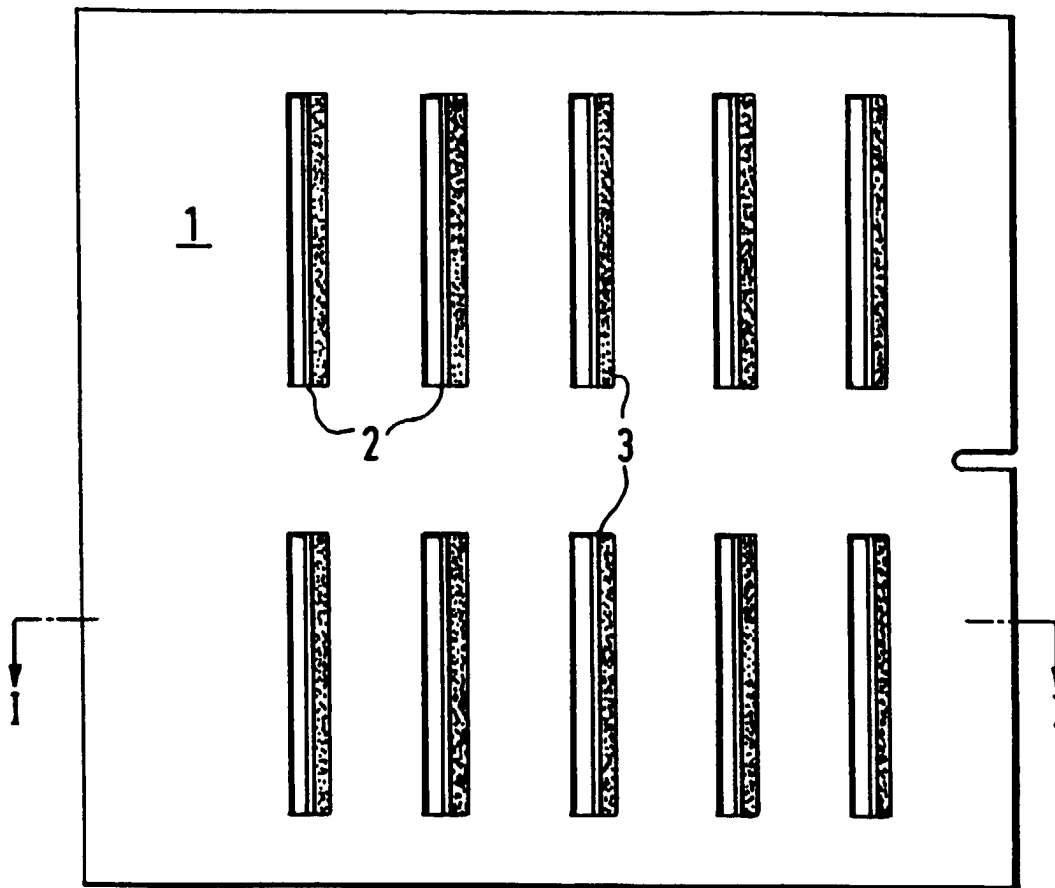


FIG.1.

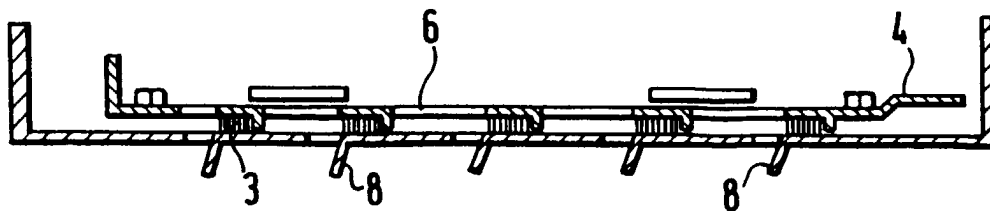


FIG.2.

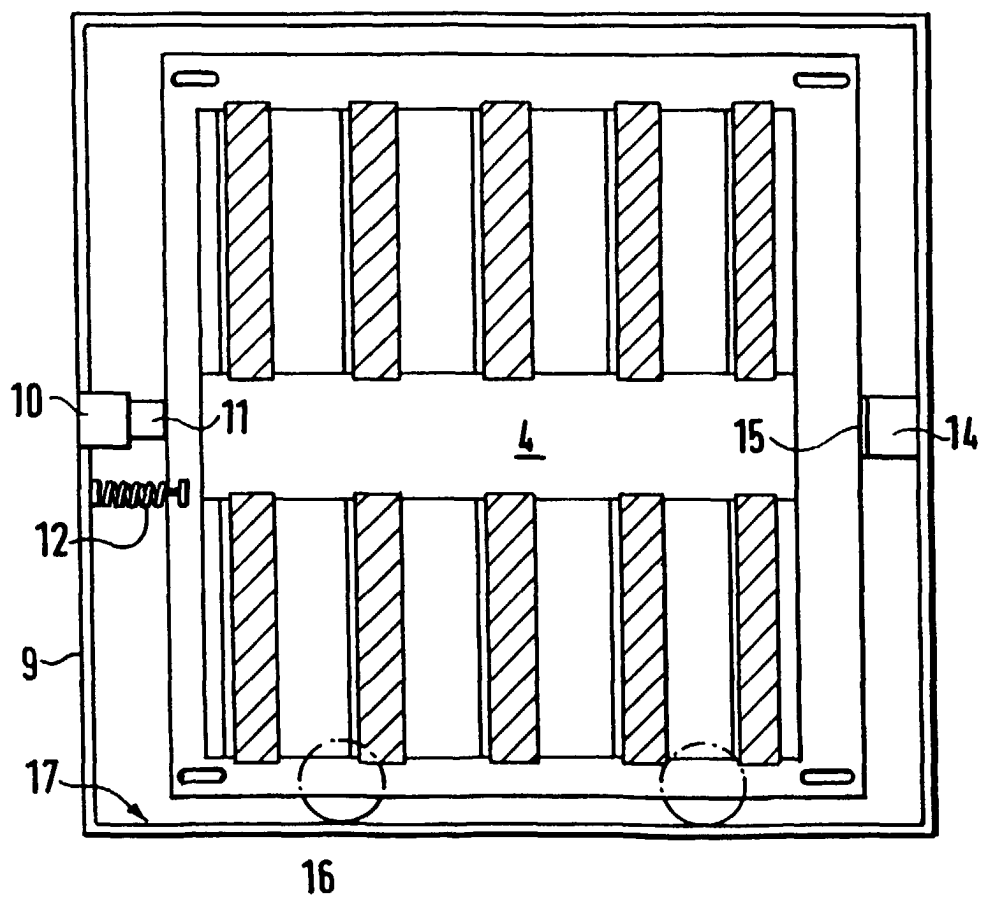


FIG. 3.