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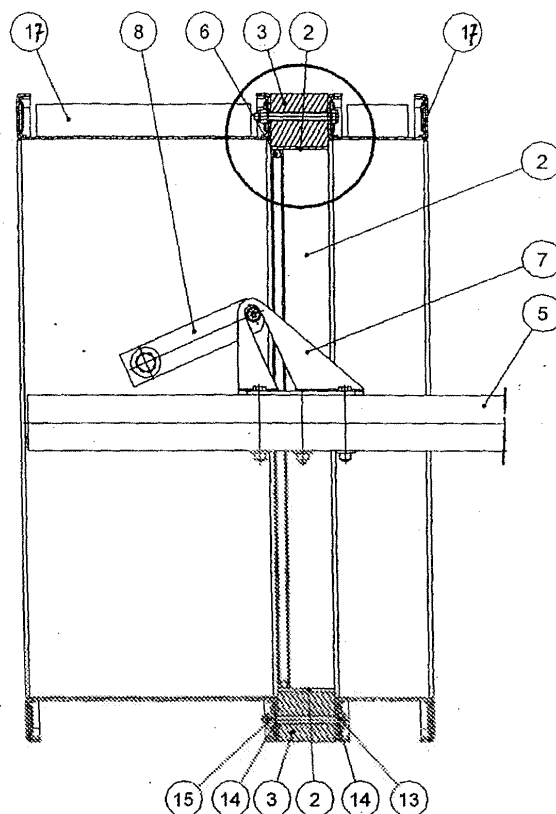
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(54) **Cut-off firewall of a rectangular cross-section comprising a partition with a sealing**

(57) Cut-off firewall of a rectangular cross-section comprising a partition wherein seals (2,6) are placed on fireproof spacers (3,4) such that the seals extend adja-

cently the partition beyond a line of the firewall frame (17). Dimensions of the movable cut-off partition (5) are smaller than internal dimensions of the firewall frame (17).



**Fig. 10**

## Description

**[0001]** This invention relates to a sealing for a partition of a cut-off firewall of a rectangular cross-section, which upon closing prevents spreading out smoke and fire from a zone in which a fire hazard occurred.

**[0002]** A cut-off firewall is destined for all buildings in which the evacuation procedure is based on separating the zone in fire. It satisfies the requirements of all buildings in which separation of the zone being in fire is planned, among other means by remote-controllable closing firewalls in this zone and continuous operation of the ventilation and air-conditioning systems in other zones.

**[0003]** A cut-off firewall is used in the points in which ventilation or air-conditioning ducts pass through elements of the anti-fire separation system. In case of fire the firewall enables the zone being in fire to be cut-off. After closing the partition, the firewall allows to preserve the resistance to fire of the element of the anti-fire separation system through which the ventilation or air-conditioning duct is led. Thereby other zones are protected against hot smoke and gases, and normal operation of the ventilation or air-conditioning system is possible.

**[0004]** Various solutions for sealing the partition of the movable firewall are applied to ensure the above mentioned features. The most commonly used is a sealing comprising, directly or indirectly, a stop for the motion of the partition of the cut-off firewall, which may have a form of angle bars mounted inside the frame perpendicularly to the direction of the air flow.

**[0005]** In known technical solutions, rectangular firewalls most commonly contain partition stops having a form of an angle bar mounted to the frame which limit the motion of the partition and are used as an additional sealing element.

**[0006]** The so-called "retaining angle bars" are known, against which seals are pressed. However, installing the stops increases the hydraulic resistance for the flowing air that involves the increase of the dimensions of the ventilators and the increase of the energy use for supplying them. The stops themselves are also an additional source of the firewalls' own noise. They are a source of contamination of the microclimatic environment inside buildings and, obviously, they constitute an additional construction element increasing the costs of manufacturing a firewall.

**[0007]** During normal operation of the ventilation system the firewall is open (rests in the waiting position). The zone in which fire is detected becomes separated by closing the partition (i.e., moving the firewall to the safety position):

- automatically - by the action of a fuse-element due to an increase of the temperature in the duct to 72°C, or
- remotely - by the transmission of the control signal from the fire signal center.

**[0008]** Closing the firewall is performed by releasing the potential energy stored in a tensioned spring of the closing mechanism. Additionally, the closing mechanism is equipped with a manual trigger that allows to close the firewall manually. In the case of closing the firewall remotely, reopening of the partition, i.e. restoring the waiting position is possible by manual tensioning the spring of the closing mechanism with a key or remotely by a cylinder. In the case of closing the firewall automatically by the action of the fuse-element, it is necessary to replace it first and then perform the above-described operations for opening the partition. The firewall exposed to fire is to be replaced. Signaling the position of the cut-off partition is ensured by marginal indicators.

**[0009]** In the present application the term "line of the firewall's frame" is to be understood as the inner surfaces of the frame and the term "external contour of the firewall" is to be understood as the external surfaces of the frame, i.e., the external contour of the frame.

**[0010]** The firewall is defined by the dimensions L (width) and H (height). The names of spacers originate from these designations. The spacer installed on the sidewalls H of the firewalls will be called spacer "H", the spacer installed on the sidewalls L of the firewalls will be called spacer "L". The spacers are installed perpendicularly to each other such that with the firewall's partition being closed their external surfaces are adjacent to the partition, i.e., to its side surfaces. The spacers are joined to each other at their ends, defining a thermal insulation layer for both parts of the firewall's frame.

**[0011]** According to the invention, in the sealing of the partition of the cut-off firewall of a rectangular cross-section, seals are placed on a fireproof spacers such that they extend into the partition beyond a line of a firewall frame, and an external dimensions of the movable cut-off partition are smaller than a internal dimensions of the firewall frame.

**[0012]** Preferably, the seal is a swelling seal.

**[0013]** Preferably, the seal is a silicon seal of the O-ring type.

**[0014]** Preferably, a inner surfaces of the fireproof spacers are situated below the line of the firewall frame.

**[0015]** The solution according to the invention ensures tightness in normal conditions, i.e. in ambient temperatures, as well as flame resistance, smoke tightness and insulating properties in fire conditions.

**[0016]** The invention is intended to be used in spots where ventilating ducts are passing through partitions of the fire separation system. In case of fire the firewall enables the immediate separation of the zone in fire and preserves the fire-resistance of the construction firewall for 120 minutes, protecting other zones against hot smoke and gases. Fast and smooth closing, within 4 seconds, ensures immediate separation of the zone endangered by fire. The design with no stops preventing the partition of the firewall increases its active area, thereby decreasing hydraulic resistance and its "own" noise. Employing the inventive solution allows to control the appro-

prate operation before and after connecting the firewall to the system of fire detection.

**[0017]** The solution based on wedging has eliminated the need of welding and spot bonding, and, as a consequence, the need for anticorrosive protection of the joining spots.

**[0018]** Reduced hydraulic resistance of the firewall saves electricity used in buildings by lowering the desired compression of ventilators.

**[0019]** The new solution reduces the manufacture costs - additional construction elements, i.e., the stops are eliminated, the hydraulic resistance and the own noise are reduced, thereby the exploitation is cheaper - by using ventilators of a smaller compression, and the noise is lower.

**[0020]** The most important functional feature of the firewalls according to the invention, i.e. the fire resistance, satisfies the corresponding compulsory standards. The firewalls according to the invention are tight in normal conditions, i.e. in ambient temperatures, where to satisfy the EIS 120 class it is necessary to preserve the tightness below the value of  $200 \text{ m}^3/\text{h} \times \text{m}^2$  of the firewall area at a differential pressure between both sides of the firewall, as well as in the conditions of a fire test, which means that during 120 minutes of the increase of temperature in the testing oven, according to the corresponding standard curve referenced in the currently valid standards, the leakage cannot exceed the value of  $200 \text{ m}^3/\text{h} \times \text{m}^2$  of the firewall area.

**[0021]** The invention is shown by embodiments illustrated in the drawing, in which:

- Fig. 1 shows the state of the art solution;
- Fig. 2 shows a side view of the partition being closed;
- Fig. 3 shows a front view of the closed partition;
- Fig. 4 shows a cross-section along the line A-A of Fig. 2;
- Fig. 5 shows a cross-section along the line B-B of Fig. 3;
- Fig. 6 shows detail D of Fig. 4;
- Fig. 7 shows detail C of Fig. 5;
- Fig. 8 shows a perspective view of the cut-off firewall with the partition being open;
- Fig. 9 shows a perspective view of the cut-off firewall with the partition being closed;
- Fig. 10 shows a side view of the cut-off firewall with the partition being open in a partial cross-section; and
- Fig. 11 shows an enlarged view of a detail of Fig. 2 with a seal according to the invention.

**[0022]** In the solution known from the state of the art, as shown in Fig. 1, a stop is shown, denoted with reference number 1, the stop being eliminated in the solution according to the invention.

**[0023]** Figs 2-11 show construction details of the sealing of the firewall according to the invention. Fig. 6 shows an O-ring type seal 6 in a free position with the firewall

partition being open, and Fig. 7 shows the same seal squeezed between the closed firewall partition and a spacer 3.

**[0024]** The figures show the design of the sealing according to the invention, wherein a swelling seal 2 and a silicon seal 6 are placed on protective spacers 3. The spacer L made from a fire-resisting board is denoted with reference number 3, the spacer H also made from a fire-resisting board is denoted with reference number 4. The cut-off partition 5 is mounted via a lever and connected with a tension member. A drive mechanism M is mounted from outside to the frame 17 of the firewall.

**[0025]** The spacers extend for 5.5 mm into the firewall. The seals 2 and 6 are placed on the surfaces of the spacers extending into the firewall frame. The seals 2 are mounted to the spacers 3 and 4 by means of stitches along their whole length. Preferably, the dimensions of the cross-section of the seal 2 are  $40 \text{ mm} \times 2 \text{ mm}$ . The seal 6 is glued to the seal 2 and additionally stitched with stitches to the spacers via the seals 6. The seals mounted in neighboring spacers 3 and 4 are configured perpendicularly to each other, similarly to the spacers. Due to extending the spacers into the firewall one reduces the risk of jamming the partition against the ventilation ducts, particularly for large dimensions of the firewalls (for  $H > 400 \text{ mm}$ ) because of protruding the open partition beyond the firewall frame 17. The spacers have rectangular cross-section of recommended dimensions  $40.0 \times 36.5 \text{ mm}$ .

**[0026]** The seal 6 is mounted on fireproof spacers 3, thereby eliminating the risk of accidental tearing the seal 6 off or tearing it off during transporting, installing or the start-up of the installation. The seal 6 having the "O"-type profile is designed especially for investigation and is claimed as an industrial design. Mounting it does not require any additional mounting rail, as is the case in known designs, which should ensure permanent attachment of the seal but is an additional cost which is avoided in the design according to the invention.

**[0027]** By mounting the fireproof spacers "L" 3 and "H" 4, on which both seals 2 and 6 are installed, such that the spacers extend slightly into the firewall beyond the line of the firewall frame 17 (Figs 6 and 10), still another practical feature has been obtained, namely that the dimensions of the movable cut-off partition 5 made from a fire resistant material are sufficiently smaller than the internal dimensions of the firewall frame 17, thereby in case of connecting the ventilating ducts inappropriately, i.e., entering the internal space of the firewall frame 17 (so called non-axial attachment) or connecting ventilation ducts which are smaller than the internal cross-section of the firewall frame 17, e.g., due to inaccurate manufacture of the ventilation duct, one significantly reduces the risk of jamming the partition in the event that due to the size of the firewall, the cut-off partition 5 in the open position extends beyond the external contour of the firewall, which significantly reduces the occurrence of inaccuracies leading to a dispute between the firewall's manufac-

turer and the company performing the installation. The seal 2 extends above the line of the frame 17 for 2 mm and the seal 6, when non-squeezed, extends for ca. 10 mm into the firewall frame 17, thereby the dimensions of the firewall may be L: 22 mm x H: 24 mm, correspondingly. 5

## Claims

1. A sealing for a partition of a cut-off firewall of a rectangular cross-section wherein seals (2, 6) are placed on a fireproof spacers (3, 4) such that they extend into the partition beyond a line of a firewall frame (17). 10  
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2. A sealing according to claim 1 wherein a dimensions of the movable cut-off partition (5) are smaller than a internal dimensions of the firewall frame (17). 20
3. A sealing according to claim 1 wherein the seal (2) is a swelling seal. 25
4. A sealing according to claim 1 wherein the seal (6) is a silicon seal of the O-ring type. 30
5. A sealing according to any of the previous claims wherein a inner surfaces of the fireproof spacers (3, 4) are situated below the line of the firewall frame (17). 35  
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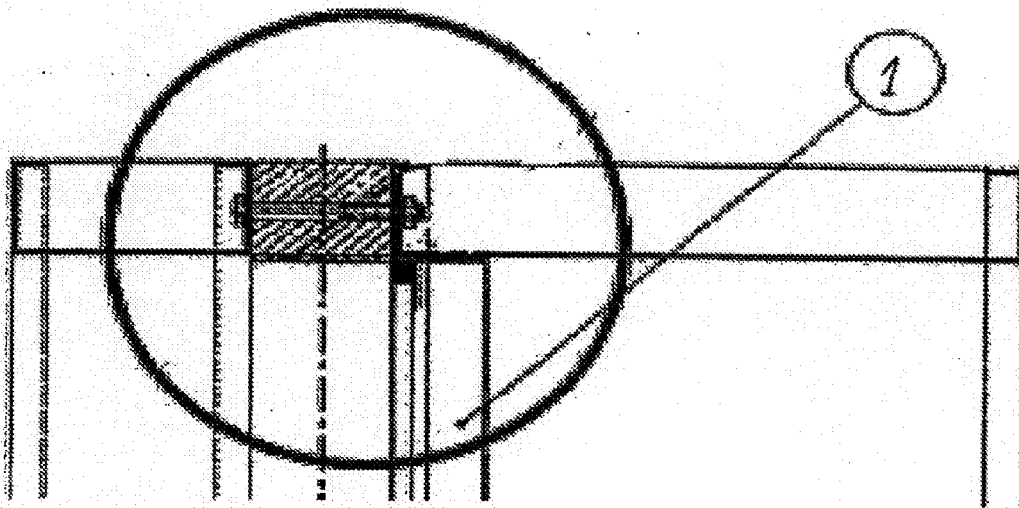
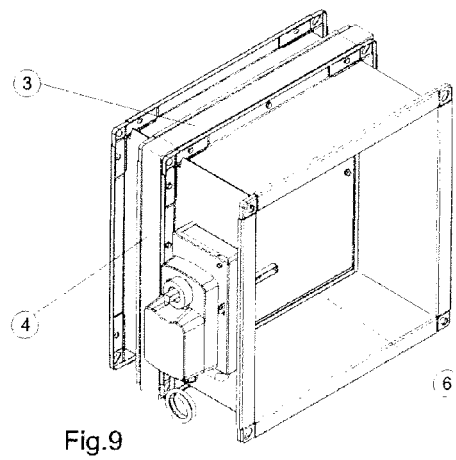
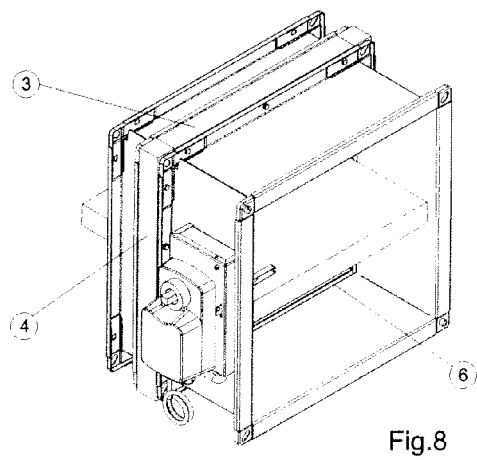
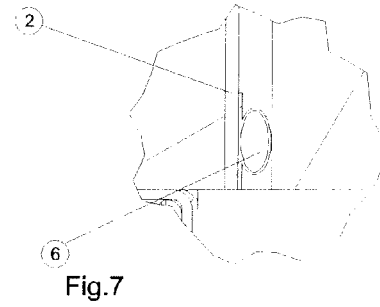
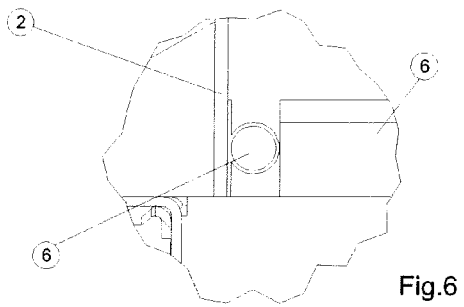
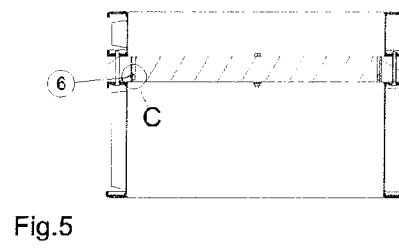
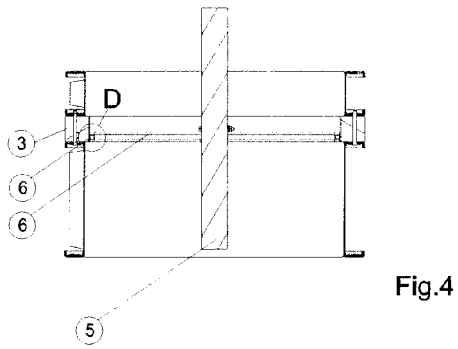
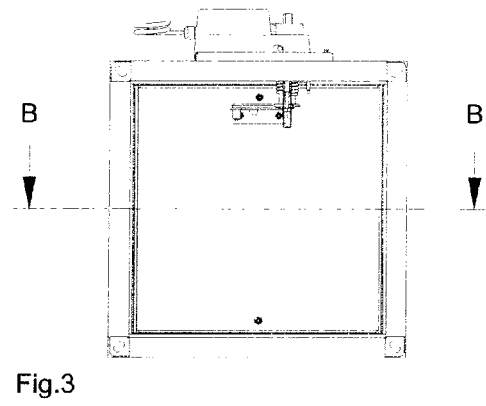
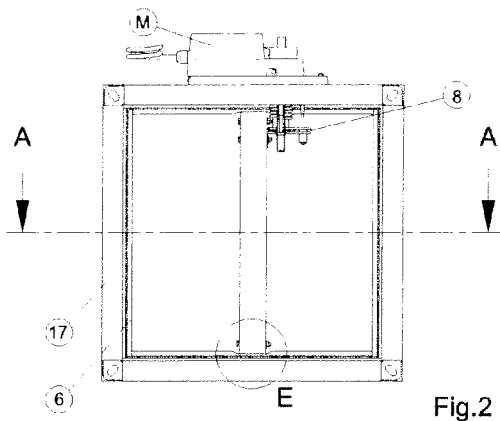


Fig. 1



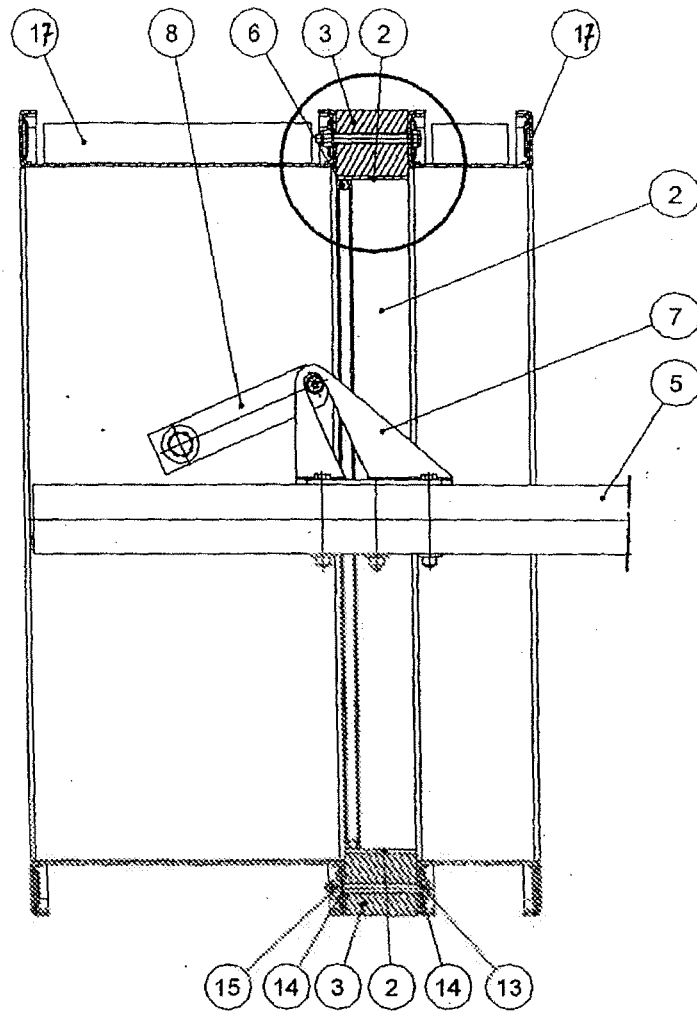


Fig. 10

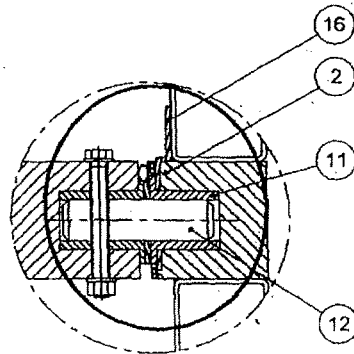


Fig. 11



## EUROPEAN SEARCH REPORT

Application Number  
EP 10 15 6593

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 84 35 118 U1 (TROX GMBH) 7 March 1985 (1985-03-07) * page 5, paragraph 3; figures 1,2 *	1-3,5	INV. A62C2/12
A	WO 2007/068786 A1 (FLAEKT WOODS AB) 21 June 2007 (2007-06-21) * the whole document *	4	
			TECHNICAL FIELDS SEARCHED (IPC)
			A62C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 May 2010	Examiner Vervenne, Koen
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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 &amp; : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03/82 (P04C01)



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

EP 10 15 6593

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06-05-2010

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