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(54) Fire damper

(57) The present invention relates to a simple, inexpensive and effective fire damper (1) having improved fire resistance, comprising an air flow duct (2), a damper blade (3) which is provided in the air flow duct (2) and can be rotated between an open position and a closed position, and a strip of intumescent material (4) which expands under the effect of heat and is designed to fill the space between the damper blade (3) and the air flow duct (2) after expansion and in the closed position of the damper blade (3), the damper blade (3) being provided with at least one protruding edge (5) along its periphery.

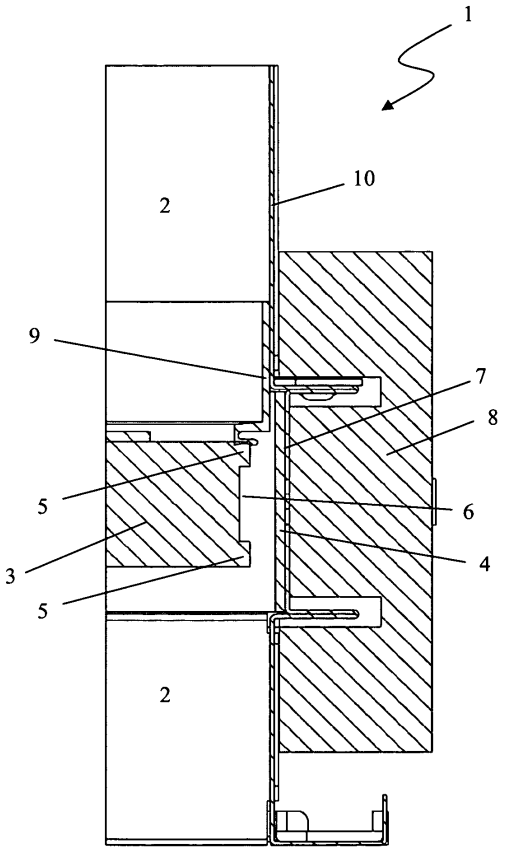

FIG. 1

EP 2 239 014 A1

Description

[0001] The present invention relates to a fire damper, comprising an air flow duct, a damper blade which is provided in the air flow duct and can be rotated from an open position to a closed position and vice versa, and a strip of intumescent material which is able to expand under the effect of heat, in which this strip is designed to fill the space between the damper blade and the air flow duct after expansion and in the closed position of the damper blade, and in which the damper blade is provided with at least one protruding edge along its periphery.

[0002] In the case of wall passages in air ducts, such fire dampers are provided in order to prevent the propagation of a fire. With a first type, the damper blade will be brought to the closed position in the case of fire by means of a fusible link mechanism which activates a spring device at 72°C. With another type, the damper blade is brought to the closed position by means of a motorized device. In this case, a cold seal seals the space between the damper blade and the air flow duct. However, this cold seal cannot withstand the relatively high temperatures which occur during a fire. Therefore, such a fire damper is also provided with a strip of intumescent material, which is able to expand under the effect of heat. This intumescent material has a relatively high density at room temperature, but expands when the temperature exceeds a certain threshold value. After expansion, the volume of this intumescent material increases by a multiple. The intumescent material is provided in the fire damper in such a way that, after expansion, it fills up the space between the damper blade and the air flow duct and it takes on the role of the cold seal. Usually, this strip of intumescent material is provided in the air flow duct. In the fire damper from DE 295 07 931 U1, this strip of intumescent material is provided along the periphery of the damper blade.

[0003] However, there is a risk that this intumescent material will be sucked out of the space between the damper blade and the air flow duct on account of the air flow in the air duct in which this fire damper is accommodated, so that this material no longer completely fills the space after expansion. This significantly reduces the fire-resistant properties of such a fire damper.

[0004] In the case of the fire damper from WO 2007/068786 A1, a protection is therefore provided which protects the intumescent material which is attached to the damper blade in such a manner that it cannot be sucked into the air duct on account of the air flow which is present therein. Thus, a mechanical seal is produced in which the protection is pressed against the air flow duct by the intumescent material. Providing protection is an expensive solution. In addition, the fire resistance thereof is lower than when the intumescent material can completely fill the space between the damper blade and the air flow duct without being sucked out.

[0005] Another common solution for the abovementioned problem is to widen the damper blade and the strip of intumescent material. This greatly reduces the risk of the material being sucked out in such a manner that the space is no longer sealed. However, this solution is also expensive.

[0006] The fire damper from EP 0 595 729 A1 is provided with a liquid reservoir in a groove in the air flow duct in which, in the case of fire and in the closed position of the fire damper, the liquid is released and is absorbed by the absorbent damper blade in order to thus keep the damper blade cool. As a result thereof, the intumescent material can only be fitted on both sides of the passage opening of the liquid reservoir, with the result that in order to ensure good sealing, the damper blade has to be of a relatively wide design here too. In addition, the construction of this fire damper is more complex in order to be able to ensure good cooling of the damper blade in case of fire. This is an expensive solution for the abovementioned problem.

[0007] The fire dampers from EP 0 816 774 A1 and DE 88 12 475 U1 comprise a damper blade which is provided with a protruding edge, with the shape of the air flow duct being of a complementary design thereto. In this manner, it is possible to achieve an improved seal in case of fire, in which case intumescent material which is fitted next to this edge cannot be sucked into the air flow duct. However, the complementary shape of the air flow duct results in a significant narrowing of the air flow duct. This leads to large pressure drops in this duct, which requires the associated ventilation device to be made larger as a result thereof. Overall, this is therefore also an expensive solution to the problem at hand.

[0008] It is therefore an object of the present invention to provide a fire damper with improved fire resistance which can be obtained in a simple manner and more economically and effectively than is the case with the prior art.

[0009] According to the invention, this object is achieved by providing a fire damper comprising an air flow duct, a damper blade which is provided in the air flow duct and can be rotated from an open position to a closed position and vice versa, and a strip of intumescent material which is able to expand under the effect of heat, in which this strip is designed to fill the space between the damper blade and the air flow duct after expansion and in the closed position of the damper blade, in which the damper blade is provided with at least one protruding edge along its periphery and in which the strip of intumescent material is designed to be wider than the width of the damper blade.

[0010] In case of fire, this fire damper provides an improved locking of the damper blade compared to the prior art, as the damper blade rotates into its closed position and remains in the closed position, following which the intumescent material expands under the effect of the heat produced by the fire and fills the space between the damper blade and the air flow duct. That is to say that the intumescent material will now surround the damper blade at least partially by not only expanding against the

edge of the damper blade but also against the protruding edge. This material is then not only blocked by the edge of the damper blade, but also by this protruding edge. The risk which existed with the prior art, namely of the intumescent material being sucked along under the effect of the air flow in the air duct in which the fire-resistant flap is fitted and no longer completely filling the space between the damper blade and the air flow duct is thus significantly reduced in this case.

[0011] Due to the improved locking of the expanded intumescent material, the damper blade and the strip of intumescent material no longer have to be made wider in order to achieve the same degree of fire resistance, which significantly reduces the material costs of the fire damper.

[0012] Preferably, a groove is provided in the air flow duct of such a fire damper according to the present invention and surrounds the damper blade in its closed position along its periphery.

[0013] Not only is the intumescent material thus locked more securely due to the fact that it is blocked by the edge of the damper blade and its protruding edge, but it also now fills the groove in the air flow duct and is secured therein.

[0014] Preferably, such a fire damper according to the present invention is furthermore provided along its periphery with at least two protruding edges which together delimit a groove.

[0015] In case of fire, in the closed position of the damper blade and after the intumescent material has expanded, this material will therefore also fill the groove in this damper blade and be secured therein. This material is then also secured in the groove in the air flow duct, in the groove in the damper blade and along the edge of the damper blade. In this manner, the intumescent material is then also secured in three ways, thus further increasing the fire resistance of the fire damper.

[0016] In a first specific embodiment of such a fire damper according to the invention, the strip of intumescent material is fitted in the groove in the damper blade.

[0017] Even more specifically, this fire damper then comprises a second strip of intumescent material which is able to expand under the effect of heat, this strip being fitted in the groove in the air flow duct.

[0018] With a second specific embodiment of a fire damper according to the present invention, the strip of intumescent material which expands under the effect of heat is only fitted in the groove in the air flow duct.

[0019] With a particularly preferred embodiment of a fire damper according to the present invention, the groove in the air flow duct is furthermore designed to be wider than the width of the damper blade.

[0020] The present invention is now described in more detail by means of the following detailed description of a few preferred embodiments of a fire damper according to the present invention. The sole aim of this description is to give illustrative examples and to indicate further advantages and features of these embodiments of fire dampers, and can thus in no way be interpreted as a restriction of the area of application of the invention or of the patent rights laid down by the claims.

[0021] In the following detailed description, reference numerals are used to refer to the attached drawings, in which:

- *Fig. **1*** shows a detail of a first embodiment of a fire damper according to the present invention in cross section;
- ***Fig. 2*** diagrammatically shows a detail of the air flow duct, the damper blade and the intumescent material of an embodiment of a fire damper according to the present invention from Fig. 1 in cross section, how in an improved locking of said damper blade is obtained with a fire damper according to the present invention after expansion of the intumescent material and in the closed position of the damper blade;
- ***Fig. 3*** diagrammatically shows a detail of the air flow duct, the damper blade and the intumescent material of a second embodiment of a fire damper according to the present invention in cross section;
- ***Fig. 4*** diagrammatically shows a detail of the air flow duct, the damper blade and the intumescent material of a third embodiment of a fire damper according to the present invention in cross section;
- ***Fig. 5*** diagrammatically shows a detail of the air flow duct, the damper blade and the intumescent material of a fourth embodiment of a fire damper according to the present invention in cross section.

[0022] In the case of wall passages in air ducts, fire dampers (1) according to the present invention are provided in order to prevent the propagation of a fire.

[0023] The fire dampers (1) illustrated in Figs. 1 to 5 comprise an air flow duct (2). This air flow duct (2) preferably has a cross section corresponding to the cross section of the air duct in which the fire damper (1) is fitted. In the case of the known air ducts, this may be a round cross section or a rectangular cross section. The air flow duct (2) is designed to be fireproof and may, for example, be made of galvanized steel. It may, for example, be bent from sheet steel (10).

[0024] These fire dampers (1) furthermore comprise a damper blade (3) which is fitted in the air flow duct (2) so that it can be rotated from an open position to a closed position and vice versa. The damper blade (3) is also fireproof and may, for example, be moisture-proof.

[0025] The damper blade (3) is provided with at least one protruding edge (5) along its periphery. The air flow duct (2) is provided with a groove (7) which, in its closed position, surrounds the damper blade (3) along its periphery.

[0026] In addition these fire dampers (1) also comprise a strip of intumescent material (4) which is able to expand under the effect of heat, this strip (4) being designed to fill the space between the damper blade (3) and the air flow duct (2) after expansion and in the closed position

of the damper blade (3).

[0027] The damper blade (3) of the fire damper (1) as illustrated in Fig. 1 is provided with two protruding edges (5) along its periphery which together delimit a groove (6). The strip of intumescent material (4) of this fire damper (1) is fitted in the groove (7) in the air flow duct (2). This groove (7) in the air flow duct (2) is designed to be wider than the width of the damper blade (3). The strip of intumescent material (4) which is fitted in this groove (7) is also designed to be wider than the width of the damper blade (3).

[0028] Fig. 1 shows a detail of a first embodiment of a fire damper (1) according to the present invention in cross section. This fire damper (1) is provided in a wall passage in a fixed wall (8), but could equally well be installed in a floor or a ceiling or a flexible wall.

[0029] Along its periphery, the damper blade (3) from this embodiment of a fire damper (1) is provided with two protruding edges (5) which together form a groove (6). The strip of intumescent material (4) of this fire damper (1) is fitted in the groove (7) of the air flow duct (2). This groove (7) in the air flow duct (2) is designed to be wider than the width of the damper blade (3). The strip of intumescent material (4) which is fitted in this groove (7) is also designed to be wider than the width of the damper blade (3).

[0030] In addition, this fire damper (1) is provided with a cold seal (9) for sealing the space between the damper blade (3) and the air flow duct (2) before the strip of intumescent material (4) expands. In this case, this cold seal (9) is fitted in the air flow duct (2), but it could equally well be arranged on the edge of damper blade (3) along the periphery thereof.

[0031] By means of a detail of the air flow duct (2), the damper blade (3) and the expanded intumescent material (4), Fig. 2 shows, in a diagrammatical sectional view, how an improved locking of the damper blade (3) compared to the prior art is achieved with a fire damper (1) as illustrated in Fig. 1 after expansion of the intumescent material (4) and in the closed position of the damper blade (3).

[0032] With this fire damper (1), when a fire breaks out and the damper blade closes and then remains in the closed position, following which the intumescent material (4) expands under the effect of the heat produced by the fire and fills the space between the damper blade (3) and the air flow duct (2), the intumescent material (4) will, on the one hand, fill the groove (7) in the air flow duct (2) and be secured therein. On the other hand, the intumescent material (4) will also at least partially surround the damper blade (3) by not only expanding against the edge of the damper blade (3), but by also filling the groove (6) in this damper blade (3) and being secured therein. This material is then also secured in the groove (7) in the air flow duct (2), in the groove (6) in the damper blade (3) and along the edge of the damper blade (3). In this way, the intumescent material (4) is then also secured in three ways, so that the fire resistance of the fire damper (1) is increased further. The risk which existed in the prior art, namely of the intumescent material (4) being sucked along under the effect of the air flow in the air duct in which the fire damper (1) is fitted and no longer completely filling the space between the damper blade (3) and the air flow duct (2) is thus significantly reduced in this case.

[0033] Figs. 3 to 5 furthermore show various alternative embodiments to illustrate the fact that the invention can be achieved by various embodiments, in each case resulting in an improved locking of the damper blade (3) after expansion of the intumescent material (4) compared to the prior art.

[0034] Along its periphery, the damper blade (3) from the second embodiment of a fire damper (1), as illustrated in Fig. 3, is provided with one protruding edge (5). The strip of intumescent material (4) of this fire damper (1) is fitted in the groove (7) of the air flow duct (2). This groove (7) in the air flow duct (2) is designed to be wider than the width of the damper blade (3). The strip of intumescent material (4) which is fitted in this groove (7) is also designed to be wider than the width of the damper blade (3). After expansion of the intumescent material (4), this material is secured here in the groove (7) in the air flow duct (2), against the protruding edge (5) of the damper blade (3) and along the edge of the damper blade (3).

[0035] Along its periphery, the damper blade (3) from the third embodiment of a fire damper (1), as illustrated in Fig. 4, is provided with two protruding edges (5) which together delimit a groove (6). A strip of intumescent material (4) is fitted in both the groove of the damper blade (3) and the groove (7) of the air flow duct (2). The groove (7) in the air flow duct (2) is designed to be wider than the width of the damper blade (3). The strip of intumescent material (4) which is fitted in this groove (7) in the air flow duct (2) is also designed to be wider than the width of the damper blade (3). After expansion of the intumescent material (4), this material is again secured here in the groove (7) in the air flow duct (2), in the groove (6) in the damper blade (3) and along the edge of the damper blade (3), so that the damper blade (3) is again secured in three ways.

[0036] Along its periphery, the damper blade (3) from the fourth embodiment of a fire damper (1), as illustrated in Fig. 5, is provided with two protruding edges (5) which together delimit a curved groove (6). The strip of intumescent material (4) of this fire damper (1) is fitted in the groove (7) of the air flow duct (2). This groove (7) in the air flow duct (2) is designed to be wider than the width of the damper blade (3). The strip of intumescent material (4) which is fitted in this groove (7) is also designed to be wider than the width of the damper blade (3). After expansion of the intumescent material (4), this material is again secured here in the groove (7) in the air flow duct (2), in the groove (6) in the damper blade (3) and along the edge of the damper blade (3), so that the damper blade (3) is again secured in three ways.

Claims

1. Fire damper (1) comprising an air flow duct (2), a damper blade (3) which is provided in the air flow duct (2) and can be rotated from an open position to a closed position and vice versa, and a strip of intumescent material (4) which is able to expand under the effect of heat, in which this strip (4) is designed to fill the space between the damper blade (3) and the air flow duct (2) after expansion and in the closed position of the damper blade (3), and in which the damper blade (3) is provided with at least one protruding edge (5) along its periphery, **characterized in that** the strip of intumescent material (4) is designed to be wider than the width of the damper blade (3).

2. Fire damper (1) according to Claim 1, **characterized in that** the air flow duct (2) is provided with a groove (7) which surrounds the damper blade (3) in its closed position along its periphery.

3. Fire damper (1) according to Claim 1 or 2, **characterized in that** the damper blade (3) is provided with at least two protruding edges (5) along its periphery which together delimit a groove (6).

4. Fire damper (1) according to Claim 3, **characterized in that** the strip of intumescent material (4) is fitted in the groove (6) in the damper blade (3).

5. Fire damper (1) according to Claim 4, **characterized in that** said fire damper (1) comprises a second strip of intumescent material (4) which is able to expand under the effect of heat, this strip (4) being fitted in the groove (7) in the air flow duct (2).

6. Fire damper (1) according to Claim 2 or 3, **characterized in that** the strip of intumescent material (4) which expands under the effect of heat is fitted in the groove (7) in the air flow duct (2).

7. Fire damper (1) according to one of the preceding claims, **characterized in that** the groove (6) in the air flow duct (2) is designed to be wider than the width of the damper blade (3).

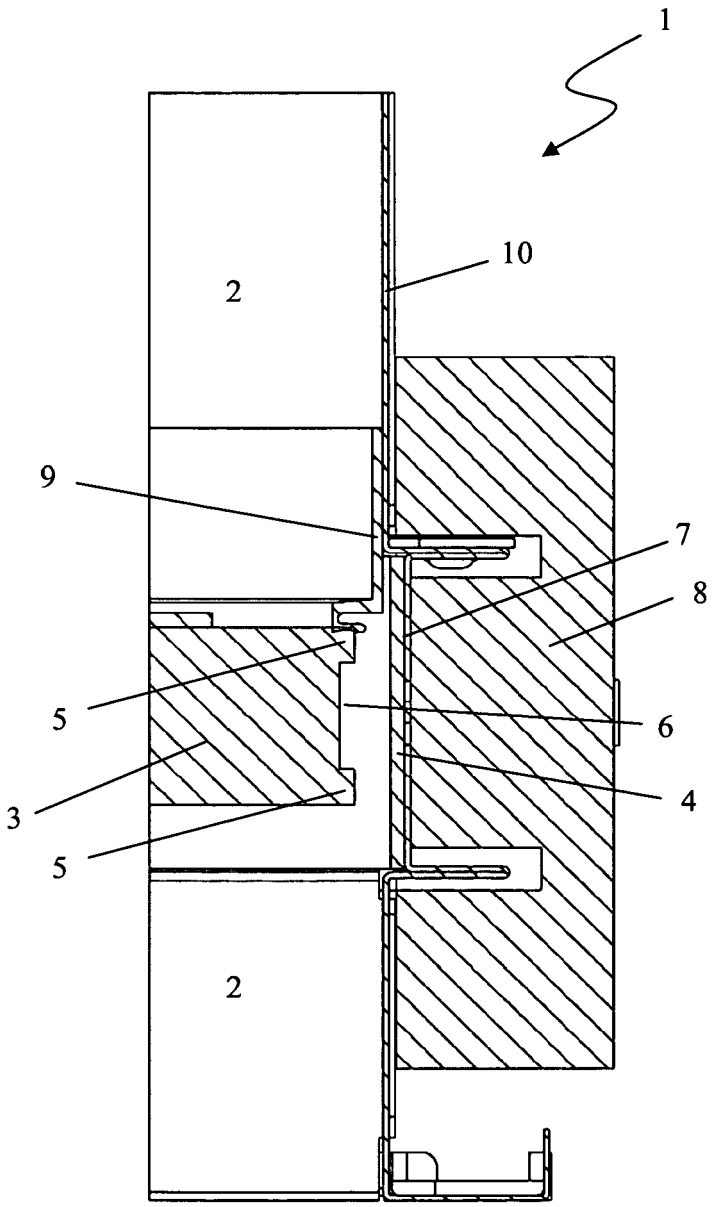

FIG. 1

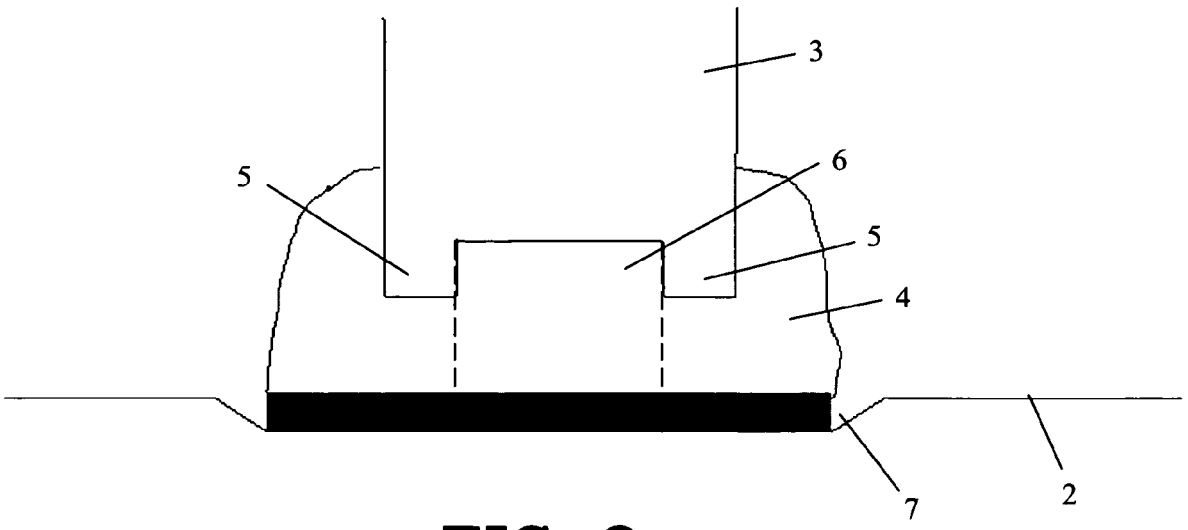

FIG. 2

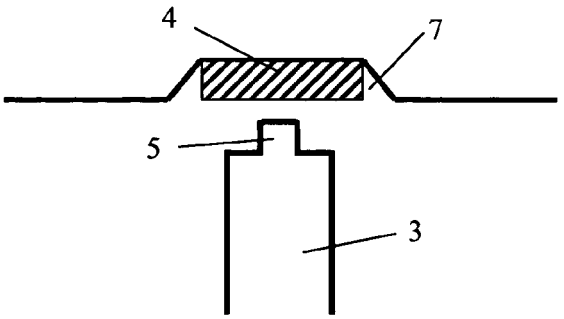

FIG. 3

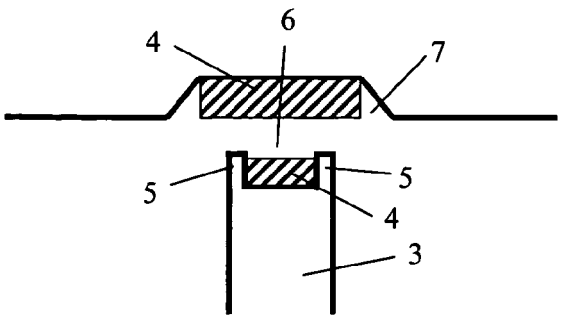

FIG. 4

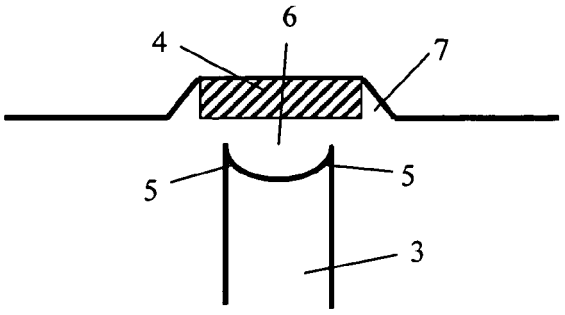

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 10 00 3324

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	DE 295 07 931 U1 (WILDEBOER WERNER DIPL ING [DE]) 10 August 1995 (1995-08-10) * page 2, line 3 - line 15 * * page 4, line 11 - line 14; figures *	2-4	
A	DE 71 36 474 U (GEBR TROX GMBH) 24 February 1972 (1972-02-24) * page 2, line 9 - line 11 * * page 3, line 1 - line 4; figures * * page 3, line 16 - page 4, line 8; figures *	5-7	TECHNICAL FIELDS SEARCHED (IPC) A62C F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10 June 2010	van Bilderbeek, Henk

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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