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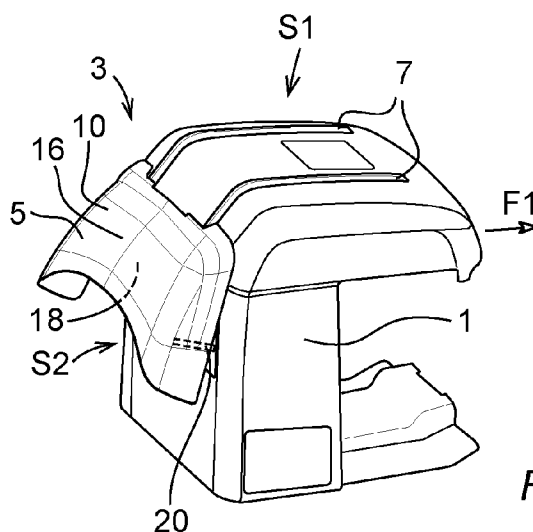


Fig. 3b

(57) Abstract: An air deflector (3) for a vehicle (1), comprising a wind-diverting element (5). The air deflector (3) is adapted to being put into an operating state at a first side (S1) of the vehicle (1), and into a carrying state at a second side (S2) of the vehicle (1). The first side (S1) and the second side (S2) of the vehicle (1) face in different directions. The air deflector (3) is provided with guide means adapted to guiding a movement of the wind-diverting element (5) between the operating state and the carrying state.

## **AN AIR DEFLECTOR FOR A VEHICLE AND A VEHICLE PROVIDED WITH THE AIR DEFLECTOR**

### **FIELD OF THE INVENTION**

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The present invention relates to an air deflector for a vehicle, comprising a wind-diverting element adapted to guiding an air flow during operation of the vehicle so that the vehicle's air resistance is reduced as compared with not having said wind-diverting element. The air deflector is adapted to being put into an operating state which is appropriate to achieving said reduction in the vehicle's air resistance and in which the wind-diverting element is situated at a first side of the vehicle in such a way as to at least partly protrude from the first side.

15

The present invention relates also to a vehicle provided with the air deflector.

### **STATE OF THE ART**

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Air deflectors are used to guide an air flow during operation of a vehicle so that the vehicle's air resistance is reduced. This reduces fuel consumption during operation of the vehicle as compared with having no air deflector.

25

The air deflector comprises the wind-diverting element which in the operating state is situated at the first side of the vehicle in such a way as to at least partly protrude from the first side.

During carriage of the vehicle, e.g. during its delivery or during any other external carriage of it, the air deflector is adapted to being put into a separate carrying state. It is thereby protected from impacts while the vehicle is being carried.

5

A problem is that the air deflector has to be raised by means of lifting devices between the carrying state and the operating state. It is therefore difficult for an operator alone to move the air deflector between the carrying state and the operating state.

10

Vehicles, particularly trucks, are commonly carried facing in the opposite direction to their main direction of movement. When the air deflector is in the operating state, such carriage results in the air deflector increasing the air resistance, causing poorer fuel consumption for the carrier.

15

Another problem is that although the carrying state certainly protects the air deflector from impacts, it does in certain cases cause increased air resistance with consequently increased fuel consumption for the carrier.

20

A further problem is that the carrying state depends on the configuration of the vehicle, resulting in different variants with regard to fitting the air deflector to different variants of the vehicle. The different fitting variants entail risk that the air deflector might be fitted incorrectly. In certain cases the different fitting variants also require different kinds of fastening elements, increasing the costs involved in fitting the air deflector.

25

US 4084846 A refers to an air deflector for a vehicle. The air deflector is adapted to being adjusted between different operating states.

5

## SUMMARY OF THE INVENTION

The object of the present invention is to propose an air deflector which solves the problems of the state of the art. A first object  
10 of the invention is to propose an air deflector which is easy to switch between an operating state and a carrying state. A second object of the invention is an air deflector which allows flexible fitting of it.

15 These objects are achieved with the air deflector indicated in the introduction which is characterised in that it is further adapted to being put into a carrying state in which the wind-diverting element is situated at a second side of the vehicle in such a way as to at least partly protrude from the second side, that the  
20 vehicle's first side and second side face in different directions and that the air deflector has guide means adapted to guiding a movement of the wind-diverting element between the operating state and the carrying state.

25 The fact that the first side and the second side face in different directions means that the wind-diverting element is arranged to be exposed to the air flow during operation of the vehicle and to be protected from impacts during carriage of the vehicle.

- The guide means makes it possible for the wind-diverting element to be moved between the operating state and the carrying state without being separated from the vehicle. The guide means makes it possible to move the wind-diverting
- 5 element between the operating state and the carrying state. There is therefore no need for any lifting device or the like for putting the air deflector into the operating state and the carrying state.
- 10 The air deflector is thus adapted to being moved in a simplified way between the operating state and the carrying state. This makes it possible to reduce fuel consumption both during operation of the vehicle and during carriage of the vehicle.
- 15 According to an embodiment of the invention, the guide means comprises at least one rail adapted to being fitted to the vehicle in such a way as to extend between the vehicle's first side and second side, and to guiding the movement of the wind-diverting element between the operating state and the carrying state.
- 20 The rail makes it possible for the wind-diverting element to be moved between the operating state and the carrying state without being separated from the vehicle.

According to an embodiment of the invention, the rail extends at

25 least from the first side to the second side of the vehicle.

According to an embodiment of the invention, the air deflector comprises a contact means adapted to allowing a sliding movement along the rail. The rail and the contact means make

possible the sliding movement of the wind-diverting element between the operating state and the carrying state without the wind-diverting element being separated from the vehicle.

- 5 According to an embodiment of the invention, the wind-diverting element comprises an elongate segment with a forward portion adapted, in the operating state, to pointing in a main direction of movement of the vehicle, and a rear portion adapted, in the operating state, to pointing away from the direction of  
10 movement.

The wind-diverting element is adapted to guiding the air flow along the elongate segment from the forward portion to the rear portion. The elongate segment is configured to guide the air  
15 flow so that the vehicle's air resistance is reduced as compared with not having said wind-diverting element.

According to an embodiment of the invention, the air deflector comprises fastening means adapted to being put into a holding  
20 state in which the air deflector is secured in both the operating state and the carrying state, and into a free state in which the air deflector is movable between the operating state and the carrying state.

- 25 The fastening means and the rail result in the air deflector being movably fastened in both the operating state and the carrying state. This makes it easy for the air deflector to be released from the carrying state, be moved to the operating state and be fastened in the operating state, or vice versa.

According to an embodiment of the invention, the fastening arrangement comprises at least one first fastening means adapted to securing the wind-diverting element to the rail in the  
5 holding state in both the operating state and the carrying state. The first fastening means secures the wind-diverting element relative to the rail. In the holding state the wind-diverting element is not movable between the operating state and the carrying state.

10

According to an embodiment of the invention, the first fastening means is adapted to securing a forward portion of the wind-diverting element to the rail.

15 According to an embodiment of the invention, the fastening arrangement comprises at least one second fastening means adapted to securing the air deflector at the second side in the carrying state, which second fastening means protrudes from the second side to a rear portion of the wind-diverting element.

20

The second fastening means secures the rear portion of air deflector in the carrying state. The second fastening means allows the rear portion to at least partly protrude from the vehicle's second side.

25

According to an embodiment of the invention, the vehicle's first side is so directed that the air deflector, when put into its operating state, is arranged to be exposed to said air flow during operation of the vehicle, and the vehicle's second side is

so directed that the air deflector, when put into its carrying state, is mainly protected by the vehicle from said air flow.

According to an embodiment of the invention, the second side  
5 faces mainly in the opposite direction to that of the vehicle's main movement during operation, and the first side faces mainly vertically towards the second side.

According to an embodiment of the invention, the elongate  
10 segment is shell-like, comprising a convex surface and a concave surface, said convex surface being adapted in the operating state to facing away from the vehicle's first side, and in the carrying state to facing away from the vehicle's second side, and said concave surface being adapted in the operating  
15 state to facing towards the vehicle's first side, and in the carrying state to facing towards the vehicle's second side. The shell-like configuration reduces the weight of the wind-diverting element without affecting its wind-diverting function.

20 According to an embodiment of the invention, the wind-diverting element has between the convex surface and the concave surface an edge portion with a side arranged to face towards the rail.

25 According to an embodiment of the invention, the first fastening means is adapted to securing the edge portion to the rail. This securing is preferably between the edge portion and the rail in the forward portion of the wind-diverting element.

According to an embodiment of the invention, the air deflector is adapted to being put into a second operating state and said guide means is adapted to allowing a second movement of the wind-diverting element between the first-mentioned operating state and the second operating state.

The rail makes it possible for the wind-diverting element to be moved between two or more operating states. The operating states may be varied according to circumstances, e.g. on the basis of expected operating speed, trailer attached to the vehicle, trailer configurations, etc.

According to an embodiment of the invention, the first side is at least part of the vehicle's roof.

According to an embodiment of the invention, the second side is at least part of a side of the vehicle's cab and faces in the opposite direction to the vehicle's main direction of movement.

According to an embodiment of the invention, the rail is fastened to the vehicle and extends over at least part of the first side, and from the first side to the second side. The rail preferably extends also over at least part of the second side.

According to an embodiment of the invention, the air deflector has two rails which extend parallel between the vehicle's first side and second side and are mutually separated from one another.

According to an embodiment of the invention, the air deflector is adapted to guiding the air flow for a vehicle combination which comprises a vehicle and a trailer or a load platform.

- 5 According to an embodiment of the invention, the air deflector is a roof air deflector for a truck.

## BRIEF DESCRIPTION OF THE DRAWINGS

- 10 The invention is explained in more detail below in the form of various embodiments with reference to the attached drawings.

Figure 1 depicts a vehicle with a cab in a view obliquely from the rear.

- 15 Figures 2-3 depict the vehicle with an air deflector according to an embodiment of the invention.

Figures 2a-2b depict the vehicle and the air deflector in an operating state as viewed respectively from the side and obliquely from the rear.

- 20 Figures 3a-3b depict the vehicle and the air deflector in a carrying state in views respectively from the side and obliquely from the rear.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

- 25 OF THE INVENTION

Figures 1 depicts a vehicle 1 with a cab in a view obliquely from the rear. The vehicle 1 is adapted to being provided with an air

deflector 3 according to an embodiment of the invention, see Figures 2-3.

In the diagrams, the vehicle 1 is a truck adapted to being  
5 coupled to a trailer. The air deflector 3 is adapted to guiding the air flow so that turbulence is avoided when the air flow comes into contact with the trailer. The invention is also applicable to other kinds of vehicles, e.g. cars, trains etc.

10 The vehicle 1 comprises a first side S1 and a second side S2. The vehicle has a main direction of movement F1 in which it is mainly intended to travel. The second side S2 faces mainly in the opposite direction to the vehicle's main direction of  
15 movement F1. The first side S1 mainly faces vertically towards the second side S2. The first side S1 comprises part of the vehicle's roof. The second side S2 comprises a rear side of the vehicle 1 which faces away from the vehicle's main direction of movement F1.

20 Figures 2-3 depict the vehicle 1 with an air deflector 3 according to an embodiment of the invention. The air deflector 3 will be described further with reference to Figures 1-3.

The air deflector 3 comprises a wind-diverting element 5  
25 adapted, during operation of the vehicle, to guiding an air flow so that the vehicle's air resistance is reduced relative to not having said wind-diverting element 5.

In the operating state, the wind-diverting element 5 is adapted to being exposed to the air flow and to guiding it away from the first side S1, thereby reducing the vehicle's air resistance.

- 5 This reduction in air resistance applies in particular to a vehicle combination made up of the vehicle 1 coupled to a trailer or a load platform. The air flow is guided away from the trailer or the load platform. The exposure of the trailer or the load platform to the air flow is thus reduced, with consequent reduction of the  
10 vehicle's fuel consumption as compared with not having the air deflector 3.

The wind-diverting element 5 comprises an elongate segment 10 with a forward portion 12 and a rear portion 14. The forward  
15 portion 12 is adapted to pointing in the vehicle's main direction of movement F1, and the rear portion 14 in the operating state is adapted to facing away from the main direction of movement F1.

The elongate segment 10 is shell-like, comprising a convex  
20 surface 16 adapted to facing away from the vehicle's first side S1 in the operating state or from the vehicle's second side S2 in the carrying state. The shell-like portion comprises also a concave surface 18 adapted to facing towards the vehicle's first side S1 in the operating state or towards the vehicle's second  
25 side S2 in the carrying state.

When the vehicle 1 is travelling in its main direction of movement F1, the air flow is in an opposite direction to said main direction of movement F1. The convex surface 16 results

in the air flow being gradually guided away from the first side S1.

In Figures 2a and 2b the air deflector 3 is in an operating state  
5 adapted to effecting said reduction in the vehicle's air resistance.

In the operating state the wind-diverting element 5 is situated at the vehicle's first side S1 in such a way as to partly protrude  
10 from the first side S1. The wind-diverting element 5 is thus situated on the vehicle's roof.

The configuration of the vehicle 1 and the extent of the rails 7 of the air deflector 3 in the embodiment depicted are such that the  
15 air deflector is so arranged that the elongate segment 10 extends along the first side S1. It is also possible for the air deflector 3 to be arranged in some other way relative to the first side S1.

20 In Figures 3a and 3b, the air deflector 3 is in a carrying state in which the wind-diverting element 5 is situated at the vehicle's second side S2 in such a way as to partly protrude from the second side S2. The carrying state is arranged to serve as a protective position for the wind-diverting element 5 when the  
25 vehicle is being carried.

The air deflector 3 comprises guide means which in the embodiment depicted takes the form of two rails 7 adapted to

guiding a movement of the wind-diverting element 5 between the operating state and the carrying state.

5 The two rails 7 extend over the first side S1 as far as the second side S2. In another embodiment the rails 7 extend over the first side S1 as far as the second side S2 and over the second side S2.

10 The configuration of the vehicle 1 and the extent of the rails 7 of the air deflector 3 in the embodiment depicted are such that the rear portion 14 of the elongate segment 10 protrudes from the second side S2 when the air deflector is in the carrying state. In another embodiment, the air deflector 3 is adapted to being so placed that the elongate segment 10 extends along the second  
15 side S2.

The air deflector 3 comprises also contact means, not depicted in the drawings, adapted to allowing a sliding movement along the rails 7. The rails 7 and the contact means thus allow a  
20 movement of the wind-diverting element 5 between the operating state on the first side S1 and the carrying state on the second side S2 of the vehicle 1.

25 The air deflector 3 comprises a fastening arrangement adapted to securing it in both the operating state and the carrying state. The fastening arrangement is adapted to being put into a holding state whereby the air deflector 3 is held in position in the operating state or the carrying state, and into a free state in

which it is movable between the operating state and the carrying state.

5 The fastening arrangement comprises a number of fastening means adapted to securing the wind-diverting element 5 to each of the rails 7 in the holding state in both the operating state and the carrying state. The fastening means are adapted to securing the forward portion 12 of the elongate segment 10 to the rails 7.

10

The fastening means can be regulated between the holding state and the free state. The fastening means comprise for example a threaded fastening element such as a screw, nut, bolt etc. The fastening means do not appear in the drawings.

15

The fastening arrangement comprises also two second fastening means 20 adapted to holding the air deflector in position at the second side S2 in the carrying state. The second fastening means 20 protrude from the vehicle's second side S2 and fasten to the rear portion 14 of the elongate segment 10. The rear portion of the elongate segment 10 is thus held in position against the vehicle's second side S2.

25 The second fastening means 20 have a state in which they are retracted in the vehicle 1 and a state in which they are deployed from its second side S2. Figure 3b depicts the second fastening means 20 in a deployed state holding the rear portion 14 of the elongate segment 10 in position at the second side S2. In the other diagrams they are retracted in the vehicle 1. The second

fastening means 20 allow the rear portion 14 of the elongate segment 10 to at least partly protrude from the vehicle's second side S2.

- 5 The second fastening means 20 allow regulation between the holding state and the free state. The fastening means each take for example the form of a stay or similar element adapted to maintaining mutual positioning between the rear portion 14 of the elongate segment 10 and the second side S2. The second
- 10 fastening means 20 comprise for example a threaded fastening element such as screw, nut, bolt etc.

The air deflector 3 is also adapted to being put into first and second operating states. The rails 7 are adapted to allowing a

15 second movement of the wind-diverting element 5 between the first-mentioned operating state and the second operating state. The air deflector 3 is thus adapted to being moved between a number of operating states and a carrying state. In another embodiment the air deflector 3 is adapted to being put into a

20 number of carrying states at the vehicle's second side S2.

The invention is not restricted to the embodiments depicted but may be modified and varied within the scope of the claims set out below.

**CLAIMS**

1. An air deflector (3) for a vehicle (1), comprising  
- a wind-diverting element (5) adapted, during operation of  
5 the vehicle (1), to guiding an air flow so that the air  
resistance of the vehicle (1) is reduced relative to not having  
said wind-diverting element (5),  
which air deflector (3) is adapted to being put into an  
operating state which is appropriate to achieving said  
10 reduction in the air resistance of the vehicle (1) and in which  
the wind-diverting element (5) is situated at a first side (S1)  
of the vehicle (1) in such a way as to at least partly protrude  
from the first side (S1),  
characterised  
15 in that the air deflector (3) is further adapted to being put  
into a carrying state in which the wind-diverting element (5)  
is situated at a second side (S2) of the vehicle (1) in such a  
way as to at least partly protrude from the second side (S2),  
that the first side (S1) and the second side (S2) of the  
20 vehicle (1) face in different directions and that the air  
deflector (3) is provided with guide means adapted to guiding  
a movement of the wind-diverting element (5) between the  
operating state and the carrying state.
- 25 2. The air deflector (3) according to claim 1, in which the  
guide means comprises at least one rail (7) adapted to being  
fitted to the vehicle (1) in such a way as to extend between  
the first side (S1) and the second side (S2) of the vehicle (1),

and to guiding the movement of the wind-diverting element (5) between the operating state and the carrying state.

5        3. The air deflector (3) according to claim 2, in which the rail (7) extends at least from the first side (S1) to the second side (S2) of the vehicle (1).

10       4. The air deflector (3) according to either of claims 2 and 3, comprising a contact means adapted to allowing a sliding movement along the rail (7).

15       5. The air deflector (3) according to any one of the foregoing claims, in which the wind-diverting element (5) comprises an elongate segment (10) with a forward portion (12) adapted, in the operating state, to pointing in a direction of movement (F1) in which the vehicle (1) mainly travels, and a rear portion (14) arranged, in the operating state, to face away from the direction of movement (F1).

20       6. The air deflector (3) according to any one of the foregoing claims, comprising a fastening arrangement capable of being put into a holding state in which the air deflector (3) is secured in both the operating state and the carrying state, and into a free state in which the air deflector (3) is movable  
25       between the operating state and the carrying state.

7. The air deflector (3) according to claim 6, in which the fastening arrangement comprises at least one fastening means adapted to securing the wind-diverting element (5) to

the rail (7) in the holding state in both the operating state and the carrying state.

5 8. The air deflector (3) according to claim 7, in which the fastening means is adapted to securing the forward portion (12) of the wind-diverting element (5) to the rail (7).

10 9. The air deflector (3) according to either of claims 7 and 8, in which the fastening arrangement comprises at least one second fastening means (20) adapted, in the carrying state, to securing the air deflector (3) at the second side (S2), which second fastening means (20) protrudes from the second side (S2) to the rear portion (14) of the wind-diverting element (5).

15

20 10. The air deflector (3) according to any one of the foregoing claims, in which the first side (S1) of the vehicle (1) is so directed that the air deflector (3), in its operating state, is arranged to be exposed to said air flow during operation of the vehicle (1), and the second side (S2) of the vehicle (1) is so directed that the air deflector (3), in its carrying state, is mainly protected by the vehicle (1) from said air flow.

25 11. The air deflector (3) according to any one of the foregoing claims, in which the second side (S2) faces mainly in the opposite direction to the main direction of movement (F1) of the vehicle (1) during operation, and the first side (S1) faces mainly vertically towards the second side (S2).

12. The air deflector (3) according to claim 5, in which the elongate segment (10) is shell-like with a convex surface (16) and a concave surface (18), said convex surface (16) being arranged, in the operating state, to face away from the first side (S1) and in the carrying state to face away from the second side (S2) of the vehicle (1), and said concave surface (18) being arranged, in the operating state to face towards the first side (S1) of the vehicle (1), and in the carrying state to face towards the second side (S2) of the vehicle (1).

10

13. The air deflector (3) according to any one of the foregoing claims, such that it is adapted to being put into a second operating state and said guide means is adapted to allowing a second movement of the wind-diverting element (5) between the first-mentioned operating state and the second operating state.

15

14. The air deflector (3) according to any one of the foregoing claims, in which the first side (S1) is at least part of the roof of the vehicle (1).

20

15. A vehicle provided with an air deflector according to any one of claims 1-14.

1/2

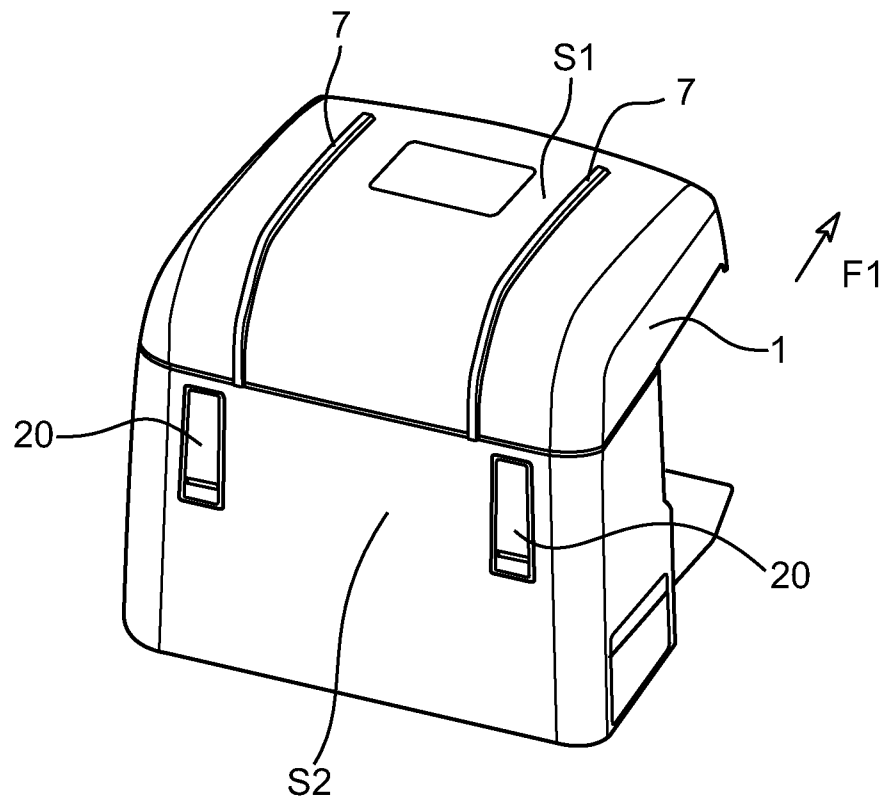


Fig. 1

2/2

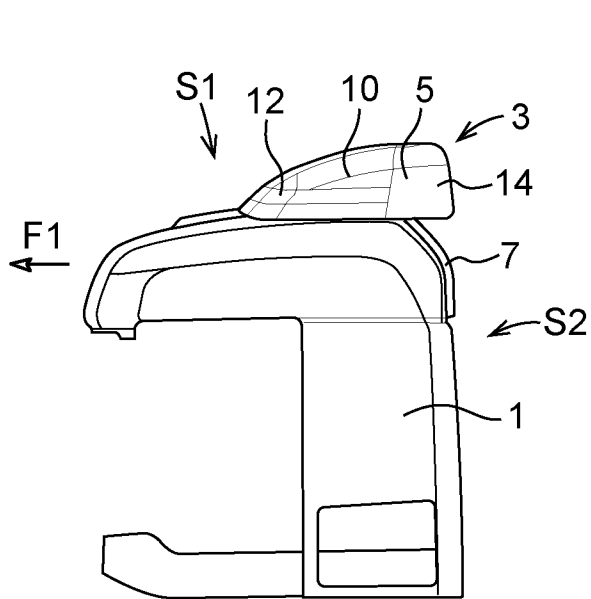


Fig. 2a

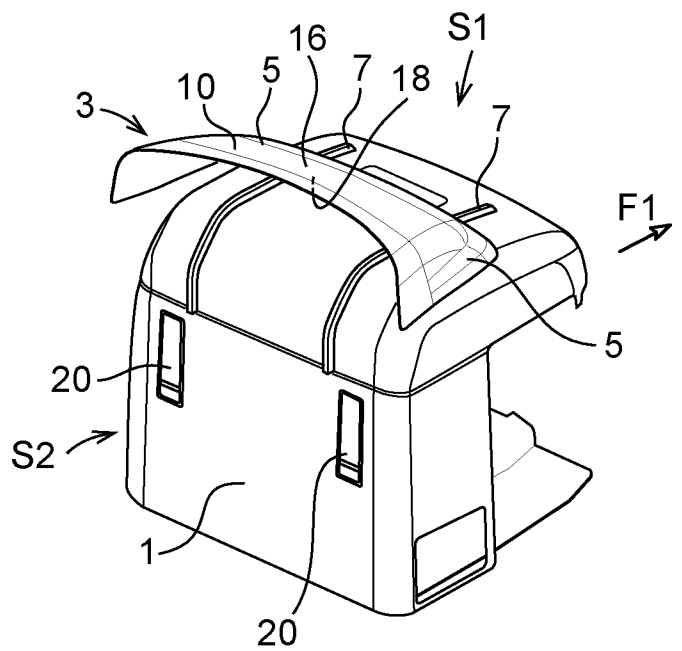


Fig. 2b

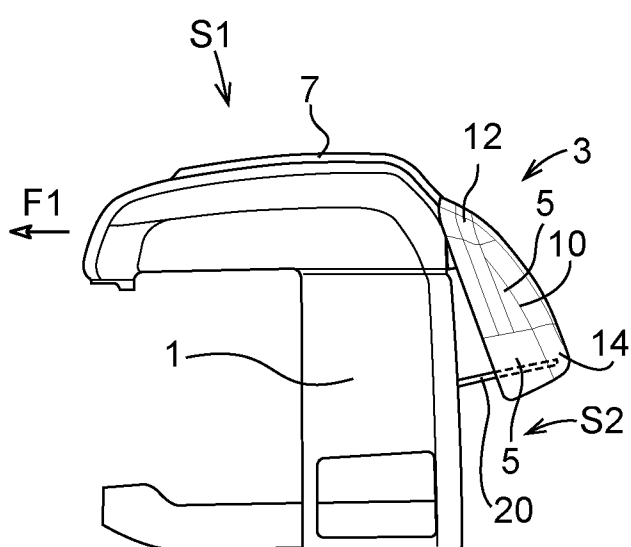


Fig. 3a

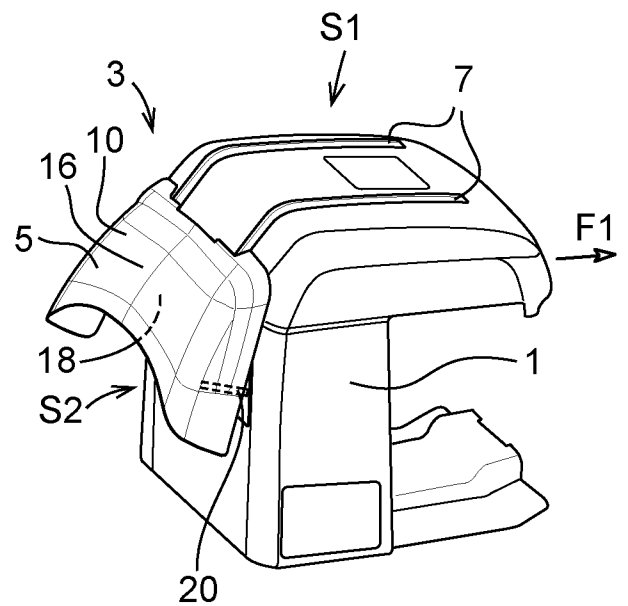


Fig. 3b

## INTERNATIONAL SEARCH REPORT

 International application No.  
 PCT/SE2011/051469

## A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B62D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                 | Relevant to claim No. |
|-----------|----------------------------------------------------------------------------------------------------|-----------------------|
| X         | DE 9420438 U1 (WILLNER HEINZ), 30 March 1995 (1995-03-30); page 4, paragraph [0002]; figures<br>-- | 1-15                  |
| X         | US 3425740 A (VAUGHN MARSHALL S DE), 4 February 1969 (1969-02-04); figures<br>--                   | 1                     |
| X         | EP 0704362 A1 (ABB PATENT GMBH), 3 April 1996 (1996-04-03); abstract; figures<br>--                | 1                     |
| X         | US 4451074 A (SCANLON BARRY), 29 May 1984 (1984-05-29); abstract; figures<br>--<br>-----           | 1                     |



Further documents are listed in the continuation of Box C.



See patent family annex.

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14-12-2011

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**International Patent Classification (IPC)**

***B62D 35/00*** (2006.01)

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

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