Fig. 7

(57) Abstract: A structure for a sliding roof including longitudinal members (2) and cross-members (3), and folding plates (4) between the cross-members (3) and connected to the cross-members (3). The folding plates and the longitudinal members are equipped with complementary profiles (9, 10, 13) extending in a direction parallel to the longitudinal members (2). The complementary profiles have a reinforcing effect.
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Structure for a sliding roof, sliding roof system, truck with sliding roof system, curtainsider trailer with a sliding roof system.

The invention relates to a structure for a sliding roof with a tarpaulin comprising longitudinal members, cross-members and folding plates between the cross-members that are connected to the cross-members.

The invention also relates to a sliding roof system and a truck and curtainsider trailer equipped with a sliding roof system.

Such a structure is known for roof systems for trailers and trucks.

A sliding roof of a truck includes two longitudinal members (usually aluminium or steel). Above them are a number of cross-members on which bearings are mounted. These cross-members (roofsticks) are connected to each other by folding plates usually made of plastic. Above these roofsticks, a roof tarpaulin is fitted. During the opening and closing of the sliding roof, the folding plates are folded up during opening and stretched out during closing.

In Europe, a number of standards have been established for securing loads on trucks. One of these standards is EN12642 Code XL. This standard specifies how strong a structure must be for a specific loading capacity of the truck. It is especially the case that the structure must be able to withstand the forces that can be exerted by the load on the sides of the truck. If the truck is equipped with a sliding roof, this sliding roof, and in some cases also a fixed roof, must be reinforced. This is done by adding
additional resources in the form of a diagonal cable
reinforcement or a reinforced roof tarpaulin or
reinforcements in the longitudinal members or a combination
of these. Such a reinforcement does increase the weight of
the sliding roof and the complexity of the structure.

It is an object of the invention to provide a structure
for a sliding roof that reinforces the sliding roof.

The construction of a sliding roof according to the
invention is characterised in that the folding plates and the
longitudinal members have complementary profiles extending in
a direction parallel to the longitudinal members to form a
mechanical connection between lying-down folding plates and
the longitudinal members.

The complementary profiles, such as a slot in the
longitudinal member and a raised edge in the folding plates
or bar on the folding plate, interlock with each other or lie
alongside each other when the folding plates are lying down.
In one embodiment of the invention, the complementary
profiles are designed so that the folding plates are no
longer able to move upwards when the longitudinal members
bend.

Thus, with folding plates that are lying down, a
mechanical connection is formed between the folding plates
and the longitudinal members. Via the folding plates, a
mechanical connection is thus also made between the
longitudinal members and the cross-members. This mechanical
connection can transmit forces between the longitudinal
members and the cross-members. The whole structure is thus
reinforced. The profiles prevent the longitudinal members
from moving in or out. A profile can be formed by a slot, a
groove, a bar or a raised edge. A bar can fall into a slot. Also, two raised edges, one from the folding plate and one in the longitudinal member can be adjacent to each other.

In a preferred embodiment, the folding plates consist of two outer sections, coupled to a cross-member, separated by a flexible middle section, whereby the two outer sections taper towards the middle section. The radiating shape of the folding plates to the cross-members conducts the forces to a relatively long part of the cross-members.

Preferably, such a folding plate contains reinforcement ribs that diverge in a fan shape. This effectively conducts the forces to the longitudinal member.

In a preferred embodiment, a folding plate consists of a plastic component made from one piece or a combination of plastic with added materials such as reinforcement materials. These added materials can be Kevlar or Twaron or glass fibre.

A metal plate with a plastic coating can also be used.

In one embodiment, a number of cross-members are shaped so that they have a complementary profile and can disengage from the longitudinal members when the sliding roof is opened.

Usually all of the cross-members on both sides are equipped with running tracks that allow the cross-members to move along the longitudinal members and prevent them from falling off the longitudinal members. In one embodiment, the cross-members are shaped so that a number of them can disengage from the longitudinal members.

These and other aspects of the invention are described here and illustrated by means of the drawing.

The drawing illustrates the following:
Figure 1 shows a roof structure for a sliding roof; Figure 2 shows a detail of a known structure; Figures 3 and 4 show a detail of a structure according to the invention; Figures 5 and 6 show further embodiments of the invention; Figure 7 shows a number of complementary profiles.

The figures are not drawn to scale; similar parts are generally indicated by the same reference numbers.

Figure 1 shows a sliding roof for a truck. A sliding roof of a truck comprises two longitudinal members 2 (usually aluminium or steel). Above them are a number of cross-members 3 on which bearings are mounted. These cross-members (roofsticks) are connected to each other by plastic folding plates 4. Above these roofsticks, a roof tarpaulin is fitted (not shown here). On the back of the truck is a folding bar 5 that can be folded upwards so that all of the roofsticks mounted on each other can move forwards and the roof is opened.

Figure 2 shows a known structure, known from German Gebrauchsmuster DE202006005850.

The folding plates 4 are connected on both sides to the cross-members 3. The cross-members are equipped on both ends with parts 7 equipped with bearings. These parts ensure that the cross-members can move over and along the longitudinal members. A middle section 8 of the folding plate can pivot or is elastic. By bringing together the cross-members, the middle section 8 moves upwards and the folding plates are
folded double. In the expanded state, as shown in Figure 2, the distance between the cross-members is equal to the width of the folding plates. The folding plates can be adjacent to the longitudinal members 2. Similar structures with folding plates are also known from the international patent application WO 97/32745 and European patent application EP 2 106 947.

In the European regulations, more stringent requirements are set for the strength of the sliding roof. This especially relates to the forces that can be exerted by the load on the sides of the truck, for example by the load.

To meet these requirements, the sliding roof is additionally reinforced, for example by adding steel cables, or by strengthening the longitudinal members with steel parts.

Such a reinforcement does increase the weight of the sliding roof and the complexity of the structure.

It is an object of the invention to provide a structure for a sliding roof that reinforces the sliding roof.

Figures 3 and 4 show details of a structure according to the invention.

The folding panels are equipped with bars 9 on the side facing the longitudinal member. The longitudinal members are equipped on the side facing the folding plates with a longitudinal slot 11 with a shape complementary to the shape of the bars 9. The longitudinal slot 11 can also serve as a guide slot for the bearings in part 7. In the pushed down state, the bars 9 lie in the slot 11. This strengthens the
structure. In this embodiment, the folding plates 4 are equipped with parts 10 that run in width to the cross-members 3. This creates a large contact surface with the cross-member, and the forces can be effectively conducted to the cross-members. Between the two parts 10 is a flexible or hinged part.

Figures 5 and 6 show a number of further embodiments of a sliding roof structure according to the invention.

Figure 5 shows the folding plates according to the invention produced from one part, implemented with complementary parts in the form of bars 9 and stops 13. The stops 13, in the folded down state, lie against a vertical edge of a longitudinal member 2. The edge then grips, as it were, the edge of the longitudinal member. This figure also shows that the folding plates are equipped with reinforcement ribs 14 that radiate to the cross-members.

In Figure 6, the structure is made so that there are two types of cross-members, type 3a that remains connected to the longitudinal members 2 and type 3b that in the open state disengages from the longitudinal members 2. In this type, the end of the cross-members is equipped with a complementary profile to the profile of the longitudinal member. In Figure 6, the part 15 is equipped with two bars and a stop.

Figure 7 shows a number of possible complementary profiles and stops. In these examples, the folding plates are equipped with bars and the longitudinal members are equipped with a groove or slot. Of course, the folding plates can also be equipped with one or more slots and the longitudinal members can be equipped with bars. It is preferable, however, that the folding plates are equipped with bars because the
longitudinal slot of the longitudinal member can then also serve as a guide slot for the cross-members. The folding plates can be equipped with reinforcing ribs to conduct the forces. The lower figure shows an embodiment in which the profiles have a gripping function. The bar 9 and the raised edge 13 are equipped with hook-shaped parts to hook into corresponding parts of the longitudinal member in the slot 11 or at the edge of the longitudinal member.

The invention can be summarised as follows:

A structure for a sliding roof including longitudinal members (2) and cross-members (3), and folding plates (4) between the cross-members (3) and connected to the cross-members (3). The folding plates and the longitudinal members are equipped with complementary profiles (9, 10, 13) extending in a direction parallel to the longitudinal members (2). The complementary profiles have a reinforcing effect.

It will be clear that, in the context of the invention, many variants are possible and the invention is not limited to the examples given above.
Claims:

1. Structure for a sliding roof with a tarpaulin consisting of longitudinal members (2) and cross-members (3), and folding plates (4) between the cross-members (3) and connected to the cross-members (3), characterised in that the folding plates and the longitudinal members are equipped with complementary profiles (9, 10, 13) extending in a direction parallel to the longitudinal members (2) to form a mechanical connection between lying-down folding plates and the longitudinal members.

2. Structure for a sliding roof according to claim 1, characterised in that the complementary profiles include a bar (9) on a folding plate (4) and a groove (10) in a longitudinal member (2).

3. Structure according to claim 2, characterised in that the folding plate is equipped with more than one bar (9) and multiple grooves (10) in a longitudinal member (2).

4. Structure according to claims 2 or 3, characterised in that the folding plate is equipped with a raised edge (13).

5. Structure according to claims 2, 3 or 4, characterised in that a profile of the folding plate is equipped with a gripping function.

6. Structure according to one of the preceding claims, characterised in that the folding plates consist of two outer sections (11), coupled to a cross-member (3), separated by a flexible middle section, whereby the two outer sections taper towards the middle section.
7. Structure according to claim 6, characterized in that the outer section of the folding plates are shaped in a right angle.

8. Structure according to one of the preceding claims, characterised in that the folding plates are made from one piece.

9. Structure according to one of the preceding claims, characterised in that the folding plates contain a reinforcement material.

10. Structure according to one of the preceding claims, characterised in that a number of cross-members (3b) are shaped so that they have a complementary profile and can disengage from the longitudinal members when the sliding roof is opened.

11. Sliding roof system containing a structure according to one of the preceding claims.

12. Truck containing a sliding roof system according to claim 11.

13. Curtainsider trailer containing a sliding roof system according to claim 11.
 According to International Patent Classification (IPC) or to both national classification and IPC.

**A. CLASSIFICATION OF SUBJECT MATTER**

**INV. B60J7/06**

ADD.

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)

B60J B61C B65D B61D

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

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

EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
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<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search

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