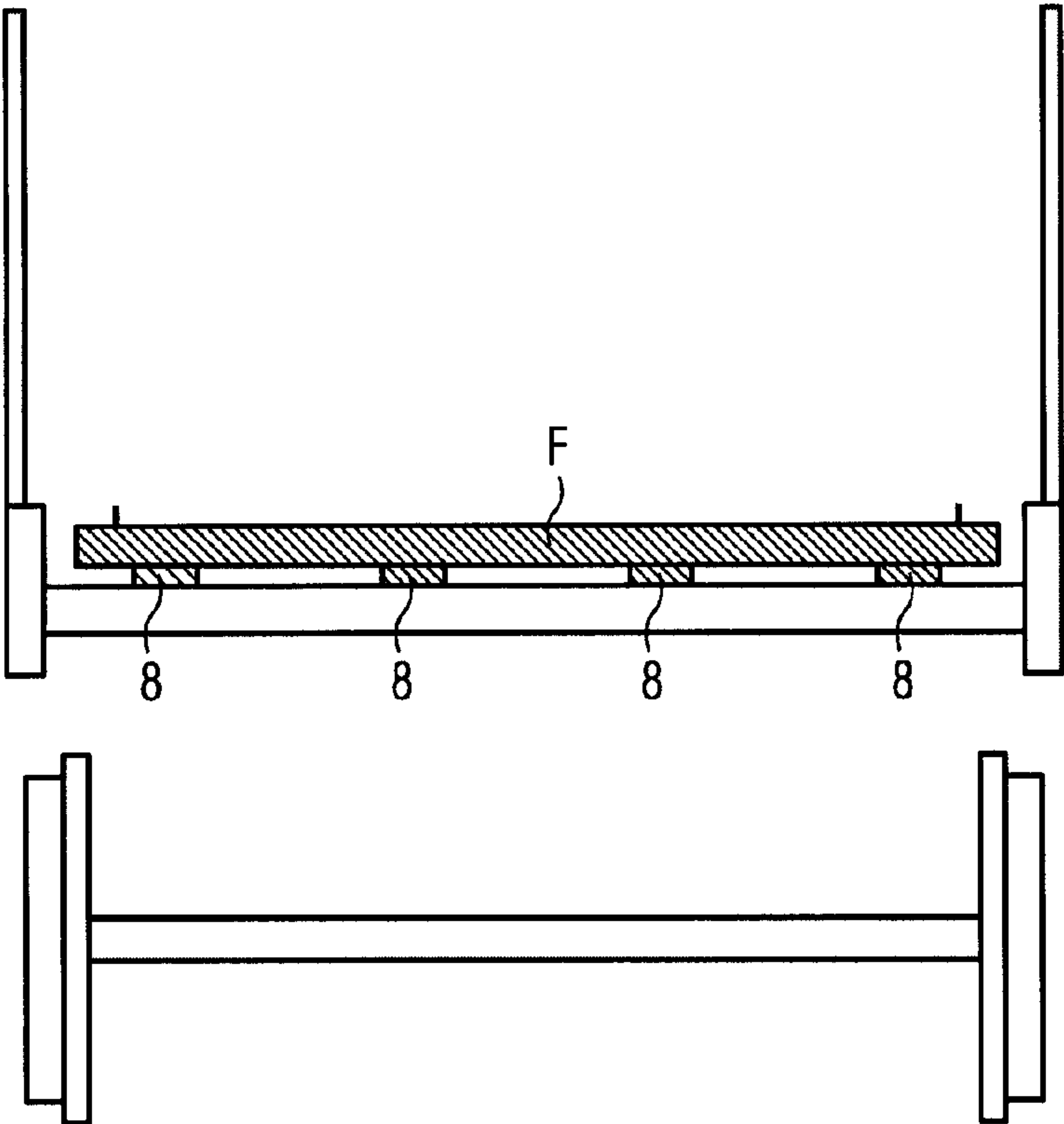




(86) **Date de dépôt PCT/PCT Filing Date:** 2011/06/01
(87) **Date publication PCT/PCT Publication Date:** 2012/01/26
(45) **Date de délivrance/Issue Date:** 2018/07/03
(85) **Entrée phase nationale/National Entry:** 2013/01/18
(86) **N° demande PCT/PCT Application No.:** EP 2011/059060
(87) **N° publication PCT/PCT Publication No.:** 2012/010362
(30) **Priorité/Priority:** 2010/07/22 (AT A1236/2010)

(51) **Cl.Int./Int.Cl.** *B61D 17/10* (2006.01)
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(54) **Titre : PLANCHER POUR VEHICULES SUR RAIL**
(54) **Title: FLOOR FOR A RAIL VEHICLE**



(57) **Abrégé/Abstract:**
The invention relates to a floor (F) for rail vehicles consisting of a four-layer structure of a first metal layer (1), a filling layer (2), a second metal layer (3) and a wear layer (4), which are undetachably connected to one another. According to the invention, the floor (F) is made in a single piece and covers the entire floor of the passenger space of a rail vehicle.

Abstract

The invention relates to a floor (F) for rail vehicles consisting of a four-layer structure of a first metal layer (1), a filling layer (2), a second metal layer (3) and a wear layer (4), which are undetachably connected to one another. According to the invention, the floor (F) is made in a single piece and covers the entire floor of the passenger space of a rail vehicle.

Description

Floor for a rail vehicle

Area of technology

The invention relates to a floor for rail vehicles.

Prior art

The floor of passenger rail vehicles is exposed to high levels of stress. The abrasive wear caused by the passengers and stress resulting from moisture and chemically aggressive cleaning agents require a robust wear layer for the floor structure. In addition, a rail vehicle floor must advantageously have heat insulating and sound absorbing properties, whilst being lightweight and reasonably priced. Furthermore, according to the type approval specifications for rail vehicles certain fire retardant properties of the floor must be demonstrated. The construction of rail vehicles takes place today practically exclusively using aluminum or steel (or stainless steel). In this situation, the shell structures of steel rail vehicles typically have a passenger space floor consisting of trapezoidal sheet and require corresponding floor structures which take account of and compensate for this mode of construction. Shell structures consisting of aluminum on the other hand have an essentially smooth, flat interior floor. According to the prior art, floors for rail vehicles are constructed from panels (typically plywood or composite panels) which are connected (typically screwed) by way of local supports (wooden spacers or profiles) to the vehicle floor. These plywood panels are provided with a wear layer which has the requisite properties, in particular resistance

to wear. The cavities produced by this type of construction between the local supports beneath the plywood panels are normally filled with insulating material (for example mineral wool) in order to improve the heat insulation. Such a floor construction has several disadvantages: The necessary installation height is considerable; the installation height of floors currently produced is typically approx. 50 mm. In addition, the design effort is also considerable because detail drawings of the floor need to be produced and order items created for each individual plywood panel.

The moisture resistance of such floors is similarly less than satisfactory because liquids entering or penetrating laterally past the board edges as a result of damage in the wear layer accumulate in the cavities and are no longer dissipated and damage the plywood panels and supports, and the use of the vehicle can be adversely affected as a result of the mold occurring or putrefaction processes. The weight of floors in accordance with the prior art is considerable, a floor of a passenger vehicle having an area of 50 m² typically weighing approx. 700 kg.

A further major disadvantage of conventional floors is their complicated installation because in order to achieve a flat interior area a very complex leveling process is required for the supports.

Statement of the invention

The object of the invention is therefore to specify a floor for rail vehicles which is lightweight, thin, highly heat insulating, simple to design and to install, environmentally friendly to recycle, moisture resistant and sound absorbing,

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as well as reasonably priced.

According to one aspect of the present invention, there is provided a floor for a rail vehicle, comprising: a four-layer structure comprising a first metal layer, a filling layer, a
5 second metal layer and a wear layer, which are bonded undetachably to one another, wherein the floor is produced in a single piece and covers the entire floor of the passenger space of a rail vehicle and the filling layer is produced from a composite material with a cork content, wherein an edge profile
10 is provided which encompasses the floor on all sides and is bonded undetachably to the floor, and wherein the edge profile has a flange oriented in the direction of the passenger space.

According to the fundamental idea of the invention, a floor for rail vehicles is constructed consisting of a four-layer
15 structure comprising a first metal layer, a filling layer, a second metal layer and a wear layer, which is produced in a single piece and covers the entire floor of the passenger space of a rail vehicle.

A corrosion-resistant light metal (aluminum alloy) is
20 advantageously used as the first and second metal layers since this makes it possible to achieve both a sufficient strength and also a low weight.

Cork or a composite material containing cork is recommended for use as the filling layer because the advantageous properties of
25 cork (low weight, elastic, shock-absorbing, good heat insulation properties, moisture resistance, fungus resistance, fire retardant properties) can thus be optimally utilized.

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The wear layer is advantageously implemented from the usual flooring materials conventionally used in rail vehicle construction. Plastic (for example PVC) and rubber materials in particular are suited for this type of use especially as they
5 exhibit a high wear resistance. However, carpet materials can also be used.

The bonding of the metal layers to the filling layer or to the

wear layer can be effected by means of any adhesive suitable for the purpose, for example by using solvent-free dispersion adhesives or those containing solvents, or by using natural resin adhesives.

The essential characteristic of the invention is the single-piece production of a floor panel from the aforementioned sandwich structure. This floor panel extends over the entire floor of the passenger space, which means that only one panel needs to be designed for each rail vehicle type, making for considerable savings in development costs. Using the aforementioned layer structure it is possible to produce a floor which exhibits the necessary inherent strength in order to be transported and assembled in a single piece.

In order to further improve the strength of a floor according to the invention it is advisable to employ reinforcing profiles which are provided in certain regions between the first and the second metal layer in place of the filling layer. On the one hand these reinforcing profiles increase the inherent strength of the floor panel, on the other hand they can be used as anchor points for fastening internal equipment (for example handrails). For the latter purpose the reinforcing profiles are to be equipped with suitable mounting facilities, for example threads. Hollow chamber profiles made of light metal (aluminum alloys) are particularly suitable for use as reinforcing profiles.

It is a major advantage of the invention that the floor can already be installed during an early construction phase of the rail vehicle; it is for example possible to attach the floor panel onto the undercarriage and then to assemble the side walls, whilst taking care to adequately protect the floor

panel during the welding operations required in this situation. A further assembly option is to leave one end wall of the rail vehicle open and to close this end wall only after the floor panel has been inserted. With both assembly options it is possible to achieve the advantage of being able to significantly reduce the manufacturing costs because less manual work is required than in the case of conventional floor designs (having a plurality of floor panels with a substructure and requiring alignment work).

A further major advantage results from the single-piece construction in that no thermal bridges can be created and that no leveling work is required.

The floor panel according to the invention is installed on the vehicle structural floor in floating fashion; no further fastening means are required, in particular no screw connections. The floor panel rests, separated by several bearing strips (elastic plastic material), directly on the vehicle structural floor. It is however recommended, in particular in order to prevent the floor panel lifting in the event of the rail vehicle being involved in a collision, to provide floor retainers. These floor retainers are fastened on the rail vehicle structure (for example on the solebar). A form-locked connection of the floor panel with the vehicle body is achieved by means of these floor retainers.

An essential characteristic is the moisture resistance of a floor panel according to the invention. On the one hand, cork is very moisture resistant, on the other hand the cork layer is additionally protected against moisture by the protection on both sides afforded by the first and second metal layers. The vehicle body itself is protected by the single-piece

construction of the floor panel because in such a manner no joints and gaps occur through which moisture can penetrate. At most, a moisture guard is required at the edges of the floor panel.

In a further development of the invention, it is advisable to provide an edge profile which encompasses the perimeter of the floor panel and has a flange which prevents the penetration of moisture into the gap between vehicle body and floor panel and further beneath the floor panel. This means that even a high moisture level, for example occurring during cleaning, cannot result in an ingress of moisture beneath the floor panel. Such an ingress of moisture beneath the floor panel is particularly disadvantageous because the moisture is no longer able to escape from this location and may cause corrosion there. This flange on the edge profile can be joined to a (preferably watertight) cover strip provided on the interior wall such that an especially moisture resistant interior space is achieved.

The edge profile can be implemented differently on different edge lines of the floor panel, for example the flange can be implemented differently in the entry areas in order to avoid a tripping hazard for the passengers.

In an advantageous embodiment of the invention, the wear layer is bonded to the second metal layer by means of a pressure-sensitive adhesive. This means it is possible to achieve the advantage that the wear layer can be removed again without damaging the underlying structure and said wear layer can thus be replaced, such as in the event damage thereto. The remaining layers of the floor panel can remain in the vehicle.

Brief description of the drawings

In the drawings, by way of example:

Fig.1 shows the layer construction of a floor according to the invention for rail vehicles.

Fig.2 shows a floor according to the invention for rail vehicles, having a reinforcing profile.

Fig.3 shows a sectional view of a floor for rail vehicles, having a reinforcing profile.

Fig.4 shows the layer construction of a floor according to the invention for rail vehicles, having an edge profile.

Fig.5 shows the installation of a floor according to the invention in a rail vehicle.

Embodiment of the invention

Fig.1 shows by way of example and schematically the layer construction of a floor according to the invention for rail vehicles. A floor F for rail vehicles comprises a first metal layer 1 which in the installed state faces the vehicle structural floor, a filling layer 2 arranged on this first metal layer 1, a second metal layer 3 arranged on this filling layer 2, and a wear layer 4 arranged on this second metal layer 3. This wear layer 4 is produced from the materials (plastic) generally used in rail vehicle construction. The elements of this floor F are bonded solidly and undetachably to one another, for example by means of an adhesive bond, such that they form one panel. The filling layer 2 is produced from cork, or a cork mixture, the thickness of this filling layer 2 in particular determining the heat insulating and sound absorbing properties of the floor F.

Fig.2 shows by way of example and schematically a floor

according to the invention for rail vehicles, having a reinforcing profile. The floor F from Fig.1 is illustrated, the floor F being constructed according to the invention as a one-piece panel which essentially covers the entire interior floor of the rail vehicle. Furthermore, the floor F shown in Fig.2 has by way of example a reinforcing profile 5 which is provided centrally in the longitudinal direction of the floor and is arranged between the first metal layer 1 and the second metal layer 3 in a recess in the filling layer 2. In Fig. 2, the reinforcing profile 5 is not illustrated visibly because it is hidden by the wear layer 4 and the second metal layer 3.

Fig.3 shows by way of example and schematically a sectional view of a floor according to the invention for rail vehicles, having a reinforcing profile. The floor F from Fig.2 is illustrated in a sectional view. The floor F has the same layer construction as in Fig.1, consisting of a first metal layer 1, a filling layer 2, a second metal layer 3, and a wear layer 4. A reinforcing profile 5 is arranged in a recess in the filling layer 3 between the first metal layer 1 and the second metal layer 3. A hollow profile constructed from three chambers is illustrated by way of example. This reinforcing profile 5 can moreover comprise anchoring means which for example enable the fitting of internal equipment (for example handrails) for the rail vehicle. To this end, parts of the reinforcing profile 5 would be implemented with reinforcement, with greater wall thicknesses, such that corresponding fastening means (threads) can be provided at this location.

Fig.4 shows by way of example and schematically the layer construction of a floor according to the invention for rail vehicles, having an edge profile. Illustrated is a section through a floor F having the layer construction as is shown in

Fig.1. At the edge of the floor F is arranged an edge profile 6 which encloses the layer construction first metal layer 1 - filling layer 2 - second metal layer 3. The wear layer 4 is retracted in the region of the edge profile 6 and does not extend right to the edge of the floor F. The edge profile 6 has a flange 7 which is arranged on the side of the wear layer 4 and extends in the direction of the passenger space. This flange 7 serves to prevent the ingress of moisture into the structural space beneath the floor F. This edge profile 6 can be designed to encompass the perimeter of the entire floor F, it being possible to use differently shaped edge profiles 6 at different contour lines of the floor F, for example profiles having a differently shaped flange 7. The edge profile 6 is bonded to the layer construction of the floor F in a suitable manner, generally by means of an adhesive bond.

Fig.5 shows by way of example and schematically the installation of a floor according to the invention in a rail vehicle. A rail vehicle - illustrated is a section across the longitudinal axis - comprises a wheelset, an undercarriage having two longitudinal support members lying outside and two side walls, and is equipped with a floor F. The floor F is mounted on the structural floor of the rail vehicle by means of a plurality of bearing strips 8, a further fastening facility such as for example screw connections is not necessary because the floor F is optimally matched to the available structural space on account of the exactly implemented outline and thus cannot be displaced.

List of reference characters

- F Floor
- 1 First metal layer
- 2 Filling layer
- 3 Second metal layer
- 4 Wear layer
- 5 Reinforcing profile
- 6 Edge profile
- 7 Flange
- 8 Bearing strip

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1. A floor for a rail vehicle, comprising:

a four-layer structure comprising a first metal layer, a filling layer, a second metal layer and a wear layer, which are bonded undetachably to one another,

5 wherein the floor is produced in a single piece and covers the entire floor of the passenger space of a rail vehicle and the filling layer is produced from a composite material with a cork content,

10 wherein an edge profile is provided which encompasses the floor on all sides and is bonded undetachably to the floor, and

wherein the edge profile has a flange oriented in the direction of the passenger space.

2. The floor for a rail vehicle as claimed in claim 1,
15 wherein the first metal layer and the second metal layer are produced from an aluminum alloy.

3. The floor for a rail vehicle as claimed in claim 1, wherein the wear layer is produced from a plastic material.

4. The floor for a rail vehicle as claimed in claim 1,
20 wherein the wear layer is produced from a rubber material.

5. The floor for a rail vehicle as claimed in claim 1, wherein the wear layer is produced from a carpet material.

6. The floor for a rail vehicle as claimed in claim 1, wherein at least one reinforcing profile is provided which is

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arranged between the first metal layer and the second metal layer in a recess in the filling layer.

7. The floor for a rail vehicle as claimed in claim 1, wherein the reinforcing profile comprises fastening device for
5 mounting internal equipment for the rail vehicle.

8. The floor for a rail vehicle as claimed in claim 1, wherein the fastening device for mounting internal equipment for the rail vehicle is a thread.

FIG 1

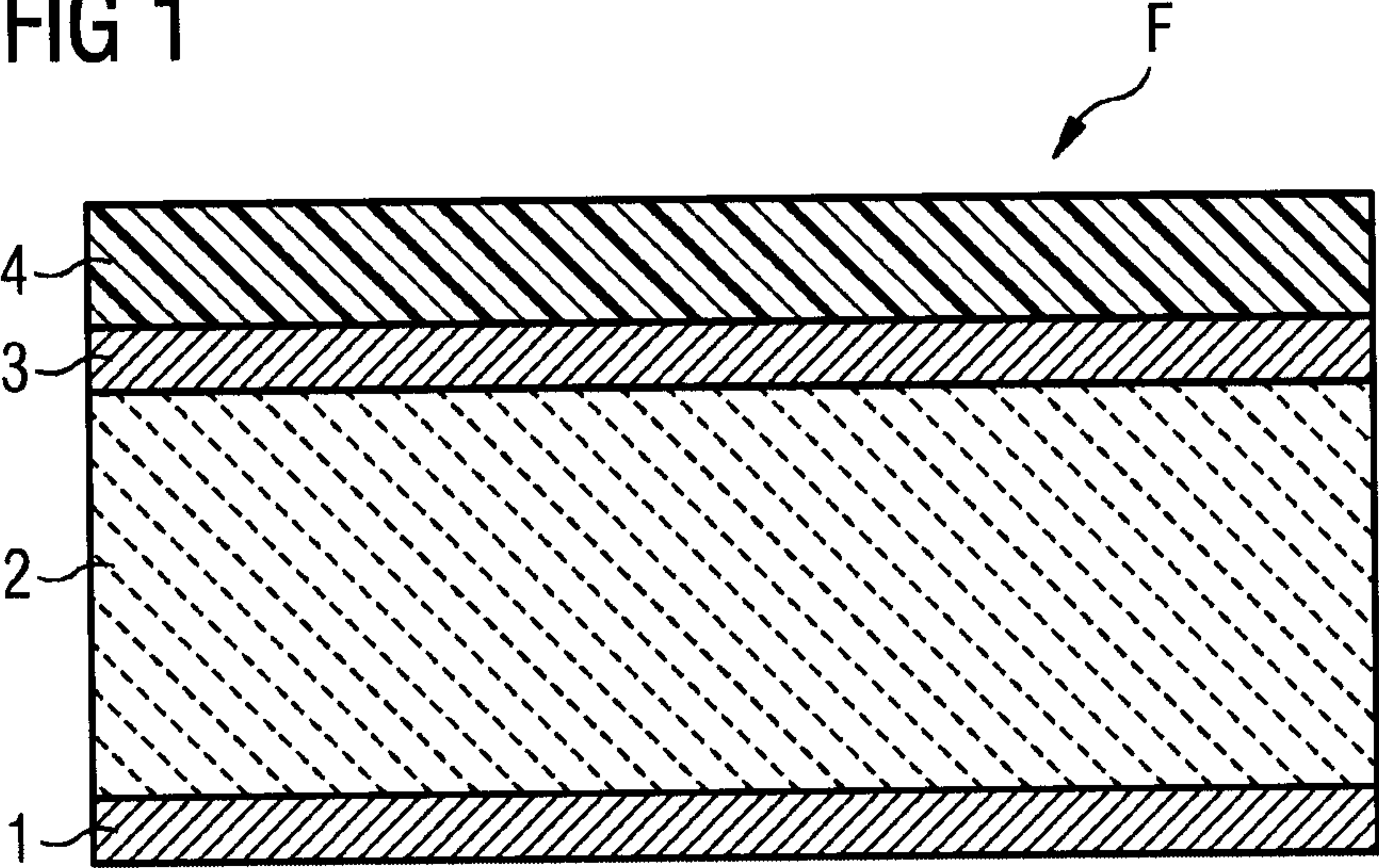


FIG 2

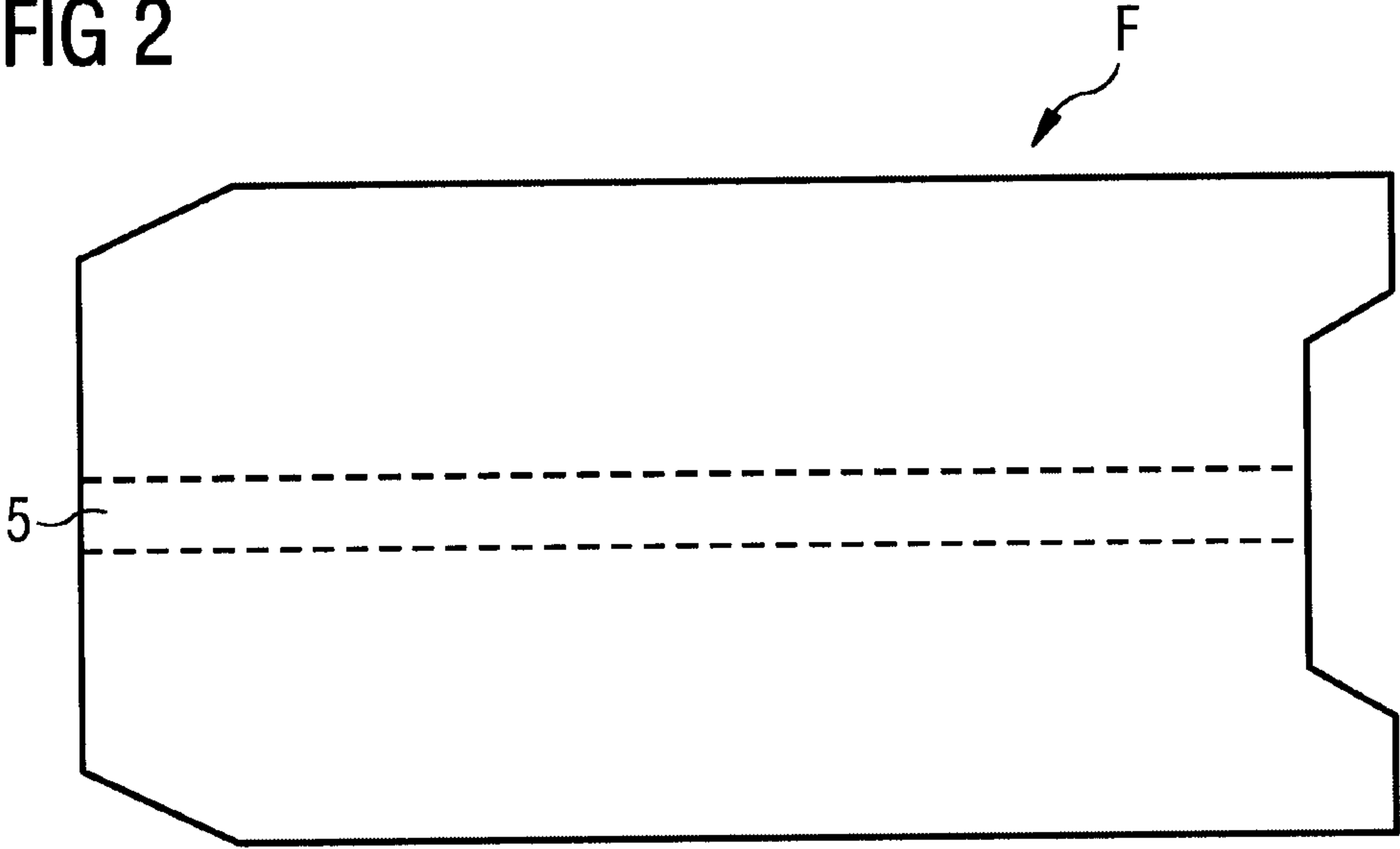


FIG 3

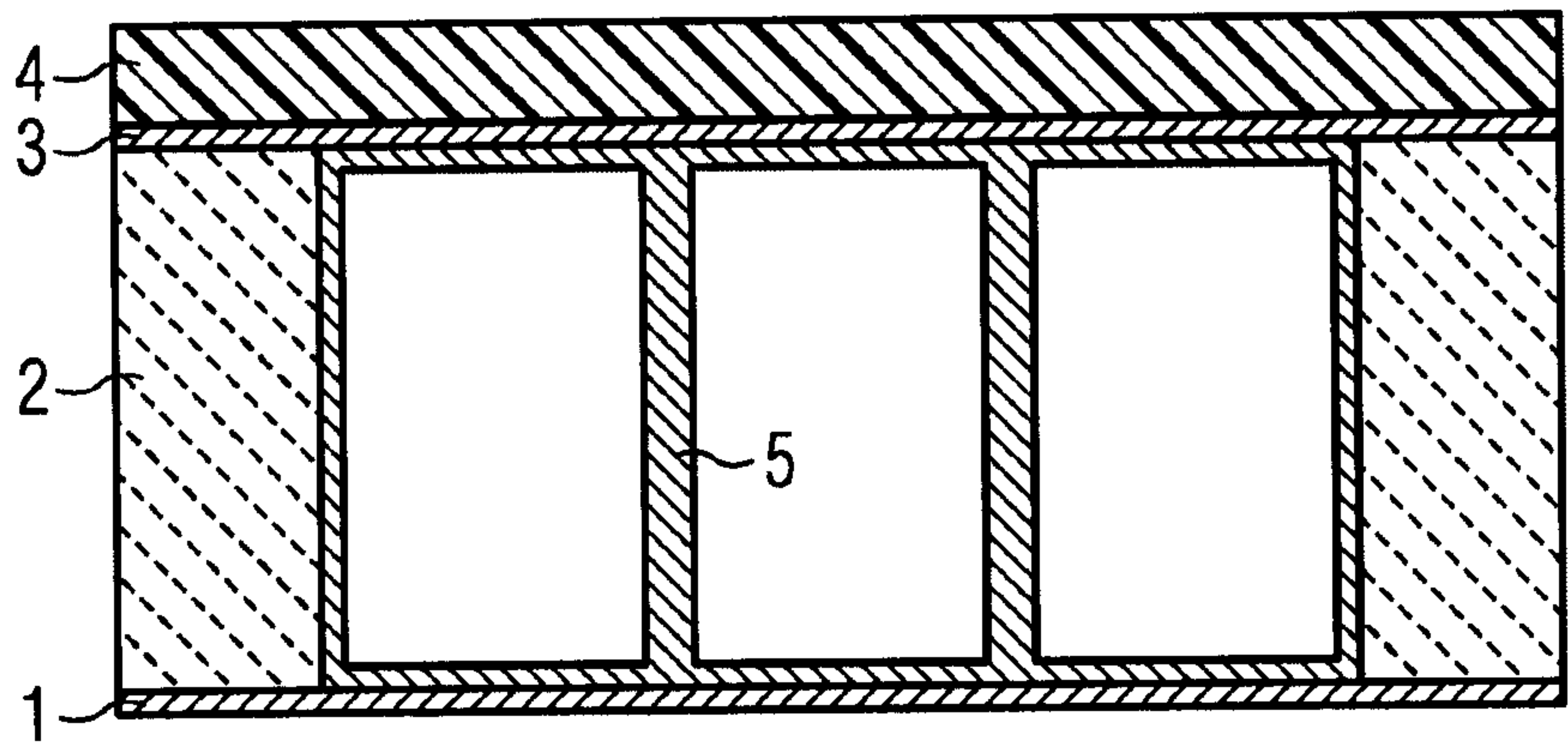


FIG 4

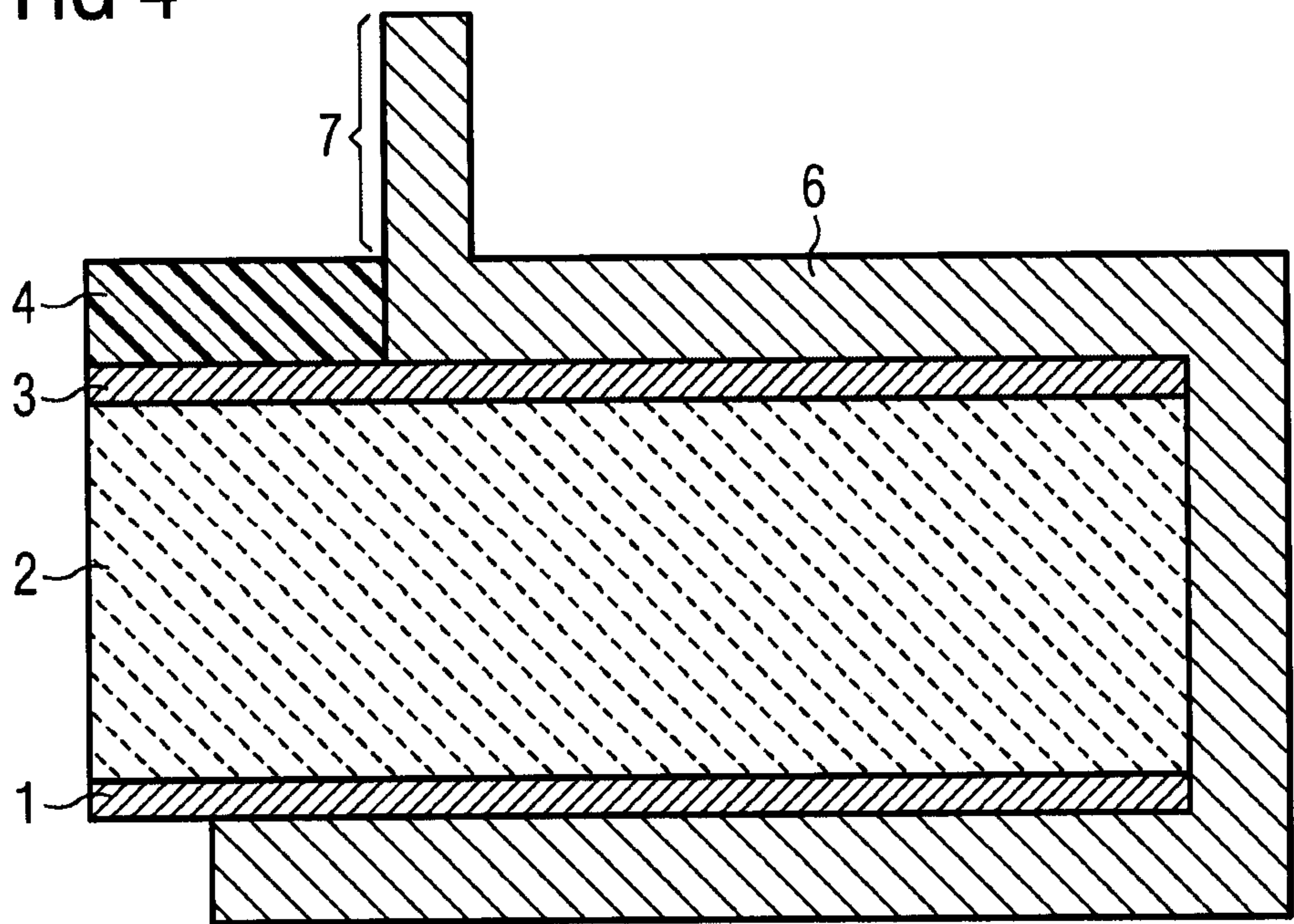


FIG 5

