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(54) **A CONSTRUCTION BOX FOR ENCASING A FUNCTIONAL ENTITY**

(57) The present invention is directed to a construction box comprising an elongated casing (1) defining an inner space wherein a suspension system for a functional entity (2) is mounted, and an insert (4,5,6) located at the

casing's inward facing side, said insert (4,5,6) comprising a thermally insulating body portion (4). The insert (4,5,6) further comprises a reinforcing skin layer (5) attached to the thermally insulating body portion (4).

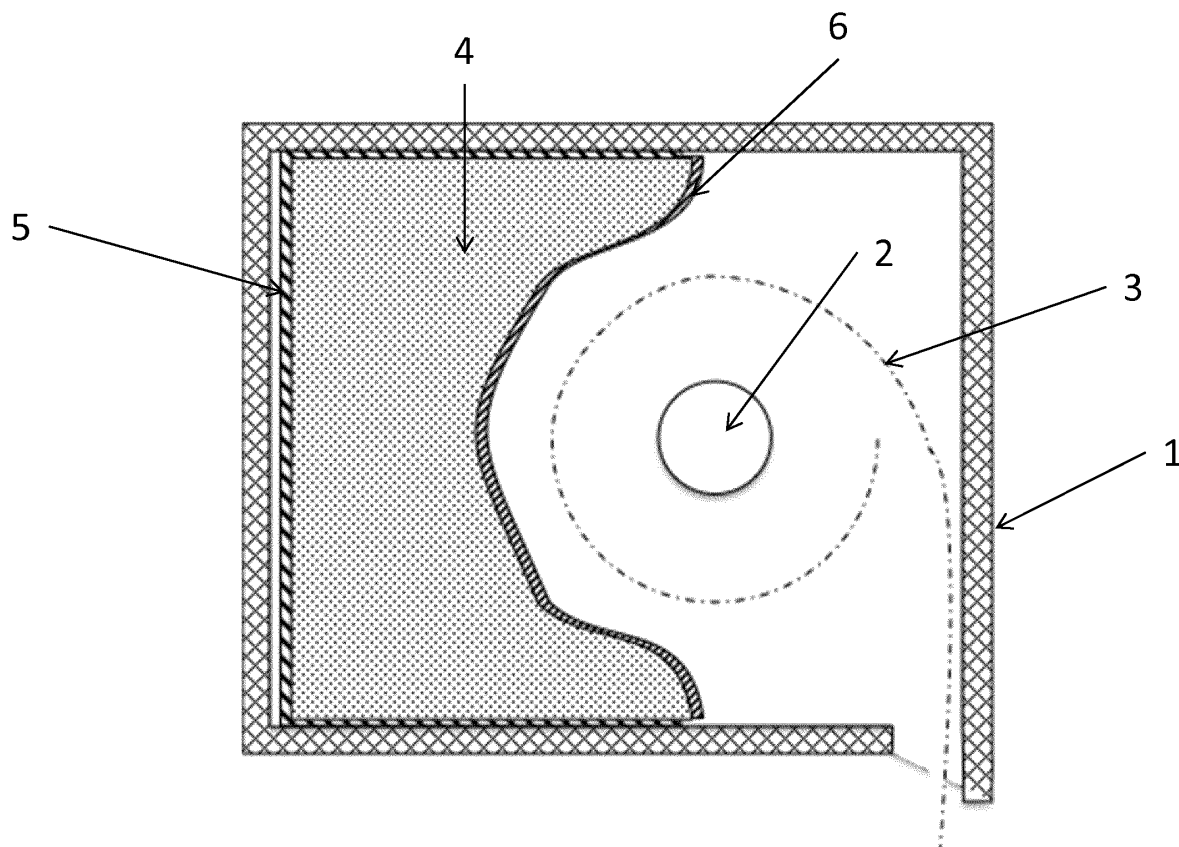


FIG 1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a construction box comprising an elongated casing defining an inner space wherein a suspension system for a functional is mounted and an insert with a thermally insulating body portion.

[0002] Further, the present invention relates to a kit of parts for a construction box, comprising an elongated casing defining an inner space wherein a suspension system for a functional entity can be mounted, and insert with a thermally insulating body portion.

BACKGROUND OF THE INVENTION

[0003] Roller shutters have been known for many decades and have proven useful, in particular, for closing off windows. Roller shutters usually have a shaft onto which a curtain, which serves to close off and protecting the window opening, can be wound. The shaft is usually rotatably supported by a suitable suspension system (e.g. bearings) in a construction box i.e. a roller shutter box mounted above the window frame. Such casing typically is an assembly of extruded elongated plastic profiles.

[0004] Usually installers or manufacturers install the casing on top of a window frame, subsequently suspend the roller shutter shaft onto the suspension system and stuff the casing with thermal insulation profiles at the inward facing side of the casing.

[0005] A generally occurring problem is that, since the window frame is not directly fixed to a construction wall, the window frame is insufficiently reinforced to withstand the static load of its own weight, combined with the static load of the suspension and the roller shutter box. To overcome this problem, the roller shutter box, that serves as an intermediate between window and wall, compensates the lack of rigidity. Moreover in most cases, the window frame is insufficiently reinforced to withstand the dynamic load of a wind pressure. Hence the roller shutter box casing should have sufficient flexural strength to withstand side forces acting on the window and the roller shutter box due to wind load or pressure differences between inside and outside.

[0006] In an attempt to provide more rigidity to the casing, FR2724409 (A1) describes a roller shutter box defined by a casing made from elongate profiled components clipped together. A reinforcing metal profile (42) is mounted underneath the roller shutter shaft for providing more inertia and stability to the casing.

[0007] Another example is BE901246 (A1) describing a roller shutter box assembled from a group of complementary modular extruded tubular profiles which can be locally reinforced or capped with sheets or profiles of e.g. aluminum or steel.

[0008] However, a drawback of the above solutions is that additional reinforcing, preferably metal, profiles have

to be mounted in the casing in order to reach the rigidity required, and that this requires the casing profiles to have a dedicated design in order to be able to fix the reinforcing profiles in the casing and keep it in place, which increases the complexity of extrusion and manufacturing cost of the casing profiles.

[0009] Another known problem of roller shutter boxes is that, since a roller shutter box makes a connection between the inside and the outside of the window and therefore inevitably constitutes a cold bridge which can be only minimized by providing sufficient and well-positioned insulation within the casing, the thermal insulation has to fit everywhere along the casing and kept in the correct position over time. Therefore, fixing, clamping, or supporting means for keeping the thermal insulation in place have to be provided upon installing and have to be mounted in the casing, such resulting in increased installation cost and complexity of installing. Alternatively, such fixing, clamping, or supporting means have to be integrated in the extruded casing profiles which obviously increases the complexity of extrusion and manufacturing cost of the casing profiles.

[0010] Considering the above, the present invention aims to provide a roller shutter box combining the advantages of sufficient rigidity, sufficient thermal insulation values, uncomplicated installation, and low manufacturing cost.

[0011] More specifically, it is an object of the present invention to provide a roller shutter box having sufficient rigidity, in particular for not bending at its endings, for withstanding the static load of the roller shutter box, combined with the static load of the suspension and the window frame, and for withstanding side forces such as wind load.

[0012] Further, another specific object of the present invention is to provide a roller shutter box wherein the thermal insulation profiles serve as a reinforcement and can be kept in correct position over time without using extra fixing means to be provided at the construction site, nor providing complex or high cost casing profiles.

[0013] In addition, the present invention aims to provide a roller shutter box having sufficient acoustic damping, not only of noises when (un)winding the roller shutter, but also noises entering the casing from outside.

SUMMARY OF THE INVENTION

[0014] The present invention is directed to a construction box comprising:

- an elongated casing defining an inner space wherein a suspension system for a functional entity is mounted, and
- an insert located at the casing's inward facing side, said insert comprising a thermally insulating body portion

characterized in that the insert further comprises a rein-

forcing skin layer attached to the thermally insulating body portion.

[0015] In addition the present invention is also directed to a kit of parts for a construction box, comprising:

- an elongated casing defining an inner space wherein a suspension system for a functional entity can be mounted, and
- an insert for being positioned at the casing's inward facing side, said insert comprising a thermally insulating body portion,

and a reinforcing skin layer for being attached to the thermally insulating body portion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

FIG 1 illustrates a preferred embodiment in accordance with the present invention.

FIG 2 schematically illustrates the forces acting on the construction box.

DESCRIPTION OF THE INVENTION

[0017] In a preferred embodiment in accordance with the present invention, a construction box, in this case a roller shutter box is provided comprising:

- an elongated casing defining an inner space wherein a suspension system for a functional entity, in this case a roller shutter shaft is mounted, and
- an insert located at the casing's inward facing side, said insert comprising a thermally insulating body portion

characterized in that the insert further comprises a reinforcing skin layer attached to the thermally insulating body portion

[0018] In the context of the present invention, the thermally insulating body portion is typically one piece of thermally insulating material, preferably made corresponding to the length of the casing, or alternatively cut off from commercially available profiles with standard lengths.

[0019] By attaching a reinforcing skin layer to the thermally insulating body portion, the thermally insulating body portion gets more rigidity such that it suffers less from any kind of deformation or damaging upon installing and optimally fits everywhere along the casing.

[0020] In addition, the reinforcing skin layer provides increased rigidity not only to the thermal insulating body portion, but much more important to the casing. In other words, by attaching a reinforcing skin layer to the thermally insulating body portion, the insert itself becomes a reinforcing profile giving sufficient rigidity to the roller shutter box such that bending may be avoided and that it may better withstand the static load of the roller shutter

box, combined with the static load of the suspension and the window frame, and for withstanding side forces such as wind load.

[0021] In an embodiment of the present invention, the insert preferably has a flexural modulus of at least 0.63 GNmm² thereby reinforcing the construction box in its capacity to withstand forces, due to gravity as schematically illustrated in figure 2.

[0022] In an embodiment of the present invention, the insert preferably has a flexural modulus of at least 2.16 GNmm² thereby reinforcing the construction box in its capacity to withstand wind forces applied to one side of the construction box as schematically illustrated in figure 2.

[0023] In an embodiment of the present invention, the reinforcing skin layer may be attached to the thermally insulating body portion at least at the body portion's side facing away from the suspension system for the functional entity. At the body portion's side facing away from the suspension system the reinforcing layer is in vertical position. This vertical position is preferred over a horizontal position and results therein that the insert, and so the functional entity, may be capable of resisting higher static loads on its endings than in the case where the reinforcing layer would be attached only at the bottom or top side of the thermal insulating body portion and thus being positioned horizontally, moreover such positioning of the reinforcing layer in a vertical position at one (vertical) side of the construction box also increases the capacity of the construction box to withstand side forces due to eg. wind load.

[0024] According to a preferred embodiment, two reinforcing skin layers are provided on the thermally insulating body portion, one at the body portion's side facing away from the functional entity and one at the body portion's opposed side facing the functional entity, such that the thermally insulating body portion is sandwiched between the two reinforcing skin layers. In the case the thermally insulating body portion is curved at one of its sides whereon a reinforcing skin layer is provided, the concerned reinforcing skin layer is preferably profiled such as to follow the curvature of the thermally insulating body portion.

[0025] According to another embodiment, the reinforcing skin layer may be attached to the thermally insulating body portion at the body portion's side facing away from the functional entity and either at its top side, or at its bottom side. Even more preferred, the reinforcing skin layer may be attached to the thermally insulating body portion at the body portion's side facing away from the functional entity and at both its top and bottom side.

[0026] In accordance with the present invention, the reinforcing skin layer may be attached to the thermally insulating body portion by any suitable means such as for example glue, screws or by snap fittings, or by being clamped onto the thermally insulating body portion.

[0027] In an embodiment in accordance with the present invention, a construction box may be provided

wherein the insert is fixed in the casing at the casing's inward facing side by means of any suitable means. Obviously, these means may be selected based (i) on having the possibility to remove and replace the insert in case the suspension system has to be reached for maintenance or repair, and (ii) on not penetrating the casing.

[0028] In a preferred embodiment in accordance with the present invention, a construction box may be provided wherein the insert's shape corresponds to at least part of the inner space at the casing's inward facing side, such that it is clamped in the inner space. The dimensions of the insert could be chosen such that it fits tightly in the casing with only very restricted possibilities for varying the position.

[0029] The advantage of the above preferred embodiment is that thermal insulating inserts can be kept in correct position over time without using extra fixing means to be provided at the construction site, nor providing complex or high cost casing profiles onto which provisions for clamping the insert have to be present. It is therefore clear that the present invention allows providing a construction box combining the advantages of sufficient rigidity, sufficient thermal insulation values, uncomplicated installation, and low manufacturing cost.

[0030] In a particular embodiment, the dimensions of the thermal insulating body portion and the reinforcing skin layer may be chosen such that body portion is tightly clamped within the reinforcing skin layer, and that the resulting insert is tightly clamped in the casing.

[0031] In the context of the present invention, the reinforcing skin layer may be made of any material suitable for attaching to the thermal insulating body portion, acting as reinforcing layer, and preferably having a Young's Modulus of at least 35.000N/mm². Particular examples are steel, stainless steel, aluminum or fiber reinforced plastics.

[0032] In the context of the present invention, the thermally insulating body portion may be made of any thermal insulating material suitable for being shaped in a profiled body portion and for being attached to, and preferably clamped into a reinforcing skin layer. Examples are polystyrene based foams, polyurethane based or urea based foams.

[0033] In an embodiment in accordance with the present invention, a construction box may be provided wherein the insert additionally comprises an acoustically insulating material layer. As such, the present invention aims to provide a construction box having sufficient acoustic damping, not only of noises when the functional entity is put on or moving, but also noises entering the casing from outside.

[0034] In the context of the present invention, the acoustically insulating layer may be made of any material suitable for attaching to the thermal insulating body portion, acting as acoustic layer, and having sufficient acoustic damping characteristics. Particular examples are polymer foam composites such polyurethane foam, bitumen, or (perforated) metals, or layers of different mate-

rials.

[0035] According to an alternative embodiment, the reinforcing skin layer comprises clamping means enabling attaching the insert to opposed side walls of the construction box, in which case, the insert can be made unified with one of the side walls and can replace one of the side walls of the construction box as illustrated in figure 4.

[0036] In addition, the present invention provides a kit of parts for a construction box, comprising:

- an elongated casing defining an inner space wherein a suspension system for a functional entity can be mounted,
- an insert for being positioned at the casing's inward facing side, said insert comprising a thermally insulating body portion, and
- a reinforcing skin layer for being attached to the thermally insulating body portion.

[0037] In an embodiment of a kit of parts in accordance with the present invention, the reinforcing skin layer may be attached to the thermally insulating body portion, such that the installer can directly install the insert without having to assemble it himself.

[0038] The kit of parts may further comprising means for attaching the reinforcing skin layer to the thermally insulating body portion and/or means for fixing the insert into the casing. Preferably, as discussed earlier, the dimensions of the thermal insulating body portion and the reinforcing skin layer may be chosen such that body portion can be tightly clamped within the reinforcing skin layer, and that the resulting insert can be tightly clamped in the casing.

[0039] Further, a kit of parts in accordance with the present invention may further comprise a functional entity and its suspension system for being installing in the casing.

[0040] Preferably and as illustrated in FIG 1, the construction box is a roller shutter box comprising a suspension system for a roller shutter shaft allowing mounting a roller shutter as functional entity in the construction box. The acoustically insulating material layer (6) is attached to the side of the thermal insulating body portion (4) facing the roller shutter (3). As such, the roller shutter box comprises a casing (1) with a suspension system (not shown) for a roller shutter shaft (2) and an insert (4,5,6) being positioned at the casing's inward facing side, the insert comprising a thermal insulating body portion (4) enclosed in a reinforcing skin layer (5) at three sides and an acoustically insulating material layer (6) at the fourth side facing the roller shutter (3).

[0041] It is clear the construction box is not limited to a roller shutter box but can be any type of construction box, in particular construction boxes to be installed in a wall and carrying a functional entity. Examples of such construction boxes include boxes encasing an air-conditioning unit or boxes encasing lighting as shown in figure 2 comprising a lamp socket 7 as suspension system

for a lamp as functional entity and in this case also comprising a reflector 8. Other examples of construction boxes include boxes encasing shading curtains, cable guides, etc.

Claims

1. A construction box comprising:

- an elongated casing defining an inner space wherein a suspension system for a functional entity is mounted, and
- an insert located at the casing's inward facing side, said insert comprising a thermally insulating body portion

characterized in that the insert further comprises a reinforcing skin layer attached to the thermally insulating body portion.

2. A construction box according to claim 1, wherein the insert has a flexural Modulus $E \cdot I_x$ of at least 0.63 Gnm^2 and a flexural modulus $E \cdot I_y$ of at least 4.83 Gnm^2 .

3. A construction box according to any of claims 1 or 2, wherein the reinforcing skin layer is attached to the thermally insulating body portion at least at the body portion's side facing away from the functional entity.

4. A construction box according to any of the preceding claims, wherein two reinforcing skin layers are attached to the thermally insulating body portion, one at the body portion's side facing away from the functional entity and at the opposed side of the thermally insulating body portion.

5. A construction box according to any of the preceding claims, wherein the reinforcing skin layer is attached to the thermally insulating body portion by means of glue, or by a snap fitting, or by being clamped within the skin layer.

6. A construction box according to any of the above claims wherein the insert's shape corresponds to at least part of the inner space at the casing's inward facing side, such that it is clamped in the inner space.

7. A construction box according to any of the above claims, wherein the reinforcing skin layer is made of inox, steel, aluminum or fiber reinforced plastics.

8. A construction box according to any of the above claims, wherein the thermally insulating body portion is made of foamed material.

9. A construction box according to any of the above

claims, wherein the insert additionally comprises an acoustically insulating material layer.

10. A construction box according to claim 10, wherein the acoustically insulating material layer is facing the roller shutter.

11. A construction box according to any of the preceding claims, wherein said box is a roller shutter box and the functional entity is a roller shutter.

12. A kit of parts for a construction box, comprising:

- an elongated casing defining an inner space wherein a suspension system for a functional entity can be mounted,
- an insert for being positioned at the casing's inward facing side, said insert comprising a thermally insulating body portion, and
- and a reinforcing skin layer for being attached to the thermally insulating body portion.

13. A kit of parts for a construction box according to claim 13, wherein the reinforcing skin layer is attached to the thermally insulating body portion.

14. A kit of parts for a construction box according to claims 13 or 14, the construction box being a roller shutter box and comprising a roller shutter and its suspension system for being installing in the casing.

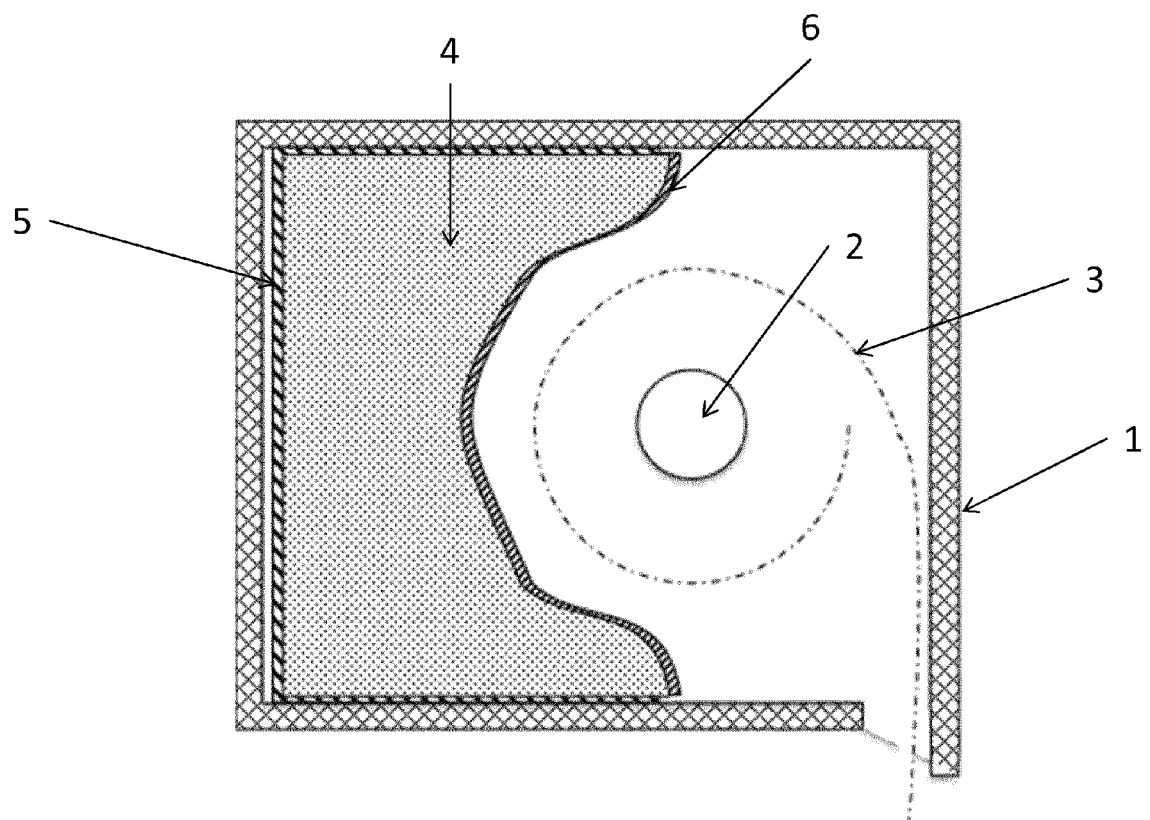


FIG 1

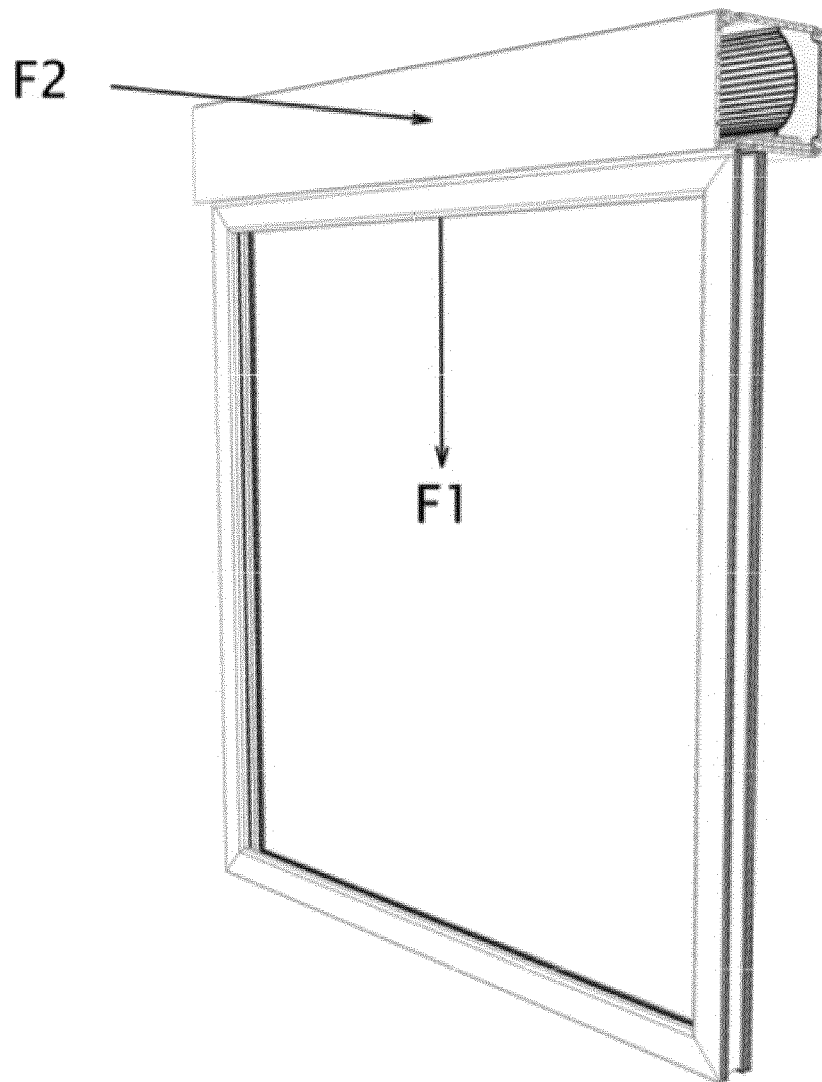


FIG 2



EUROPEAN SEARCH REPORT

Application Number
EP 15 16 1998

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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 20 2010 011055 U1 (SELIT DAEMMTECHNIK GMBH [DE]) 30 December 2010 (2010-12-30) * paragraphs [0012], [0015], [0016], [0022], [0024], [0025] * * claims 1,2,6,8 * * figure 1 *	1-14	INV. E06B9/17
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			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 30 September 2015	Examiner Tänzler, Ansgar
CATEGORY OF CITED DOCUMENTS 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 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 & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

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

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30-09-2015

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EPO FORM P0459

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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