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(71) Applicant: **Maene Nv**
8200 Brugge (BE)

(72) Inventors:
- **Maene, Geert**
  8200, Brugge (BE)
- **Merlin, Dimitri**
  8200, Brugge (BE)

(74) Representative: **BiiP cvba**
Culliganlaan 1B
1831 Diegem (Bruxelles) (BE)

(54) **A device for holding a rigid sheet**

(57) The present invention relates to a device for holding a rigid sheet comprising: a U-profile having a base part to be fixed to a wall or floor; a carrier rail inside the U-profile for holding the rigid sheet, said carrier rail supported by the U-profile; a means for adapting the carrier rail's position with respect to the U-profile; characterized in that the means for adapting the carrier rail's position is fixed on the base part of the U-profile and holds the carrier rail. Further, the present invention relates to the use of such device for constructing balustrades, railings, parapets, safety rails, banisters, stairs, head posts, or balconies.

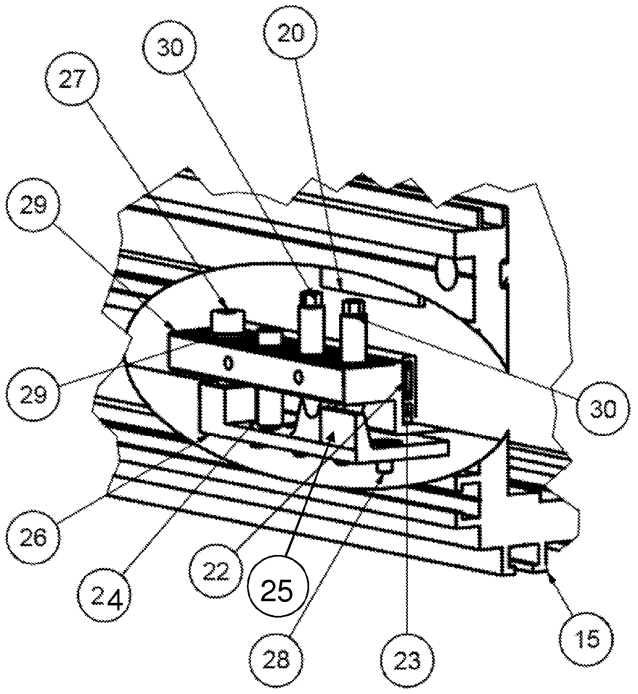

FIG 5

EP 2 479 357 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a device for holding a rigid sheet, in particular for holding a glass pane. Further, the present invention relates to the use of such device for constructing balustrades, railings, parapets, safety rails, banisters, stairs, head posts, or balconies.

BACKGROUND OF THE INVENTION

[0002] Devices for holding a rigid sheet are used in a number of applications. A first example is in balustrade and railing equipment where such device holds a rigid sheet made of glass, plastics, steel, stone etc. in vertical position forming a balustrade to prevent people falling off terraces or stairs.

[0003] A second application is in decoration or storing equipment where the device holds a rigid sheet made of glass, plastics, steel, stone etc. in horizontal position forming a tablet or a table without legs for showing decorative articles or storing goods.

[0004] A general problem with those devices is that it is very difficult to keep the rigid sheet in desired position during mounting. For example, a table as describe above should by held substantially horizontal while mounting in order to get it fixed in that position. It is obvious that it is not easy to keep for example a heavy stone tablet in horizontal position while mounting. The same applies in case of a balustrade where mostly big size panels have to be kept substantially vertical while mounting.

[0005] Moreover, since adjacent rigid sheets can suffer from different planarity, as is often the case with hardened glass panels, it is important to have the ability to align an installed rigid sheet with adjacent ones.

[0006] There have been many attempts to solve the above problem. For example, DE 103 38 816 describes a balustrade wherein the panes of glass are inserted in a carrier rail and secured therein by means of an adhesive and spacers. The carrier rail is held by a U-shaped hook formed at the outside of the carrier rail hooking onto a first projection provided on a supporting profile fixed to the wall or floor, and by a set screw mechanism fixed to a second projection also provided on the supporting profile. After hooking the carrier rail carrying the glass panes onto the first projection such that it hinges, the set screws can be turned thereby adjusting inclination of the carrier rail with respect to the supporting profile.

[0007] A first problem with the above device is that, since the projections allowing the inclination adjustment are provided at the outside of the supporting profile and since not only vertical forces due to the weight of the balustrade load but also horizontal forces due to wind expose the supporting profile to extreme load, the part of the supporting profile on which the projecting are provided has to be strengthened either by using a triangular profile, either by fixing it directly in the wall or the floor. Obviously, the manufacturing cost of such triangular profile with projections is high due to its design.

[0008] Additionally, but not less important in balustrade design, such triangular profile is also esthetically less attractive.

[0009] Another problem with the above device is that the set screws can not easily be reached since they are provided underneath and outside the balustrade, forcing technical people in dangerous situations upon installing and adjusting the inclination between the carrier rail and the supporting profile.

[0010] Still another problem of the above device is that, since the glass panes are secured by adhesives, these adhesives have to be cut or grinded to replace damaged panes, which makes reparation of the balustrade a difficult, time consuming and labor-intensive to job.

[0011] Further, projections as used in the above device are very sensitive to corrosion increasing the risk of causing dangerous situations or even accidents, especially under continuous wind load.

[0012] Another example of a prior art device is described in EP 1 647 663 wherein a U-profile is used for holding a tablet. A system for adapting the inclination of the tablet with respect to the U-profile is provided comprising a set screw for regulation after mounting the tablet.

[0013] An important problem with this device is that the side parts of the U-profile needs to be completely hidden in and supported by the wall in order to withstand the vertical forces on the system for adapting the inclination, in particular upon using it for storing heavy-weight articles. If the side parts of the U-profile would not be strengthened and supported by the wall, the U-profile would unfold and release the tablet. Obviously, although this device is esthetically beneficial, preparing a recess in the wall along the length of the table is a difficult, time consuming and labor-intensive job.

[0014] Considering the drawbacks of the above devices, it is an object of the present invention to provide a device for holding a rigid sheet, wherein the risk of unfolding the supporting profile is decreased, even upon exposing the device to extreme horizontal forces from wind load in case of balustrades or exposing to extreme vertical forces from storing heavy-weight articles.

[0015] It is another object of the present invention to provide a device for holding a rigid sheet wherein supporting profiles with lower manufacturing costs can be used, while keeping sufficient resistance against extreme load on the rigid sheet and while still providing means for adjusting the inclination and/or the height of the rigid sheet with respect to the supporting profile after mounting the rigid sheet.

[0016] It is also an object of the present invention to provide a device for holding a rigid sheet wherein the height regulation and the inclination regulation of the rigid sheet with respect to the supporting profile are cooperating in such a way that the contribution of the inclination

regulation to the height regulation can be estimated and compensated, resulting in less time consuming and easier regulation.

[0017] Further, it is an object of the present invention to provide a device for holding a rigid sheet wherein the inclination and/or height of the rigid sheet can be adapted without forcing technical people into dangerous positions.

[0018] Another object of the present is to provide a device for holding a rigid sheet wherein replacing damaged balustrade panes is less time consuming and less labor-intensive.

[0019] Still another object of the present invention is to provide a device for holding a rigid sheet which is less sensitive to corrosion resulting in decreased risk of causing dangerous situations or accidents.

[0020] The present invention meets the above objects by providing a device for holding a rigid sheet comprising a means for adapting the carrier rail's position, said means being fixed on the base part of an U-profile and holding the carrier rail.

SUMMARY OF THE INVENTION

[0021] The present invention is directed to a device for holding a rigid sheet comprising:

- a U-profile having a base part to be fixed to a wall or floor
- a carrier rail inside the U-profile for holding the rigid sheet, said carrier rail supported by the U-profile;
- a means for adapting the carrier rail's position with respect to the U-profile;

characterized in that the means for adapting the carrier rail's position is fixed on the base part of the U-profile and holds the carrier rail.

[0022] Further, the present invention is directed to the use of such device for constructing balustrades, railings, parapets, safety rails, banisters, stairs, head posts, or balconies

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

FIG 1 is a cross-section of a device for holding a rigid sheet in accordance with the present invention having a height regulator.

FIG 2 is a cross-section of an embodiment of a device for holding a rigid sheet in accordance with the present invention having a tilting regulator

FIG 3 is a cross-section of another embodiment of a device for holding a rigid sheet in accordance with the present invention having a tilting regulator.

FIG 4 illustrates a regulator plate as used in a preferred embodiment of a device for holding a rigid sheet according to the present invention.

FIG 5 illustrates a carrier rail and a means for amending the carrier rail's position as used in a preferred embodiment of a device for holding a rigid sheet according to the present invention.

DESCRIPTION OF THE INVENTION

[0024] In the context of the present invention, a rigid sheet as understood as a panel, a pane, a board, a plate, a tablet, and the like, made of a rigid material such as metal, stone, glass, or plastics. In particular, the rigid sheet may be a pane of glass.

[0025] According to a first embodiment of the present invention, a device for holding a rigid sheet is provided comprising:

- a U-profile (15) having a base part to be fixed to a wall or floor
- a carrier rail (29) inside the U-profile for holding the rigid sheet (1), said carrier rail supported by the U-profile;
- a means for adapting the carrier rail's position (24, 26, 27, 28, 30) with respect to the U-profile;

characterized in that the means for adapting the carrier rail's position is fixed on the base part of the U-profile and holds the carrier rail.

[0026] Because the means for adapting the carrier rail's position is fixed on the base part of the U-profile and holds the carrier rail, the risk of unfolding the U-profile may be decreased, even upon exposing the device to extreme horizontal forces from wind load in case of balustrades or exposing to extreme vertical forces from storing heavy-weight articles. Forces working on the rigid sheet are conducted via the carrier rail and the means for adapting the carrier rail's position to the base part of the U-profile. By doing so, the side parts of the U-profile, being weaker than the base part, are not loaded by these forces.

[0027] Another advantage is that, because the carrier rail is supported inside the U-profile by the means for adapting the carrier rail's position fixed on the base part of the U-profile, straightforward supporting profiles, i.e. U-profiles, with lower manufacturing costs may be used, while keeping sufficient resistance against extreme load on the rigid sheet.

[0028] Still another advantage of the fact that the carrier rail is supported inside the U-profile on the latter's base part, is that projections at the outside are not required, making the profile less sensitive to corrosion and resulting in decreased risk of causing dangerous situations or accidents.

[0029] In an embodiment in accordance with the present invention, a device for holding a rigid sheet is

provided, wherein the means for adapting the carrier rail's position may comprise a height regulator for lifting the rigid sheet with respect to the U-profile.

[0030] The advantage of having such height regulator is that the carrier rail holding the rigid sheet can be first fixed inside the U-profile substantially at the required position, followed by fine-tuning the carrier rail's height with respect to the U-profile by manipulating the height regulator. This makes installation of the rigid sheet and fine-tuning of its position less time consuming and less labor-intensive.

[0031] In accordance with the present invention and as illustrated in FIG 1, such height regulator may comprise a regulator plate (26) fixed to the base part of the U-profile and a lifting set screw (24) engaging on the regulator plate for lifting the carrier rail (29) and the rigid sheet (1) with respect to the U-profile (15).

[0032] The advantage of using a height set screw engaging on a regulator plate that is fixed on the base part of the U-profile is that the set screw is positioned inside the U-profile and therefore can be easily reached such that the height of the rigid sheet can be adapted without forcing technical people into dangerous positions.

[0033] Another advantage is that the regulator plate where the set screw is engaging on, is supported by the base part of the U-profile, making the height regulator sufficiently robust.

[0034] Further, by using a regulator plate and a set screw, the rigid sheet's position may be regulated steplessly variable, such that its height can be perfectly aligned with adjacent rigid sheets.

[0035] In an embodiment in accordance with the present invention, a device for holding a rigid sheet is provided, wherein the means for adapting the carrier rail's position may comprise a tilting regulator for tilting the rigid sheet with respect to the U-profile perpendicular to the plane of the rigid sheet.

[0036] The advantage of having such tilting regulator is that the carrier rail holding the rigid sheet can be first fixed inside the U-profile substantially at the required position, followed by fine-tuning the rigid sheet's inclination with respect to the U-profile by manipulating the tilting regulator.

[0037] In accordance with the present invention and as illustrated in FIG 2 and FIG 3, such tilting regulator may comprise a wedge (25) fixed on the regulator plate (26) or fixed to the base part of the U-profile and a tapered set screw (30) engaging on the wedge for tilting the rigid sheet with respect to the U-profile. If on the one hand the wedge is positioned such that its inclined side (i.e. the side where the tapered screw is engaging on) faces the plane of the rigid sheet (as is the case in FIG 2), the carrier rail will be pushed away from the wedge upon turning the tapered screw in its engaging direction. If, on the other hand, the wedge is positioned such that its inclined side (i.e. the side where the tapered screw is engaging on) faces the opposite of the plane of the rigid sheet (as is the case in FIG 3), the carrier rail will be pulled towards the wedge upon turning the tapered screw in its engaging direction. By pulling or pushing the carrier rail in a certain direction, the rigid sheet may tilt with respect to the U-profile.

[0038] In a particular embodiment in accordance with the present invention, the means for adapting the carrier rail's position may comprise a first tilting regulator and a second tilting regulator for tilting the rigid sheet with respect to the U-profile in respective opposite directions perpendicular to the plane of the rigid sheet.

[0039] In accordance with the present invention and as illustrated in FIG 4, the first tilting regulator and the second tilting regulator may comprise respectively a first and a second wedge (25) positioned such that its inclined sides are opposite to each other, and a respective first and second tapered set screw.

[0040] The advantage of a wedge fixed on the regulator plate or on the base part of the U-profile is that the tapered set screw is positioned inside the U-profile and therefore can be easily reached such that the inclination of the rigid sheet can be adapted without forcing technical people into dangerous positions.

[0041] Further, by using a wedge and a tapered set screw, the rigid sheet's position may be regulated steplessly variable, such that its inclination can be perfectly aligned with adjacent rigid sheets.

[0042] Another advantage is that the wedge is supported by the base part of the U-profile or by the regulator plate that on its turn is also fixed to the base part (e.g. by means of countersunk screws (28)), making the tilting regulator sufficiently robust.

[0043] Additionally, the means for adapting the carrier rail's position may comprise a locking screw (27) for locking the carrier rail's position after regulating it's position by the height regulator and/or the tilting regulator(s). Such locking screw may also engage on the regulator plate or on the base part of the U-profile.

[0044] Preferably, the height set screw and/or the tapered set screw(s) are positioned such that its axes are parallel to the plane of the rigid sheet, such that technical people installing the rigid sheet or the carrier rail holding the rigid sheet can easily manipulate these set screws.

[0045] Further, in case of balconies or stairs, the regulator plate, the height set screw, the wedge(s) and the tapered set screw(s) may be preferably positioned at the inside of the balcony or stairs, such that technical people can easily manipulate the set screws from the inside of the balustrade, additionally improving safety, obviously improving safety during installing and adapting the carrier rail's position.

[0046] In a particular embodiment in accordance with the present invention and as illustrated in FIG 5, a device for holding a rigid sheet is provided, wherein the means for adapting the carrier rail's position may comprise both a height regulator and a first and second tilting regulator. Preferably, the regulator plate (26) comprising two wedges (25) is mounted on the base part of the U-profile (15) inside the U-profile, and the height set screw (24) and

the tapered set screws (30) are positioned such that its axes are parallel to the plane of the rigid sheet and that all set screws engage in substantially the same direction on the regulator plate and on the wedges. Such device allows the height regulation and the inclination regulation of the rigid sheet with respect to the supporting profile being cooperative in such a way that the contribution of the inclination regulation to the height regulation can be estimated and compensated, resulting in less time consuming and easier regulation and less time consuming and easier replacement of rigid sheets.

[0047] In general, a device in accordance with the present invention allows technicians installing the U-profile to a wall or floor of a balcony or stairs while standing on the balcony floor or the stairs. Subsequently, the means for adapting the carrier rail's position, the carrier rail, and the rigid sheet, can be mounted in the U-profile, likewise standing on the balcony floor or the stairs. Finally, they can adapt the rigid sheet's position, likewise standing on the balcony floor.

[0048] The U-profile, the carrier rail and the means for holding the carrier rail's position may be made of any kind of material having suitable characteristics with respect to tensile strength, compressive strength, corrosion resistance, etc. as required by the application where the device is used.

[0049] The U-profile and the carrier rail may be for example made of structural steel (e.g. S235), preferably aluminum, and most preferably anodized or coated aluminum.

[0050] In a preferred embodiment according to the present invention, at least part of the means for adapting the carrier rail's position, preferably the regulator plate, the wedge(s) and the tapered set screw(s), may be made of high corrosion resistant stainless steel.

[0051] Such high corrosion resistant stainless steel may have a hardness of at least 32 Rockwell hardness (HRC), tensile strength of at least 1100 MPa, compressive strength of at least 900MPa, good weldability, and corrosion resistance superior to that of AISI 420 and WNr. 1.2083 stainless steel.

[0052] Preferably, such high corrosion resistant stainless steel may be Ramax® (as specified in http://www.bucorp.com/files/ramax.pdf), or Ramax® LH (as specified in http://www.bucorp.com/files/UDDEHOLM RAMAXLH.pdf), or most preferably Corrax® (as specified in http://www.bucorp.com/files/UDDEHOLM CORRAX.pdf).

[0053] In an embodiment in accordance with the present invention, the device for holding a rigid sheet may comprise a hinge system fixed to a side part of the U-profile for supporting the rigid sheet in a direction substantially perpendicular to the plane of the rigid sheet. Such hinge system may comprise two rubber or plastic elements (19, 31), e.g. gaskets, each at one side of the rigid sheet. At least one (19) of the plastic or rubber elements is pushed against the rigid sheet by a clamp (18, 20, 21) mounted on one of the side parts of the U-profile. By doing so, the plastic or rubber elements function as a hinge allowing tilting the rigid sheet, while supporting and more or less clamping the latter.

[0054] According to the present invention, the device for holding a rigid sheet may further comprise a bracket for fixing the U-profile to the wall or floor. The U-profile may be mounted, either by fixing its base part on the bracket, either by fixing one or both of its side parts on the bracket, or by a combination of both.

[0055] The carrier rail may have any length suitable for carrying the rigid sheet. Such device for holding a rigid sheet may comprise one or preferably several short carrier rails, each held by a separate means for amending that carrier rail's position with respect to the U-profile. FIG 5 shows such short carrier rail (29) held inside the U-profile by the regulator plate (26) comprising two wedges (25) and being mounted on the base part of the U-profile (15) inside the U-profile. The height set screw (24) and the tapered set screws (30) can be regulated before locking the carrier rail's position by the locking screw (27).

[0056] A device for holding a rigid sheet as described in the above embodiment may be used constructions, more particular constructing balustrades, railings, parapets, safety rails, banisters, stairs, head posts, or balconies.

Claims

1. A device for holding a rigid sheet comprising:

- a U-profile having a base part to be fixed to a wall or floor
- a carrier rail inside the U-profile for holding the rigid sheet, said carrier rail supported by the U-profile;
- a means for adapting the carrier rail's position with respect to the U-profile;

characterized in that the means for adapting the carrier rail's position is fixed on the base part of the U-profile and holds the carrier rail.

2. A device for holding a rigid sheet according to claim 1, wherein the means for adapting the carrier rail's position comprises a height regulator for lifting the rigid sheet with respect to the U-profile.

3. A device for holding a rigid sheet according to claim 2, wherein the height regulator comprises a regulator plate fixed to the base part of the U-profile and a lifting set screw engaging on the regulator plate for lifting the rigid sheet with respect to the U-profile.

4. A device for holding a rigid sheet according to claims 1 to 3, wherein the means for adapting the carrier rail's position comprises a tilting regulator for tilting the rigid sheet with respect to the U-profile perpen-

dicular to the plane of the rigid sheet.

5. A device for holding a rigid sheet according to claim 4, wherein the means for adapting the carrier rail's position comprises a first tilting regulator and an a second tilting regulator for tilting the rigid sheet with respect to the U-profile in respective opposite directions perpendicular to the plane of the rigid sheet.

6. A device for holding a rigid sheet according to claims 4 or 5, wherein such tilting regulator comprises a wedge fixed to the plate regulator and a tapered set screw engaging on the wedge for tilting the rigid sheet with respect to the U-profile.

7. A device for holding a rigid sheet according to any of the above claims, wherein at least part of the means for adapting the carrier rail's position is made of high corrosion resistant stainless steel.

8. A device for holding a rigid sheet according to claim 5, wherein the high corrosion resistant stainless steel is Corrax®.

9. A device for holding a rigid sheet according to any of the above claims, wherein a hinge system is fixed to a side part of the U-profile for supporting the rigid sheet in a direction substantially perpendicular to the plane of the rigid sheet.

10. A device for holding a rigid sheet according to any of the above claims, wherein the rigid sheet is a pane of glass.

11. A device for holding a rigid sheet according to any of the above claims, further comprising a bracket for fixing the U-profile to the wall or floor.

12. Use of a device according to any of the above claims for constructing balustrades, railings, parapets, safety rails, banisters, stairs, head posts, or balconies.

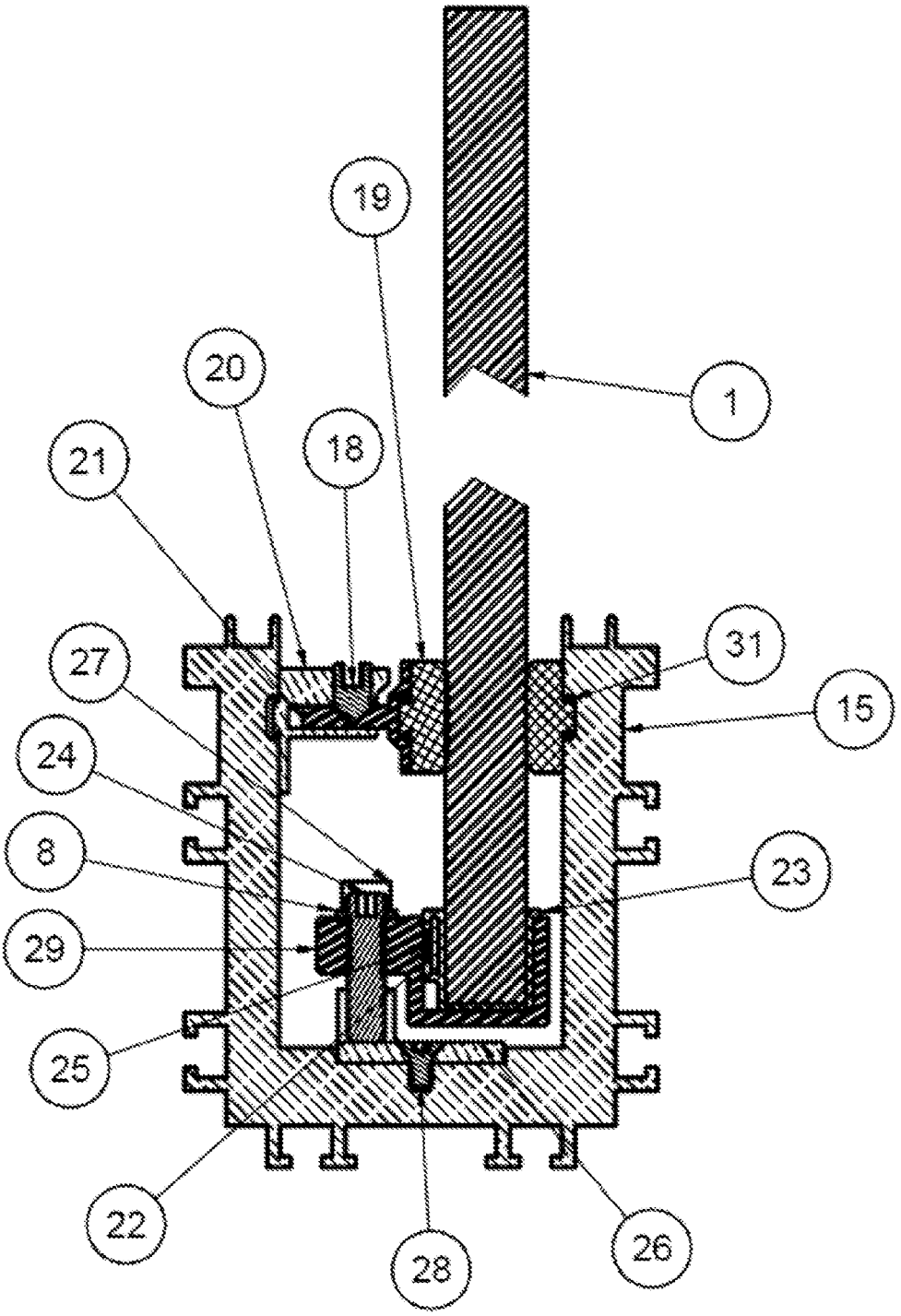

FIG 1

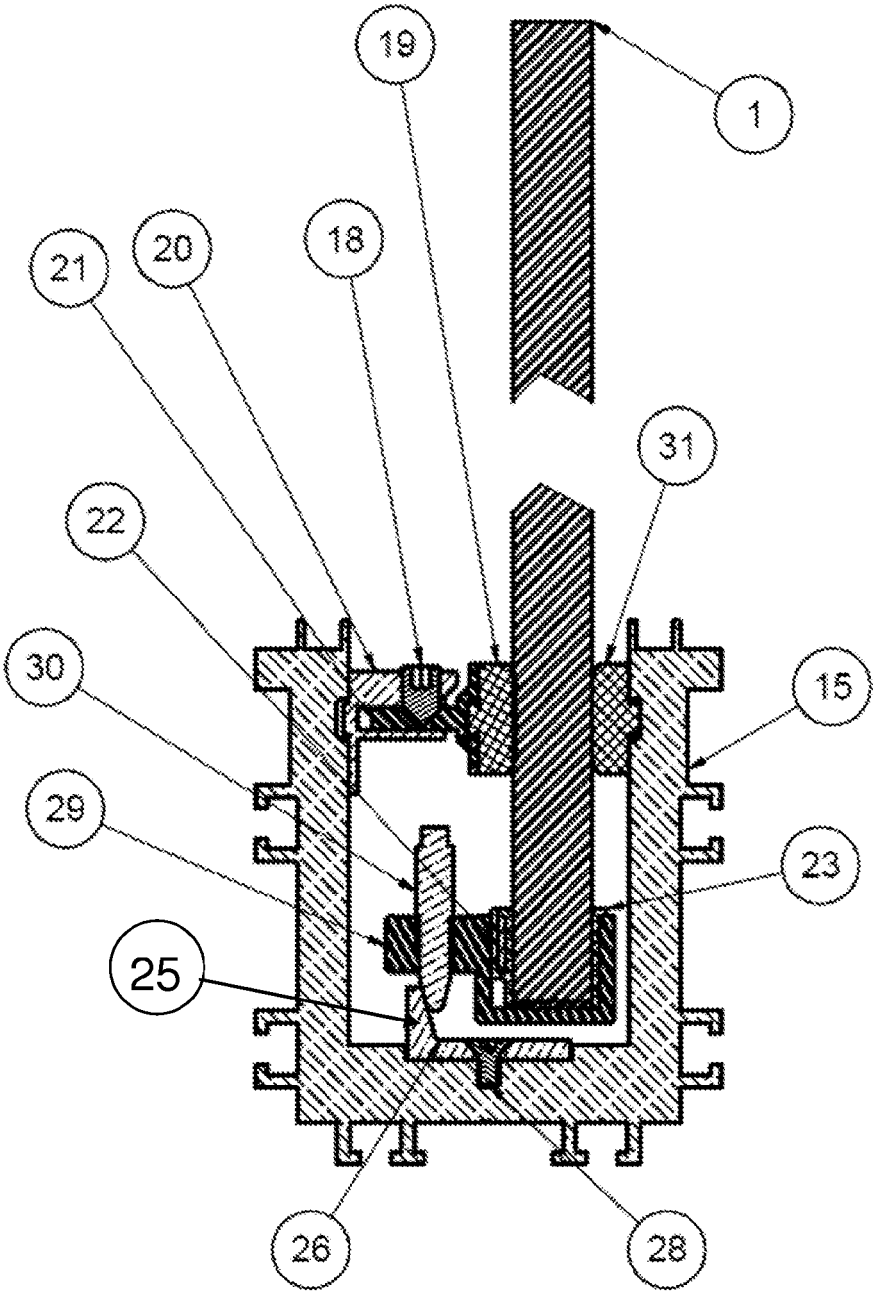

FIG 2

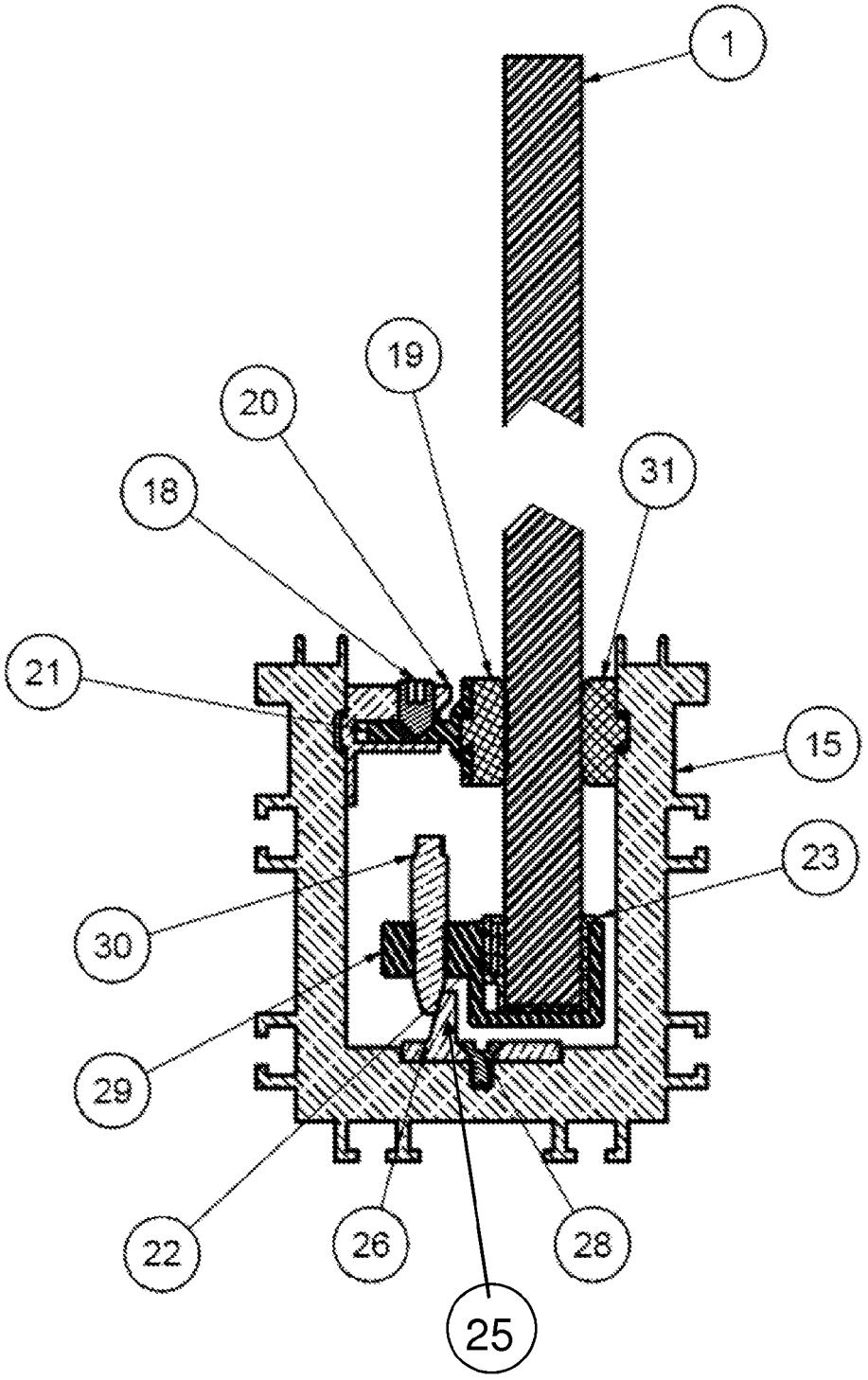

FIG 3

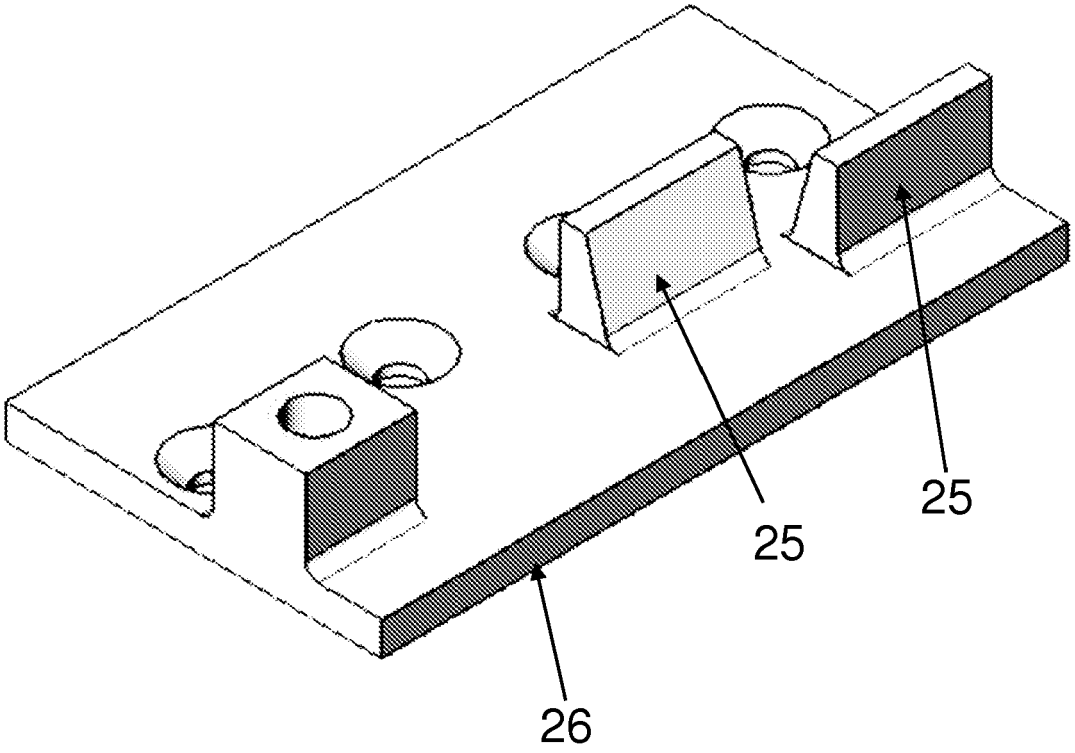

FIG 4

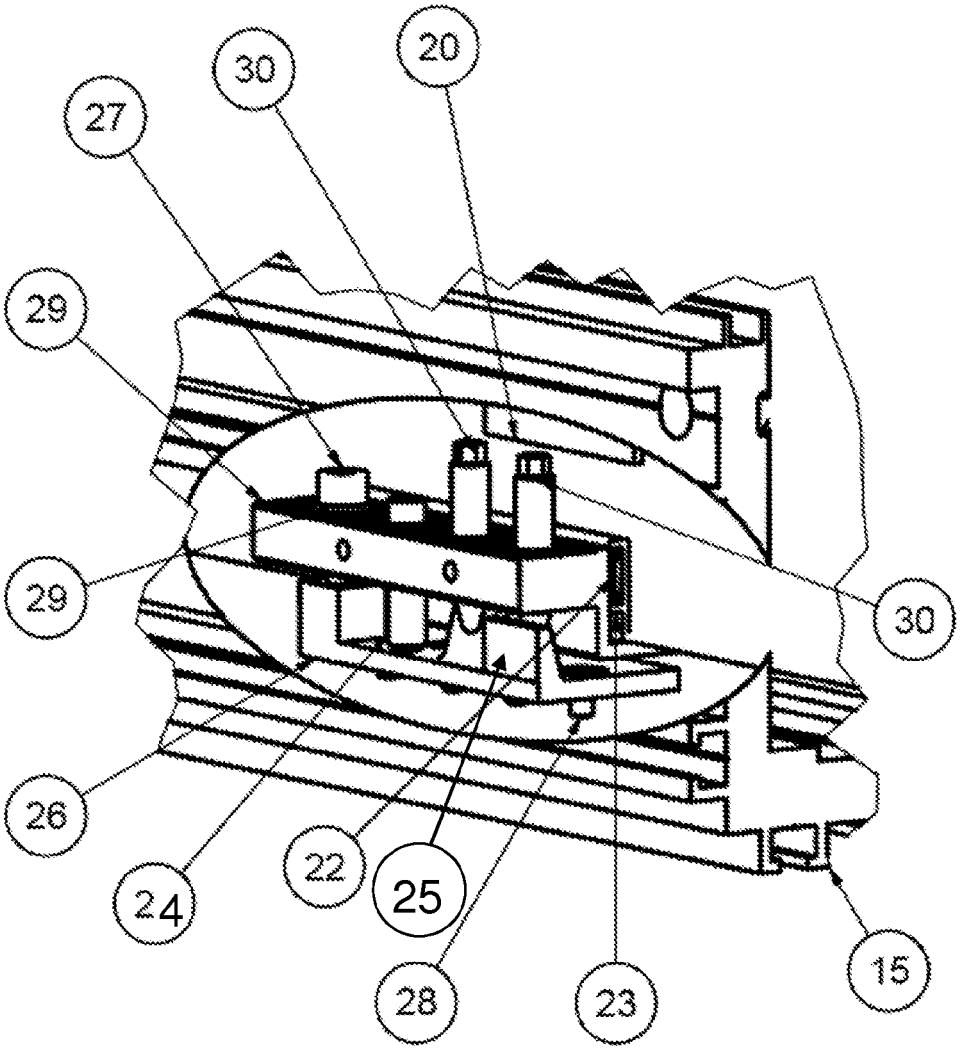

FIG 5

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EUROPEAN SEARCH REPORT

Application Number
EP 11 15 2022

DOCUMENTS CONSIDERED TO BE RELEVANT

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TECHNICAL FIELDS SEARCHED (IPC)
E04F
E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 July 2011	Severens, Gert

CATEGORY OF CITED DOCUMENTS

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14-07-2011

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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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