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(54) **MEANS FOR INSTALLING A SUSPENDED CEILING PROFILE AND ADJUSTING THE HEIGHT OF THE SUSPENDED CEILING**

(57) A device for fastening suspended ceiling profile and adjusting the height of suspended ceiling, featuring two branches, both of the branches comprising telescopic U-profile bars with perforated walls inserted into one

another, with connectors for connecting to the ceiling profile and fastening to the base ceiling and the bars are mutually fixed by means of fastener(s).

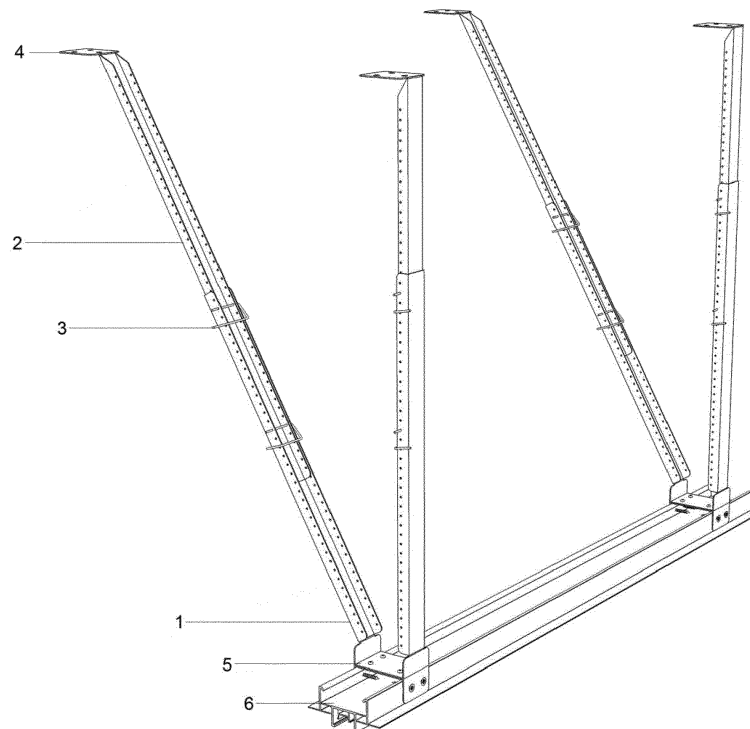


FIG 1

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Description

Technical field

[0001] The invention belongs in the field of construction, specifically the invention relates to a device for fastening suspended ceiling profile to the base ceiling and for adjusting the height of suspended ceiling during the installation of ceiling profile and ceiling material. A suspended ceiling is also to be understood to mean, among other, a stretch ceiling.

Prior art

[0002] Known is a separate structure produced from wooden beams or gypsum board, depending on the room application, for the installation of ceiling profiles. A separate structure requires cutting the structural elements to the right size and angle, and this mostly on site, which means generation of construction waste, but also significant time commitment.

[0003] Known is a fastener for ceiling profile (CN204475635, Liu Qiqi, published 15.07.2015), which comprises two similar parts that consist of a housing, L-shape connector, spring and a movable U-shape clamp. The fastener is equipped with a geared snap connector, where the gears are fixed by means of a locking screw. The geared snap connector is mounted on an L-shape connector between the two parts, engaging with the gears of both parts. This solution is intended for interconnection and elongation of ceiling profiles, allowing infinite spatial elongation of ceiling profiles, but not allowing the adjustment of the height of the ceiling profile.

[0004] Known is a solution for fastening stretch ceilings (RU33770, Morozov A.G, published 10.11.2003). The stretch ceiling is fastened on an embossed profile, which has a horizontal upper edge, from where one central, two interim and two extreme vertical edges reach downwards. In the middle section of the central vertical edge there are projections on both sides, the extreme vertical edges are shorter than other edges and have a projection at lower parts, pointed towards the interim edges. The interim edges have projections at the same height with the projections of the horizontal edge, pointed towards the extreme edges. The interim edges have steps in their middle section, which are positioned at an angle of 30 to 60 degrees. The central edge has a thicker section in the bottom part. The projections of the central vertical edge are designed to hold harpoons. This solution is only intended for fastening stretch ceiling, without height adjustment of the stretch ceiling.

[0005] Known is a fastener for stretch ceiling (RU182714, ООО "FRAN", published 29.08.2018), which comprises a bearing profile with horizontal and vertical slats and a harpoon. A horizontal slat with two vertical bottom edges forms a Π -shape element, which houses the top part of the harpoon, while the inner section of the vertical edge of the bearing profile has an upper

fixing extrusion, which is intended for fastening the harpoon, forming the locking system of the fastener. The drawback of this solution is that it does not allow adjusting the height of the ceiling, as the purpose of the structure is to fasten the stretch ceiling so that its harpoon with a special shape would cover the profile itself and leave the impression that the ceiling starts directly from the wall. The profile is only intended for fastening the profile to the wall.

[0006] Known is a device (ES1056504, Valero Rodrigues Eduardo, published 01.04.2004), which relates to a fastener of an adjustable suspended ceiling profile. The device comprises a plate attached to the base ceiling, with a rod attached to it. At the bottom of the rod is a threaded stopper, which allows adjusting a block that includes levers and perforated plates. The device comprises a U-shape element, which is at a suitable height and allows adjusting and fixing the vertical inclination of the suspended ceiling profile by means of an adjustable screw passing through the block. The structure of this device is complex, adjusting the height by means of it is complicated, the scope of adjustment is more limited and does not allow installation of profiles intended for the installation of stretch ceilings.

[0007] Known is a method and device (system) for fastening suspended ceilings and adjusting the height of suspended ceiling (for automatic levelling) (WO2019229716, Akifix S.P.A Con Socio Unico, published 05.12.2019). The device comprises parts of the support frame profile of suspended ceilings and fixing rods with an adjusting screw for adjusting the spacing between the profile parts and the base ceiling, while adjustment includes the use of a laser device. The laser device is used for determining the differences between the heights of the base ceiling and suspended ceiling profiles, transmitted to an electric screwdriver which operates the adjusting screws to change the spacing between the suspended ceiling and base ceiling and adjust the height of the ceiling. The drawback of this solution is that it has a complicated structure and requires the use of expensive auxiliary equipment.

Summary of invention

[0008] The objective of the invention is to produce a device that allows fastening suspended ceiling profile to a base ceiling and adjusting the height of the installed suspended ceiling by means of the same device, so that the installed suspended ceiling would be at uniform height.

[0009] The presented device has two branches, the length of both branches individually adjustable. Both branches of the device comprise a U-profile fastener for the ceiling profile and a U-profile fastener for the base ceiling, which have different widths and can be inserted inside one another as a telescope, whereas the walls of the ceiling profile fastener and the base ceiling fastener are perforated. The ceiling profile fastener and the base

ceiling fastener are fixed to one another via perforations by means of locking element(s). In the upper part of the base ceiling fastener is a mount with a bendable connection for the base ceiling, in the lower part of the ceiling profile fastener is a connector with a bendable connection, the upper part joined with the branches of the device and the lower part fastened to the ceiling profile (the ceiling profile itself is not part of the invention). The device is produced of metal.

[0010] The connector is a H- or U-shape profile. A connector with the H-shape profile consists of interconnected upper and lower U-profile. A connector with the U-shape profile only consists of the upper U-profile.

[0011] The locking element is a rectangular structure of bent wire, which has three sides on the same plane and a fourth side projecting from the rest of the structure at an acute angle, and the structure is open in the connecting part of the projecting side and one of the longer sides of the rectangle, while the side with the open end in the structure is longer than the opposite side and the side with the open end and projecting at an acute angle is longer than the opposite side.

List of figures

[0012]

Figure 1 shows the device according to this invention together with a ceiling profile.

Figure 2 shows the device according to this invention together with a ceiling profile, fastened to the base ceiling.

Figure 3 shows the locking element.

Figure 4 shows the locking element locked on the device.

Embodiment of the invention

[0013] The presented device for fastening suspended ceiling profile and adjusting installed suspended ceiling comprises a double-branch device comprising several bars with perforated walls, both branches with individually adjustable height and fasteners intended for fastening the device to the base ceiling as well as to the required suspended ceiling profile.

[0014] A branch of the device comprises a ceiling profile fastener 1, base ceiling fastener 2, at least one locking element 3, a base ceiling mount 4 and a connector 5 for connecting the branches to the ceiling profile 6.

[0015] Ceiling profile fastener 1 and base ceiling fastener 2 are metal bars with U-profile and perforated walls, one narrower than the other and placed inside the other (telescopic bars) and by moving these in relation to one another the telescopic solution allows changing their length and adjusting thereby the height of the device prior

to fastening to the base ceiling or also, if required, when the fastener has already been fastened to the base ceiling. In a preferred embodiment, the base ceiling fastener 2 is narrower than the ceiling profile fastener 1 and is placed inside the ceiling profile fastener 1. Ceiling profile fastener 1 and base ceiling fastener 2 are interconnected by means of locking element(s) 3, which are inserted at required points into perforations in their walls.

[0016] Locking element 3 has a substantially rectangular structure (in a preferred embodiment a bent wire), three sides on the same plane and a fourth side that projects from the rest of the structure at an acute angle. The structure is open in the connection part of the projecting side and one of the longer sides of the rectangle. The side with the open end is longer than the opposite side. The side with the open end, projecting at an angle, is also longer than the opposite side. By means of locking element(s) 3, the ceiling profile fastener 1 and base ceiling fastener 2 are fixed (locked) to one another by inserting the longer side of the locking element(s) 3 through the aligned perforations in the walls of the ceiling profile fastener 1 and base ceiling fastener 2. The locking element(s) 3 are fixed (locked) to the ceiling profile fastener 1 and base ceiling fastener 2 by moving it/these either upwards or downwards with the help of the shorter side projecting at an acute angle, proceeding from the direction in which the locking element(s) 3 have currently been installed. The locking element(s) 3 are fixed preferably pointing downwards. The side of locking element(s) 3, which projects at an angle, is pressed as it is against the wall of the ceiling profile fastener 1, preventing thereby the locking element(s) 3 from escaping from the perforations. It is not relevant, whether the locking element(s) 3 are inserted into the ceiling profile fastener 1 and base ceiling fastener 2 from the right or left side, as it functions in both directions.

[0017] In the upper end of the base ceiling fastener 2 is a base ceiling mount 4 with a bendable connection, containing openings for connecting the base ceiling fastener 2 to the base ceiling, using separate fasteners (for example screws). The bendability of the base ceiling mount 4 allows changing the connection angle between the base ceiling mount 4 and base ceiling fastener 2, which is an advantage in case of a base ceiling that is uneven and at different heights and allows compensating for the unevenness and/or height difference.

[0018] Connector 5 is an element on ceiling profile fasteners 1, which can be both in a U shape or H shape. An element in the H-shape is formed of two mutually combined U-profiles. If connector 5 is in the U-shape, it is formed only of the upper U-profile.

[0019] In case of an H-shape connector 5, the ceiling profile fasteners 1 are connected to the ceiling profile by the vertically positioned external sides of ceiling profile 6 and the vertical side walls of the lower U-profile of the H-shape connector 5. Ceiling profile 6 is connected to the channel formed by the lower walls of connector 5 (lower U-profile) by means of fasteners (for example

screws) that penetrate through the walls. If connector 5 is not in the H-shape (in other words, it is without the lower, backwards U-profile), the ceiling profile fastener 1 can be fastened to the ceiling of ceiling profile 6 through the bottom part of the upper U-profile by means of fasteners (for example screws).

[0020] This is a universal system by which profiles designed for use with various ceiling materials can be fastened to connector 5. For example, it is suitable for use with both stretch ceilings as well as other suspended ceiling materials. Ceiling profile fastener 1 and base ceiling fastener 2 can also be produced with different lengths, allowing the height adjustment of suspended ceiling in various ranges.

[0021] Figures 1 and 2 show two sets of the device, fastened to ceiling profile 6, however, the number of the devices can vary, depending on the length of the suspended ceiling profile and the dimensions of the ceiling.

[0022] The device is installed by inserting the ceiling profile fastener 1 and base ceiling fastener 2 with perforated walls into one another and then fixing these in place through their perforations, using locking element(s) 3. Fixing with the locking element(s) 3 means in the given case also adjustment of the height of the suspended ceiling, as the height of the suspended ceiling is precision-adjusted across the whole suspended ceiling in the range of the perforations. Then the device is fastened to the base ceiling with the help of base ceiling mount 4, adjusting, if necessary, by bending the connection angle between the base ceiling mount 4 and base ceiling fastener 2. After fastening the device to the base ceiling and fixing the suspended ceiling at desired height, the ceiling profile 6 is fastened to connector 5. At this the ceiling profile 6 is fastened with screw fasteners according to the selected profile, either through the bottom walls of the H-shape element of connector 5 or through the bottom part of the U-profile.

[0023] The height of the device and hence also the height of the suspended ceiling profile can be adjusted in various ways prior to fastening to the base ceiling:

- base ceiling fasteners 2 are connected to the base ceiling mount 4 through a bendable connection, which allows changing the connection angle between the device and the base ceiling prior to fastening the device to the base ceiling;
- the mutual position of the suspended ceiling fastener 1 and base ceiling fastener 2 is changed (sliding the telescope bars in or out) and their mutual position is fixed by means of locking element(s) 3, which allows adjusting the desired height of the device by means of perforations in the walls of suspended ceiling fastener 1 and base ceiling fastener 2;
- after the device has been fastened to the base ceiling, it is again possible to adjust its distance to the base ceiling, if necessary, by removing the locking

element(s) 3 from the suspended ceiling fastener 1 and base ceiling fastener 2, changing the mutual position of the suspended ceiling fastener 1 and base ceiling fastener 2 and then re-fixing with locking element(s) 3 in new positions in the perforations.

[0024] It is recommended to maintain a minimum of five centimeter overlap between the suspended ceiling fastener 1 and base ceiling fastener 2 in order to ensure stable and sturdy connection between different parts of the device and a possibility to use simultaneously several locking elements 3 that provide the whole device with stability.

[0025] With the presented device it is very easy to create suspended ceilings at different levels in the same room. The presented device provides an efficient means for successfully overcoming unevenness in the ceilings of rooms of various uses (incl. also in wet environments, such as pool or sauna premises). The presented device can be utilized with very different profiles - with lighting profiles, modular profiles, isolation profiles, etc. Profiles are fastened similarly in case of traditional solutions and the presented solution - also with screw connections and by fastening to the base structure at every 60 cm.

[0026] The presented device allows achieving a base structure suitable for the installation of suspended ceiling profiles with approx. 80% less time and by saving on materials. In addition, a device of this invention made of stainless steel allows installation of suspended ceiling profiles in wet environments, which would not be possible with wooden beams. The presented device can be installed on site in a room of any purpose, in a precisely given volume and quantity, without unnecessary surplus materials or construction waste.

Claims

1. A device for fastening suspended ceiling profile and adjusting the height of suspended ceiling comprises base ceiling mounts, fasteners of the ceiling profile, locking elements, fastening elements, connectors of the elements, **characterized in that**

- the device has two branches, the length of both branches individually adjustable;
- a branch comprises a U-profile fastener (1) for the ceiling profile and a U-profile fastener (2) for the base ceiling, which have different widths and can be inserted inside one another as a telescope;
- the walls of the ceiling profile fastener (1) and the base ceiling fastener (2) are perforated;
- the ceiling profile fastener (1) and the base ceiling fastener (2) are fixed to one another through perforations by means of at least one locking element (3);
- in the upper part of the base ceiling fastener

- (2) is a mount (4) for the base ceiling, with a bendable connection;
 • in the lower part of the ceiling profile fastener (1) is a connector (5) with a bendable connection;
 • the upper part of the connector (5) is joined with both branches of the device and the lower part of the connector (5) is fastened to the ceiling profile (6).
2. A device according to claim 1, **characterized in that** the device is of metal.
3. A device according to claims 1 and 2, **characterized in that** the mount (4) of the base ceiling comprises openings for fasteners.
4. A device according to claims 1 to 3, **characterized in that** the connector (5) is an H-shape profile.
5. A device according to claim 4, **characterized in that** the connector (5) consists of an interconnected upper and lower U-profile.
6. A device according to claims 1 to 3, **characterized in that** the connector (5) consists of the upper U-profile.
7. A device according to claims 1 to 6, **characterized in that** the locking element (3) is a rectangular structure of bent wire, has three sides on the same plane and a fourth side projecting from the rest of the structure at an acute angle, and the structure is open in the connecting part of the projecting side and one of the longer sides of the rectangle, while the side with the open end in the structure is longer than the opposite side and the side with the open end and projecting at an acute angle is longer than the opposite side.
8. A device according to claim 7, **characterized in that** the locking element (3) is inserted by its longest side into aligned perforations in the ceiling profile fastener (1) and base ceiling fastener (2) and the locking element (3) is fixed on the wall of the ceiling profile fastener (1) from a side that is at the projecting angle, pointing upwards or downwards.
9. A device according to claim 8, **characterized in that** the locking element (3) is fixed in the wall of the ceiling profile fastener (1), pointing downwards.
10. A device according to claims 1 to 9, **characterized in that** the ceiling profile fastener (1) and base ceiling fastener (2) are intended to be fixed by means of two locking elements (3).

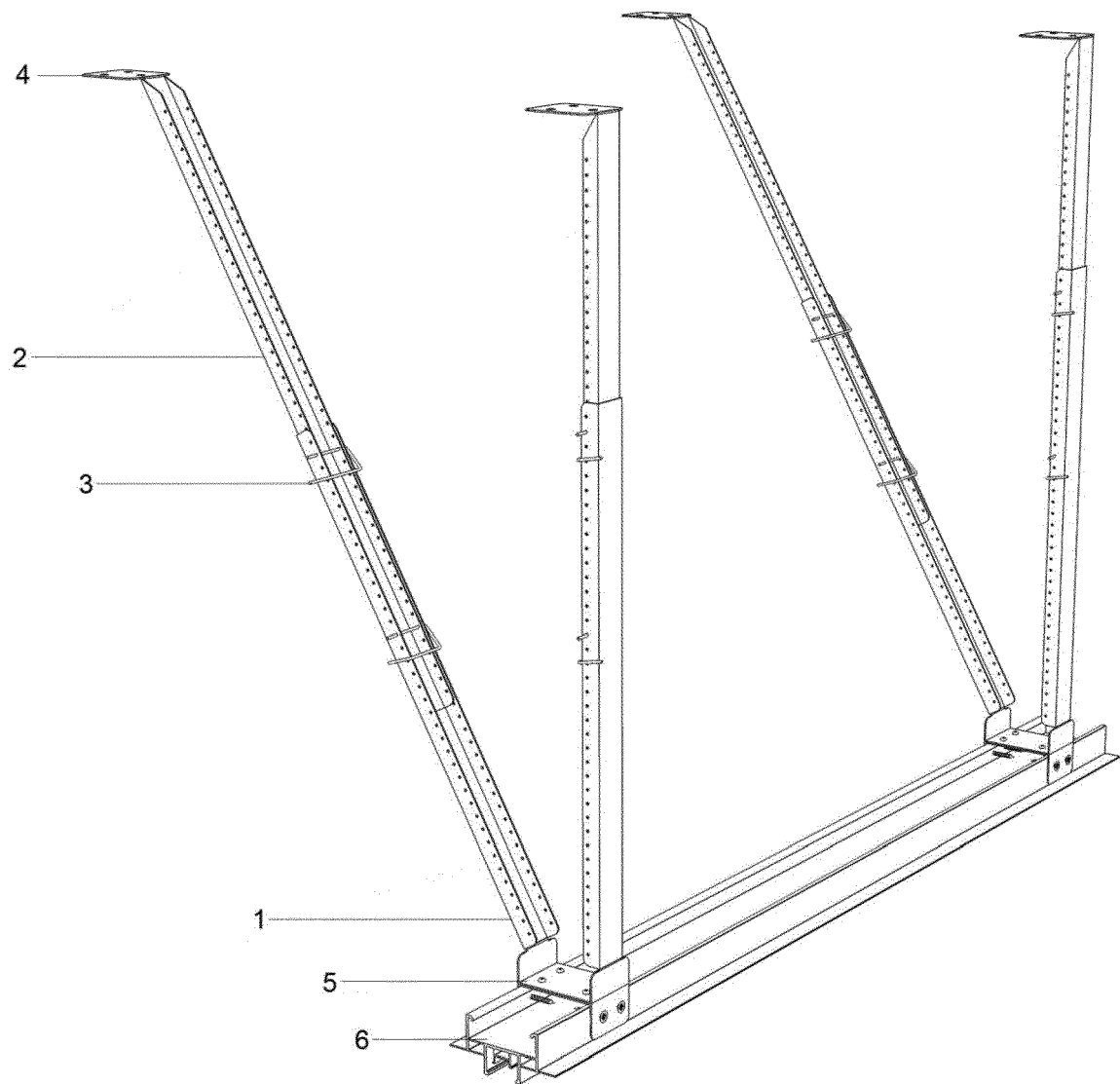


FIG 1

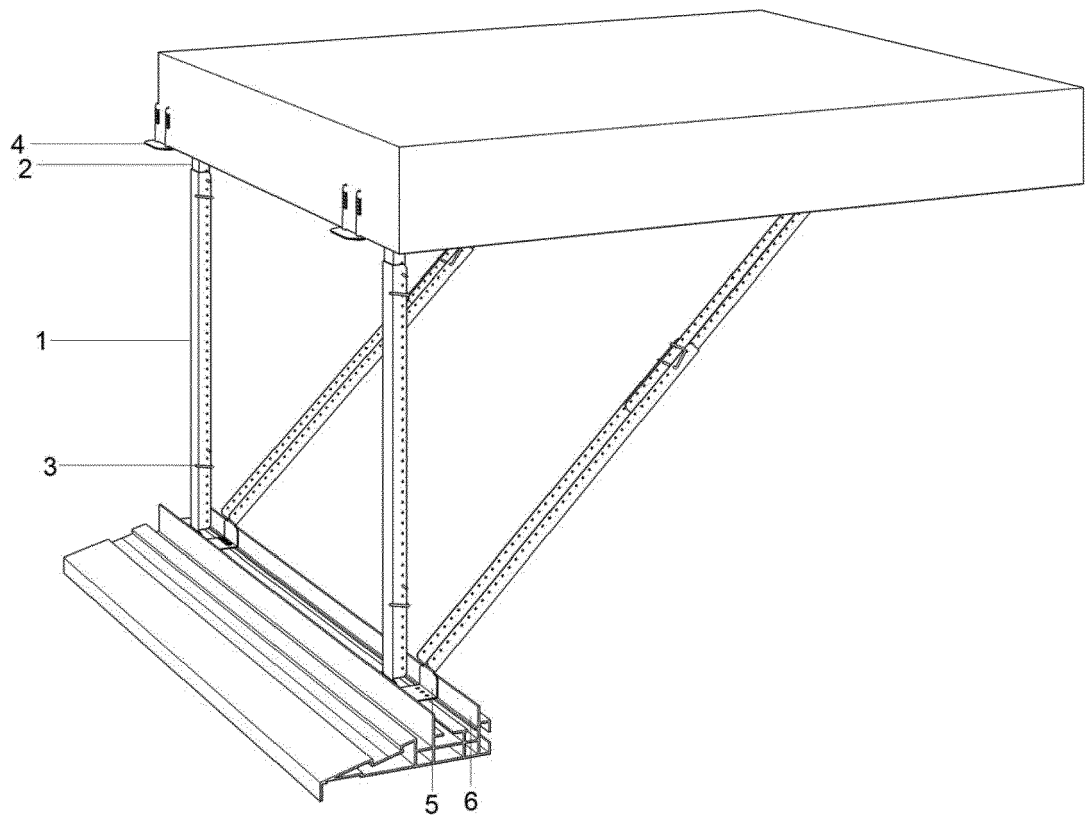


FIG 2

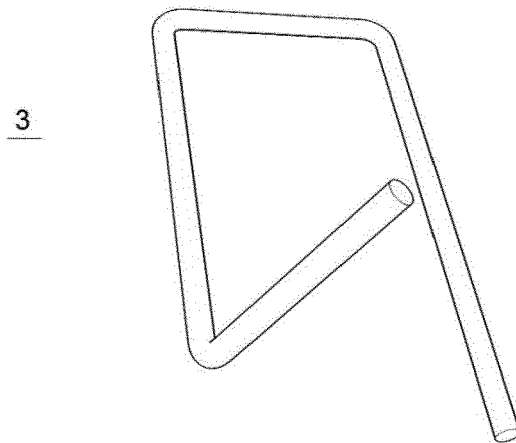


FIG 3

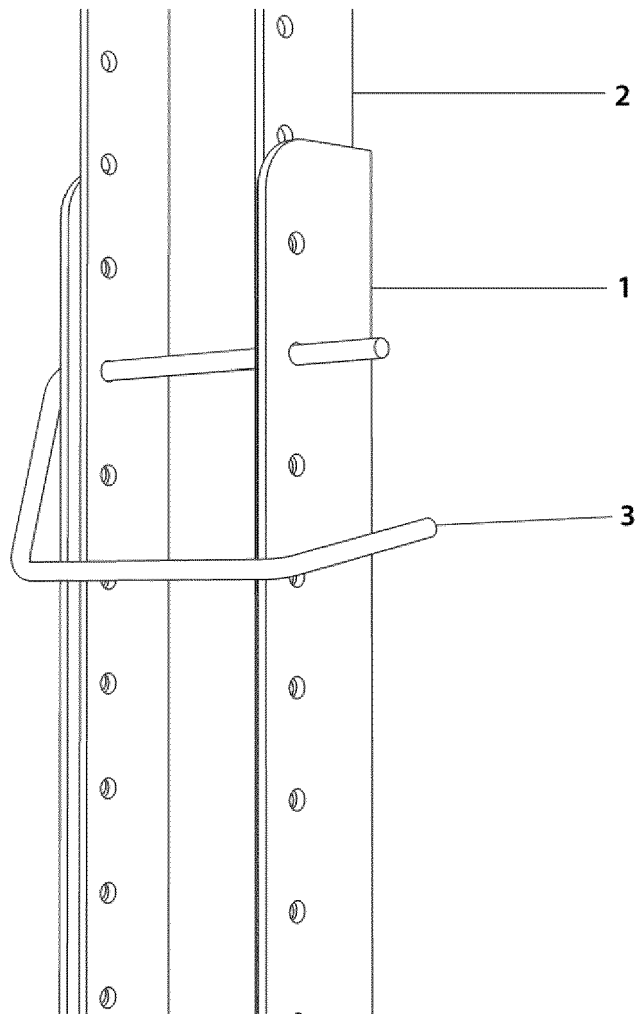


FIG 4



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Application Number

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Place of search The Hague		Date of completion of the search 19 March 2022	Examiner Lopes, Claudia
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