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(71) Applicant and

(72) Inventor: SANDSTRÖM, Johan [SE/SE]; Korphopps-
gatan 10, S-120 65 Stockholm (SE).

(74) Agent: JOHANSSON, Urban; Mycklingsvägen 6, S-894
30 Själevad (SE).

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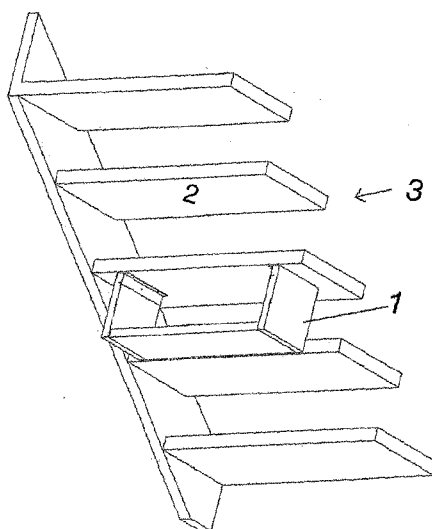
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ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: SHELF SYSTEM, INTENDED FOR MOUNTING, E.G., ON THE UNDERSIDE OF A STAIRWAY.



(57) Abstract: The invention concerns a shelf system (1) intended to be mounted on the underside of an essentially horizontal surface (2) such as the underside of a step in a stairway (3, 4). The shelf consists of at least one shelf section (5) and at least one fastening device (6) with which the shelf section can be temporarily attached under for example a stairway. The invention is characterized by the fastening device consisting of at least two rails (7, 8), which are designed to engage with a corresponding number of grooves (9, 10) in the shelf section.



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Shelf system, intended for mounting, e.g., on the underside of a stairway.

Technical Field

The present invention concerns a shelf system which is intended to be mounted on the underside of an essentially horizontal surface in accordance with the claims.

5 Background of the Invention

For people living in confined quarters and others with limited space in their residence, it may be convenient to utilize the space on and under a stairway for temporary or permanent storage of objects. Currently, it is common that storage in stairways occurs by placing loose items on the steps of the stairway. This method can result in personal injury if someone trips on an item
10 on a step and falls down the stairway. Furthermore, accidents can be caused by objects that are kicked or that fall from a higher situated step and hit a person further down the stairway or under the stairway. Because of the fact that every year, according to the Swedish Rescue Services Agency, 12 000 cases of personal injury on stairways are reported, whereof 10 500 are due to falls, it is not advisable to store objects haphazardly on a stairway. In regards to the
15 danger of accidents at hand, there is a need of a better solution for storage in the vicinity of a stairway.

Even in kitchens considerable problems are found with existing storage space such as kitchen cabinets and the like not being sufficient. This results in the use of improvised storage space for storing of for example spices, cook books, cell phone chargers and microwave ovens.
20 These improvised storage spaces in a kitchen can be directly unsuitable for their purpose. Many times it is difficult, if not impossible to increase the existing storage space in a kitchen with known storage furnishings. It is for example not feasible to drill holes in order to mount a simple shelf in the vertical space between a kitchen cabinet and the kitchen counter because this surface often consists of tile or glass with moisture-proof qualities. Such an attachment
25 would leave unfavorable drill holes with an increase risk for cracking and moisture damage. The present invention has unexpectedly shown itself, when mounted under an essentially horizontal surface such as the underside of a kitchen cabinet, to lead to increased storage possibilities and at the same time offer the shelf user flexible mounting and demounting without unfavorable drill holes in the wall surface. By storing kitchen equipment, for example

a microwave oven, in a hanging shelf attached beneath the kitchen cabinet's bottom board, a more open work area on the kitchen counter is permitted. Kitchen counter space is all too often limited by a counter placed microwave oven and even more so by the oven door's need of a wide radius during opening. Open counter space is more easily cleaned after baking and cooking which leads to better kitchen hygiene.

Prior Art

Storing objects beneath a stairway by standing or placing items on the floor surface does substantially diminish the danger of accidents, but the floor surface then becomes unusable for purposes other than purely storage. In order to use the space under stairways more efficiently, a number of shelf designs have earlier been developed, which are intended to be placed under a stairway. Examples of these designs are described in patent US6877828 and in the US design patent USD401778. These are shelf systems which are intended for use in the space under a stairway.

These types of shelves are designed so that they in a rough manner essentially correspond with the shape of the space under the stairway. They are ungainly and differ greatly from the present invention. These types of shelves are for example only intended to be placed on the floor beneath a stairway. In other words they are not intended to be mounted to the underside of a stairway. These types of shelves improve the possibilities for storage beneath a stairway, but do not allow for the floor space to be used for purposes other than storage. Furthermore, a shelf on the floor impedes cleaning of the floor under the stairway, which is a surface that usually accumulates more dust than other floor surfaces.

Therefore it is the purpose of the present invention to create a shelf for a stairway, which in a safe manner can be set-up under a step and at the same time keep the underlying floor surface free for access and use for other purposes.

The storage of objects on kitchen counters by placement directly on the counter is currently entirely possible, but the counter space then becomes more difficult to keep clean and unusable for other purposes than storage. Currently, horizontal metal stands and rods intended for simple storage next to kitchen counters are also available. These stands and rods run along the underside of kitchen cabinets next to the wall. This kind of storage is very limited because it only allows for the hanging up of specific objects intended for this purpose. Hanging up kitchen utensils with hooked handles is thereby possible but unfortunately no level surfaces are found for storage of cook books, cell phones, etc.

Yet another purpose with the present invention is therefore to create a shelf for the kitchen environment that can in a safe manner be attached under a kitchen cabinet and at the same time preserve the kitchen wall's moisture-proof qualities.

Description of the Invention

5 The invention will be described in detail in the following description with reference to the enclosed schematic drawings that in an exemplifying purpose show the current preferred embodiments of the invention.

Figure 1 shows a shelf system according to the present invention mounted in an open stairway.

10 Figure 2 shows a shelf system according to the present invention mounted in an enclosed stairway.

Figure 3 shows a shelf section.

Figure 4 shows the accompanying rails more in detail.

Figure 5 shows a second embodiment of the invention.

15 Figure 6 shows a second embodiment of the shelf surface more in detail.

Figure 7 shows a shelf section equipped with a friction surface.

Figure 8 shows a second embodiment of the track more in detail.

With reference to figures 1 and 2 a shelf system **1** is shown that is intended to be mounted hanging from an essentially horizontal surface **2** preferably such as the underside of a step in
20 an open **3** or enclosed **4** stairway. The essentially horizontal surface **2** can for all practical intent be comprised of any horizontal surface that is suitable for the purpose.

The shelf system which is shown more in detail in figures 2, 3 and 4 consists essentially of at least one shelf section **5** that is attached with the aid of a fastening device **6**. The fastening device is preferably comprised of at least two rails **7** and **8**. The material making up the shelf
25 section can suitably be of wood but the shelf sections can be made of plastic, metal or of other materials suitable for the purpose.

Each side of the shelf is equipped with a groove **9** and **10** in which a rail **7** and **8** is designed to be inserted into. If the shelf is made of a wood material the groove can suitably be milled with the aid of some form of earlier known technique. If the shelf is made of a plastic material

the groove can be formed in conjunction with its manufacture such as with injection moulding and the like. Alternatively, the shelf can be equipped with strips instead of grooves thereby achieving a comparable technical effect.

5 The rails 7 and 8 are preferably manufactured of a flanged profile; alternatively these rails can be made in another suitable manner such as by extrusion or by a similar manufacturing method. The cross section of the rails 7 and 8 can conceivably be of different shapes in alternative embodiments of the shelf system.

10 In figure 4 is shown the most preferred profile at the present time of the rails 7 and 8. The rails consist of a first part **11**, a second part **12** and an intermediate part **13**. The first part 11 is intended to be attached to the underside of the essentially horizontal surface. The second part 12 is intended for holding up the shelf section.

15 The rails 7 and 8 are mounted on the underside of the essentially horizontal surface such as the underside of a step. The rails are appropriately screwed tight into the step. Alternatively, the rails can be attached with other earlier known techniques suitable for the purpose. The rails are essentially mounted parallel with each other at a distance adjusted in accordance with the width of the shelf section. Afterward the shelf section is inserted into place by pushing the shelf section's grooves 9 and 10 onto the rails 7 and 8.

20 After the shelf section has been mounted onto the rails, the shelf and the rails can be interlocked. This interlocking can suitably be accomplished with the aid of some earlier known technique for interlocking units with each other. In figure 4 the interlock is shown with the aid of a locking screw that is screwed through a hole **14** in the profile's intermediate part 13 and into the shelf sections inner edge. Alternatively, a peg or similar can be used to fasten the shelf section with the rails.

25 It has been shown by inventor conducted tests that the shelf's function is efficient if the angle V lies within an interval from 75 to 90 degrees. An angle measuring 90 degrees is not optimal because there is a risk of the rails becoming deformed and bent outward if minor overloading of the shelf section occurs at which the shelf section can loosen from the rails. If the angle V is less than 90 degrees, the load bearing capacity of the shelf is improved. This improved load capacity is made possible by the diminished moment on the rails when the angle V decreases, 30 resulting in a reduced risk of the shelf section loosening from the rails. The increased load capacity associated with a decreased angle must be set in relation to the increased risk of the shelf section getting stuck, in conjunction with the shelf being pushed in or pulled out, when

the angle decreases. If the angle V is less than 75 degrees, the risk is very great that the shelf will jam directly when it is pushed onto the rail. During the inventor's own test of the design it has unexpectedly been shown that the technical function is optimal if the angle V is approximately 84 degrees, but the function is essentially optimal within an interval from 80 to 87 degrees. Due to the degree of the angle, the rails are prevented from slipping out of the grooves under the pressure of the horizontal forces in the direction of the shelf plane's width. Furthermore, the risk of the shelf getting stuck is extremely minimal.

The main advantage of the invention is that the space beneath a stairway can be used in a considerably more efficient and safer manner than with existing storage devices intended to be used in conjunction with storage of objects in a stairway. Another advantage of the invention is that the space under and between stairway steps can be used more efficiently without occupying floor space. Still another advantage with the shelf system in accordance with the invention is that it secures the storage of loose objects in a stairway with a greatly reduced risk of injury as a result.

In an alternative embodiment the shelf is adjustable in height and width. This adjustability is accomplished by being able to push the units together in width and/or height after which the parts can be internally locked together, see figures 5 and 6. In figure 5 this locking is shown with the aid of a locking screw **15** with accompanying nut, which are screwed through the oval hole track **16** in the shelf profile. Alternatively, a peg or similar can be used to lock the parts together in regards to width and/or height.

In figure 6 is shown a cross section of an alternative embodiment of an adjustable shelf plane. This adjustability is accomplished by being able to push the units together and apart in width and/or height after which the parts can be internally locked together. The rounded edge **17** has a smaller radius than the rounded edge **18**, which allows its fit **19**. The bent edges **20** and **21** add stiffness to the material and minimize any sideways play.

Figure 7 shows an applied friction surface **22** to the shelf section (shelf plane). This friction surface prevents books, magazines and/or other media from falling over when leaning toward a shelf side. Thanks to the friction surface conditions are improved greatly for standing objects to remain standing even if the shelf plane is exposed to vibrations and small changes in slope caused by stairway traffic. During normal stairway use problems with vibrations and step sway are not especially evident, but because of running up and down a stairway (children and so on) and because of heavy transports (moving furniture etc) the shifting of standing

objects can occur. The friction surface is preferably made of a thin self-adhesive material of rubber or similar material which provides increased friction for the shelf plane's surface. Alternatively the friction surface can consist of paint or similar which is applied to the shelf plane.

5 Figure 8 shows a second embodiment of the rail more in detail. The top bend **23** is bent in the same main direction as the lower bend **24**. This allows for a hidden fastening after the shelf has been put into place. No horizontal or visible screws can be seen. Because the top bend **23** is bent in the same main direction as the lower bend **24**, the leverage is reduced and thereby the torque. This minimizes the risk for warping problems. The rail's and indirectly the storage
10 solution's load capacity is thus increased compared with a fastening for a rail bent according to figure 4.

In an alternative embodiment of figure 8 the rails have been adapted to allow sideways flexibility. This flexibility makes it possible for the shelf to be pressed up towards the rail, which then springs outward. The rail's angled part **24** is allowed to snap into the
15 corresponding angled groove **9, 10** after the shelf is put into place. The shelf is thereby attached and the earlier advantages with unseen horizontal screws remains. A rail with flexibility allows for the possibility of simple mounting under for example a kitchen cabinet where lighting and trim may otherwise present obstructions.

Even if certain preferred embodiments have been described in detail, variations and
20 modifications can within the scope of the invention become evident for specialists in the field and all such are regarded as falling within the scope of the following claims. Thus the material in the shelf and the rail may vary in regards to the area of use. Therefore the shelf can be made of wood, plastic, metal or other material suitable for the purpose. Hence the rail can be made of for example metal, plastic, carbon fiber or other material suitable for the purpose.

Claims

1. Shelf system (1) intended for mounting on the underside of an essentially horizontal (2) surface such as the underside of a stairway, consisting of at least one shelf section (5) and at least one fastening device (6) with which the shelf section can be temporarily attached under the essentially horizontal surface **characterized by** that the fastening device consists of two rails (7, 8), which are intended to essentially be mounted parallel with each other under the horizontal surface, and which the shelf section via at least two grooves (9, 10) is designed to temporarily be fitted onto.
2. Shelf system according to claim 1 **characterized by** that the grooves in the shelf section are constituted of recesses in the shelf section.
3. Shelf system according to one or more of the previous claims **characterized by** that the grooves (9, 10) incline slanted upward from the opening and form an angle (V) with the vertical plane, whose angle (V) lies within the interval of 75 to 90 degrees.
4. Shelf system according to claim 3 **characterized by** that the angle V lies within an interval of 80 to 87 degrees.
5. Shelf system according to claim 3 **characterized by** that the angle V is essentially 84 degrees.
6. Shelf system according to one or more of the previous claims **characterized by** that the shelf section can be temporarily attached along the rail's longitudinal axis via a locking device.
7. Shelf system according to one or more of the previous claims **characterized by** that the width of the shelf section is adjustable.
8. Shelf system according to one or more of the previous claims **characterized by** that the height of the shelf section is adjustable.
9. Shelf system according to one or more of the previous claims **characterized by** that the shelf section is equipped with at least one friction surface.
10. Shelf system according to claim 9 **characterized by** that the friction surface is made of a thin self-adhesive material.

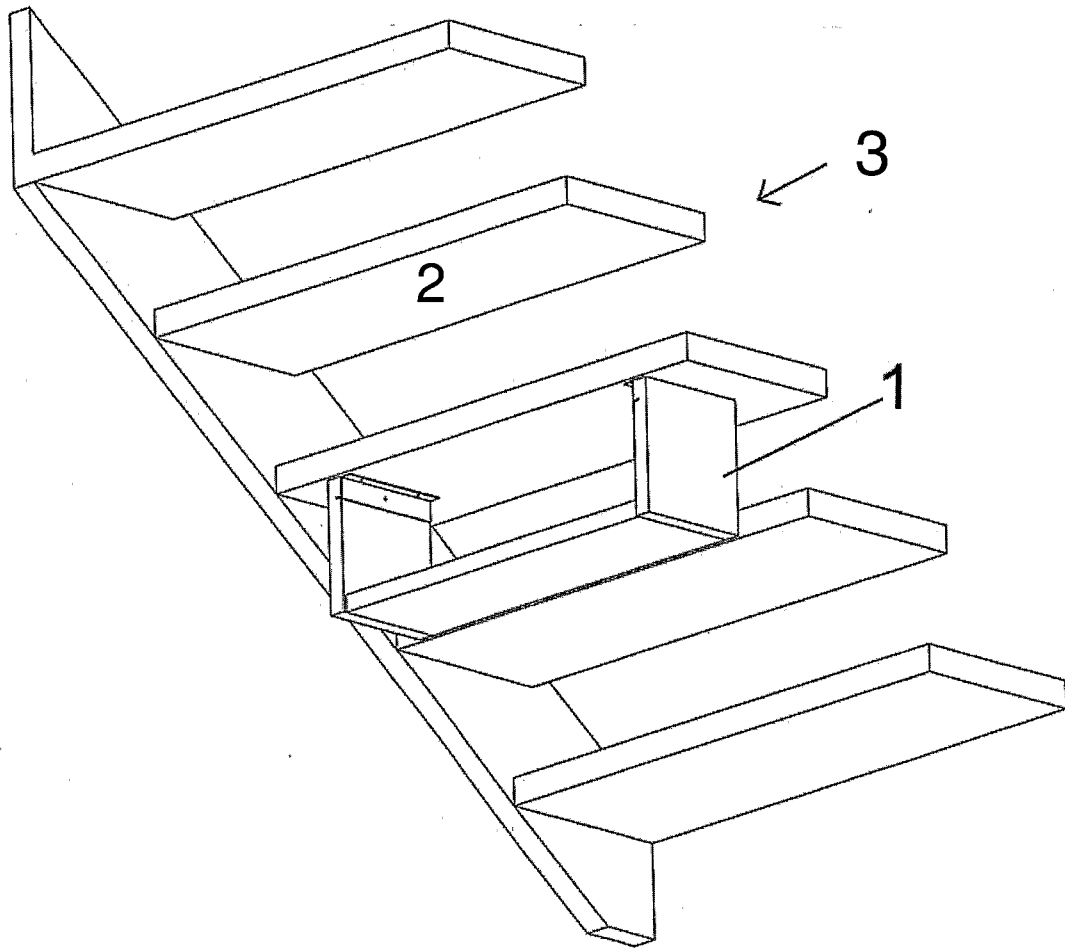


Figure 1

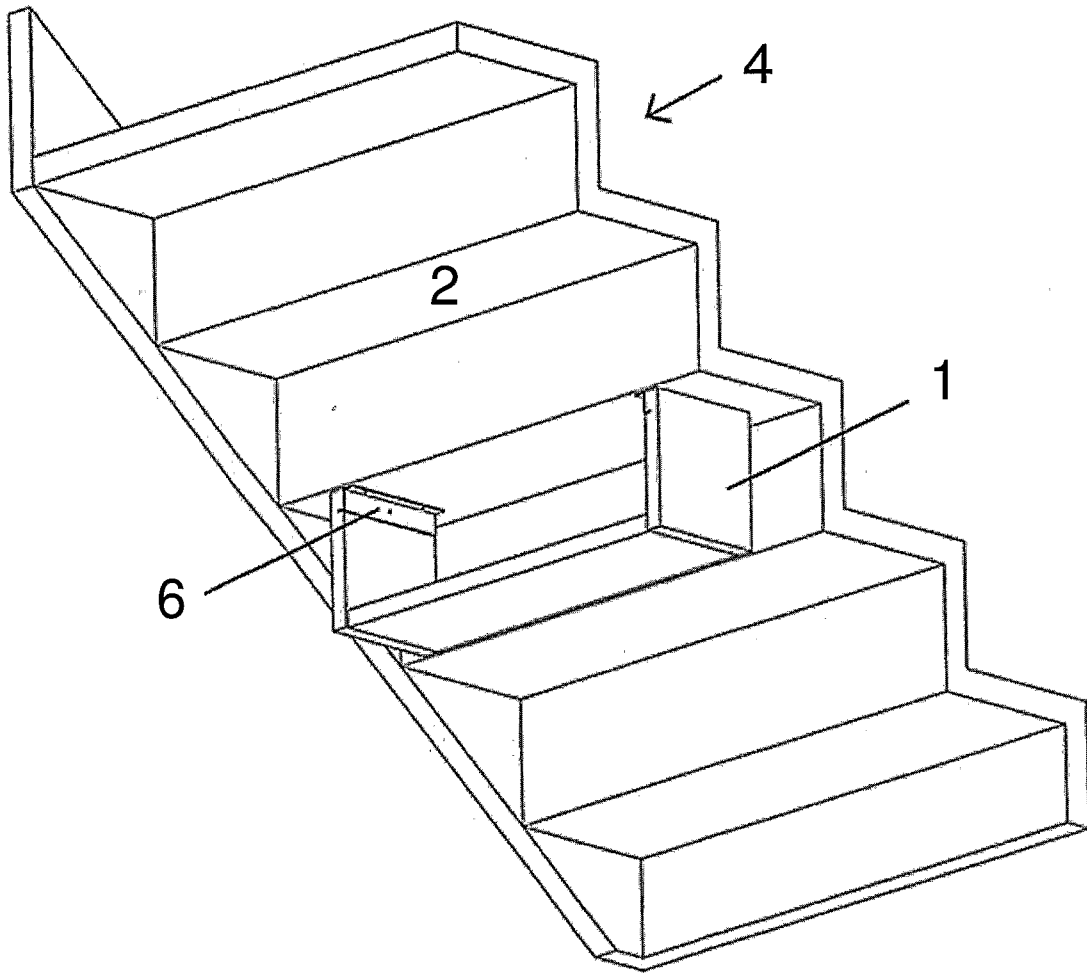


Figure 2

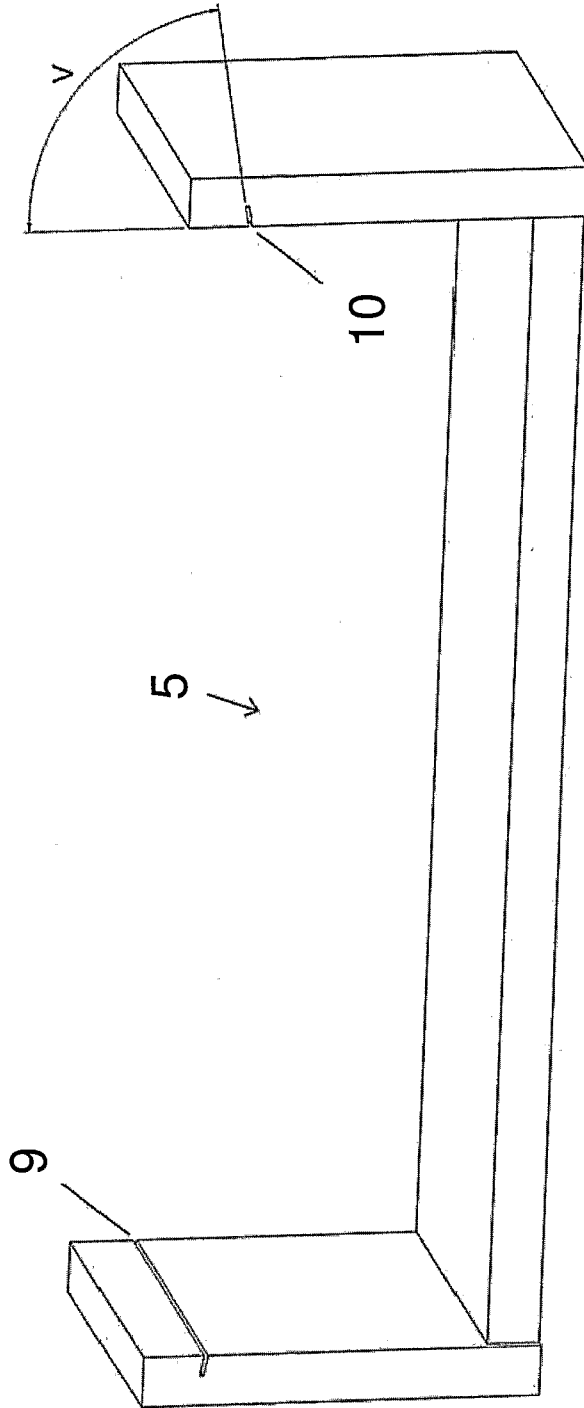


Figure 3

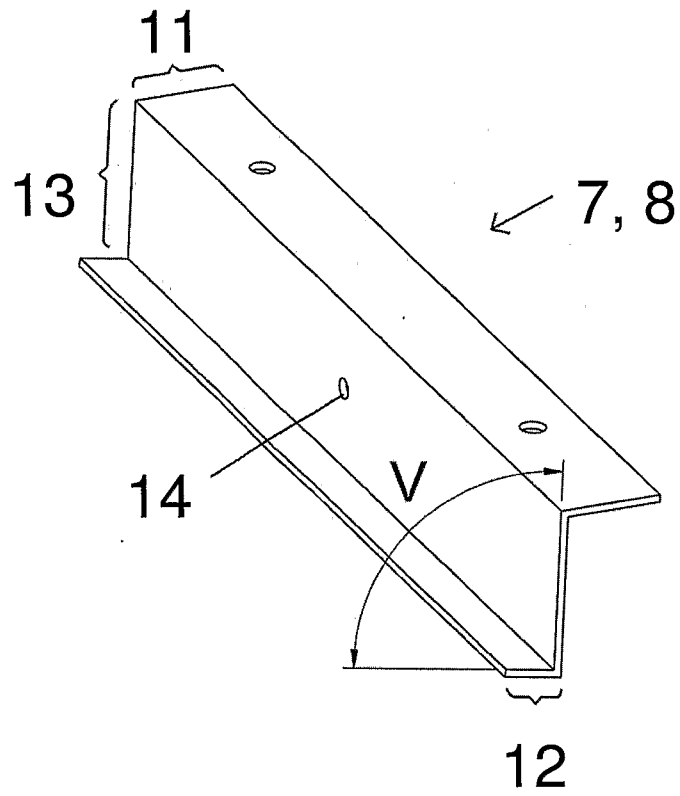


Figure 4

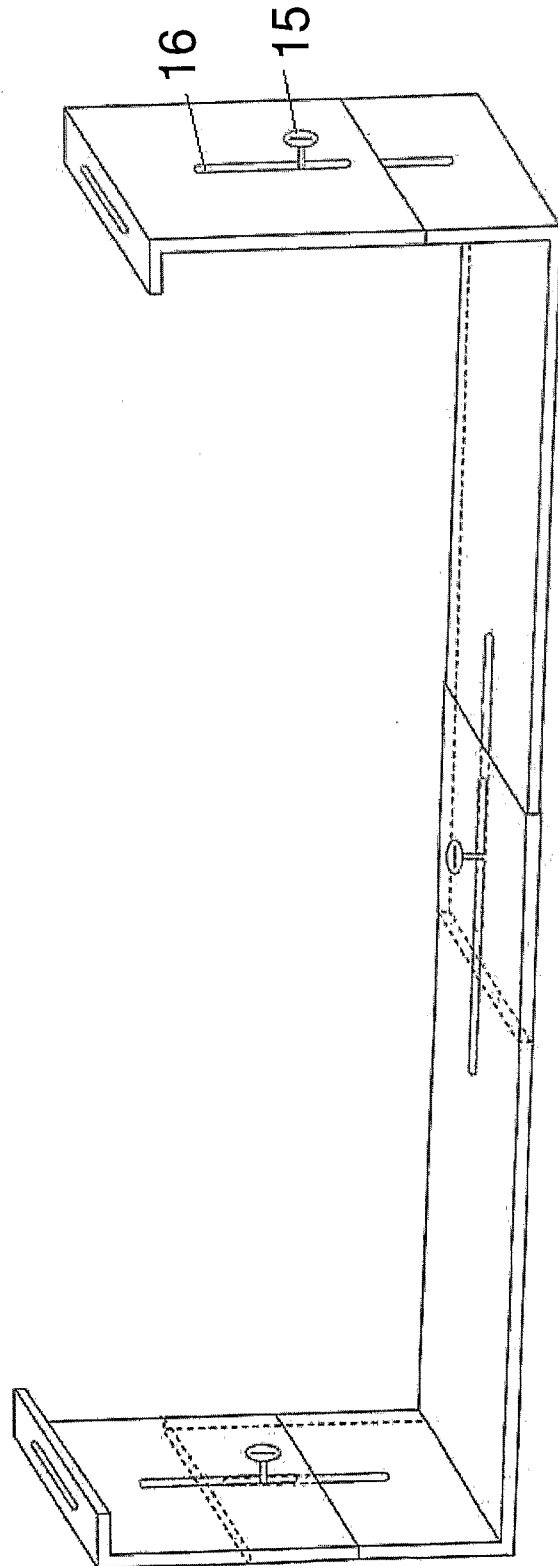


Figure 5

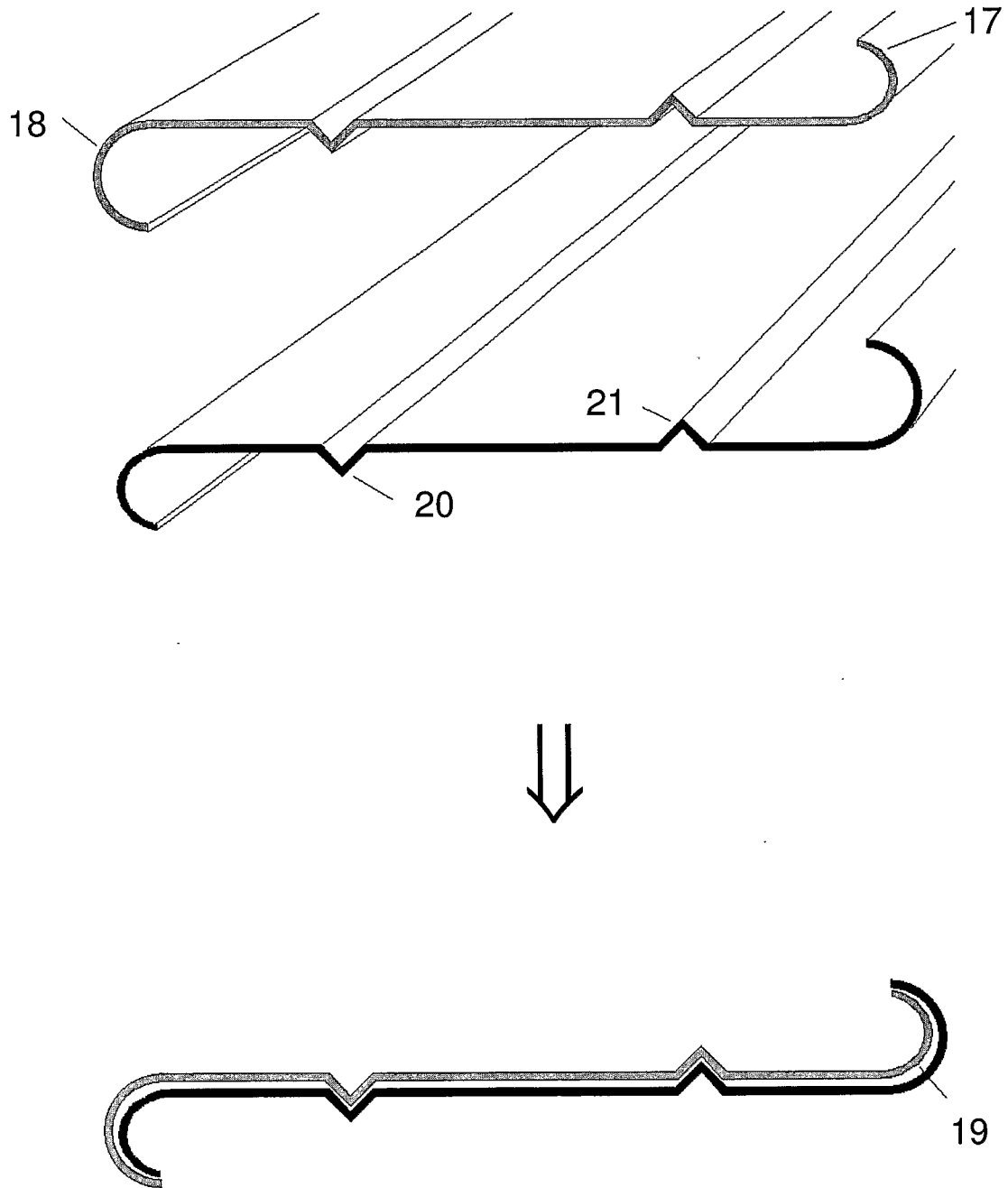


Figure 6

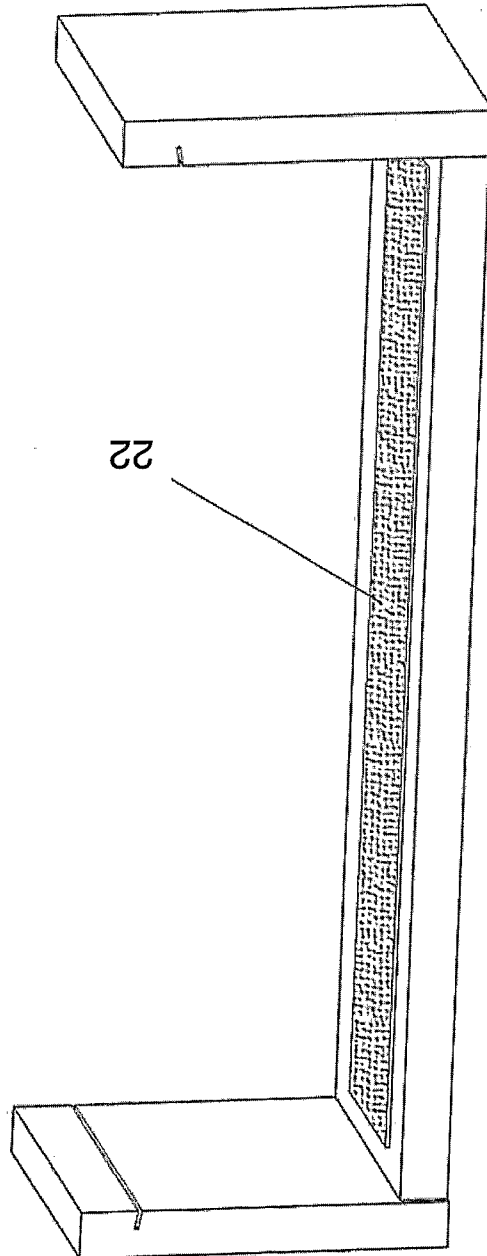


Figure 7

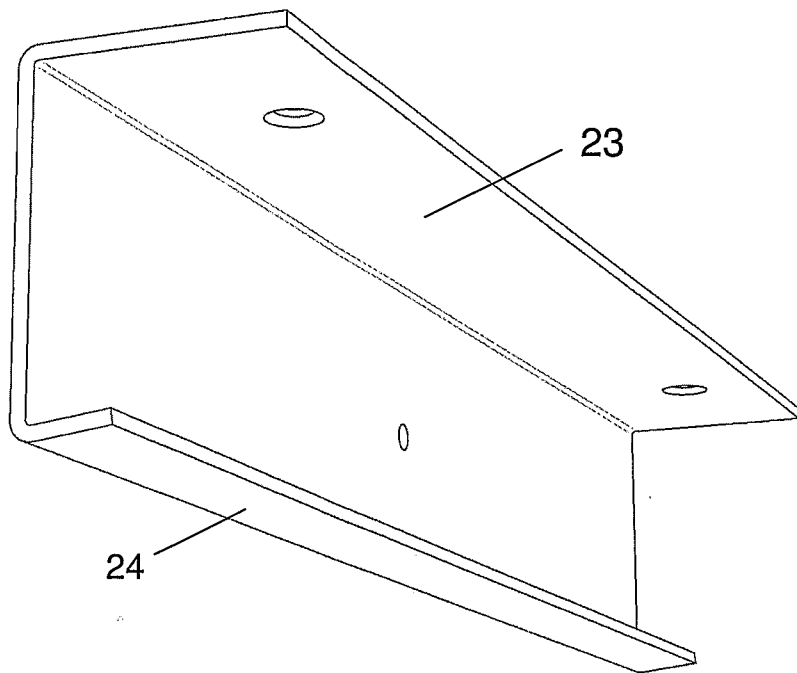


Figure 8

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

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)

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EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SE 210665 C (H. LIENER-KUNDE), 31 January 1967 (31.01.1967), page 1, column 1, line 1 - line 4; page 1, column 2, line 19 - line 26 --	1,2
A	CH 155729 A (J. CAVIEZEL-CAVELTI), 16 Sept 1932 (16.09.1932), figure 3, claim 3 --	1
A	US 4700849 A (L.A. WAGNER), 20 October 1987 (20.10.1987), figure 1, abstract -- -----	1

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Swedish Patent Office
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Facsimile No. +46 8 666 02 86

Authorized officer

Leif Vingård / MRo
Telephone No. +46 8 782 25 00

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Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT
Information on patent family members

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SE 210665 C 31/01/1967 NONE

CH 155729 A 16/09/1932 NONE

US 4700849 A 20/10/1987 NONE
