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(54) **Sheet dispenser**

(57) The invention relates to a dispensing system 1 and a dispenser 100 for dispensing single sheets 5 from a roll of a continuous web of plastic cushioning material 4, containing transversal lines of perforations 9 defining the single sheets, horizontally mounted on a support 2 and comprising a slotted bar 10 wherein positioning of the plastic material through the slot 16 facilitates the removal of discrete sheets of said material. In particular the invention relates to a dispenser comprising a device 2 for holding a horizontal shaft 3 on which said roll 4 can be rotatably mounted on; and a slotted bar 10, wherein the length and height of the slot 16 are determined by the width and thickness of the material of the roll that should be dispensed, said slotted bar 10 being provided at its edges with elongated fastening means 6, 6a joining the side edges of said slotted bar to respective upward hanging positions 7, 7a in such a way that said slotted bar can swing and can pivot about its longitudinal axis by an angle greater than 0° and less than 180°, wherein the length of said elongated fastening means 6, 6a is equal to or slightly less than the distance between the hanging positions 7, 7a and the horizontal shaft 3.

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## Description

### Technical field

**[0001]** The invention relates to a dispensing system for dispensing single sheets from a roll of a continuous web of plastic cushioning material containing transversal lines of perforations defining the single sheets, horizontally mounted on a support. In particular the invention relates to a system comprising a slotted bar wherein positioning of the plastic material through the slot facilitates the single-hand removal of discrete sheets of said material.

### Background art

**[0002]** Plastic cushioning materials, such as thin sheets of expanded plastic materials or Bubble Wrap®, are routinely used for the protection of fragile products in particular during shipping. Plastic cushioning materials are generally supplied in the form of rolls of continuous webs so that individual sheets of any length can be cut on demand. However some applications require the use of sheets having a fixed length. In these cases the most common form of supply is a box containing discrete precut sheets. So far the replacement of boxes of single precut sheets with rolls of continuous webs of materials having single sheets separated by perforations has been hampered by the difficulty of reliably removing single sheets from a roll mounted on a stand in a fast and effortless manner.

**[0003]** Typical stands for rolls of bulky materials, such as paper towels, to be used in in working shops or garages, generally consist of a base supporting a horizontal shaft, the roll being mounted on the shaft. Most of the times removing one single sheet from the roll without unreeling it requires the use of both hands: one for holding the roll and one for pulling the sheet. This is extremely inconvenient, in particular when the user has its hands wet or occupied. US 5,651,487 and US 6,805,271 offer two alternative solutions to this problem. Both solutions are specifically directed to the single-hand removal of paper towels and are ill suited for the use with plastic cushioning materials due to the excessive friction that the devices described in the aforementioned documents would exert on a plastic cushioning material being unwound.

**[0004]** Furthermore a dispensing system suitable for plastic cushioning materials must take into consideration specific characteristics of these materials. The first one is the wide range of roll widths plastic cushioning materials come in. The most common widths for cushioning materials range from 300 mm to 1,500 mm, but widths as low as 100 mm or as high as 2,000 mm are not uncommon. Therefore the design of the dispensing system must be such that it can be easily transposed to all different sizes and, preferably, that one device can dispense materials of different widths although selected from a restricted range.

**[0005]** The second characteristic that differentiates plastic cushioning materials from paper towels is the low resistance of plastic cushioning materials to longitudinal tearing. Depending on the direction of the applied force during the sheet removal operation plastic cushioning materials may tear along the length of the roll rather than across the perforation line causing losses of time and material.

**[0006]** Accordingly, there is a need in the art for a system to dispense single sheets of pre-perforated plastic cushioning materials without the limitations of the prior art systems.

### Disclosure of the invention

**[0007]** A first object of the present invention is a dispensing system for dispensing single sheets from a roll of a continuous web of plastic cushioning material containing transversal lines of perforations defining the single sheets (a roll of pre-perforated plastic cushioning material), said dispensing system comprising:

- a device for holding a horizontal shaft on which said roll can be rotatably mounted on; and
- a slotted bar, wherein the length and height of the slot are determined by the width and thickness of the material of the roll that should be dispensed, said slotted bar being provided at its side edges with elongated fastening means devised to join the side edges of said slotted bar to respective upward hanging positions in such a way that said slotted bar can swing and can pivot about its longitudinal axis by an angle greater than 0° and less than 180°, wherein the length of said elongated fastening means is equal to or slightly less than the distance between the hanging positions and the horizontal shaft.

**[0008]** A second object is a dispenser of single sheets of plastic cushioning material from a roll of pre-perforated plastic cushioning material, said dispenser comprising:

- a device for holding a horizontal shaft;
- a roll of pre-perforated plastic cushioning material rotatably mounted on said shaft, the free edge of such a roll being threaded through the suitably sized slot of a slotted bar laying on the roll surface;
- said slotted bar being provided at its side edges with elongated fastening means, joining the side edges of said slotted bar to respective upward hanging positions in such a way that said slotted bar can swing and can pivot about its longitudinal axis by an angle greater than 0° and less than 180°, said elongated fastening means being of a length equal to or slightly less than the distance between the hanging positions and the horizontal shaft.

**[0009]** In a preferred embodiment said hanging posi-

tions are suitably set with respect to the horizontal shaft so that contact between the slotted bar and the roll surface would occur at an angle of 45° ± 25° with respect to the vertical diameter of the roll.

**[0010]** A third object is a method for dispensing single sheets of pre-perforated plastic cushioning material from a roll, said method comprising:

- mounting a roll of pre-perforated plastic cushioning material on a horizontal shaft held by a dispenser in such a way that the roll can freely rotate about its longitudinal axis;
- threading the free edge of the roll downwardly through the suitably sized slot of a slotted bar, said slotted bar being provided at its side edges with elongated fastening means, joining the side edges of said slotted bar to respective upward hanging positions in such a way that said slotted bar can swing and can pivot about its longitudinal axis by an angle greater than 0° and less than 180°, said elongated fastening means being of a length equal to or slightly less than the distance between the hanging positions and the horizontal shaft; and
- pulling the web through the slot until the perforated line defining a sheet has passed the slot and then pulling said web downwardly thus separating the sheet along the perforation line without tearing the web longitudinally.

## Brief description of the drawings

**[0011]** Fig. 1 is a perspective view of the dispensing system of the present invention.

**[0012]** Fig. 2 is a perspective view of a dispenser according to one embodiment of the present invention.

**[0013]** Fig. 3 is a partial cross-sectional view of the slotted bar of the invention in a resting state (A, full line) and when in operation, during the roll unwinding step (B, dotted line)

**[0014]** Fig. 4 is an enlarged view of the slotted bar of the present invention.

## Mode(s) for carrying out the invention

**[0015]** The dispensing system 1 of the present invention is shown in Figure 1 in use with a roll of pre-perforated plastic cushioning material 4. The roll of plastic cushioning material consists of a continuous web of single sheets 5 separated by perforations 9, the web being wrapped around a cardboard core (not shown). The pre-perforated, or serrated, roll of plastic cushioning material 4 is mounted on a horizontal shaft 3 supported by a holding device. Said roll can freely rotate around the shaft or, alternatively, the roll can be integral with the shaft and the shaft can freely rotate in the holding device. The leading edge 8 of the cushioning material wound on the roll is threaded through a slot 16 of the slotted bar 10, transversely positioned across the width of roll 4 and in contact therewith. The size of the slot 16 is suitably designed, in width and in height, to let the web of cushioning material be threaded therethrough without difficulties.

**[0016]** Elongated fastening means 6 and 6a join the side edges of slotted bar 10 to respective hanging positions 7 and 7a upward with respect to the surface of roll 4. The distance of said hanging positions 7 and 7a from horizontal shaft 3 is equal to or slightly more than the length of elongated fastening means 6 and 6a.

**[0017]** With reference to Figure 2, which represents one embodiment of the dispenser 100 of the invention, slotted bar 10 is connected to holding device 2 by means of elongated fastening means 6 and 6a which join the side edges of the slotted bar 10 to hanging positions 7 and 7a positioned above the surface of roll 4.

**[0018]** The elongated fastening means 6 and 6a can be flexible wires or chains, such as preferably metallic small chains, or rigid rods. Slotted bar 10 however should be able to swing freely. For instance from a first "engaged" position in contact with the roll of plastic material (as shown in Fig. 2) to a second "raised" position (not shown) when a finished roll has to be removed and a new roll is to be mounted on shaft 3. When no roll is mounted on the shaft the possibility to swing will allow slotted bar 10 to be kept vertical by the gravity force. The elongated fastening means 6 and 6a therefore can be rigid rods but need anyway to be fastened to the dispensing device by a flexible joint, i.e. a joint that allows the elongated fastening means to swing relative to the dispensing device.

**[0019]** As shown in more detail in Figure 3, slotted bar 10 is also free to pivot about its longitudinal axis. Position A (full line) in Figure 3 shows a detail of the dispensing system 1 of the invention in its resting state, i.e. when no sheets of plastic cushioning material are being removed from roll 4. In this state slotted bar 10 rests on the surface of roll 4 forming an angle $\alpha$ with elongated fastening means 6 and 6a. Position B (dotted line) shows the dispensing system in operation, i.e. when the roll is being unwound. Angle $\alpha$ should not be $\leq 0°$ or $\geq 180°$. Preferably the slotted bar should not be able to pivot about its longitudinal axis by an angle $\alpha \leq 10°$ and $\geq 170°$, more preferably by an angle $\alpha \leq 20°$ and $\geq 160°$, and even more preferably by an angle $\alpha \leq 30°$ and $\geq 150°$.

**[0020]** A possible manner to join the elongated fastening means 6 and 6a to the slotted bar 10 in order to ensure the possibility to the bar to pivot as reported, is described in Figure 4. The slotted bar 10 is composed of two bars 11 and 12, defined by a length $l_b$. Said bars are kept at a fixed distance by two sets of side connectors 13 and 13a placed on opposite ends of the bars. Each set of connectors is composed of a first plate (14 and 14a) in direct contact with each of the bars and of a second plate (15 and 15a) adjacent to the first one and facing away from the bars. Elongated fastening mean 6 is joined to first plate 14 on the side facing second plate 15, that is it is held between the two plates. Similarly, elongated fastening mean 6a is joined to plate 14a and held be-

tween plate 14a and plate 15a. A first bolt 17 passing through both plates 14 and 15 secures said plates to one side of bar 11. A second bolt 18 secures plates 14 and 15 to one side of bar 12. In a similar way bolts 17a and 18a secure the second connector to the other end of bars 11 and 12 respectively. Elongated fastening means 6 and 6a are connected to first plates 14 and 14a in such a way that they are free to rotate, thereby allowing the pivoting of slotted bar 10 about its longitudinal axis. However the presence of bolts 17 and 18 (and 17a and 18a) will limit the rotation to an angle of greater than 0° and less than 180°.

**[0021]** Bars 11 and 12 have a polygonal cross-section, preferably square or rectangular as shown in Figures 3 and 4.

**[0022]** The size of bars 11 and 12, and consequently of slot 16, will depend on the width, or range of widths, of the sheets to be dispensed. In particular, bars 11 and 12 should have a length ($l_b$) slightly exceeding the maximum width of the sheets to be dispensed. Suitable lengths for bars 11 and 12 range from 150 mm up to 2,500 mm, preferably from 200 mm to 2,100 mm.

**[0023]** The other two dimensions of bars 11 and 12, that is their height and width, will be selected in order to obtain a sufficently rigid slotted bar 10 to properly perform. Generally, they will depend on several factors such as the length of the bars and the material making the bars. Typical dimensions for both the height and the width of bars 11 and 12 are from 0.5 to 10 cm, preferably from 1 to 8 cm and even more preferably from 1 to 6 cm.

**[0024]** Slotted bar 10 is preferably made of resilient materials that provide strength to the structure such as metals, reinforced plastics, wood and the like.

**[0025]** The height of slot 16, that is the distance between bars 11 and 12, will be determined by the thickness of the plastic cushioning material to be dispensed, in particular it will be greater than the thickness of the thicker material to be dispensed. Typically, the height of slot 16 will be from 0.5 to 30 mm greater, preferably from 0.5 to 20 mm greater than the thickness of the thicker material to be dispensed. Plastic cushioning materials have thicknesses ranging from 0.5 to 10 mm in the case of expanded polyolefin materials and from 2 to 20 mm in the case of cellular materials such as Bubble Wrap®. Typical values for the height of slot 16 are from 1 to 50 mm, from 1 to 40 mm, from 2 to 30 mm, from 5 to 25 mm.

**[0026]** The length of the elongated fastening means 6 and 6a should be equal or slightly less than the distance between the hanging positions 7 or 7a and the horizontal shaft 3. Preferably the difference between the length of the elongated fastening means and the distance between the hanging positions and the shaft should be less than the radius of the core of the roll being mounted on said shaft. This guarantees the contact of the slotted bar with the surface of the roll even when only a few sheets of cushioning material are left on the roll, therefore providing a dispensing device that continues to be highly effective even as the size of the roll of cushioning material decreases.

**[0027]** In a preferred embodiment the hanging positions 7 and 7a are set with respect to the horizontal shaft 3 so that contact between the slotted bar 10 and the surface of the roll 4 occurs in the sector at an angle of 45° $\pm$ 25° with respect to the vertical diameter of the roll.

**[0028]** Holding device 2 is shown in Figure 2 in the form of an A-shaped stand. These stands are commonly used in industrial environments, where a wide range of widths, up to the largest ones, is used. Other designs are however possible. For instance an alternative design, particularly suited for use in conjunction with narrow webs of plastic cushioning material, comprises a holding device for supporting the shaft on which the roll of plastic cushioning material is mounted, said holding device being attached to the underside of a counter and/or cabinet. The holding device could be in the form of a U-shaped bracket wherein each end of the U is designed to hold one end of the core of the roll or alternatively a shaft could be axially extended through the center of the core and mounted at its ends between the U-shaped bracket. The slotted bar, through the elongated fastening means, could be engaged either with the U-shaped bracket or alternatively to the underside of the counter and/or cabinet.

**[0029]** Still alternatively the slotted bar 10 could be attached through elongated fastening means 6 and 6a to upward hanging positions 7 and 7a fixed, for instance, on a wall and a movable and suitably sized holding device 2 can then be positioned in such a way to cooperate therewith to give the dispenser of the invention.

**[0030]** To operate the dispensing device of the present invention, the roll of plastic cushioning material is firstly mounted on the shaft 3, which is then engaged with holding device 2. These operations are facilitated by the fact that slotted bar 10 can be lifted up and away from shaft 3. Once the roll is supported on the holding device and slotted bar 10 is positioned across and in contact with roll 4, the free edge 8 of the web of plastic cushioning material is threaded through slot 16 to an extent that a user can grip the extending sheet. In general slotted bar 10 is positioned transversely across the direction of unreeling of roll 4. However the dispensing system 1 of the invention can effectively perform its function even when slotted bar 10 is positioned against the direction of unreeling of roll 4. The user then pulls the plastic cushioning material through slot 16 and unrolls the desired number of sheets from the roll 4. In this phase the friction between slotted bar 10 and the sheets passing through slot 16 slows at least partially the unrolling motion, thereby increasing the control that the user has on the number of sheets being unrolled. When the desired number of sheets is withdrawn from the roll, such that the perforation line to be torn is spaced away form the bar in contact with the surface of the roll, the desired number of sheets is pulled downward and slightly at an angle. This pulling motion serves to pin the bar facing the user into braking contact with the exterior surface of roll 4. The braking

action prevents the roll from rotating and also concentrates the force of the tearing motion to the perforations to cause the perforation to tear efficently and without causing any longitudinal tearing of the sheets. The braking effect of the slotted bar 10 eliminates the unrolling of unwanted sheets of plastic material during the tearing operation.

**[0031]** Thus the dispensing system and the dispensing device of the invention enable a user to reliably dispense only the desired number of sheets from a continuous web of pre-perforated plastic cushioning material with the use of one hand, without unreeling unwanted lengths of material and without causing the longitudinal tearing of the same.

**[0032]** Although the present invention has been described in connection with the preferred embodiments, it is to be understood that modifications and variations may be utilized without departing from the principles and scope of the invention, as those skilled in the art will readily understand. Accordingly, such modifications may be practiced within the scope of the following claims.

## Claims

1. A dispensing system (1) for dispensing single sheets (5) from a roll of a continuous web of pre-perforated plastic cushioning material (4), said dispensing system comprising: a device (2) for holding a horizontal shaft (3) on which said roll can be rotatably mounted on; and a slotted bar (10), wherein the length and height of the slot are determined by the width and thickness of the material of the roll that should be dispensed, said slotted bar (10) being provided at its edges with elongated fastening means (6, 6a) devised to join said side edges of said slotted bar to respective upward hanging positions (7, 7a) in such a way that said slotted bar can swing and can pivot about its longitudinal axis by an angle greater than 0° and less than 180°, wherein the length of said elongated fastening means (6, 6a) is equal to or slightly less than the distance between the hanging positions (7, 7a) and the horizontal shaft (3).

2. A dispenser (100) of single sheets of pre-perforated plastic cushioning material from a roll, said dispenser comprising: a device (2) for holding a horizontal shaft (3); a roll of pre-perforated plastic cushioning material (4) rotatably mounted on said shaft, the free edge (8) of such a roll being threaded through the suitably sized slot (16) of a slotted bar (10) laying on the surface of said roll (4); said slotted bar being provided at its edges with elongated fastening means (6, 6a), joining the side edges of said slotted bar to respective upward hanging positions (7, 7a) in such a way that said slotted bar can swing and can pivot about its longitudinal axis by an angle greater than 0° and less than 180°, said elongated fastening means (6, 6a) being of a length equal to or slightly less than the distance between the hanging positions (7, 7a) and the horizontal shaft (3).

3. The dispenser according to claim 2 wherein the hanging positions (7, 7a) are set with respect to the horizontal shaft (3) so that contact between the slotted bar (10) and the surface of the roll (4) occurs at an angle of 45° $\pm$ 25° with respect to the vertical diameter of the roll.

4. A method for dispensing single sheets of pre-perforated plastic cushioning material from a roll, said method comprising: mounting a roll of pre-perforated cushioning material (4) on a horizontal shaft (3) held by a holding device (2) in such a way that the roll can freely rotate about its longitudinal axis; threading the free edge (8) of the roll downwardly through the suitably sized slot (16) of a slotted bar (10), said slotted bar being provided at its side edges with elongated fastening means (6, 6a), joining the side edges of said slotted bar to respective upward hanging positions (7, 7a) in such a way that said slotted bar can swing and can pivot about its longitudinal axis by an angle greater than 0° and less than 180°, said elongated fastening means (6, 6a) being of a length equal to or slightly less than the distance between the hanging positions (7, 7a) and the horizontal shaft (3); and pulling the web through the slot (16) until the perforated line (9) defining a sheet has passed the slot and then pulling it downwardly thus separating the sheet along the perforation line without tearing the web longitudinally.

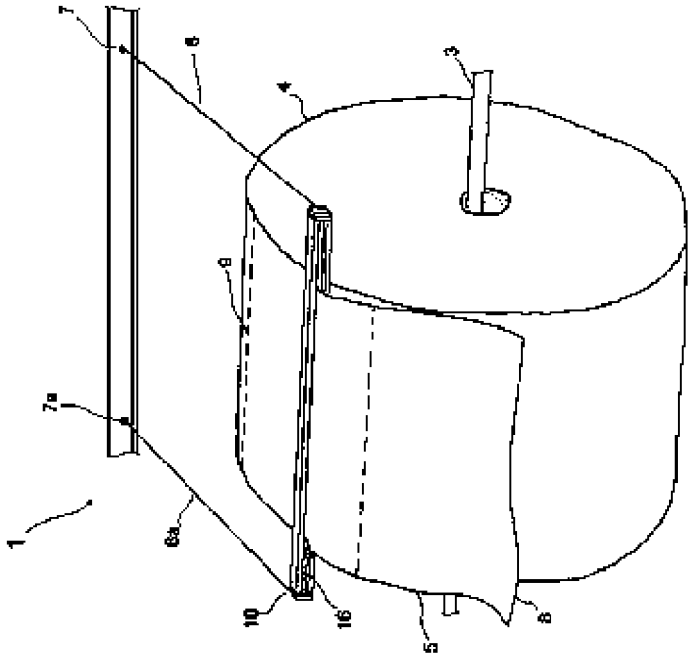


Fig. 1

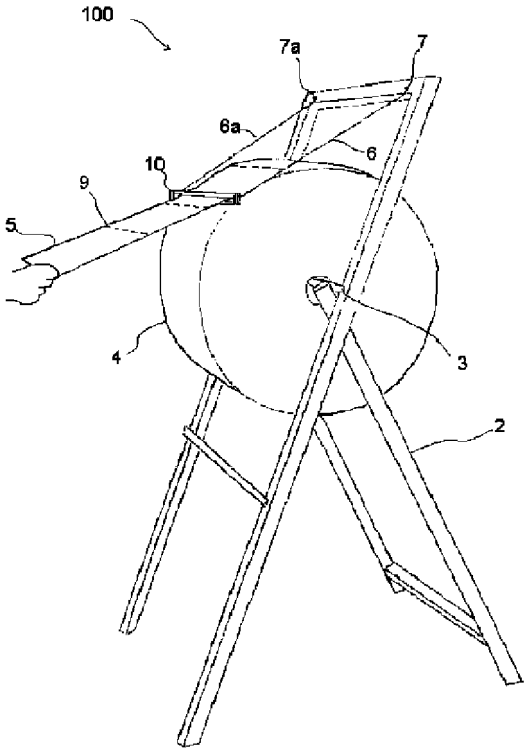


Fig. 2

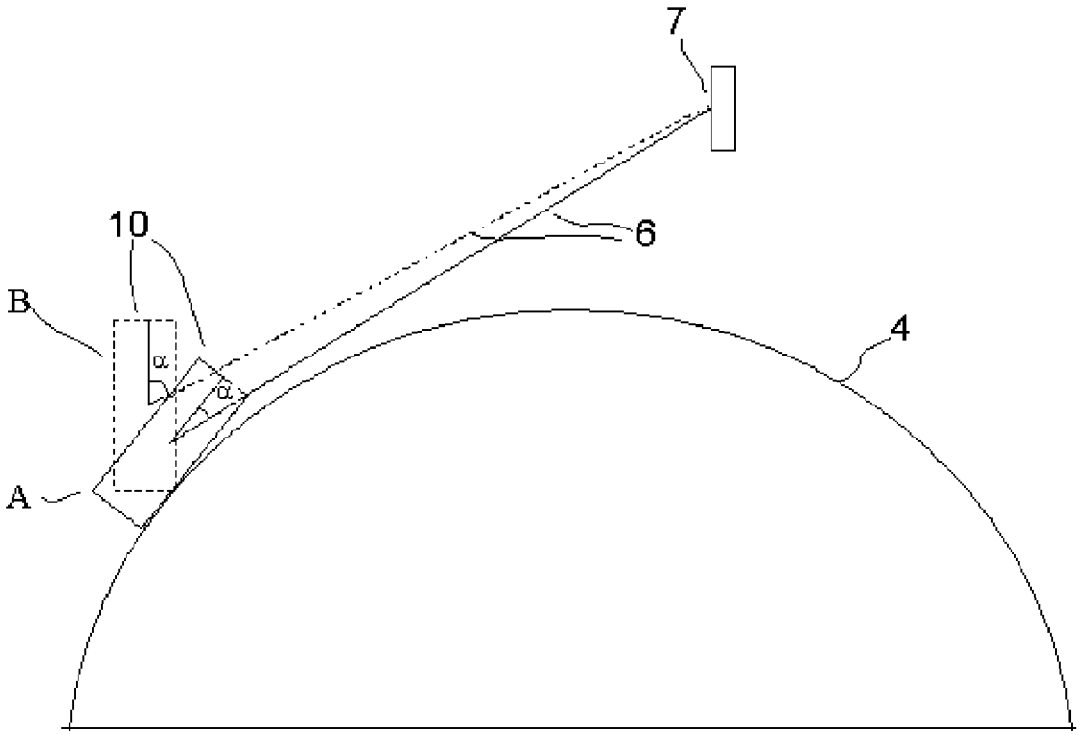


Fig. 3

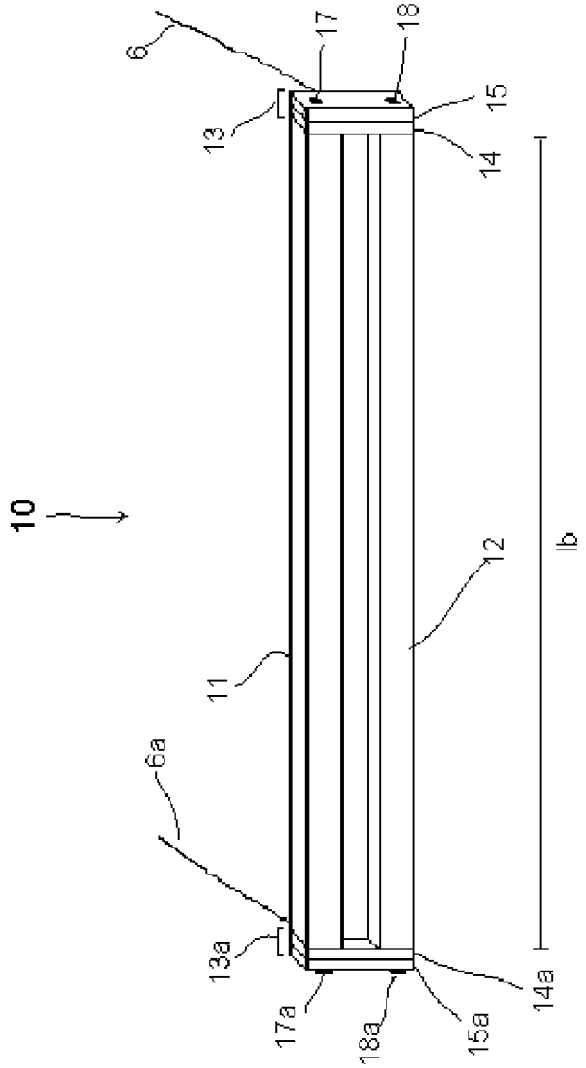


Fig. 4

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# EUROPEAN SEARCH REPORT

Application Number
EP 05 10 4738

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| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 10 November 2005 | Raven, P |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 10 4738

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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