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(54) **NIGHT COVER FOR A REFRIGERATED DISPLAY CASE AND REFRIGERATED DISPLAY CASE**
NACHTABDECKUNG FÜR EIN KÜHLREGAL UND KÜHLREGAL
ELEMENT DE FERMETURE NOCTURNE POUR UNE VITRINE FRIGORIFIQUE ET VITRINE
FRIGORIFIQUE

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Description

[0001] This invention relates to a night cover for a refrigerated display case comprising at least one vertical, horizontal or inclined cover section with two side ends each. The invention also relates to a refrigerated display case.

[0002] To prevent warmer ambient air from entering a refrigerated display case, an air curtain is used to cover the front opening of the refrigerated display case showing a flow direction from top to bottom or from side to side. The air curtain can be a single, double or multi-layer air curtain.

[0003] In addition refrigerated display cases are used to be covered at night or during closing hours of the shop. In particular open refrigerated display cases are known to be equipped with means for covering the front of the case during closing hours of the shop where the refrigerated display case presents refrigerated goods to the customer when the shop is open. By covering the refrigerated display case during closing hours the energy needed for refrigerating can be reduced. The night covers in use are usually blinds stored at the top end of the refrigerated display case during shop opening hours. Often blinds are used as night covers which are shut when the shop closes. Instead of blinds also panels are used to cover the front of the refrigerated display case.

[0004] One prior art example is described in document DE 298 04 329 U1. Figure 1 of the present application shows a sectional view of an example of an open-fronted refrigerated display case, in particular a refrigerated display stand or so called multideck cabinet. The basic case 1 is preferentially insulated and stands on feet 2. A cold air channel 5 for the back flow of cold air is located underneath storage space 3 where the goods are displayed. Storage space 3 is likely to comprise some shelves 12. For instance an evaporator 6 is placed in line with the cold air channel 5. The evaporator 6 can also be placed somewhere else in the cold air channels 5 or 7.

[0005] A cold air outlet is located at the front top end of the refrigerated display stand where the cold air flows through a grid 4 and then from top to bottom along the open front of the refrigerated display stand and back through grid 4' into the cold air channel 5 for the back flow of cold air. The flow along the front opening is indicated by arrows and forms a so called air curtain. The cold air entering via grid 4' is drawn back to the cold air outlet by a fan 8 located in the cold air channel 7.

[0006] A night covering is used to cover the front opening of the refrigerated display stand to save energy during the closing hours of the shop. The night covering shown in the example of Figure 1 is a night blind 10 with pivoted rod 9. The night blind 10 shows a perforation which is necessary to inhibit the build up of condensation inside the covered area of the refrigerated display stand. Especially at the underside of the shelves 12 condensation would build up when using unperforated blinds. The build up of condensation should be avoided in order to ensure

the goods displayed in proper condition. The condensation would cause a wet product to be displayed which is unsatisfactory for the customer and could damage the products on the long run.

[0007] With the perforated night blind 10 shut a so called cold air lake builds up at the lower level (10b) of the storage space 3 inside the refrigerated display case. This lower level (10b) lays for example underneath the dotted line 11 shown in figure 1. From this lower level cold air flows through the perforation holes in the blind and is therefore lost for refrigeration of the goods (see dotted-broken arrows). At the same time ambient air flows into the storage space via the perforation holes at the upper level (10a) of the blind (see dotted-broken arrows in the upper region). The loss of cold air at the lower level is high due to the fact that cold air tends to fall. Also due to this fact a current builds up that sucks in ambient air via the perforation holes of the upper level of the blind, because the amount of cold air flowing back to the channel 5 and therefore comes back via channel 7 to the upper level is reduced and because of warmer air tends to rise.

[0008] The intake of warmer ambient air at the upper level of the storage space reduces the risk of build up of condensation. The risk is especially high at the upper level because of the cold air being at its minimum temperature when entering the storage space at the top. The cold air becomes slightly warmer on its way down the air curtain. Therefore the build up of condensation is less likely at the lower level.

[0009] The described loss of cold air at the lower level of the storage space can be reduced by adapting the diameter of the perforation holes in such a way that the diameter decreases with decreasing height. This reduces the unwanted loss but tends to need more efforts in producing the blinds.

[0010] It is an object of the present invention to provide a better night cover for refrigerated display cases which can be produced with less efforts and gives considerable safety in preventing the build up of condensation.

[0011] This object is met by a night cover for a refrigerated display case according to the present invention comprising at least one cover section having a first end and a second end in a longitudinal direction and two side ends each and having at least one gap decreasing in width between at least one of said side ends and an element located next to this side end wherein the gap width decreases with increasing distance from the first end.

[0012] The loss of cold air at the end of the storage space located at the second end of the cover section is minimized by the decreasing width of the gap. The intake of warmer ambient air is encouraged by the wider gap at the first end of the cover section. The term "element located next to this side end" here includes a next cover section neighbouring this side end of the first cover section as well as the side wall of the refrigerated display case neighbouring for example the side end of the last one cover section in a row.

[0013] Depending on the design of the particular re-

frigerated display case, the night cover extends vertically, horizontally or inclined. In case of a vertical arrangement of the night cover, the longitudinal direction of the cover section extends vertically and the first end of the cover section is the upper end thereof so that the gap has its largest width at the upper end of the cover section. In case of a horizontally arranged night cover, the longitudinal direction of the cover section is parallel to the air flow direction and the positions of the first and second ends of the cover section depend on the air flow direction. The first end is at that longitudinal end of the cover section where the air flow exiting from the cold air outlet is entering the refrigerated display space and has the lower temperature. Similar considerations apply to a night cover which is arranged with inclination.

[0014] The night cover and in particular the night cover sections according to embodiments of the invention can be designed as blinds, especially as roller blinds, or alternatively as panels.

[0015] The following particulars are related to embodiments with a horizontally arranged night cover.

[0016] In accordance with an embodiment of the present invention the night cover comprises cover sections showing a trapezium shape with the two parallel sides at the top and bottom and the two non-parallel sides at the side ends formed as straight lines. Alternatively, the night cover comprises cover sections showing a shape similar to the trapezium shape but with the two non-parallel sides at the side ends formed as curved lines. In both cases the width of the gap narrows with decreasing height.

[0017] In accordance with an embodiment of the present invention the cover or each cover section is formed by a blind or a blind section, respectively.

[0018] In accordance with an embodiment of the present invention each blind section has its own individual pivoted rod. Alternatively, the night cover comprises one pivoted rod to which all blind sections are mounted. Gaps separate the individual blind sections to make sure they do not interfere with each other when being rolled up and let down. The gaps narrow with decreasing height but still leave a small width at the bottom. The pivoted rod(s) can be mounted at the top of blind sections or alternatively at the bottom. For the latter holders are provided at the top of the refrigerated display to hold the blind sections in closed position.

[0019] In accordance with an embodiment of the present invention the night cover comprises a weight in the bottom end of the cover sections. This is especially useful for straightening blinds made of a light weight material to ensure there is no gap between the bottom end of the blind and the bottom end of the storage space. In addition the position of the cover can be fixed to a holder at the bottom end. The weight can be part of or mounted to one single rod where all cover sections are fixed to. Alternatively, separate rods for each cover section can be provided each comprising such a weight.

[0020] For horizontal or inclined cover sections the

above-mentioned embodiments can be realized as well with adaptation to the different longitudinal direction of the cover section.

[0021] Embodiments of the present invention are now described in greater detail with reference to the drawings.

Figure 1 shows a refrigerated display case as described above comprising a conventional night cover; and
 Figure 2 shows an embodiment of a night cover according to the present invention having three cover sections;
 Figure 3 shows an embodiment of a night cover according to the present invention having a single cover sections and straight lined side lines;
 Figure 4 shows an embodiment of a night cover according to the present invention having a single cover sections and curved side lines; and
 Figures 5 to 9 show examples of differently shaped refrigerated cases equipped with night covers according to the present invention.

[0022] Figure 2 shows an exemplary embodiment of a vertically arranged night cover of the present invention comprising three blind sections A, B, and C. Embodiments with only one blind section or any other number of blind sections different from three would be possible as well. Each of the blind sections A, B, and C is shaped like a trapezium. There are gaps 22 between each of two adjacent blind sections A, B, and C. The three blind sections A, B, and C together form a blind 21 which covers for example a refrigerated display case similar to the refrigerated display case shown in Figure 1. Dash and dote lines 26 at both side ends 25 of the blind 21 indicate the positions of side walls of a refrigerated display case for which the blind 21 may be used. The shape of each blind section A, B and C and in particular the shape of the gaps 22 is adapted to the desired amount of air flowing in and out of the refrigerated display case at a certain height of the refrigerated display case. The shape of the blind sections A, B, and C could alternatively be trapezium like, e.g. with curved side lines (not shown) instead of straight side lines 25 (as shown) at the nonparallel sides. The design is adaptable to the layout of different refrigerated display cases. As the gap 22 narrows with decreasing height the flow of cold air out of the refrigerated display case and the flow of ambient air into the refrigerated display case is adapted to the need of preventing the build up of condensation on the one hand and the minimization of energy loss on the other hand.

[0023] In the example shown in Figure 2, the blind sections A, B and C are mounted on one single pivoted rod 23. In an alternative embodiment (not shown), each of the blind sections A, B, and C is mounted to an associated one of a plurality of rods.

[0024] The gaps 22 separate the individual blind sections A, B and C over their full length to make sure they do not interfere with each other when being rolled up and let down. The gaps 22 narrow with decreasing height but still leave a small width at the bottom.

[0025] The night cover 21 according to the invention can be improved by implementing a weight into the bottom end of the cover sections A, B, and C. This is especially useful for straightening blinds made of a light weight material to ensure there is no gap between the bottom end of the blind and the bottom end of the storage space. This weight can be part of or mounted to one single rod 24 where all cover sections are fixed to. As an alternative (not shown) each one of the blind sections A, B, and C is provided with its own bottom end rod 24.

[0026] Figure 3 shows an embodiment of a night cover according to the present invention having a one-piece cover 21 with straight side lines 25, a single pivoted rod 23 and a single bottom end rod 24.

[0027] Figure 4 shows an embodiment of a night cover according to the present invention having a one-piece cover 21 with curved side lines 25, a single pivoted rod 23 and a single bottom end rod 24.

[0028] One or all of the blind sections A, B, and C may have straight side lines 25 or curved side lines 25 at at least one of the sides in accordance with Figure 3 and 4, respectively.

[0029] According to a further aspect, the the invention provides a refrigerated display case and more particularly an open-fronted refrigerated display case, especially an open-fronted refrigerated display stand comprising a night cover of the kind described above. Differently designed embodiments of such refrigerated display cases are shown in Figures 5-9 very schematically.

[0030] Figure 5 shows a multideck refrigerated display case 1a similar to the case shown in Figure 1. Figure 6 shows a smaller refrigerated display island 1b with a single night cover 21 at a top surface. Figure 7 shows a wider refrigerated display island 1c with two night cover 21 at a top surface. Figure 8 shows a refrigerated display case 1d of the type called "serve over counter" with a single night cover 21 at an inclined surface facing sales personnel. And Figure 9 shows a refrigerated display case 1e of the type called "semi-vertical" with a single night cover 21 at an inclined surface facing customers.

[0031] In general the night cover according to the present invention is suitable for all purposes where a cooled zone, e. g. the space inside the refrigerated display case, and a warmer zone, e. g. the ambient air in the shop, are to be separated by allowing only a certain limited flow between the two zones.

Claims

1. Night cover (21) for a refrigerated display case comprising at least one cover section (A, B, C) having a first end (27) and a second end (28) in a longitudinal

direction **characterized in that** it comprises two side ends (25) each and having at least one gap (22) decreasing in width between at least one side end (25) and an element located next to this side end (25) wherein the gap width decreases with increasing distance from the first end (27).

2. Night cover (21) according to claim 1 wherein the element located next to said one side end (25) of the cover section (A, B, C) is an adjacent further cover section (A, B, C).

3. Night cover (21) according to claim 1 or 2 wherein the element located next to said one side end (25) of the cover section (A, B, C) is an adjacent side wall of a display case (1) to which the cover section (A, B, C) is applied.

4. Night cover (21) according to any of claims 1 to 3 comprising at least one cover section (A, B, C) designed as a blind.

5. Night cover (21) according to claim 4 wherein the blind is designed as a roller blind.

6. Night cover (21) according to any of claims 1 to 4 comprising at least one cover section (A, B, C) designed as a panel.

7. Night cover (21) according to one of claims 1 to 6 comprising at least one cover section (A, B, C) showing a trapezium shape with the two parallel sides at the first and second ends and the two non-parallel sides at the side ends (25) formed as straight lines.

8. Night cover (21) according to one of claims 1 to 7 comprising at least one cover section (A, B, C) showing a shape similar to the trapezium shape but with the two non-parallel sides at the side ends (25) formed as curved lines.

9. Night cover (21) according to one of claims 5 to 8 comprising a pivoted rod (23) for the at least one blind section (A, B, C).

10. Night cover (21) according to one of claims 5 to 9 comprising a plurality of blind sections (A, B, C) and one pivoted rod (23) to which all blind sections (A, B, C) are mounted.

11. Night cover (21) according to one of claims 1 to 10 comprising a weight in the second end (24) of the cover sections A, B and C.

12. An open-fronted refrigerated display case (1; 1a; 1b; 1c; 1d) comprising a night cover (21) according to one of the preceding claims.

Patentansprüche

1. Nachtabdeckung (21) für eine Kühlvitrine, mit mindestens einem Abdeckungsabschnitt (A, B, C) mit einem ersten Ende (27) und einem zweiten Ende (28) in Längsrichtung,
dadurch gekennzeichnet, dass sie jeweils zwei seitliche Enden (25) aufweist, wobei mindestens ein Spalt (22) vorhanden ist, der zwischen mindestens einem seitlichen Ende (25) und einem diesem seitlichen Ende (25) benachbarten Element in seiner Breite abnimmt, wobei die Spaltbreite mit zunehmender Distanz von dem ersten Ende (27) abnimmt. 5
2. Nachtabdeckung (21) nach Anspruch 1, wobei es sich bei dem Element, das benachbart dem einem seitlichen Ende des Abdeckungsabschnitts (A, B, C) angeordnet ist, um einen benachbarten, weiteren Abdeckungsabschnitt (A, B, C) handelt. 10
3. Nachtabdeckung (21) nach Anspruch 1 oder 2, wobei das dem einen seitlichen Ende (25) des Abdeckungsabschnitts (A, B, C) benachbarte Element eine benachbarte Seitenwand einer Vitrine (1) ist, an der der Abdeckungsabschnitt (A, B, C) vorgesehen 15
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4. Nachtabdeckung (21) nach einem der Ansprüche 1 bis 3, mit mindestens einem Abdeckungsabschnitt (A, B, C), der als Jalousie ausgebildet ist. 30
5. Nachtabdeckung (21) nach Anspruch 4, wobei die Jalousie als Rollo ausgebildet ist. 35
6. Nachtabdeckung (21) nach einem der Ansprüche 1 bis 4, mit mindestens einem Abdeckungsabschnitt (A, B, C), der als Flächenelement ausgebildet ist. 40
7. Nachtabdeckung (21) nach einem der Ansprüche 1 bis 6, mit mindestens einem Abdeckungsabschnitt (A, B, C) mit Trapezform, wobei die beiden parallelen Seiten an dem ersten und dem zweiten Ende sowie die beiden nicht parallelen Seiten an den seitlichen Enden (25) als gerade Linien ausgebildet sind. 45
8. Nachtabdeckung (21) nach einem der Ansprüche 1 bis 7, mit mindestens einem Abdeckungsabschnitt (A, B, C) mit einer Form ähnlich der Trapezform, wobei jedoch die beiden nicht parallelen Seiten an den seitlichen Enden (25) als gekrümmte Linien ausgebildet sind. 50
9. Nachtabdeckung (21) nach einem der Ansprüche 5 bis 8, 55

mit einer drehbar gelagerten Stange (23) für den mindestens einen Jalousieabschnitt (A, B, C).

10. Nachtabdeckung (21) nach einem der Ansprüche 5 bis 9, mit einer Mehrzahl von Jalousieabschnitten (A, B, C) und einer einzigen drehbar gelagerten Stange (23), an der alle Jalousieabschnitte (A, B, C) angebracht sind.
11. Nachtabdeckung (21) nach einem der Ansprüche 1 bis 10 mit einem Gewicht an dem zweiten Ende (24) der Abdeckungsabschnitte A, B und C.
12. Kühlvitrine (1; 1a; 1b; 1c; 1d) mit offener Vorderseite, die eine Nachtabdeckung (21) nach einem der vorhergehenden Ansprüche aufweist.

Revendications

1. Élément de fermeture nocturne (21) pour une vitrine frigorifique comprenant au moins une section d'élément de fermeture (A, B, C) présentant une première extrémité (27) et une seconde extrémité (28) dans une direction longitudinale, **caractérisé en ce qu'il** comprend deux extrémités latérales (25) présentant chacune au moins une fente (22) se réduisant en largeur entre au moins une extrémité latérale (25) et un élément situé à côté de cette extrémité latérale (25), dans lequel la largeur de la fente se réduit au fur et à mesure qu'elle s'éloigne de la première extrémité (27).
2. Élément de fermeture nocturne (21) selon la revendication 1, dans lequel l'élément situé à côté de ladite une extrémité latérale (25) de la section d'élément de fermeture (A, B, C) est une autre section d'élément de fermeture adjacente (A, B, C).
3. Élément de fermeture nocturne (21) selon la revendication 1 ou 2, dans lequel l'élément situé à côté de ladite une extrémité latérale (25) de la section d'élément de fermeture (A, B, C) est une paroi latérale adjacente d'une vitrine frigorifique (1), sur laquelle la section d'élément de fermeture (A, B, C) est appliquée.
4. Élément de fermeture nocturne (21) selon l'une quelconque des revendications 1 à 3, comprenant au moins une section d'élément de fermeture (A, B, C) conçue comme un store.
5. Élément de fermeture nocturne (21) selon la revendication 4, dans lequel le store est conçu comme un store roulant.

6. Élément de fermeture nocturne (21) selon l'une quelconque des revendications 1 à 4, comprenant au moins une section d'élément de fermeture (A, B, C) conçue comme un panneau. 5
7. Élément de fermeture nocturne (21) selon l'une quelconque des revendications 1 à 6, comprenant au moins une section d'élément de fermeture nocturne (A, B, C) présentant une forme trapézoïdale avec les deux côtés parallèles sur la première et seconde extrémités et les deux côtés non parallèles sur les extrémités latérales (25) formées comme des lignes droites. 10
8. Élément de fermeture nocturne (21) selon l'une quelconque des revendications 1 à 7, comprenant au moins une section d'élément de fermeture (A, B, C) présentant une forme similaire à la forme trapézoïdale mais avec les deux côtés non parallèles sur les extrémités latérales (25) formées comme des lignes courbes. 15 20
9. Élément de fermeture nocturne (21) selon l'une quelconque des revendications 5 à 8, comprenant une tige pivotante (23) pour l'au moins une section de store (A, B, C). 25
10. Élément de fermeture nocturne (21) selon l'une quelconque des revendications 5 à 9, comprenant une pluralité de sections de store (A, B, C) et une tige pivotante (23), sur laquelle toutes les sections de store (A, B, C) sont montées. 30
11. Élément de fermeture nocturne (21) selon l'une quelconque des revendications 1 à 10, comprenant un poids dans la seconde extrémité (24) des sections d'élément de fermeture A, B et C. 35
12. Vitrine frigorifique à ouverture frontale (1 ; 1a ; 1b ; 1c ; 1d) comprenant un élément de fermeture nocturne (21) selon l'une quelconque des revendications précédentes. 40

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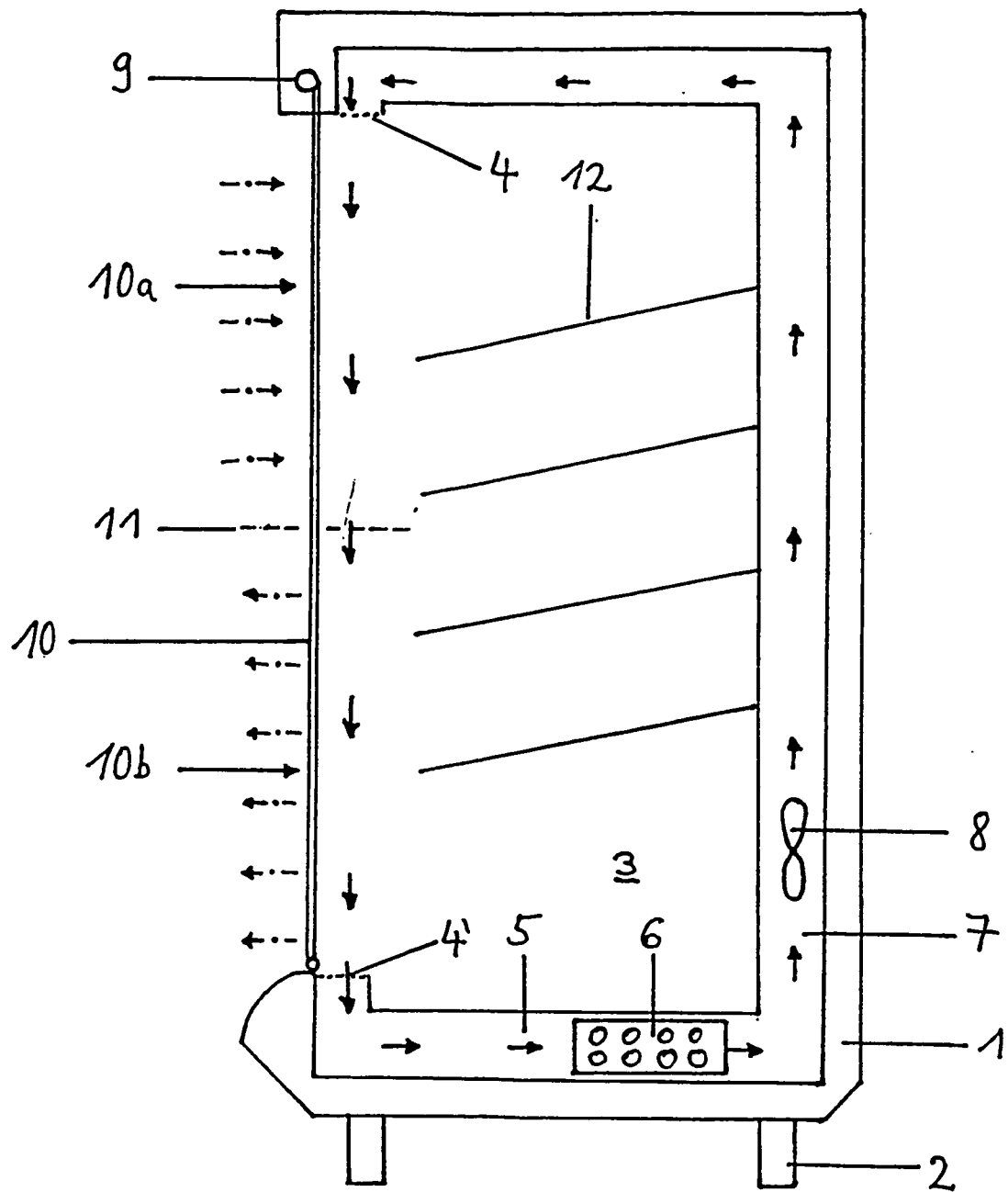


Fig. 1

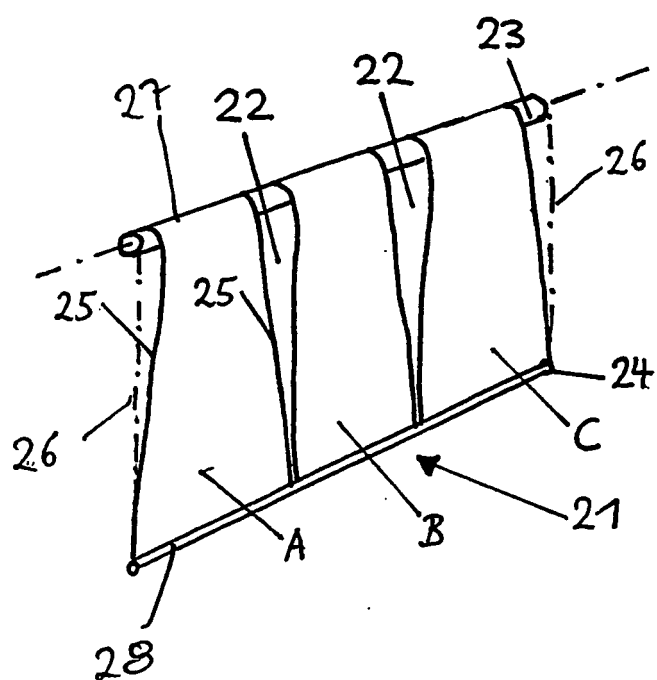


Fig. 2

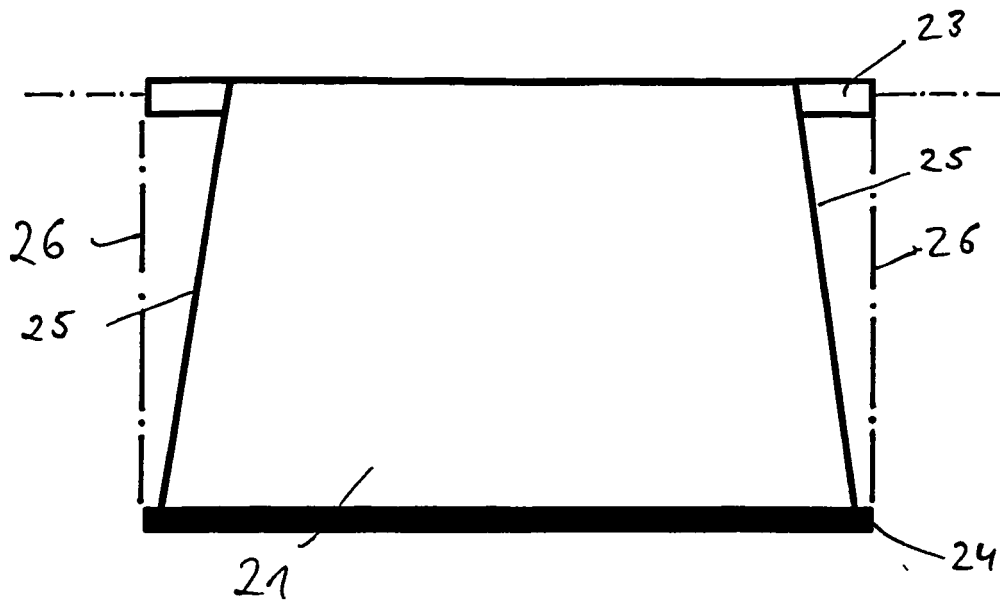


Fig. 3

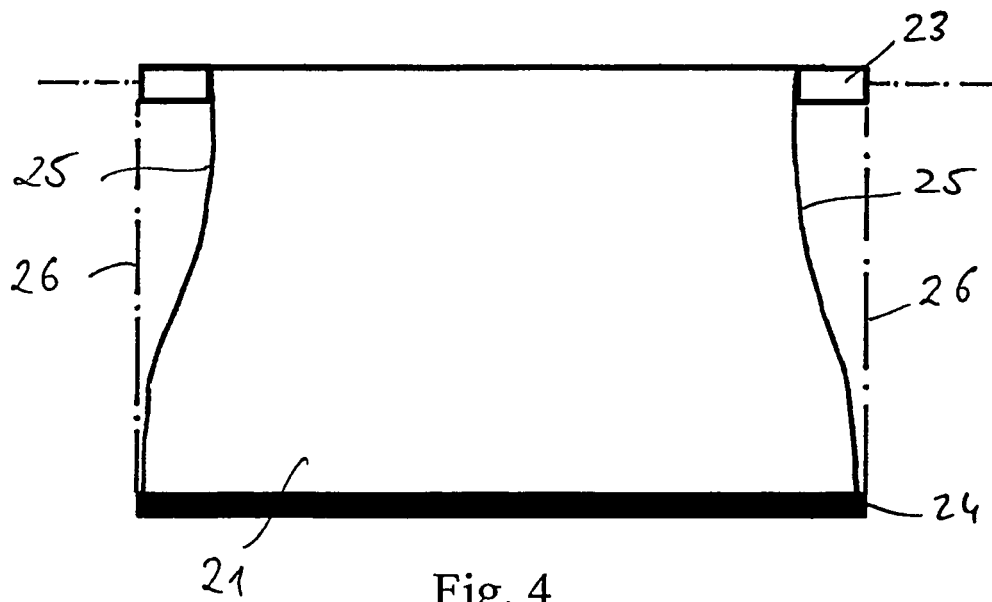


Fig. 4

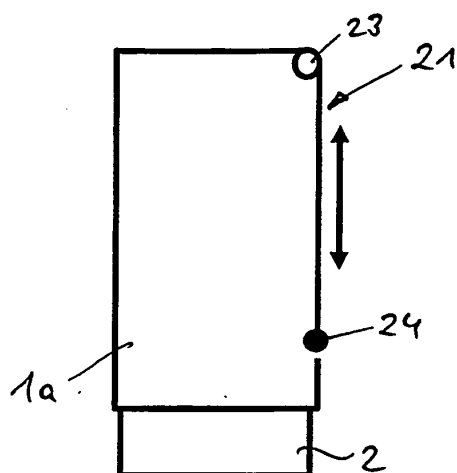


FIG. 5

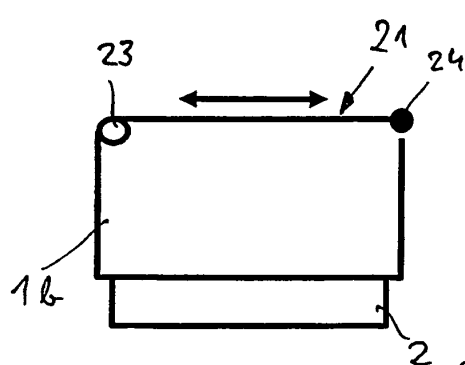


FIG. 6

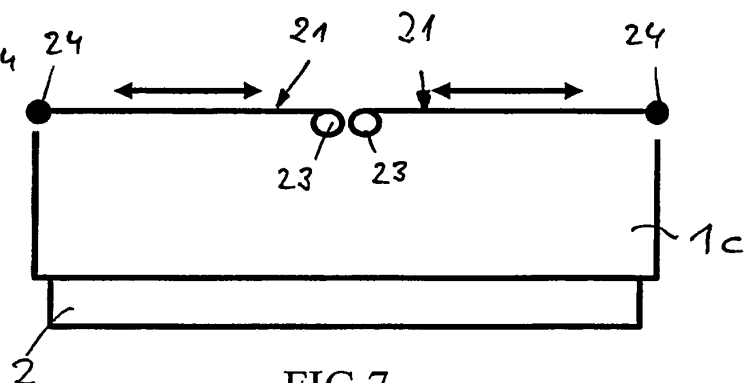


FIG. 7

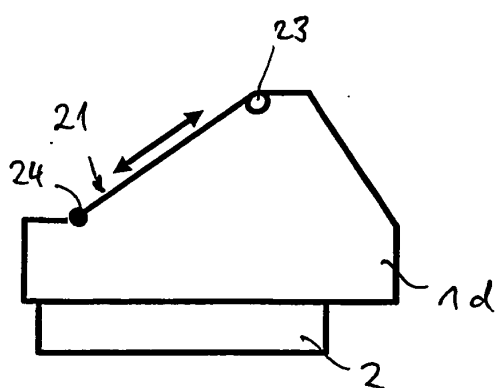


FIG. 8

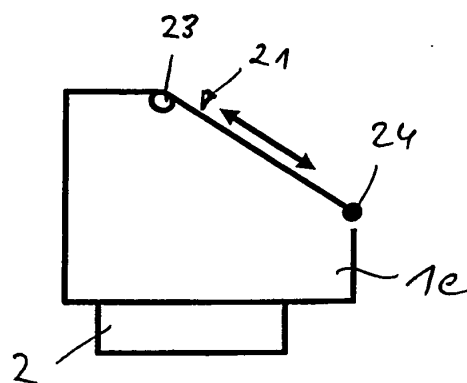


FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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