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(54) **Method of protecting rod-like elements gathered in tray while handling the tray**

Verfahren zum Schutz von stabförmigen Elementen auf einem Schragen während der Handhabung des Schragens

Procédé de protection d'éléments de type tige rassemblés dans un récipient plateau lors de la manipulation du récipient

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Description

[0001] The object of the present invention is a method of protecting rod-like elements gathered in a tray used in the tobacco industry from translocations while handling the tray during unloading the tray in order to transfer the rod-like elements to the next workstations.

[0002] The trays are often used in production lines that produce tobacco products such as cigarettes, cigarette filters or cigars as intermediate stores in order to temporarily store the rod-like elements. Especially, they apply in cases when the machine supplying the rod-like elements has a different operating capacity than that of the element-receiving machine. The trays are also used, where the ready products are transferred among various production lines. The supply of the rod-like elements to the workstations takes place after their unloading by a tray-unloader. Many different types of trays are employed in the tobacco industry. The general operating principle of the tray-unloader consists in that each delivered tray rotates so as to mechanically empty its content or unload it by gravity, wherein rotary motion or a combination of rotary-linear motion are used and full trays are supplied from below or they translocate along the direction of axis of rotation of the rotary mechanism. During the tray rotation, the rod-like elements are held down by means of a supporting plate that contacts the upper open side of the tray. After the tray rotation and placement in the tray unloading position, the supporting plate withdraws from its lower holding position. Then the rod-like elements fall down by gravity out of the tray onto the rod-like elements already present in the hopper or they can be removed mechanically from the tray. In the applied tray-unloaders, the tray-rotary mechanism is constructionally integrated with the supporting plate, wherein the supporting plate contacts the rod-like elements during the tray rotary motion and only in the course of the tray rotary motion. It results from the fact that the trays are not filled up to their upper edge. It is because the products are manufactured with certain allowances, thus the filing level becomes variable. Besides, the tray-loaders designed to fill trays with the rod-like elements cannot ensure the filling repeatability of the tray. In addition, also the upper tray corners cannot be fully filled up because of the element translocations that take place in the tray transport to the tray-unloader. Because of the clearance between non-uniform layer of the rod-like elements in the tray and also considering that the supporting plate does not enter the tray interior but only abuts to its upper edge, the rod-like elements translocate during rotation of the filled up tray so as to be supported by the supporting plate, and at the same time rub against the back wall of the tray. The above-mentioned translocations result in a dynamic load exerted on the rod-like elements as well as in the damage of the element ends that contact the back wall of the tray. After the tray rotation, the rod-like elements rest on the supporting plate until it is withdrawn. The withdrawal of the supporting plate follows in its linear motion, swinging motion or resultant of linear and swinging motion. Many patent specifications present systems of that type. For example, from the US patent specification no. 3,527,369 tray-unloading device is known wherein the supporting plate for the rod-like elements has a swinging mount. The supply of filled-up tray and placement thereof below under the supporting plate is made in the linear motion and in parallel direction to the rotation axis of the rotary mechanism, and then the tray is interlocked in the mentioned mechanism and rotated together with the supporting plate. Having rotated, the tray is lowered so as to take up its unloading position as near as possible to the earlier unloaded rod-like elements, wherein the supporting plate is removed to its withdrawn position. From another US patent specification no. 3,298,549, also a tray-unloading device is known, wherein the supporting plate for the rod-like elements travels in its linear motion between the hold-up position and the withdrawn position. The filled-up tray approaches from below the supporting plate on the rotary mechanism. Having been then interlocked, the tray and the supporting plate will rotate. The ultimate phase of the tray travel toward the unloading position is a resultant combination of rotary and linear motions. The tray arrives at its unloading position above the earlier unloaded rod-like elements, and the supporting plate having been removed, the unloading of rod-like elements out of the tray will follow. In other US patent specification no. 3,655,080, a tray-unloading device is also disclosed, wherein the rod-like elements are held by means of two-part supporting plate. The filled-up tray approaches the two-part supporting plate from below and then becomes interlocked in the rotary mechanism and rotated. Having rotated, the tray is lowered down to its unloading position, wherein the two symmetric halves of the two-part supporting plate are separated and the rod-like elements unloading follows. In all the known solutions, during the tray rotation, the rod-like elements can translocate relative to the tray and approach the supporting plate. It is because of clearance between the upper surface of elements and the surface of the supporting plate. Especially, the clearance is increased at the corners of the tray. Thus a part of the rod-like elements becomes damaged, in particular the element ends that rub against the back wall of the tray. In addition, the dynamic motion of the rod-like elements can cause them to take up non-parallel positions relative to the other adjacent elements. Also, considering the structural conditions of the unloading device, the supporting plate does not hold up the rod-like elements along their entire length, which might also cause their deformations. Slightly different device in form of attachment for hand emptying of trays is known from the description of patent US 2,753,062. According to this invention the attachment is placed onto a tray filled with cigarettes, the attachment covers two open sides of the tray, whereas the top open side is covered with two flaps rotary mounted on axes attached perpendicularly in corners of the plate which covers the front open side of the tray. After placing the attachment the flaps mentioned above of the width

corresponding to the width of the tray fall onto the surface of stack of cigarettes in the tray with swing movement round the axes of rotation and finally they overlap, whereas the flaps are positioned with their lengths perpendicularly to the cigarettes in the tray. Having the attachment positioned as above the operator grips the tray and the attachment pressing the flaps over the cigarettes, which causes deformation of the cigarettes especially in the centre part of the tray, where the flaps overlap, for they are made of rigid material like plexi having trade names "Perspex" or "Lucite". The pressure of the flaps causes that cigarettes translocate and fill the corners of the tray, nevertheless the flaps do not copy a natural layout of cigarettes in the tray but they translocate them in the space under the flaps and deform them. After making a rotation above the hopper of the packer the operator releases the overlapping connection of the flaps, which causes that the flaps open the side of the tray with swing movement by gravity and mass of the cigarettes falls out of the tray in an uncontrolled manner onto the cigarettes gathered in the hopper, which causes further damages. Such attachment can not be applied in modern production lines for cigarettes.

[0003] The object of this invention is a method of protecting the rod-like elements gathered in a tray , the tray having a back wall and side walls, while handling the tray during the operation of rotating the tray in a tray unloading device, the tray filled with rod-like elements being fed to the unloading device with its top open side upwards, after locking in the device and rotation through an angle of about 180°, the rod-like elements move out of the tray by gravity or mechanically for the next workstations. According to this invention, in the tray that moves toward the unloading device, the rod-like elements are held down from above with the aid of a segment support consisting of numerous separate segments positioned so that their lengths are parallel to the rod-like elements, the segment support is connected to the unloading device. Each segment can displace freely and independently on others over a plane perpendicular to the back wall of the tray and parallel to the side wall of the tray, moreover during feeding the tray, the segments enter the tray interior until they contact the rod-like elements thus copying the natural layout of the rod-like elements in the tray, then all the segments become locked in the tray, and after rotation of the tray with the segments and the immobilized rod-like elements, the segments and the rod-like elements resting on them are properly displaced to one common level, and then the segments are removed in direction perpendicular to the back wall of the tray, which enables the tray unloading. The number of segments of the support is compatible with the assumed precision of copying the natural layout of the rod-like elements in the tray. All the segments can be equal, the rod-like elements being held by the segments along their entire length. The presented method enables rotating the tray filled up with the rod-like elements with no translocation of elements relative to the tray. Thus the rod-like elements are not exposed to the dynamic loads, damage of their ends or unparallel layout relative to other adjacent elements. While handling the tray, the filling degree of the tray has no negative influence whatsoever and the operation remains also reliable if the tray is slightly overfilled above its upper edge. The segment length can be freely adapted depending on the length of rod-like elements so as to support the elements along their entire length and prevent them from squeezing.

[0004] For better understanding, the object of the invention is presented in a simplified way for an exemplary embodiment in the following drawings. Fig. 1 presents a perspective view of a plate assembly of a rotary mechanism of a tray unloading device, segments of a segment support and a tray filled up with rod-like elements, the tray awaiting to be placed in the unloading device, fig. 2 -a front open side view of the assembly and the tray shown in fig. 1, fig. 3 -a cross-section of the assembly and the tray shown in fig. 2, fig. 4 -a view of the assembly from fig. 2 after the tray placement on the plate of the rotary mechanism, fig. 5 -a cross-section view of the assembly from fig. 4, fig. 6 - the assembly from fig. 5 after its rotation, fig. 7 - the assembly from fig. 6 after leveling the segments of the support, fig. 8 -a front open side view of the assembly from fig. 7, fig. 9 - the position of the assembly from fig. 7 after the tray placement in the unloading position and fig. 10 -a cross-section of the plate of the rotary mechanism and segments after rotation in the awaiting position for the next consecutive tray.

[0005] Embodiment. In fig. 1, fig. 2 and fig. 3 of the drawing, a situation is presented, wherein an unloading device 1 is ready to receive a tray 2 filled up with rod-like elements 3. The device 1 has a plate 4 connected to the rotary mechanism that rotates by means of an axis 5. A segment support 6 is fastened to the plate 4, wherein each segment 7 is separately suspended by means of a four-bar linkage 8 on the plate 4 and the length of segments 7 is compatible with that of the rod-like elements 3 and is parallel to them. In the shown instant, the segments 7 are freely suspended and can stay in any position along the direction of motion of the tray 2. During the displacement of the tray 2 upwards so as to position it on the plate 4 of the rotary mechanism (fig. 4 and fig. 5), the segment support 6 enters the interior of the tray 2 so that the individual segments 7 contact the rod-like elements 3 and copy the natural layout of the rod-like elements 3 in the tray 2. Then after locking the tray 2 on the plate 4, the segments 7 are also locked in the position determined earlier and then the plate 4 and the tray 2 rotate round the axis 5 (fig. 6), afterwards the segments 7 are withdrawn to one common level (fig. 7, fig. 8) so that the segment support 6, on which the external layer of the rod-like elements 3 rests, forms one common plane. At the next stage (fig. 9), the tray 2 with the rod-like elements 3 is positioned on the support plate 9 at the unloading section 10 of the unloading device 1 and the plate 4 of the rotary mechanism and the segments 7 of the segment support 6, withdrawn to the common level,

rotate round the axis 5 (fig. 10), then the segments 7 are unlocked and return to the position of their free suspension (fig. 2) and the unloading device 1 is ready to receive the consecutive tray 2.

Claims

1. A method of protecting rod-like elements gathered in a tray (2), the tray (2) having a back wall and side walls, while handling the tray (2) especially of protecting against translocations during the operation of rotating the tray (2) in unloading device (1), the tray (2) being fed to the unloading device (1) with its top open side upwards, after the tray (2) is locked and rotated through about 180° the rod-like elements (3) move out of the tray (2) by gravity or mechanically for next workstations, **characterized in that** in the tray (2) fed for the tray unloading device (1) rod-like elements (3) are held down from above with the aid of a segment support (6) consisting of numerous separate segments (7) positioned so that their lengths are parallel to the rod-like elements (3) and the support (6) is connected to the unloading device (1), whereas each of the segments (7) can displace freely and independently on others over a plane perpendicular to the back wall of the tray (2) and parallel to the side walls of the tray, moreover during feeding the tray (2) the segments (7) enter the interior of the tray (2) till they contact the rod-like elements (3) and copy the natural layout of the elements (3), then all the segments (7) become locked, and after rotation of the tray (2) with the segments (7) and the immobilized rod-like elements (3), the segments (7) and the rod-like elements (3) resting on them are properly displaced to one common level, and then the segments (7) are removed which enables the tray (2) unloading.

2. A method as in claim 1, **characterized in that** the number of segments (7) of the support (6) is compatible with the assumed precision of copying the natural layout of the rod-like elements (3) in the tray (2).

3. A method as in claim 1 or 2, **characterized in that** all the segments (7) of the support (6) are equal.

4. A method as in claim 1, **characterized in that** the segments (7) hold the rod-like elements (3) along their entire length.

Patentansprüche

1. Methode der Sicherung der stangenähnlichen Elemente, die sich in der Kassette (2) befinden, vor Translokation, die Kassette (2) mit der Hinterwand und Seitenwänden während der Manipulation mit der Kassette (2), besonders der Sicherung vor Translokation während des Umdrehens der Kassette (2) auf der Entladungsvorrichtung (1) zu welcher die von oben offene Kassette (2) gefüllt mit den stangenähnlichen Elementen (3) mit der offenen nach oben gerichteten Seite (1) überreicht wird, und nach der Blockierung in der Vorrichtung (2) und der Umdrehung um den Winkel von etwa 180° die stangenähnliche Elemente (3) schieben sich mit Hilfe der Gravitation oder mechanisch aus der Kassette (2) zu weiteren Operationsstellen vor, charakteristisch **dadurch**, dass in der Kassette (2), die zur Entladungsvorrichtung überreicht wird, die stangenähnlichen Elemente (3) werden von oben mit Hilfe der segmentären Stütze (6), die aus vielen separaten Segmenten (7) besteht, festgehalten, und die separaten Segmente (7), die mit ihrer Länge parallel zu den stangenähnlichen Elementen (3) untergebracht sind, und die segmentäre Stütze (6) ist mit der Entladungsvorrichtung (1) verbunden, wobei jedes von den Segmenten (7) kann sich ungehindert frei translozieren (verlagern), unabhängig von den übrigen, in der zur Hinterwand der Kassette senkrechten, parallel zu ihrer Seitenwand, und während der Überreichung der Kassette (2) schieben sich die Segmente (7) in ihr Innere bis zur Berührungskontaktaufnahme mit den stangenähnlichen Elementen (3), nachbildend die natürliche Anordnung der Elemente in der Kassette (2), woran alle nicht miteinander verbundene Segmente (7) blockiert werden, und nach dem Umdrehen der Kassette (2) zusammen mit den Segmenten und mit den stillgelegten stangenähnlichen Elementen (3) werden die Segmente (7) zusammen mit den auf ihnen liegenden stangenähnlichen Elementen (3) zu einem gemeinsamen Niveau entsprechend verschoben, und danach werden sie in der zur Hinterwand der Kassette (2) senkrechten Richtung weggebracht und **dadurch** wurde die Entladung der Kassette (2) ermöglicht.

2. Methode gemäß Anspruch 1 und charakteristisch **dadurch**, dass die Anzahl der Segmente (7) der Stütze (6) entspricht der angenommenen Präzision der Nachbildung der natürlichen Anordnung der stangenähnlichen Elemente (3) in der Kassette (2).

3. Methode gemäß Ansprüche 1 und 2 charakteristisch **dadurch**, dass alle Segmente (7) der Stütze (6) gleich sind.

4. Methode gemäß Anspruch 1, charakteristisch **dadurch**, dass die Segmente (7) halten die stangenähnlichen Elemente (3) in ihrer ganzen Länge fest.

Revendications

1. La manière de protéger les éléments à forme de baguettes, se trouvant dans la cassette (2) durant la manipulation de celle-ci, la cassette (2) étant munie d'une paroi arrière et de parois latérales (2), et surtout la manière de prévenir le déplacement pendant l'opération de tourner la cassette (2) sur le dispositif de déchargement (1), sur lequel la cassette ouverte par le haut (2), remplie d'éléments à forme de baguettes (3), est posée avec la partie ouverte dirigée vers le haut (1), et une fois bloquée dans le dispositif (2) et tournée d'environ 180°, les éléments à forme de baguettes (3) glissent de la cassette grâce à la gravitation soit mécaniquement (2) vers les postes d'opération consécutifs, se **caractérise par le fait, que** les éléments à forme de baguettes (3), se trouvant dans la cassette (2), lorsque celle-ci est posée sur le dispositif de déchargement, sont tenus par le haut à l'aide d'un support à segments (6), composé de plusieurs segments à part (7), situés par leur longueur parallèlement par rapport aux éléments à forme de baguettes (3), tandis que le support (6) est connecté au dispositif de déchargement (1), chacun des segments (7) pouvant se déplacer librément, indépendamment des autres, sur le plan perpendiculaire par rapport à la paroi arrière de la cassette, parallèlement à sa paroi latérale, et au moment de la pose de la cassette les segments (7) glissent à l'intérieur de celle-ci jusqu'à entrer en contact avec les éléments à forme de baguettes (3), en copiant la disposition naturelle des éléments dans la cassette, ce après quoi tous les éléments qui n'ont pas été fixés (7) viennent à être immobilisés, et une fois la cassette (2) tournée avec les segments et les éléments à forme de baguettes (3) bloqués, les segments (7) sont déplacés de façon appropriée, ensemble avec les éléments à forme de baguettes (3) reposant sur eux, au même niveau commun, pour être ensuite évacués dans la direction perpendiculaire par rapport à la paroi arrière de la cassette pour permettre le déchargement de la cassette (2).

2. La manière selon la révendication 1. se **caractérise par le fait que** le nombre de segments (7) du support (6) est compatible avec la précision présumée de copier la disposition naturelle des éléments à forme de baguettes (3) dans la cassette (2).

3. La manière selon la révendication 1. ou 2. se **caractérise par le fait que** tous les segments (7) du support (6) sont identiques.

4. La manière selon la révendication 1. se **caractérise par le fait que** les segments (7) retiennent les éléments à forme de baguettes (3) sur tout leur long.

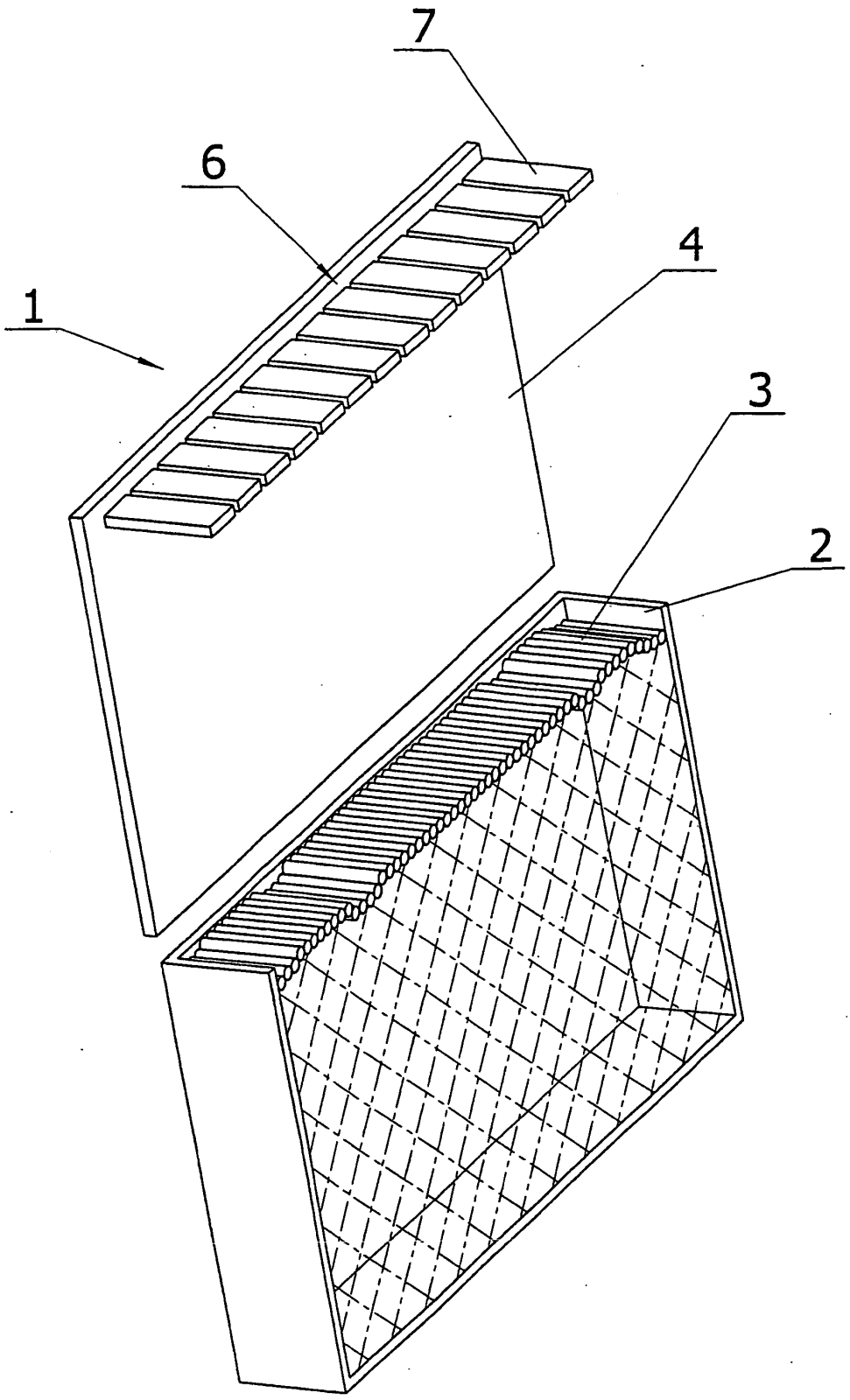


Fig.1

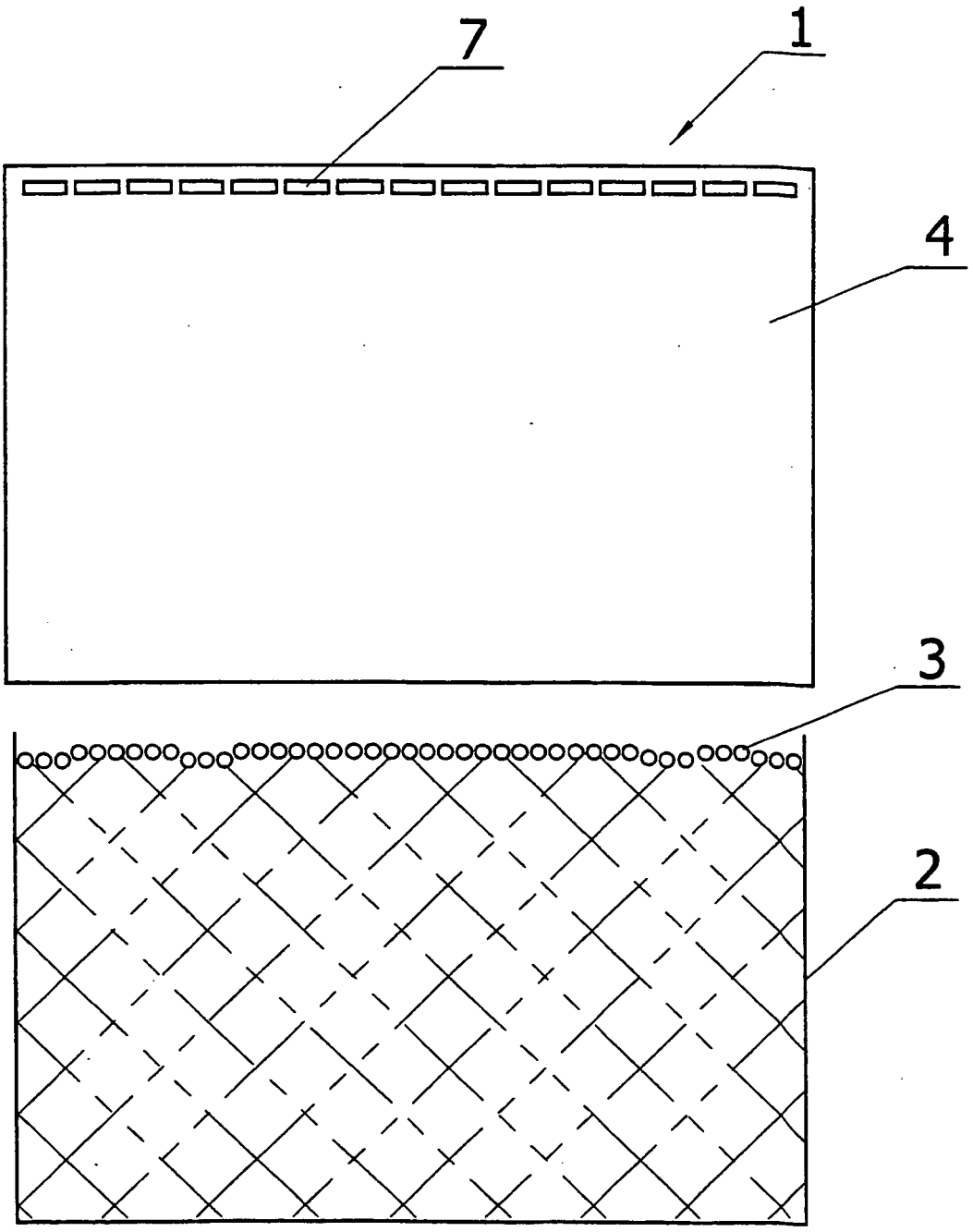


Fig.2

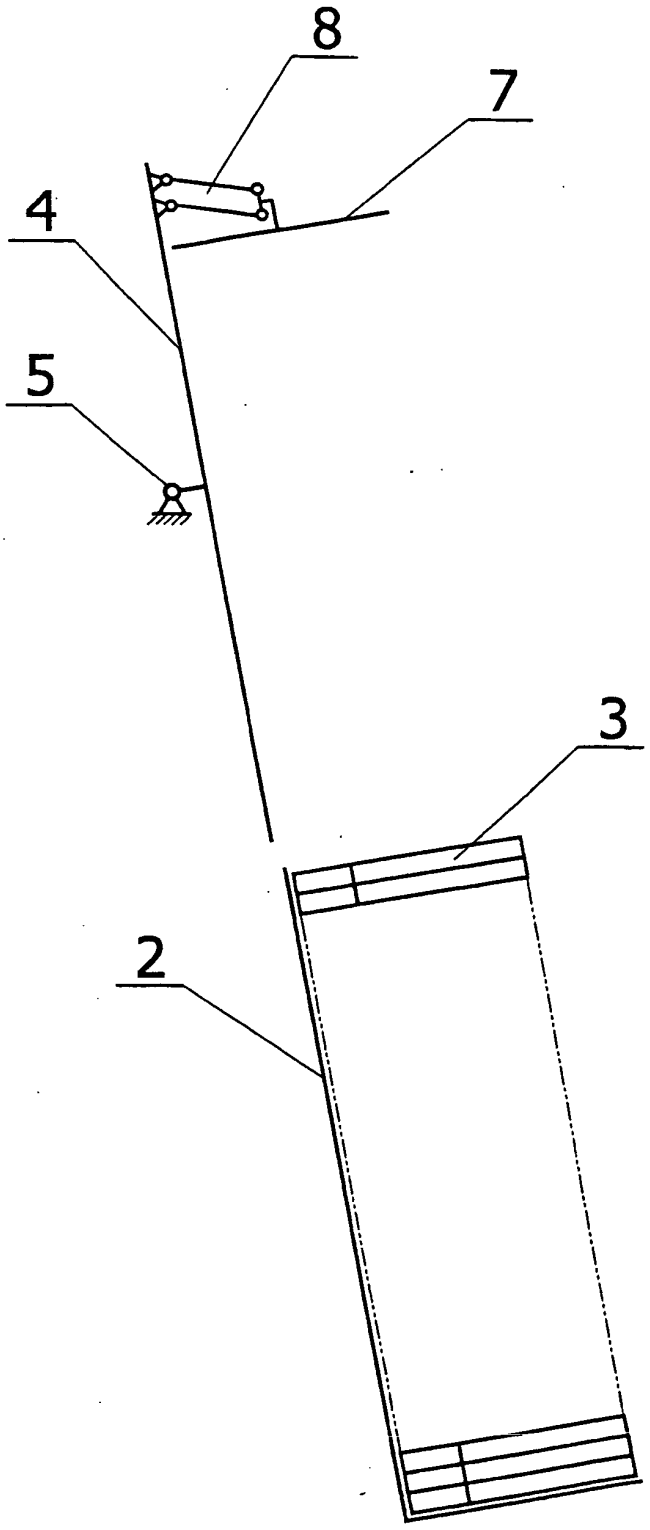


Fig.3

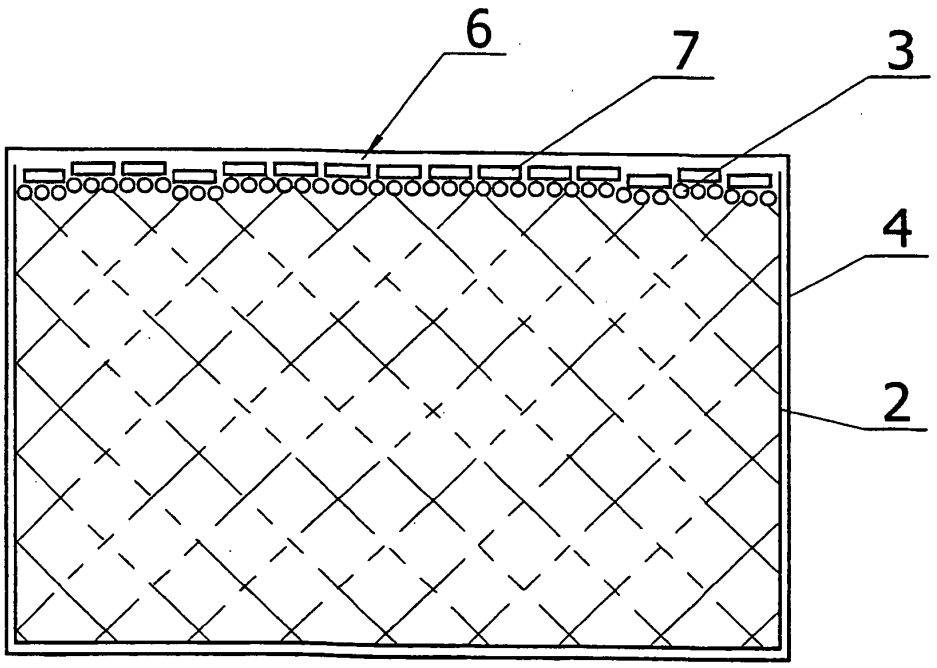


Fig.4

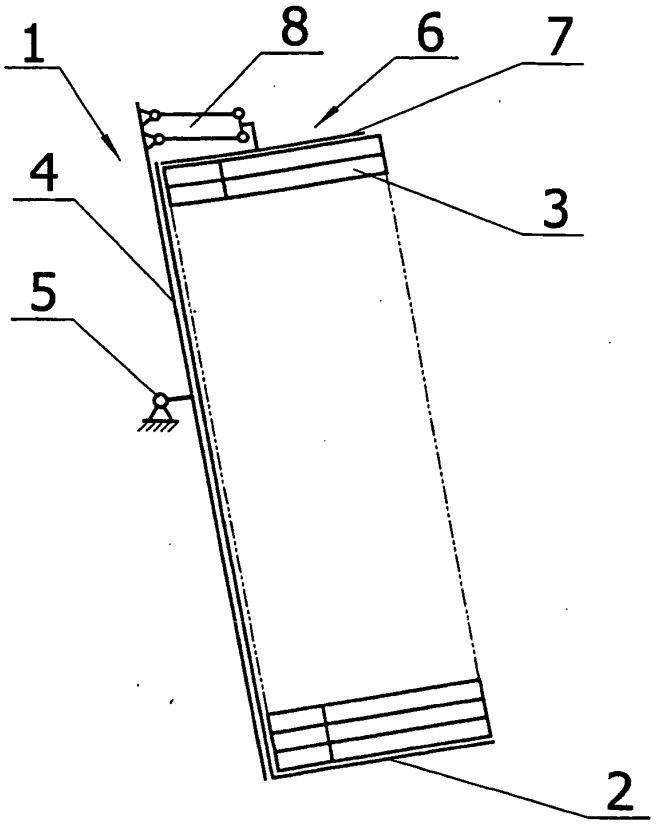


Fig.5

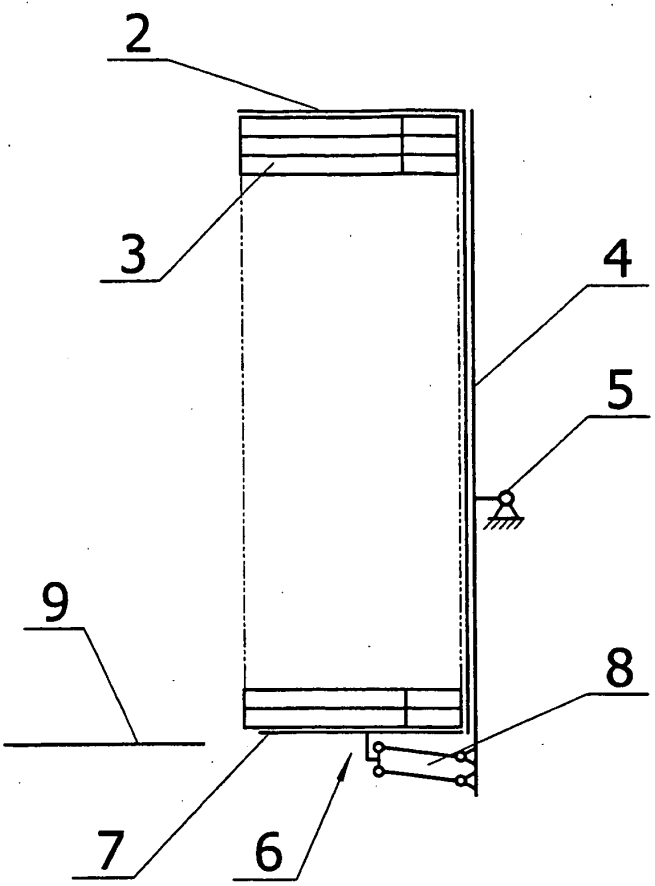


Fig.6

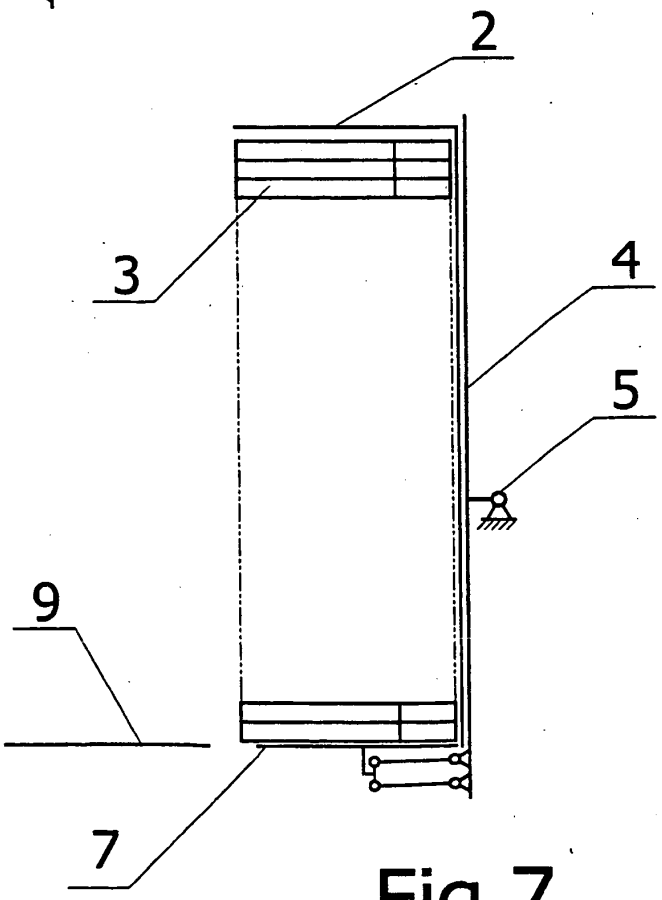


Fig.7

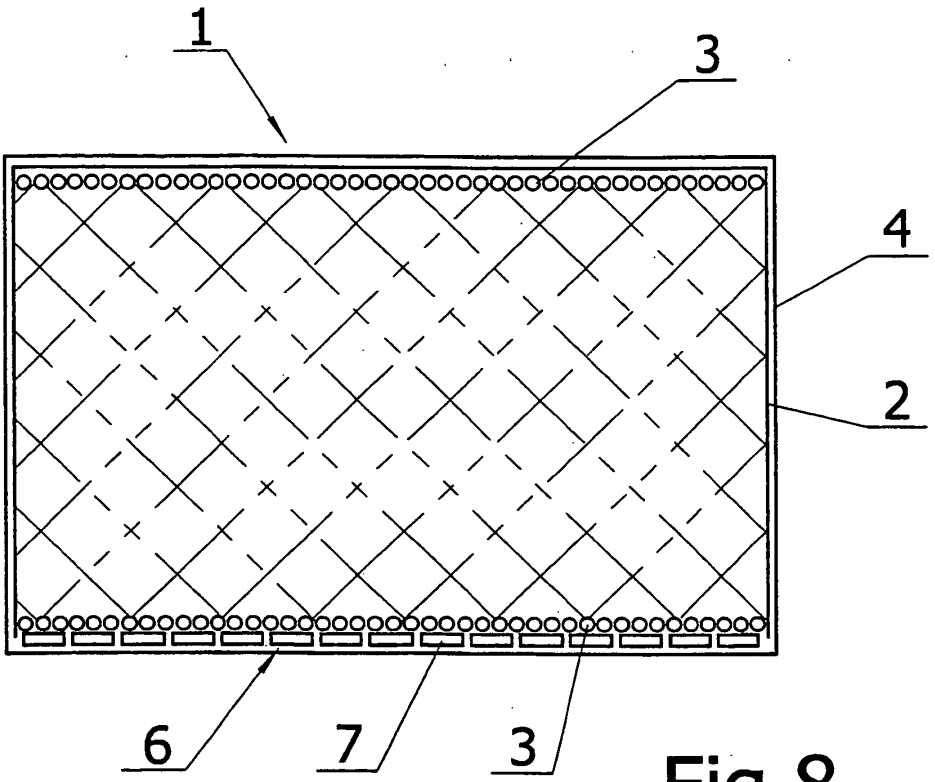


Fig.8

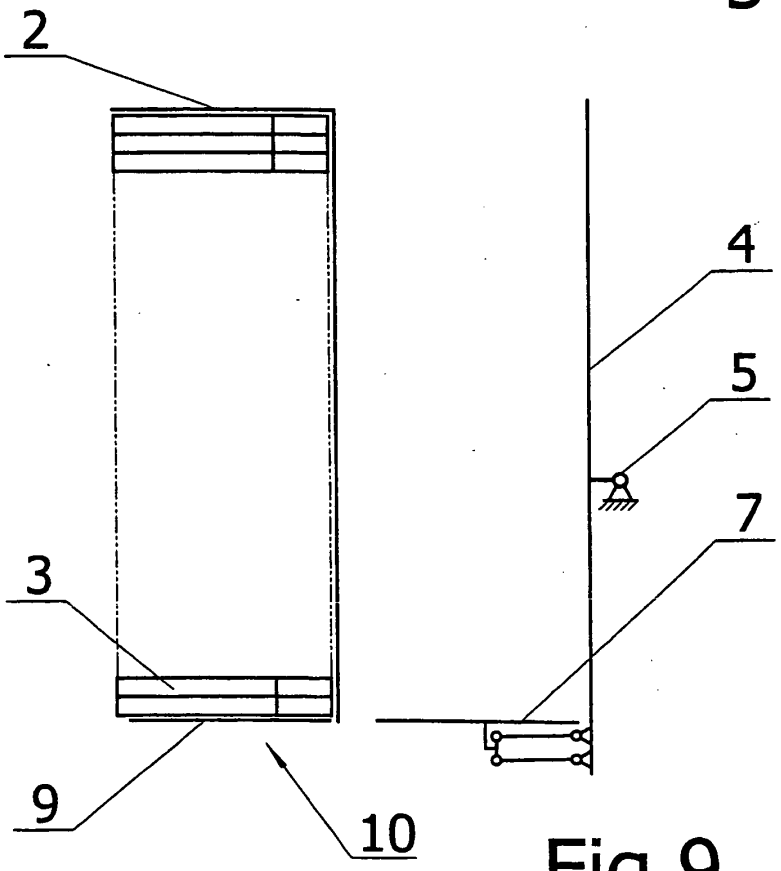


Fig.9

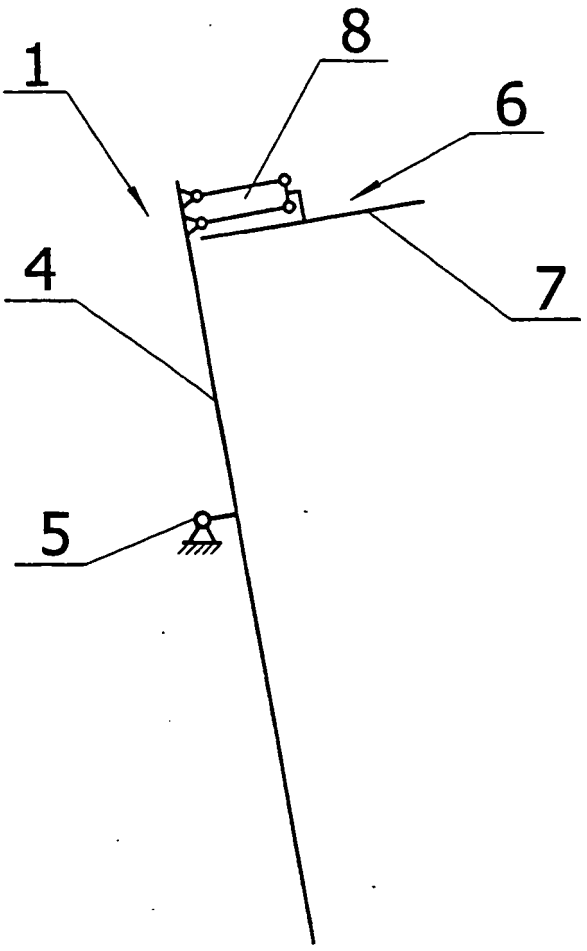


Fig.10

REFERENCES CITED IN THE DESCRIPTION

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