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(54) **METHOD OF MASS FLOW CONTROL AND DEVICE FOR MASS FLOW CONTROL**

VERFAHREN UND VORRICHTUNG ZUR GÜTERFLUSSKONTROLLE

PROCÉDÉ DE RÉGULATION DE DÉBIT MASSIQUE ET DISPOSITIF POUR RÉGULATION DE DÉBIT MASSIQUE

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GB-A- 2 179 614

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EP 2 533 655 B1

Description

[0001] Subject-matter of the invention is a method of controlling mass flow in the form of multi layer stream of rod-shaped articles, particularly tobacco industry products, and a device for controlling the said flow.

[0002] In production lines manufacturing rod shaped tobacco articles, like cigarettes, filters or cigarettes with filters already stuck on, in the course of the production process the said products cover a considerable distance after leaving the manufacturing machine before they are placed in packets in the packing machine or in the stores. The flow usually takes place in a multi layer ordered stream, which eliminates deformation or destruction. There is a need for handling the stream of products in order to convey it to or from different devices used in the production line. For this purpose, on the path of horizontal conveyor carrying the articles, near-perpendicular channels which connect one horizontal conveyor with another horizontal conveyor or receiver are made. Rod-shaped articles fill fully vertical channels and principally horizontal conveyors, which is a condition determining the state of their order. The flow on a horizontal path is usually forced by a conveyor, while the flow in angularly situated channels usually takes place by gravity. The said flow handling consists many times in cutting off the channel in which the articles flow or in directing the stream of articles to another receiving device, with the necessary condition being that rod-shaped articles are as little damaged as possible when controlling the flow. Devices for stopping the flow of a stream and/or changing its direction are known in the state of the art. For instance, from the USA patent No. US 5.217.101 a device is known for connecting mass flows of rod-shaped articles in the tobacco industry in which a plate or a shaped gate swivel-mounted on the axis situated near the connection point of horizontal conveyor with angular channel is used, with the plate or shaped gate being opened when a too small flow of the stream is detected or a need for connecting the streams arises. The shaped gate may form simultaneously an interim mini-store stockpiling the overflow of rod-shaped articles. Another device for transporting rod-shaped articles is known from the USA patent No. US 5.529.164. In this construction, a slidable plate provided with a flexible tape which in case of need is angularly inserted in accordance with the direction of stream flow in the upper part of the vertical channel thus shutting off its inlet is used, with the flexible tape becoming a part of the bottom wall of horizontal conveyor. A temporary overflow of articles is absorbed by a generally known pocket formed by two self-aligning arms arranged in the upper wall of horizontal conveyor in the channel axis, with arm ends being connected by a membrane. On the other hand, in the description of the USA patent No. US 4.986.408 concerning a device for handling rod-shaped articles, an attempt to use a slidable plate arranged parallel to the path of horizontal stream of rod-shaped articles that separates this stream from the vertical channel was made. The invention presents different technical solutions for the plate itself as well as for the means of its activation. A drawback of this solution is the possibility of damaging rod-shaped articles during horizontal inserting of the plate into the area of the channel filled with these articles. A similar principle of cutting off the flow by a tape-type element inserted between rod-shaped articles above the inlet of vertical channel was shown in the USA patent No. US 4.553.660. In US patent 7.832.544 B2, published also as EP 1.989.945 A1, was presented an angular channel for transporting rod-like elements in a machine manufacturing elements for various further processing machines or installations of tobacco industry, wherein side walls of the channel are flexible and rod-like elements are positioned perpendicular to the said walls of the channel. The walls are presented by means of one common drive device and always maintain parallelism in relation to each other. A solution nearest to the subject-matter of the applied invention was presented in the description of the USA patent No. US 7.044.286 concerning the separation of streams of multi layer flows of rod-shaped articles. According to the described method, rod-shaped articles are removed, for the purpose of separation, from the border area of horizontal conveyor or angularly situated channel, which becomes a passive stream, to the area of horizontal channel or conveyor, which becomes an active stream, and the amount of removed articles is equal to the volume of a corresponding part of a cylinder with a radius corresponding to the width of horizontal conveyor and/or the width of the channel, with cylinder walls parallel to its axis separating non-parallel streams from each other. Said articles may be also closed in a niche with the shape of horizontal conveyor or channel made inside the rotating cylinder, across the axis of rotation, with the rotation axis of the cylinder being in the symmetry plane of the niche, and besides the rotation axis of the cylinder being in the symmetry plane of the horizontal conveyor and/or channel, and the articles being shut by a rotation of the cylinder. Presented valve device for separating streams according to said invention consists of a valve in form of a cylinder or its sector situated in the crossing point of horizontal conveyor and channel, with the rotation axis of the valve being the axis of the cylinder and overlapping the intersection edge of upper plane of the wall of horizontal conveyor with the plane of side wall of the channel or the intersection edge of the plane of the bottom wall of horizontal conveyor with the plane of side wall of the channel, or the rotation axis of the valve being in symmetry plane of the channel and/or horizontal conveyor in a distance from the intersection edge of side wall of the channel with the wall of horizontal conveyor equal to or a little greater than the cylinder radius, while inside the cylinder a through niche with the shape of the channel and/or horizontal conveyor is made, with the rotation axis of the valve being in symmetry plane of the niche. The above solution partly eliminates the degradation of the outer layer of articles in passive stream and facilitates the flow of multi layer

stream with any speed, with the removal of articles to active stream preventing pressure buildup in the stream, and the removal of articles from the border area not causing a disturbance of their ordered reciprocal arrangement. Removed articles are indeed replaced by the cylinder wall on which the stream flows, however, when inserting the sharp edge of cylinder valve in the stream of articles, which does not have a possibility of shock absorption, a degradation of a part of articles being in direct contact with said edge may occur.

[0003] According to the invention, a significant feature of the method of controlling mass flow in the form of a multi layer stream of rod-shaped articles filling a channel positioned angularly in relation to horizontal plane, in which the flow of rod-shaped articles takes place by gravity or is forced, is altering the path of mass flow by means of swing or slide shiftable movable elements being fragments of opposite side walls of the angularly positioned channel, the mass flow in the angularly positioned channel is stopped after shifting movable elements, with the possibility of restoring the previous flow after shifting movable elements to the previous position. Such method allows reducing the degradation of the outer layer of rod-shaped articles due to absorption of the pressure of movable element of one side wall by pushing aside the movable element of the opposite wall.

[0004] The object of the invention is also the construction of the device for controlling mass flow in the form of multi layer stream of rod-shaped articles filling a channel positioned angularly relative to horizontal plane, where the flow of rod-shaped articles takes place by gravity or is forced, with said channel having side walls, first and second, where each wall is provided with the movable element, the second side wall having a narrowed part. According to the invention a first movable element constituting a fragment of a first side wall is situated beneath an axis parallel to the plane of side walls and positioned slightly under upper fixed part of the first side wall, and on the axis is rotary mounted a plate perpendicular to the side walls of the channel, whereas on the plate is mounted a second movable element, constituting a fragment of the opposite second side wall, by means of an actuator fixed to the plate giving the second element rotational or slide shiftable movement, whereas the second movable element has the form of a cylindrical sector with an interior cut-out corresponding to the width of the narrowed part of the second side wall of the channel, whereas the narrowed part entering the interior cut-out while shifting the second movable element. Shifting the movable elements stops the mass flow in the channel. The first movable element is swivel-mounted on a pivot and the plate is fixed on the pivot permanently and together with the first movable element. The end of the first side wall below the first movable element forms a shutoff element situated outside of the first side wall, with said shutoff element preferably having the shape of a cylinder jacket sector with a radius corresponding to the length of the first movable element. In the construction variation of a device according to the invention, a lower part of the first side wall is formed by the first movable element slidably mounted in the direction outwards to the first side wall and moving slide shiftable within a store formed outside of the lower part of the channel, with the first movable element being coupled with the plate with the aid of a Scotch yoke mechanism. An advantage of the construction according to the invention is the possibility of such control of the mass flow of rod-shaped articles in a channel situated angularly relative to horizontal conveyor, which enables temporary flow stopping, with rod-shaped articles in principle not being degraded during the operation of movable elements being at the same time the side walls of the channel.

[0005] The object of the invention was shown in embodiments in schematic drawing in which Fig. 1 shows in a perspective view a device for controlling mass flow of rod-shaped articles using movable elements forming side walls of a channel in the shape of an appropriately swinging plate and a cylinder sector with open flow, Fig. 2 - device of Fig. 1 in a perspective rear view, Fig. 3 - device of Fig. 1 in front view in a position of flow shut-off, Fig. 4 - device of Fig. 3 in an intermediate return position of the movable element in the shape of a cylinder sector, Fig. 5 - device of Fig 3 in a subsequent intermediate return position of movable element in the shape of a cylinder sector with open flow, Fig. 6 - a perspective view of the embodiment of the device of Fig. 1 using the first movable element in the shape of a slidable plate, Fig. 7 - device of Fig. 6 in rear view, Fig. 8 - device of Fig. 6 in front view with shut-off flow, Fig. 9 - device of Fig. 8 with open flow and shifted plate of movable element, and retracted movable element in the shape of a cylinder sector in an intermediate position and Fig. 10 - device of Fig. 8 with open flow and movable element in the shape of a cylinder sector retracted to another intermediate position.

Embodiment I

[0006] The device shown in Fig. 1 to Fig. 5 for controlling the mass flow of rod-shaped articles flowing in a vertically positioned channel 1, having a first side wall 2 and a second side wall 3 in the direction of a horizontal conveyor 4, contains a first movable element 5 forming the lower part of the first side wall 2, swivel-mounted on a pivot 6 parallel to the planes of side walls 2 and 3 and arranged just below the first side wall 2 in its plane. Swivel-mounted on the pivot 6 is a plate 7 perpendicular to side walls 2 and 3, with the first movable element 5 making a rotation together with the plate 7. The end of the first side wall 2 below the first movable element 5 is provided with a shutoff element 8 situated outside the first side wall 2 which has the shape of a cylinder jacket sector of a radius r corresponding to the length of the first movable element 5. By means of an actuator 9, on the plate 7 is mounted a second movable element 10 forming a fragment of the second side wall 3, with the actuator 9 giving the second element 10 a reciprocating motion. The

second movable element 10 has the shape of a cylinder with an inside cut-out 11 corresponding to the width of narrowed part 12 of the second side wall 3. A drive 13 of the pivot 6 and the actuator 9 are situated on the rear side of the plate 7.

[0007] In case it is necessary to stop the mass flow of rod-shaped articles flowing in the channel 1, of which a part of the first side wall 2 constitutes the first movable element 5, and a part of the second side wall 3 constitutes the second movable element 10 together with the narrowed part 12, the plate 7 makes a rotation together with the elements 5 and 10 around the pivot 6 until the end of the second movable element 10 is situated at the edge of the shutoff element 8, and the first movable element 5 is situated at the end of the shutoff element 8, with the cylinder chord plane of the second movable element 10 keeping, during rotation, parallelism to the plane of the first movable element 5. That way the flow is shut off, and the rod-shaped articles are placed in a niche formed by the movable elements 5 and 10 and the shutoff element 8. When reopening the flow in the channel 1, in order to avoid the degradation of rod-shaped articles, at first, by means of the actuator 9 the second movable element 10 is retracted, with the narrowed part 12 forming then the second wall 3 of the channel 1, and then the plate 7 making the return rotation together with the movable elements 5 and 10 until the plane of the first movable element 5 overlaps the plane of the first side wall 2, after which the actuator 9 brings the second movable element 10 to initial position so that the cylinder chord plane overlaps the plane of narrow part 12 of the second side wall 3 of the channel 1.

Embodiment II

[0008] The device shown in Fig 6 to Fig. 10 for controlling the mass flow of rod-shaped articles is similar to the device described in embodiment I, except that the first movable element 5' constitutes a plate coupled with a pivot 6' by means of a Scotch yoke mechanism 14', with the movable element 5' making reciprocating motion inside a store 15' formed from the outward-bent end 16' of the upper part of the first side wall 2' and the horizontal wall 17' situated below the first movable element 5'. All other elements, structurally and functionally identical as in embodiment I, have been denoted in the drawing with the symbol'.

Claims

1. A method of controlling mass flow in the form of multi layer stream of rod-shaped articles filling a channel positioned angularly relative to horizontal plane in which the flow of rod-shaped articles takes place by gravity or is forced and the path of mass flow is altered by means of swing or fragments slide shiftable movable elements being fragments of opposite side walls of the angularly positioned channel, **characterized in that**, the movable elements after shifting stop the mass flow in the angularly positioned channel, with the possibility of restoring the previous flow by shifting the movable elements to the previous position.

2. A device for controlling mass flow in the form of multi layer stream of rod-shaped articles filling a channel positioned angularly relative to horizontal plane, wherein the flow of rod-shaped articles takes place by gravity or is forced, with the said channel having side walls, first and second, each of which is provided with a movable element, **characterised by** the second side wall having a narrowed part, and by a first movable element (5) constituting a fragment of the first side wall (2) is situated beneath an axis (6) parallel to the plane of side walls (2, 3) and positioned slightly under upper fixed part of the first side wall (2), and on the axis (6) is rotary mounted a plate (7) perpendicular to the side walls (2, 3) of the channel (1), whereas on the plate (7) is mounted a second movable element (10), constituting a fragment of the opposite second side wall (3), by means of an actuator (9) fixed to the plate (7) giving the second element (10) rotational or slide shiftable movement, whereas the second movable element (10) has the form of a cylindrical sector with an interior cut-out (11) corresponding to the width of the narrowed part (12) of the second side wall (3) of the channel (1), the narrowed part (12) entering the interior cut-out (11) while shifting the second movable element (10), whereas shifting the movable elements (5, 10) stops the mass flow in the channel (1).

3. The device as in claim 2, **characterized in that**, the first movable element (5) is swivel-mounted on a pivot (6).

4. The device as in claim 3, **characterized in that**, the plate (7) is fixed on the pivot (6) permanently and together with the first movable element (5).

5. The device as in claim 4, **characterized in that**, the end of the first side wall (2) below the first movable element (5) forms a shutoff element (8) situated outside the first side wall (2).

6. The device as in claim 5, **characterized in that**, the shutoff element (8) has the shape of a cylinder jacket sector with a radius (r) corresponding to the length of the first movable element (5).

7. The device as in claim 2, **characterized in that**, the lower part of the first side wall (2') constitutes the first movable element (5') slidably mounted in the direction outwards the first side wall (2'), moving slide shiftable within a store (15') formed outside the lower

part of the channel (1').

8. The device as in claim 7, **characterized in that**, the first movable element (5') is coupled with the plate (7') by means of a Scotch yoke mechanism (14').

Patentansprüche

1. Verfahren zur Steuerung von Massenstrom in Form des mehrschichtigen Stapels von stangenähnlichen Elementen, die das unter einem Winkel zur horizontalen Fläche gerichteten Kanal füllen, in dem die Verlagerung von stangenähnlichen Elementen unter dem Einfluss der Schwerkraft erfolgt oder erzwungen wird, und die Bahn des Massenstromes mit Hilfe der schwingend oder gleitend umgestellten beweglichen Elementen, die die Fragmente der gegenüber liegenden Seitenwände des unter einem Winkel gerichteten Kanals sind, geändert wird, **dadurch gekennzeichnet, dass** die beweglichen Elemente nach der Umstellung den Massenstrom in unter einem Winkel gerichteten Kanal unterbrechen, wobei der vorherige Strom nach der Umstellung von beweglichen Elementen in die ursprüngliche Lage wiederhergestellt werden.

2. Anlage zur Steuerung von Massenstrom in Form des mehrschichtigen Stapels von stangenähnlichen Elementen, die das unter einem Winkel zur horizontalen Fläche gerichteten Kanal füllen, in dem die Verlagerung von stangenähnlichen Elementen unter dem Einfluss der Schwerkraft erfolgt oder erzwungen wird, wobei das oben erwähnte Kanal die Seitenwände besitzt, erste und zweite Wand, von denen jede ein bewegliches Element hat, **dadurch gekennzeichnet, dass** die zweite Seitenwand einen verengten Teil hat, und dadurch, dass das erste bewegliche Element (5), das das Fragment der ersten Seitenwand (2) ist, sich unterhalb der Achse (6) befindet, die zur do Fläche der Seitenwände (2, 3) parallel ist und ein wenig unterhalb des oberen unbeweglichen Teils der ersten Seitenwand (2) angeordnet ist, und auf der Achse (6) die Platte (7) drehbar befestigt ist, die zu den Seitenwänden (2, 3) des Kanals (1) senkrecht ist, und an die Platte (7) das zweite bewegliche Element (10), das das Fragment der gegenüber liegenden zweiten Seitenwand (3) ist, mit Hilfe des an die Platte (7) befestigten Antriebs (9), der dem zweiten Element (10) die Dreh- oder Vorschubbewegung gibt, befestigt ist, wobei das zweite bewegliche Element (10) die Form des Ausschnittes der Walze mit dem inneren Ausschnitt (11) hat, der der Breite des verengten Teils (12) der zweiten Seitenwand (3) des Kanals (1) entspricht, der verengte Teil (12) jest in den inneren Ausschnitt (11) während der Umstellung des zweiten beweglichen Elements (10) eingeführt wird, wobei die Umstellung von beweglichen Elementen (5, 10) den Massenstrom im Kanal (1) unterbricht.

3. Anlage nach Anspruch 2, **dadurch gekennzeichnet, dass** das erste bewegliche Element (5) auf der Achse (6) drehbar befestigt ist.

4. Anlage nach Anspruch 3, **dadurch gekennzeichnet, dass** die Platte (7) jest auf der Achse (6) gemeinsam und dauerhaft mit dem ersten beweglichen Element (5) befestigt ist.

5. Anlage nach Anspruch 4, **dadurch gekennzeichnet, dass** das Ende der ersten Seitenwand (2) unterhalb des ersten beweglichen Elementes (5) das Abschlusselement (8) darstellt, das außerhalb der ersten Seitenwand (2) angeordnet ist.

6. Anlage nach Anspruch 5, **dadurch gekennzeichnet, dass** das Abschlusselement (8) die Form des Ausschnittes des Mantels der Walze mit dem Radius (1), der der Länge des ersten beweglichen Elements (5) entspricht, hat.

7. Anlage nach Anspruch 2, **dadurch gekennzeichnet, dass** der untere Teil der ersten Seitenwand (2') das erste bewegliche Element (5') ist, das auf der ersten Seitenwand (2') verschiebbar nach außen befestigt ist, und sich innerhalb des Magazins (15'), das außerhalb des unteren Teils des Kanals (1') gebildet wurde, verlagert.

8. Anlage nach Anspruch 7, **dadurch gekennzeichnet, dass** das erste bewegliche Element (5') mit der Platte (7') mit Hilfe des Jochmechanismus (14') gekuppelt ist.

Revendications

1. Procédé de contrôle de débit massique sous la forme de flux de plusieurs couches d'articles en forme de tige de remplissage d'un canal positionné de manière angulaire par rapport au plan horizontal dans lequel le flux d'articles en forme de tige se fait par gravité ou est forcé et le chemin de la masse l'écoulement est modifiée au moyen d'oscillation ou glisser des éléments mobiles pouvant être déplacés étant des fragments de parois latérales opposées du canal de positionnement angulaire, **caractérisé en ce que** les éléments mobiles après décalage arrêter le flux massique dans le canal de positionnement angulaire, avec la possibilité de rétablir l'ancien débit en déplaçant les éléments mobiles à la position précédente.

2. Dispositif pour commander le flux de masse sous la forme de flux de plusieurs couches d'articles en for-

me de tige de remplissage d'un canal positionné de manière angulaire par rapport au plan horizontal, dans lequel le flux d'articles en forme de tige se fait par gravité ou est forcé, avec ledit canal ayant des parois latérales, un premier et un second, qui sont chacun munis d'un élément mobile, **caractérisé en ce que** la seconde paroi latérale ayant une partie rétrécie, et par unpremier élément mobile (5) constituant un fragment de la première paroi latérale (2) est situé au-dessous d'un axe (6) parallèle au plan des parois latérales (2, 3) et positionnée légèrement sous la partie fixe supérieure de la première paroi latérale (2), et sur l'axe (6) est rotative montée une plaque (7) perpendiculaire aux parois latérales (2, 3) du canal (1), tandis que sur la plaque (7) est monté un second élément mobile (10), constituant un fragment de la deuxième paroi latérale opposée (3), au moyen d'un actionneur (9) fixé à la plaque (7) donnant le deuxième élément (10) de déplacement pouvant être déplacé en rotation ou la glissière, tandis que le deuxième élément mobile (10) a la forme d'un secteur cylindrique avec un évidement intérieur (11) correspondant à la largeur de la partie rétrécie (12) de la deuxième paroi latérale (3) du canal (1), la partie rétrécie (12) pénétrant dans la découpe intérieure (11) tout en déplaçant le deuxième élément mobile (10), tandis que le décalage des éléments mobiles (5, 10) arrête le débit massique dans le canal (1).

3. Dispositif selon la revendication 2, **caractérisé en ce que** le premier élément mobile (5) est monté pivotant sur un pivot (6).

4. Dispositif selon la revendication 3, **caractérisé en ce que** la plaque (7) est fixée sur le pivot (6) de façon permanente et conjointement avec le premier élément mobile (5).

5. Dispositif selon la revendication 4, **caractérisé en ce que** l'extrémité de la première paroi latérale (2) en dessous du premier élément mobile (5) forme un élément d'arrêt (8) située à l'extérieur de la première paroi latérale (2).

6. Dispositif selon la revendication 5, **caractérisé en ce que** l'élément d'arrêt (8) a la forme d'un secteur d'enveloppe de cylindre avec un rayon (r) correspondant à la longueur du premier élément mobile (5).

7. Dispositif selon la revendication 2, **caractérisé en ce que** la partie inférieure de la première paroi latérale (2') constitue le premier élément mobile (5) monté de manière coulissante dans la direction vers l'extérieur de la première paroi latérale (2'), se déplaçant coulissant pouvant être déplacé à l'intérieur d'un magasin (15') formée à l'extérieur de la partie inférieure du canal (1').

8. Dispositif selon la revendication 7, **caractérisé en ce que** le premier élément mobile (5) est couplé à la plaque (7') au moyen d'un mécanisme sinusoïdal (14').

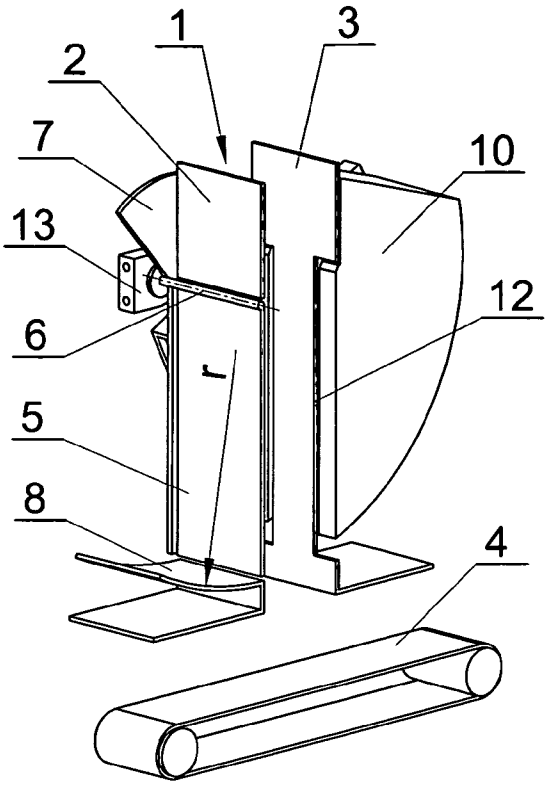


Fig. 1

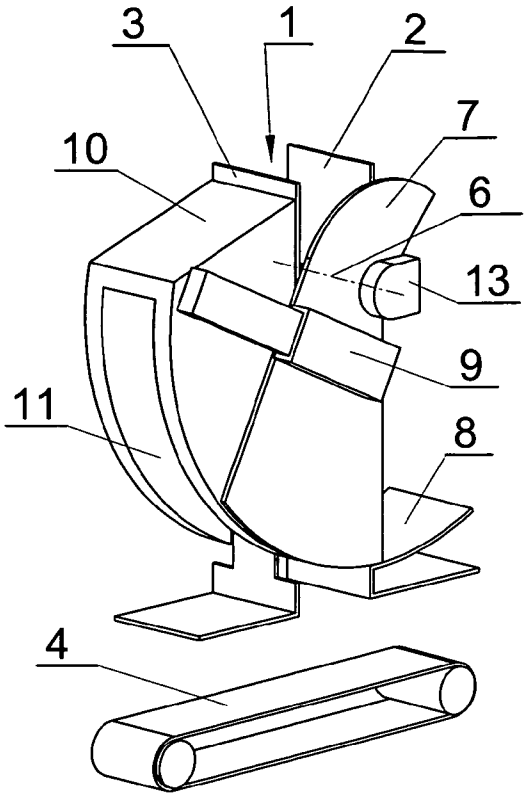


Fig. 2

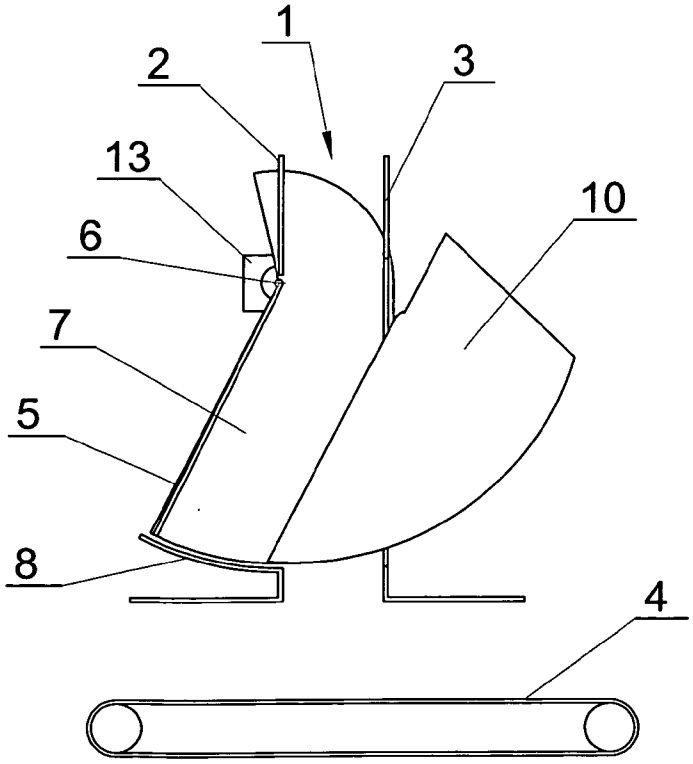


Fig. 3

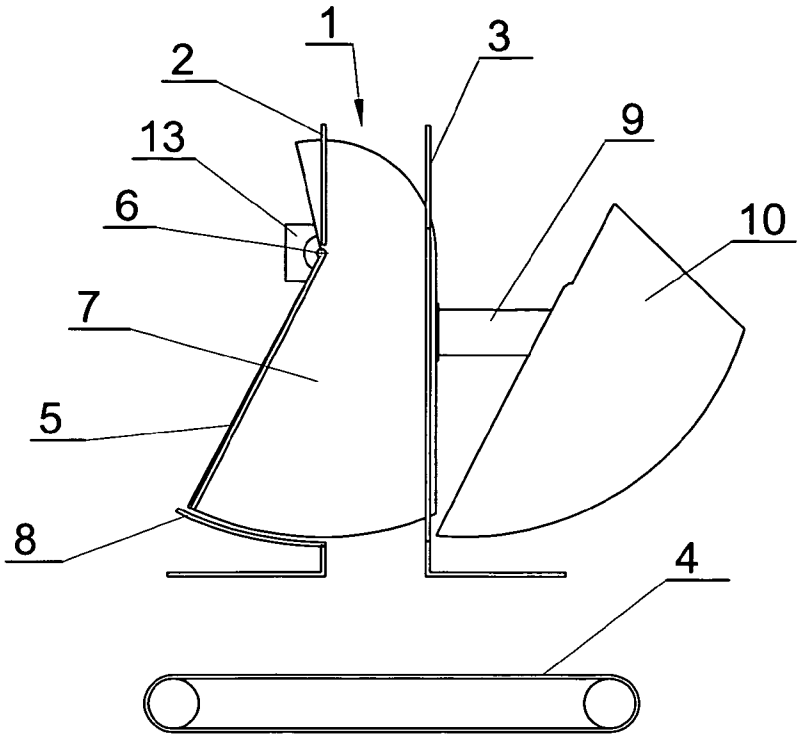


Fig. 4

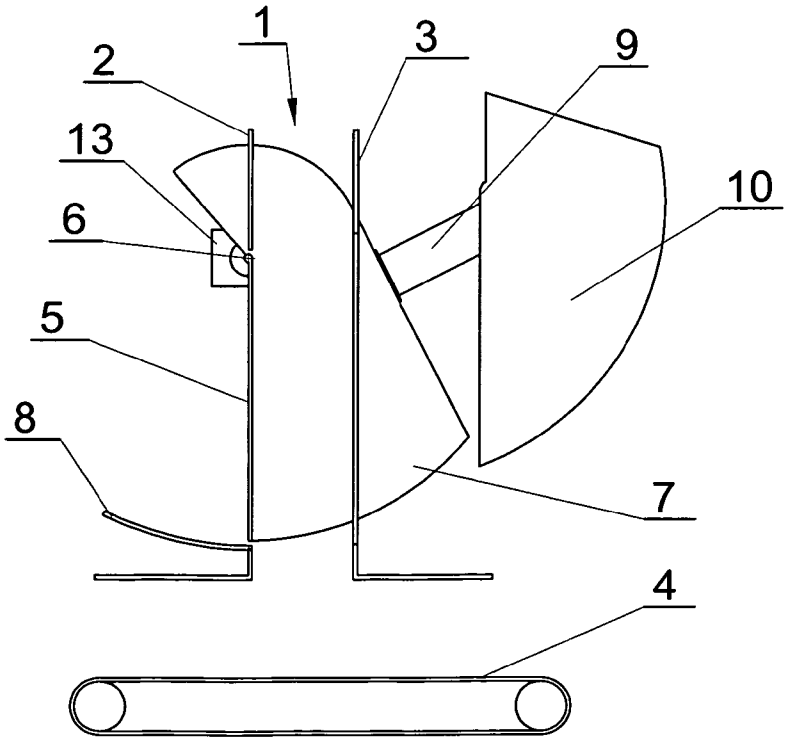


Fig. 5

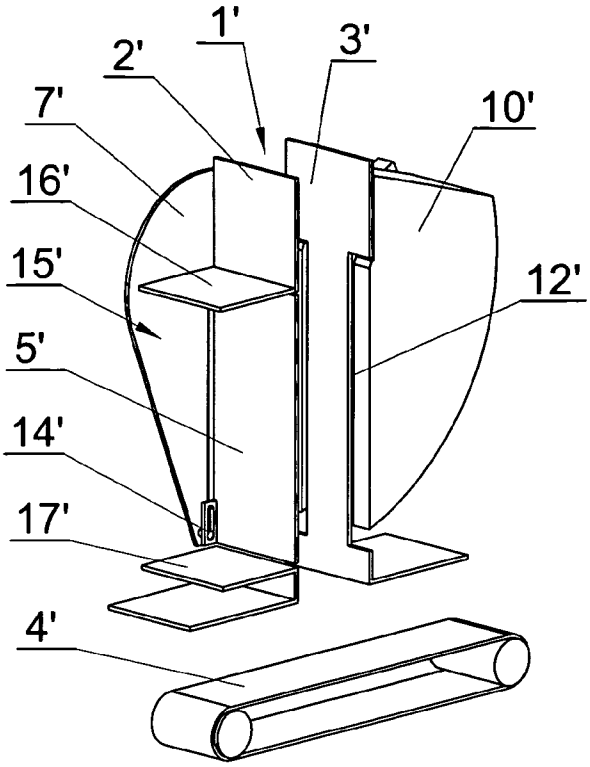


Fig. 6

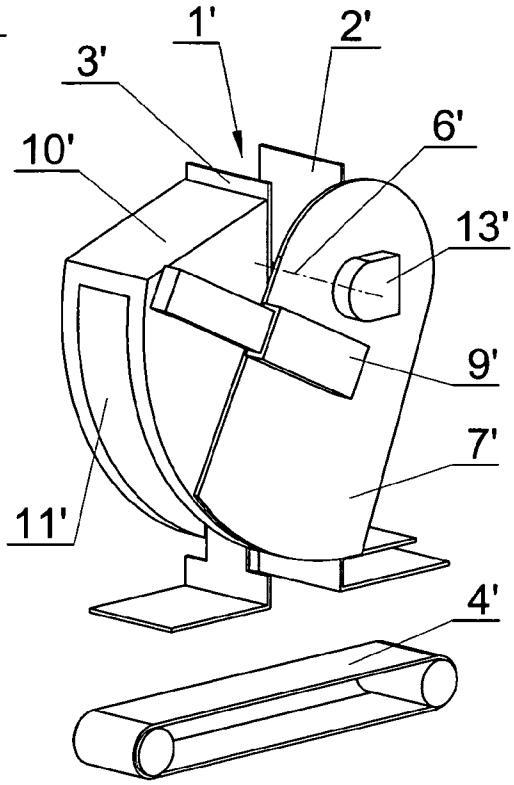


Fig. 7

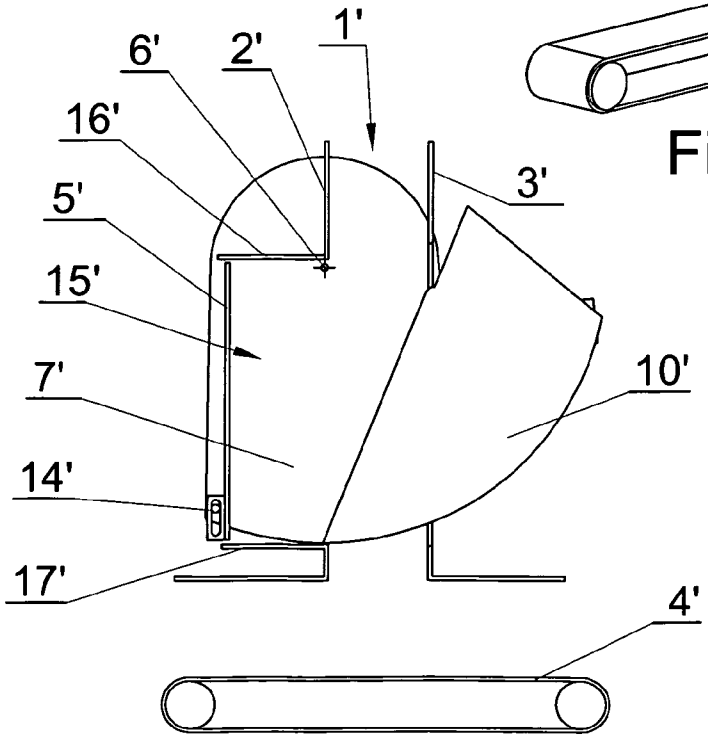


Fig. 8

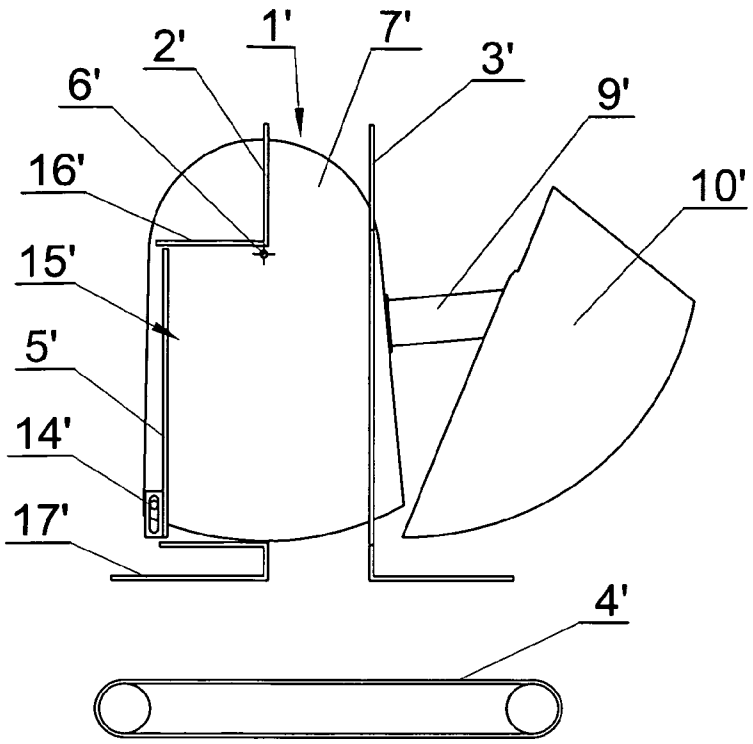


Fig. 9

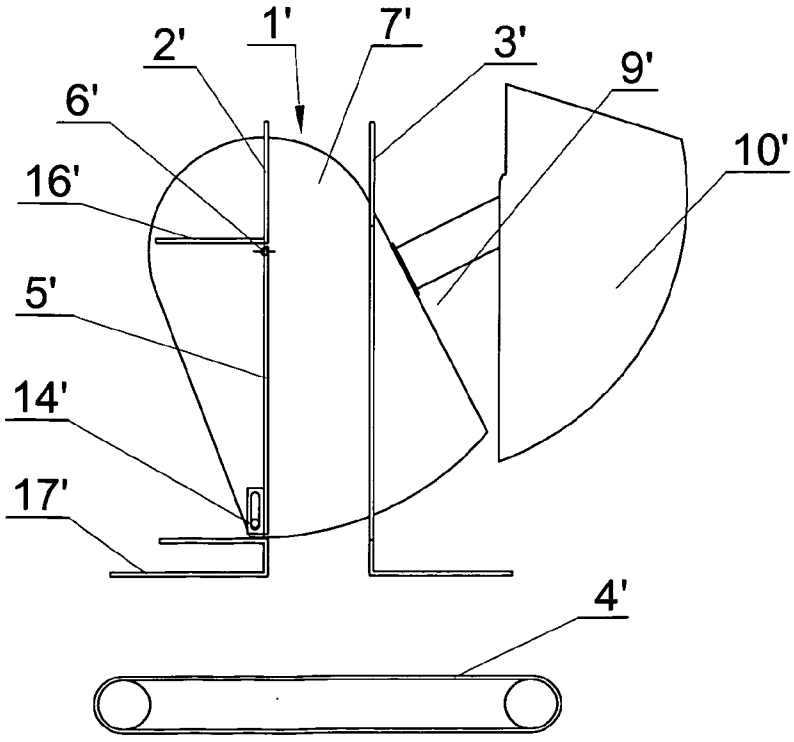


Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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Eljárás és berendezés tömegáram szabályozására

SZABADALMI IGÉNYPONTOK

1. Eljárás vízszintes síkkal szöget bezáró csatornát megtöltő rúdszerű termékek gravitáció vagy kényszerhatás következtében végbemenő többrétegű áramlásának szabályozására, ahol a tömegáram útvonalát a szögben elrendezett csatorna egymással szemközti falainak szakaszait képező himba vagy elcsúsztatható szán formájú elemek mozgatásával megváltoztatjuk, ***azzal jellemezve***, hogy a mozgatható elemek az elcsúszást követően megállítják a tömegáramot a szögben elrendezett csatornában úgy, hogy fennmarad a korábbi áramlás helyreállításának lehetősége a mozgatható elemek előző helyzetükbe történő csúsztatásával.

2. Berendezés vízszintes síkkal szöget bezáró csatornát megtöltő rúdszerű termékek gravitáció vagy kényszerhatás következtében végbemenő többrétegű áramlásának szabályozására, amely a tömegáram útvonalát a szögben elrendezett csatorna egymással szemközti falainak szakaszait képező himba vagy elcsúsztatható szán formájú, mozgatható elemekkel van ellátva, ***azzal jellemezve***, hogy a második oldalfalnak szűkülő része van, továbbá az első oldalfal (2) egy szakasza első mozgatható elemet (5) alkot, amely az oldalfalak (2, 3) síkjával párhuzamos tengely (6) alatt, és kissé az első oldalfal (2) felső, rögzített része alatt helyezkedik el, továbbá a tengelyen (6) forgathatóan van elrendezve egy lemez (7), amely merőleges a csatorna (1) oldalfalaira (2, 3), ahol a lemez (7) egy második mozgatható elemet (10) hordoz, amely a szemben lévő második oldalfal (3) egy szakaszát alkotja, és a lemezhez (7) rögzített működtető eszközzel (9) forgatható, és a második elemet (10) forgathatja vagy elcsúsztathatóan elmozdítja, ahol a második mozgatható elem alakja körhenger szektor, amelynek belső kivágása (11) van, amely megfelel a csatorna (1) második oldalfala (3) szűkülő része (12) szélességének, és a szűkülő rész (12) benyúlik a belső kivágásba (11) miközben eltolja a második mozgatható elemet (10), és a mozgatható elemek (5, 10) elmozdítása leállítja a csatornában (1) folyó tömegáramot.

3. A 2. igénypont szerinti berendezés, ***azzal jellemezve***, hogy az első mozgatható elem (5) csuklósan van elhelyezve egy csuklón (6).

4. A 3. igénypont szerinti berendezés, ***azzal jellemezve***, hogy a lemez (7) az első mozgatható elemmel (5) együtt a csuklón (6) van rögzítve.

5. Az 4. igénypont szerinti berendezés, ***azzal jellemezve***, hogy az első oldalfal (2) vége az első mozgatható elem (5) alatt elzáró elemet (8) képez, amely az első oldalfalon (2) kívül helyezkedik el.

6. Az 5. igénypont szerinti berendezés, ***azzal jellemezve***, hogy az elzáró elem (8) alakja hengerpalást szektor, amelynek sugara (r) megfelel az első mozgatható elem (3) hosszának.

7. A 2. igénypont szerinti berendezés, ***azzal jellemezve***, hogy az első oldalfal (2') alsó része alkotja az első mozgatható elemet (5'), amely olyan irányban elcsúsztathatóan van illesztve, amely az első oldalfalon (2') kívül esik, és elmozdítja az elcsúsztatható szánt egy tárolórekeszen (15') belül, amely a csatorna (1') alsó részén kívül van kiképezve.

8. A 7. igénypont szerinti berendezés, ***azzal jellemezve***, hogy az első mozgatható elem (5') a lemezhez (7') háromszög kapcsolórudas hajtóművel (14') van csatlakoztatva.

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