



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.06.2016 Bulletin 2016/22

(51) Int Cl.:
A24C 5/35 (2006.01)

(21) Application number: **14195446.1**

(22) Date of filing: **28.11.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **International Tobacco Machinery Poland Sp. z o.o.**
26-600 Radom (PL)

(72) Inventor: **Ryba, Tomasz**
26-600 Radom (PL)

(74) Representative: **Markieta, Jaroslaw Franciszek**
Kancelaria Rzeczników Patentowych
J. Markieta, M. Zielinska-Lazarowicz Sp. p.
Wankowicza 5A lok. 23
02-796 Warszawa (PL)

(54) **A SPLITTABLE TRANSPORT CHANNEL USED IN THE TOBACCO-PROCESSING INDUSTRY**

(57) The object of the application is a channel (1) for transporting rod-like articles in the tobacco industry, arranged in layers and transversely to their direction of transport, transversely partitioned into two parts, a first immovable part (1a) and a second movable part (1b), with one of them being rotatable around the channel axis (X), whereas the second part is movably fastened relative to the first part. A channel (1) according to the invention

is characterized in that the plane (2) of partition of the channel into two parts extends at an angle to the channel axis, and the movable connection allows the movement of the second part of the channel relative to the first part of the channel so that during the movement the bottom edges of the second part principally move with a motion component directed upwards.

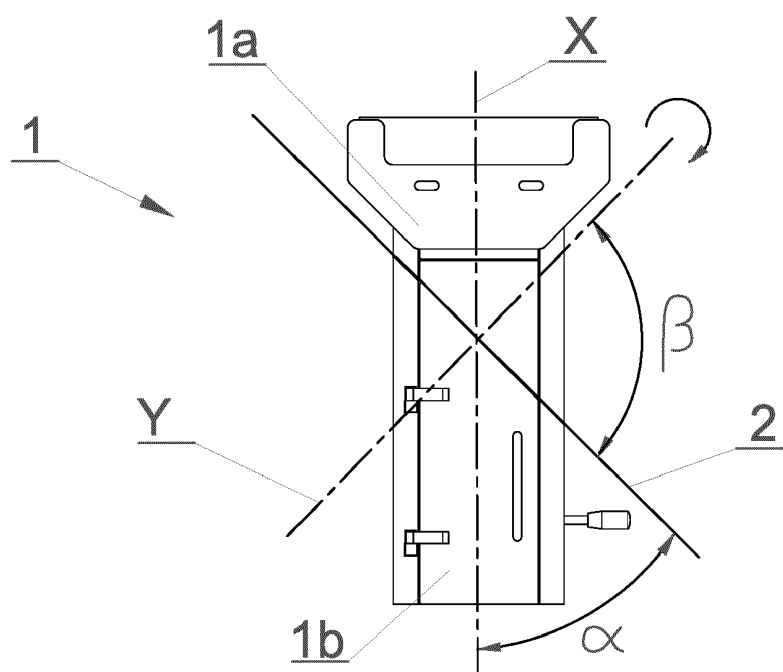


Fig. 1

Description

[0001] The object of the invention is a partitioned transport channel for the downward gravitational transport of rod-like articles in the tobacco industry.

[0002] In the production lines of rod-like articles of the tobacco industry such as cigarettes, filters or cigarettes with filters already attached, in the course of the production process the said articles cover a considerable distance after leaving the manufacturing machine before being placed into packages in the packaging machine or into the storages. They are usually conveyed in a multi-layered ordered stack, which eliminates the deformation, damage or destruction of the articles. There is a need of handling the stream of articles in order to deliver it to or from different devices used in the production line, among others in the downward direction. For this purpose, on the path of a horizontal conveyor transferring the articles, generally perpendicular channels connecting one horizontal conveyor with another horizontal conveyor or receiver are created. From time to time, there is a need to replace the receiver situated under the vertical transport channel, then it is necessary to disassemble, in whole or in part, the vertical transport channel connecting this receiver with the conveyor situated at a different level in order to put away one receiver and place another one.

[0003] The substance of the invention is a channel for the transport of rod-like articles in the tobacco industry, arranged in layers and transversely to their direction of transport, transversely partitioned into two parts, a first immovable part and a second movable part, with the second part being movably fastened relative to the first part. A channel according to the invention is characterized in that the plane of partition of the channel into two parts runs at an angle to axis of the channel, and the movable connection allows the movement of the second part of the channel relative to the first part of the channel so that during the movement the bottom edges of the second part move with a motion component directed principally upwards.

[0004] Furthermore, a channel according to the invention is characterized in that the plane crosses the channel at an angle of 0-90 degrees to the channel axis.

[0005] Furthermore, a channel according to the invention is characterized in that the plane crosses the channel at an angle of 30-60 degrees to the channel axis.

[0006] Furthermore, a channel according to the invention is characterized in that the plane crosses the channel principally at an angle of 45 degrees to the channel axis.

[0007] Furthermore, a channel according to the invention is characterized in that the second part of the channel is a rotatably fastened part, and the axis of the rotary connection is situated at a side wall of the channel.

[0008] Furthermore, a channel according to the invention is characterized in that the second part of the channel is a slidably fastened part relative to the first part.

[0009] Furthermore, a channel according to the invention is characterized in that the axis of rotation is situated

outside of the contour of the transport channel.

[0010] Furthermore, a channel according to the invention is characterized in that axis of rotation is situated outside of the flow area of the transport channel.

[0011] Furthermore, the channel according to the invention is characterized in that the movable connection allows the movement of the second part of the channel relative to the first part of the channel so that during the movement the upper edges of the second part of the channel move in the partition plane.

[0012] Furthermore, the channel according to the invention is characterized in that the movable connection allows the movement of the second part of the channel relative to the first part of the channel so that during the movement all bottom edges of the second part principally move with a motion component directed upwards.

[0013] Due to the use of a partitioned transport channel in the mass flow of rod-like articles in the tobacco industry, we may more efficiently replace devices receiving the articles from the channel without the necessity of disassembling it. Due to the use of a rotatable hinge situated at the line of partition of the channel and outside of its cross-section contour, when we make a rotational movement of the bottom part towards us, around the hinge axis, we deflect it rotationally upwards clearing the space under the channel. Furthermore, it is not required to keep a large gap between the bottom edge of the bottom part and the upper edge of the inlet into the receiving device, which would adversely affect the flow of rod-like articles. It is required to keep a distance between the upper part and the bottom part of the channel if a pivoting hinge with the horizontal axis of rotation, parallel to the bottom edge of the channel is used. By making a rotational movement around the horizontal axis, the bottom part of the channel causes the crossing of the line on which the bottom edge of the channel is situated.

[0014] The object of the invention was presented in detail in a preferred embodiment in a drawing in which:

Fig. 1 shows a partitioned transport channel in a front view before the assembly;

Fig. 2 shows the partitioned transport channel in an axonometric view with a plane partitioning the channel into two parts before the assembly;

Fig. 3 shows the partitioned transport channel in a side view before the assembly;

Fig. 4 shows the partitioned transport channel in a front view after the assembly;

Fig. 5 shows the partitioned transport channel in a side view with a visible partitioning plane after the assembly;

[0015] Fig. 1 shows a partitioned transport channel 1 for gravitational transport of rod-like articles from a higher

level to a lower level in the tobacco industry in the front view before the assembly. The channel 1 has a shape of a cube with an internal flow surface in which filter or tobacco rods are transported. The channel 1 is partitioned into two parts 1a and 1b by a virtual plane 2 which partitions the channel 1 transversely at an angle α in the range of 0-90°, more preferably at an angle of 30-60 degrees to the channel axis, or at a preferred angle of 45° to its X axis which centrally crosses the middle of the channel and is principally vertical. Such a channel, transversely partitioned at an angle 45° to the channel axis X, takes the least space necessary for its assembly. Our rotational movement of the part 1b made towards us when facing the front plane of the channel around the axis of rotation Y causes its deflection upwards. The axis Y is situated at an angle β in the range of 80-100°, preferably 90°, to the virtual plane 2 and may be parallel to the channel axis X. The channel 1 is kept in the assembled position (Fig. 4) by the lock 7 situated at the hinge (Fig. 3). The hinge 4 is adjacent to one of the channel walls at the level of its partition and is partitioned by a virtual plane 2 into two parts 4a and 4b at the same angle α to the channel axis X at which the channel 1 is partitioned. Each part of the hinge 4a and 4b is permanently fastened to the channel's upper part 1a and bottom part 1b, respectively. A member connecting both parts in the hinge 4 is the pin 5 through which the axis of rotation Y passes. Such a movable connection of first and second parts allows for a movement of the second part of the channel relative to the first part of the channel so that during the movement the bottom edges of the second part move with a motion component directed principally upwards.

[0016] The presented embodiment shows a channel in which the second part is a rotatably fastened part, and the axis of the rotatable connection is situated at the side wall of the channel. However, it is possible to place the axis of the rotation outside of the contour of the transport channel.

[0017] As an alternative, the connection of the first and the second part relies on the replacement of the rotatable connection by a slidable connection in which the second part of the channel is slidably fastened relative to the first part.

[0018] Regardless of the character of the connection, that is both in case of a rotatable (rotation) and a slidable (translation) connection, favourable effects were observed in particular when the upper edges of the second part moved principally in the plane of the partition. Regardless of the character of the connection, it has to ensure a relative movement of bottom edges of the second part, in particular all bottom edges of the second part of the channel, with a motion component directed principally upwards. It is so important because the outlet of the transport channel, thus the bottom edges of the second part of the channel are situated very close to the device to which the rod-like articles are delivered. The clearance between the channel outlet and the receiving device is

usually smaller than the diameter of a rod-like article, thus the movement of the second part of the channel should be principally free from the motion component directed downwards - which allows avoiding a collision between the second part of the transport channel and the receiving device.

[0019] Fig. 2 shows the partitioned transport channel 1 together with a partitioning virtual plane 2 in an axonometric view. The plane 2 transversely partitions the channel 1 into two parts, in this embodiment an upper immovable part 1a and a bottom movable part 1b. From the side of the inlet into the channel 1, a hatched surface of the flow 3 of rod-like articles through this channel is visible.

[0020] Fig. 3 shows the partitioned transport channel 1 in the side view. A hinge 4 is fastened to the rear wall 6 of the channel 1. The virtual plane 2 (not shown in the drawing) transversely partitions the channel 1 into two parts 1a and 1b also partitions the hinge 4 into two parts 4a and 4b which are fastened to the rear wall 6 of the channel 1 to the parts 1a and 1b, respectively. A member connecting two parts of the channel 1a and 1b and two parts of the hinge 4a and 4b is a pin 5 situated in the hinge 4, passing through its two parts 4a and 4b perpendicular to the virtual partition plane 2 (not visible in the figure). The axis of rotation Y which may be parallel to the axis X passes centrally along the pin 5. The axis of rotation Y must be situated outside of the area of flow 3 of rod-like articles in the channel 1. It can overlap the rear wall 6 of the channel 1 or it may be situated outside of its contour.

[0021] Fig. 4 shows the front view of the channel 1 after the assembly in the final position. When we make a rotational movement relative to the axis Y through the bottom part of the channel 1b towards us when standing opposite to the channel, in the front view the rear wall 6b of the bottom part 1b which is situated outside of the working area of the upper part 1a (Fig. 5) becomes visible, whereas the side wall 9 of the bottom part 1b reaches the level of the bottom edge 8 of the part 1a. The bottom part of the hinge 4b, which is fastened to the bottom part of the channel 1b around the axis of rotation Y, moves along the same path.

[0022] Fig. 5 shows the partitioned transport channel 1 after the assembly with a visible displacement of the part 1a relative to the part 1. Due to the rotational movement in the partition plane the transport channel is broken, and the channel outlet moves with a motion component directed upwards.

[0023] The solution according to the invention was presented with reference to a channel with a principally cuboid shape, i.e. channels with a rectangular cross-section; however, it may be just as well used for oval or elliptic channels. The usefulness of the invention for all above-mentioned channel shapes has been proven in carried out tests and simulations.

Claims

1. A channel for the transport of rod-like articles in the tobacco industry, arranged in layers and transversely to their direction of transport, transversely partitioned into two parts, first immovable part and second movable part, whereas the second part is fastened movably relative to the first part
characterized in that
the plane (2) partitioning the channel into two parts (1a, 1b) runs at an angle to the axis of the channel, and
the movable connection allows the movement of the second part (1b) of the channel relative to the first part (1a) of the channel so that during the movement the bottom edges of the second part (1b) move with a motion component directed principally upwards.
2. A channel as in claim 1 **characterized in that** the partition plane (2) crosses the channel at an angle of 0-90 degrees to the channel axis.
3. A channel as in claim 1 **characterized in that** the partition plane (2) crosses the channel at an angle of 30-60 degrees to the channel axis.
4. A channel as in claim 1-3 **characterized in that** the partition plane (2) crosses the channel principally at the angle of 45 degrees to the channel axis.
5. A channel as in any of claims 1 to 4 **characterized in that** the second part (1b) of the channel is a rotatably fastened part, and the axis of the rotary connection is situated at a side wall of the channel.
6. A channel as in any of claims 1 to 4 **characterized in that** the second part (1b) of the channel is fastened slidably relative to the first part.
7. A channel as in claim 5 **characterized in that** the axis of rotation (Y) is situated outside of the contour of the transport channel.
8. A channel as in any of the claims 5 or 7 **characterized in that** the axis of rotation (Y) is situated outside of the flow area of transport channel.
9. A channel as in any of claims 1 to 8 **characterized in that** the movable connection allows the movement of the second part (1b) of the channel relative to the first part of the channel so that during the movement the upper edges of the second part of the channel move in the partition plane.
10. A channel as in any of claims 1 to 9 **characterized in that** the movable connection allows the movement of the second part (1b) of the channel relative to the

first part (1a) of the channel so that during the movement all bottom edges of the second part principally move with a motion component directed upwards.

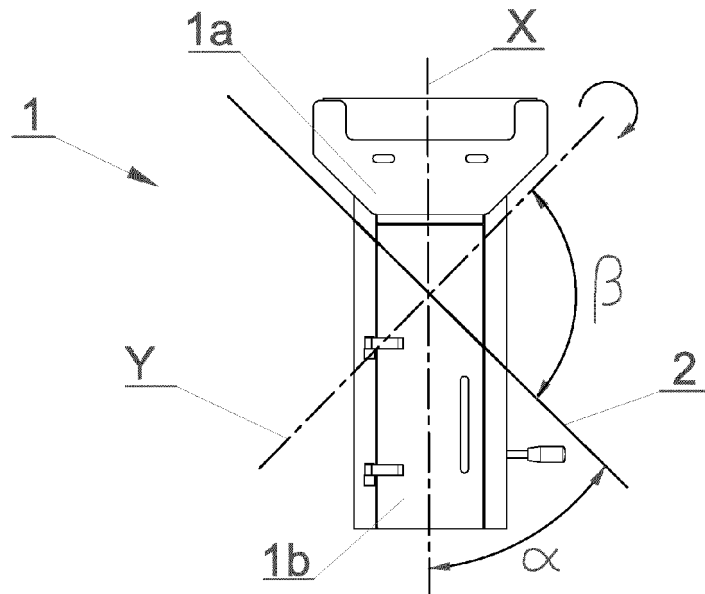


Fig. 1

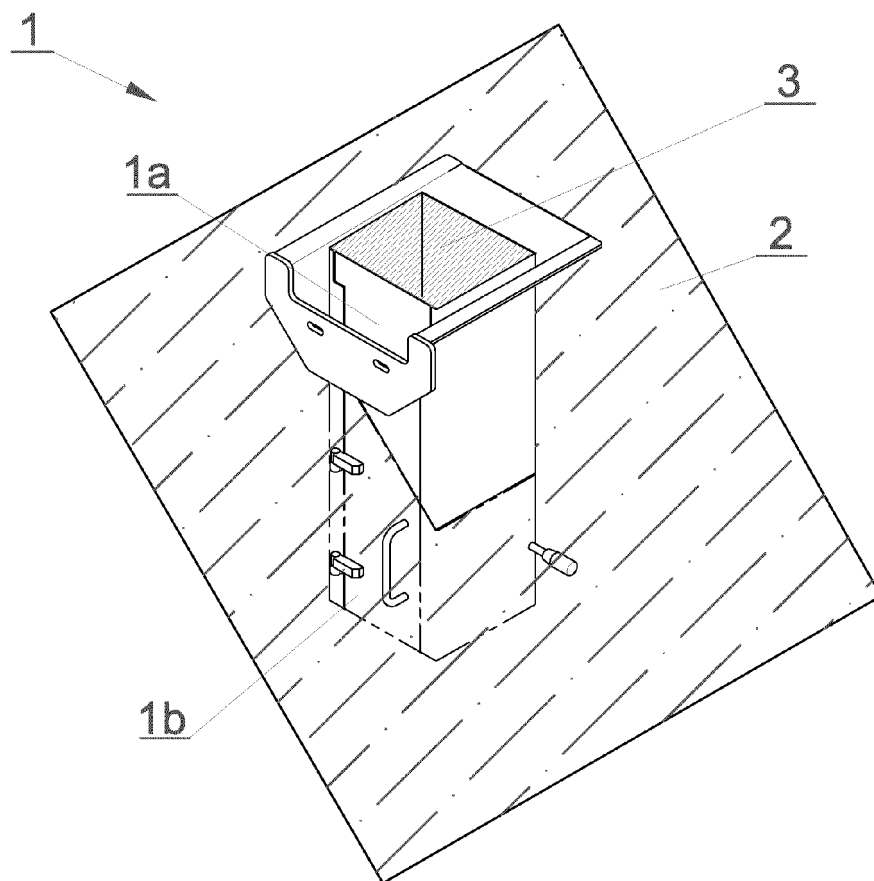


Fig. 2

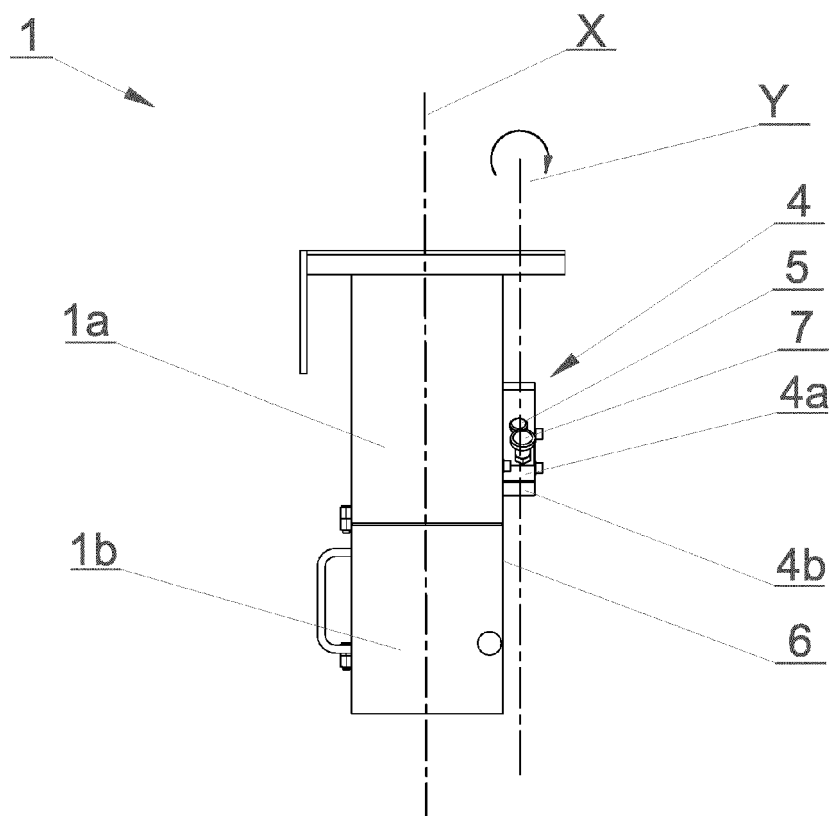


Fig. 3

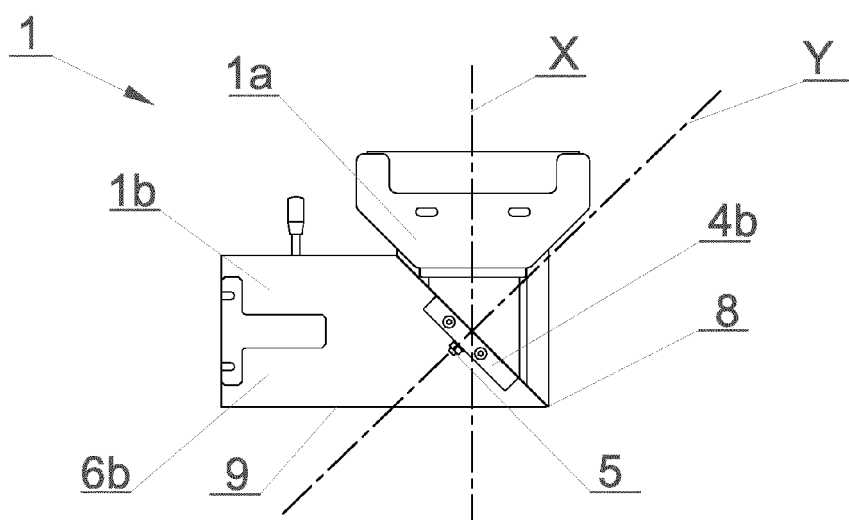


Fig. 4

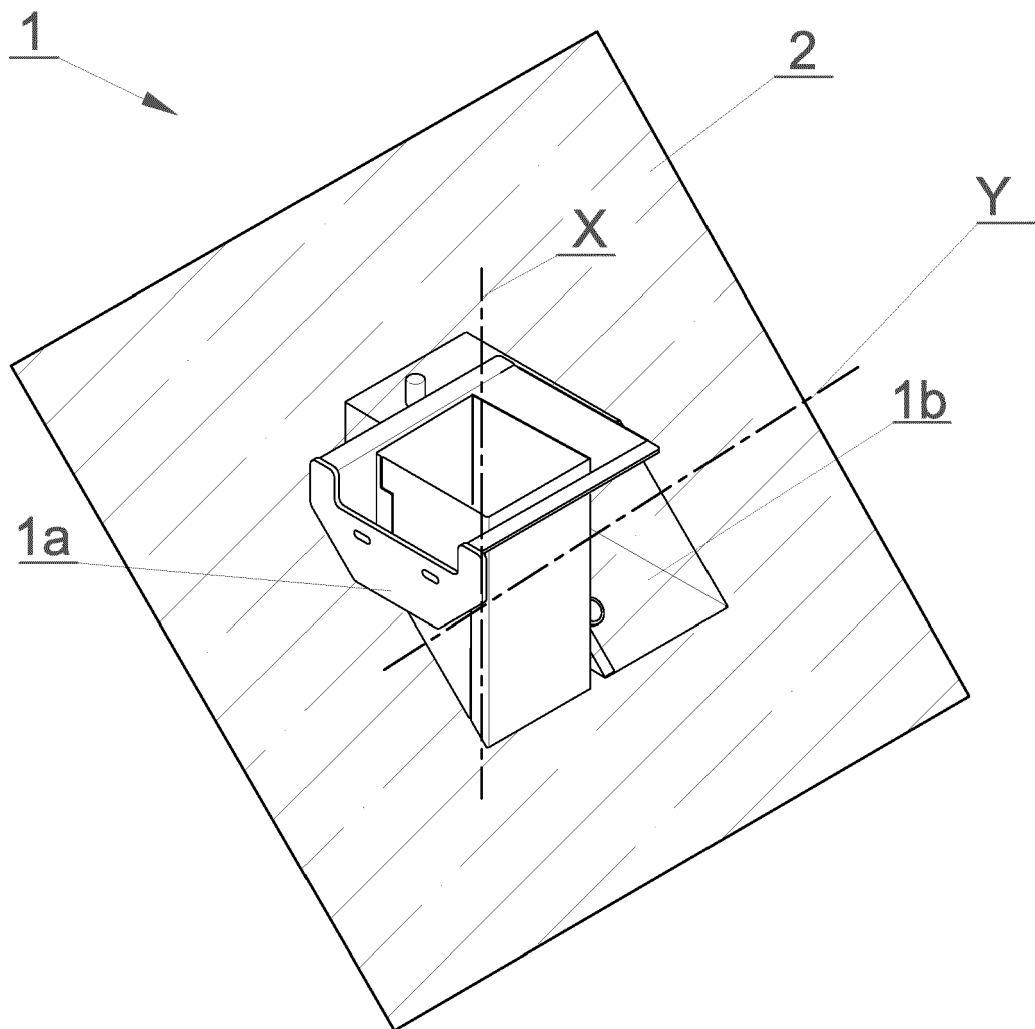


Fig. 5



EUROPEAN SEARCH REPORT

 Application Number
 EP 14 19 5446

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2011/099880 A1 (INT TOBACCO MACHINERY POLAND [PL]; CIESLIKOWSKI BARTOSZ [PL]) 18 August 2011 (2011-08-18) * page 7 - page 10; figures; examples * -----	1-10	INV. A24C5/35 ADD. B65G11/123
X	US 3 595 356 A (BOJE DANIEL Q ET AL) 27 July 1971 (1971-07-27) * column 1, line 74 - column 2, line 50; figures * -----	1-10	
X	EP 0 201 847 A2 (BOECKER ALBERT GMBH & CO KG [DE]) 20 November 1986 (1986-11-20) * page 10, line 1 - page 12, line 11; figures * -----	1-10	
A	US 3 348 646 A (LEONARD MCCALL) 24 October 1967 (1967-10-24) * the whole document * -----	1-10	
A	WO 02/096227 A2 (INT TOBACCO MACHINERY POLAND [PL]; SIKORA LESZEK [PL]; OWCZAREK RADOSL) 5 December 2002 (2002-12-05) * the whole document * -----	1-10	TECHNICAL FIELDS SEARCHED (IPC) A24C B65G
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 21 May 2015	Examiner Marzano Monterosso
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 19 5446

5

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-05-2015

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011099880 A1	18-08-2011	CN 102811630 A	05-12-2012
		EP 2533655 A1	19-12-2012
		JP 5683028 B2	11-03-2015
		JP 2013519608 A	30-05-2013
		PL 216278 B1	31-03-2014
		RU 2012138451 A	20-03-2014
		US 2012321428 A1	20-12-2012
		WO 2011099880 A1	18-08-2011

US 3595356 A	27-07-1971	NONE	

EP 0201847 A2	20-11-1986	DE 3532217 A1	20-11-1986
		EP 0201847 A2	20-11-1986

US 3348646 A	24-10-1967	NONE	

WO 02096227 A2	05-12-2002	AT 298984 T	15-07-2005
		AU 2002256946 A1	09-12-2002
		BG 108317 A	29-10-2004
		CA 2444966 A1	05-12-2002
		CN 1510996 A	07-07-2004
		CZ 20033199 A3	17-03-2004
		DE 60204963 D1	11-08-2005
		DE 60204963 T2	18-05-2006
		EP 1395135 A2	10-03-2004
		ES 2245732 T3	16-01-2006
		JP 4015028 B2	28-11-2007
		JP 2004532782 A	28-10-2004
		PL 347731 A1	02-12-2002
		RU 2003137232 A	10-01-2005
		US 2004231961 A1	25-11-2004
		WO 02096227 A2	05-12-2002
