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(57) A conveyor system comprising a channel for guiding a multi-layer stream of rod-like articles of the tobacco industry received from a conveyor of rod-like articles, whereas the channel is adjusted to guide rod-like articles among conveyors situated one above the other and has at least two arch-shaped, inside and outside, walls, characterized by being provided with at least one lateral guide for guiding end pieces of rod-like articles

constituting a support for guided rod-like articles, whereas the guide is deflected from the normal line of the principal plane of the channel at the angle (ψ) contained between the lateral wall and the normal line of the principal plane of the channel which is adjusted by inside walls of the guides of the conveying channel depending on the angles (α , β) of inclination of the uppermost layer relative to the lowermost layer in the inflowing stream.



Description

[0001] The object of the invention is a conveyor transport system comprising a channel for guiding a multi-layer stream of rod-like articles of the tobacco industry.

[0002] The tobacco industry articles in the form of cigarettes, cigarillos, cigars, filter rods are usually conveyed in production lines in the form of a mass flow, i.e. a multi-layer stream of rod-like articles is conveyed within the machines and among the machines. The mass flow may be transported by means of belt or chain conveyors situated vertically, horizontally or at any angle. The mass flow may also take place by gravitation in vertical or inclined channels. The methods of designing of systems for conveying a mass flow are known from such documents as GB1175202, GB1453191, GB1519778. There are frequently used conveyor systems, where the mass flow is realized at different levels one below the other, whereas at different levels the stream of article moves in opposite directions such as in the solution disclosed in GB2007179.

[0003] From the publication WO2011019291A1 a two-level store is known where the transported rods are conveyed from the lower to the upper level, whereas from the publication WO2008081160A2 a multi-level store is known at the successive levels of which the mass flow moves in successively alternating directions, whereas each level is embodied as a separate circular conveyor. In a multi-layer stream of cigarettes, the lowermost and uppermost layers of cigarettes are nonparallel to each other due to the thickness of the wrapping material connecting the tobacco and filter portions. The filter portions of cigarettes lie on one side of the flow and in case of multiple layers the non-parallelism of the lowermost and uppermost layers is visibly increasing. In addition, this non-parallelism does not constitute a problem when conveying a stream of cigarettes at a single level along a rectilinear conveyor, whereas it may constitute a problem on a circular conveyor. When conveying a stream of cigarettes among successive levels or conveyors situated one above the other, which usually takes place in channels on an arched path using arched guides or conveyors, a problem occurs consisting in that the cigarettes moving in a layer next to the outside walls of the channel are subject to local dislocations and move out of the stream nonparallel to other cigarettes in the stream, i.e. cross-wise to the direction of flow of the stream through the channel.

[0004] The object of the invention is a conveyor system comprising a channel for guiding a multi-layer stream of rod-like articles of the tobacco industry received from a conveyor of rod-like articles. The channel is adjusted to guide rod-like articles among the conveyors situated one above the other and has at least two arch-shaped, inside and outside, walls. A system according to the invention is characterized by being provided with at least one lateral guide for guiding the end pieces of rod-like articles constituting a support for guided rod-like articles, whereas

the guide is deflected from the normal line of the principal plane of the conveying channel at the angle ψ contained between the lateral wall and the normal line of the principal plane of the conveying channel which is adjusted depending on the angles α , β of inclination of the uppermost layer relative to the lowermost layer in the inflowing stream.

[0005] Furthermore, a system according to the invention is characterized in that the angle (ψ) of inclination of the lateral guide of the conveying channel is an angle in the range between -6 and 6 degrees, preferably in the range between 3 and 4 degrees.

[0006] Furthermore, a system according to the invention is characterized in that the lateral guide of the conveying channel is shifted from the inside walls of the conveying channel.

[0007] Furthermore, a system according to the invention is characterized in that the inner surface of the lateral guide is a convex surface.

[0008] Furthermore, a system according to the invention is characterized in that the angle (ψ) varies along the length of the channel.

[0009] Furthermore, a system according to the invention is characterized in that the lateral guides in the inlet area have inlet surfaces adjusted to the conveyor's shape.

[0010] The solution according to the invention allows any desired shaping of the channel for guiding the stream of rod-like articles.

[0011] The object of the invention is presented in embodiments in a drawing in which:

Fig. 1a shows a multi-layer stream of rod-like articles moving linearly,

Fig. 1b shows a section through the multi-layer stream of rod-like articles of fig. 1a,

Fig. 2a shows a multi-layer stream of rod-like articles moving on a circular path,

Fig. 2b shows a section through the multi-layer stream of rod-like articles of fig. 2a,

Fig. 3 shows an example of a conveying line with a channel in the first embodiment;

Fig. 4 shows a cross-section through the channel of fig. 3,

Fig. 5 shows a top view of a channel with a linear conveyor,

Fig. 6 shows a top view of a channel with a circular conveyor,

Fig. 7 shows a lateral guide in a simplified form,

Fig. 8 shows a conveying line with a channel having adjustable guides.

[0012] In a stream 1 shown in fig. 1a and 1b, moving along a straight line, rod-like articles 2, in this case cigarettes are conveyed in multiple layers. The lowermost layer 3 in the stream 1 shown in fig. 1b in a section A-A through the stream has a direct contact with the conveyor 4, whereas the uppermost layer 5 due to a non-uniform

diameter of the articles 2 is inclined at an angle α to the lowermost layer 3. The problem of inclination of the uppermost layer 5 relative to the lowermost layer 3 also concerns conveyors where the articles move on a circular path as shown in fig. 2a and 2b. For filters F situated inside the circular conveyor 4A as in fig. 2a the angle of inclination β of the uppermost level 5 relative to the lowermost level 3 will be greater than the angle α for articles moving along a straight line, for filters F situated outside the circular conveyor 4A the angle of inclination β will be less than the angle α for the articles 2 moving along a straight line.

[0013] In the fragment of the conveying line shown in fig. 3 the flow of the stream 1 of rod-like articles among the successive conveyors is shown. The direction of flow on the successive conveyors has been indicated by arrows, whereas the conveyors may be embodied as rectilinear 4 or circular 4A conveyors. A channel 6 is used for receiving and guiding a multi-layer stream 1 and delivering it onto the successive conveyor 4, 4A situated below. In this embodiment the channel 6 has an inside wall 7 created by a fragment of the conveyor 4 or 4A designed as a belt or chain conveyor, and an outside wall 8 having the form of a stationary arched guide 9.

[0014] Fig. 4 shows a C-C section through the channel 6 of fig 3. The wall 8 is inclined relative to the wall 7 at the angle γ which depends on the angles α , β of inclination of the uppermost layer relative to the lowermost layer in the inflowing stream 1. The purpose of the inclination of the walls 7, 8 is to prevent the articles from positioning slantwise to other articles, especially on the side of the outside wall 8. The channel 6 is provided with an inlet 10 whose inside walls are also inclined relative to each other. Furthermore, the channel 6 is provided with two lateral guides 11, 12 (not shown in fig. 3, visible in the cross-section in fig. 4) whose function is to prevent rod-like articles 2 from drawing out of the channel, in principle crosswise to the direction of flow of the articles stream, also in a situation when some articles position themselves nonparallel to other articles in the stream. It can be seen in the embodiment shown in fig. 4 that the lateral guide 12 is deflected from the line 17 of the conveying channel 6 by an angle ψ . The line 17 of the channel 6 is a line in the normal direction to the principal plane 18 of the conveying channel, whereas the said plane is equally distanced from both inside walls of the channel and is shown in fig. 3. The angle ψ is contained between the lateral wall and the line normal to the principal plane of the conveying channel 6 which is adjusted depending on the angles (α , β) of inclination of the uppermost layer 5 relative to the lowermost layer 3 in the inflowing stream. Preferably the angle ψ of inclination of the lateral guide of the conveying channel is an angle in the range between -6 and 6 degrees, preferably in the range between 3 and 4 degrees. Furthermore, the lateral guide 11, 12 of the conveying channel 6 is distanced from the inside walls 7, 8 of the conveying channel 6, the inner surface of the lateral guide may be a convex surface.

[0015] The lateral guides 11 and 12 are shown in a top view in fig. 5, designated as D in fig. 3. In the inlet area 10, the lateral guides 11, 12 are provided with inserting members 11A and 12A in the form of flat members deflected outwards. The inserting surfaces 11B and 12B realize the function of inserting the articles into the channel and may be shaped as flat surfaces, may consist of several planes or may be cylindrical in shape. The inserting surfaces 11C and 12C realize the function of lateral guiding of the articles in the channel and may be shaped as flat surfaces.

[0016] Fig. 6 shows a top view of the channel 6 with the circular conveyor 4A and the guides 13 and 14. The inserting surfaces 13B and 14B of the inserting members 13A and 14A may take any shape in order to be adjusted to the conveyor's shape. Similarly to the embodiment described above, the surfaces 13C and 14C guide the articles, and precisely the end pieces of articles, in the channel 6.

[0017] Fig. 7 shows, in a simplified form, the guides 11, 12, 13, 14 which are provided with inlet surfaces in the area A and guiding surfaces for rod-like articles in the area C. Frequently, the articles have the tendency to draw out in one direction, then it is sufficient to install one lateral guide in order to prevent the articles from drawing out of the channel.

[0018] The lateral guides of the channel for guiding rod-like articles may be designed as stationary, or they may be designed as slidable by fastening them to a mechanism which will allow shifting the guides in the direction corresponding to the axes of conveyed articles. Fig. 8 shows a similar view as in fig. 5, whereas each of the lateral guides 11, 12 is shifted by means of the drive members 15, 16. It is possible to design a single mechanism coupling the shifting of both lateral guides.

Claims

1. A conveyor system comprising a channel (6) for guiding a multi-layer stream (1) of rod-like articles (2) of the tobacco industry received from a conveyor (4, 4A) of rod-like articles (2), whereas the channel is adjusted to guide rod-like articles (2) among conveyors situated one above the other and has at least two arch-shaped, inside and outside, walls.

characterized by

being provided with at least one lateral guide (11, 12) for guiding end pieces of rod-like articles (2) constituting a support for guided rod-like articles (2), whereas the guide (12) is deflected from the normal line (17) of the principal plane (18) of the channel (6) at the angle (ψ) contained between the lateral wall (12) and the normal line (17) of the principal plane (18) of the channel (6) which is adjusted depending on the angles (α , β) of inclination of the uppermost layer (5) relative to the lowermost layer (3) in the inflowing stream (1).

2. A system as in claim 1 **characterized in that** the angle (ψ) of inclination of the lateral guide (12) of the conveying channel (6) is an angle in the range between -6 and 6 degrees, preferably in the range between 3 and 4 degrees. 5
3. A system as in claim 1 or 2 **characterized in that** the lateral guide (12) of the conveying channel (6) is distanced from the inside walls (7, 8) of the conveying channel (6). 10
4. A system as in any of the claims 1 to 3 **characterized in that** the inner surface of the lateral guide (12) is a convex surface. 15
5. A system as in any of the claims 1 to 4 **characterized in that** the angle (ψ) varies along the length of the channel (6). 20
6. A system as in any of the claims 1 to 4 **characterized in that** the lateral guides (11, 12, 13, 14) in the inlet area (10) have inlet surfaces (11B, 12B, 13B, 14B) adjusted to the shape of the conveyor (4, 4A). 25

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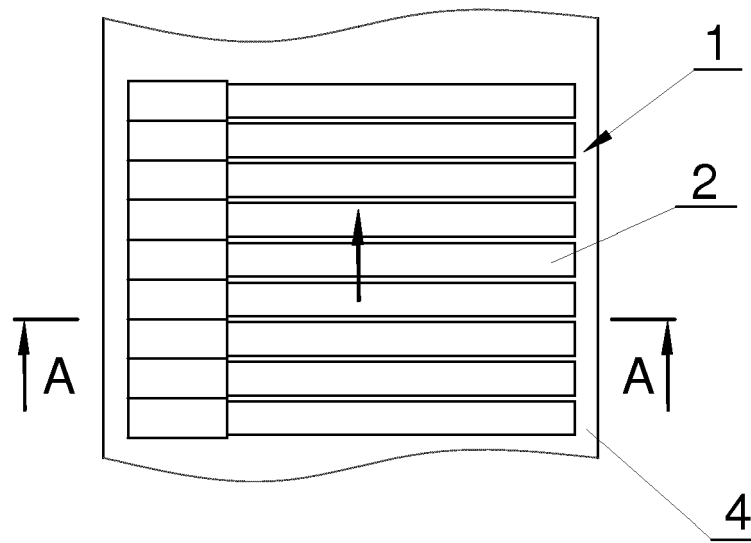


Fig. 1a

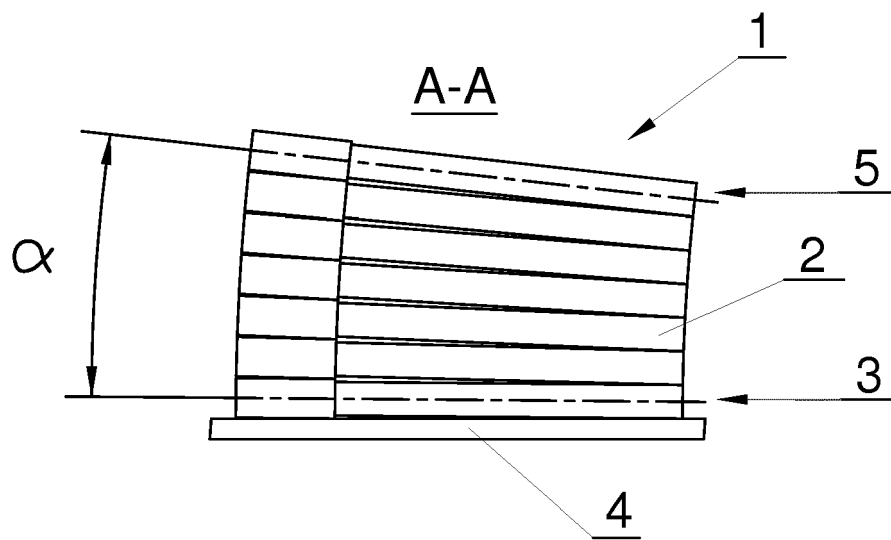


Fig. 1b

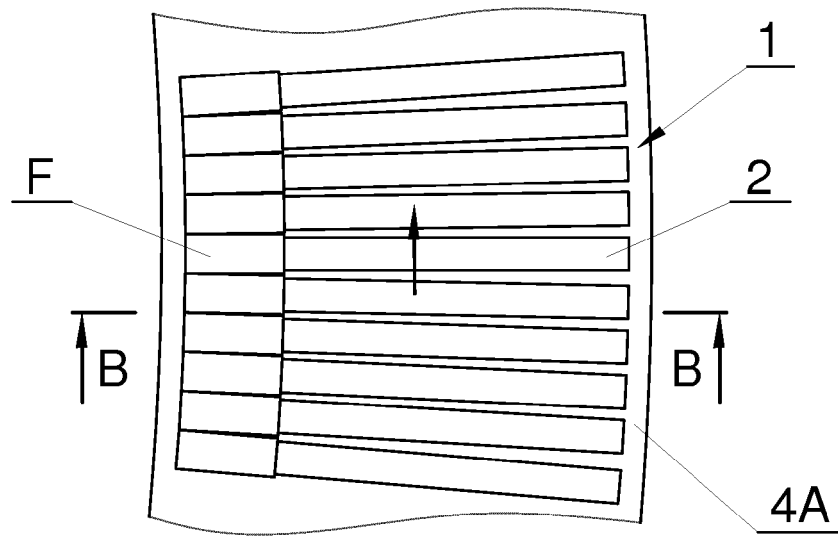


Fig. 2a

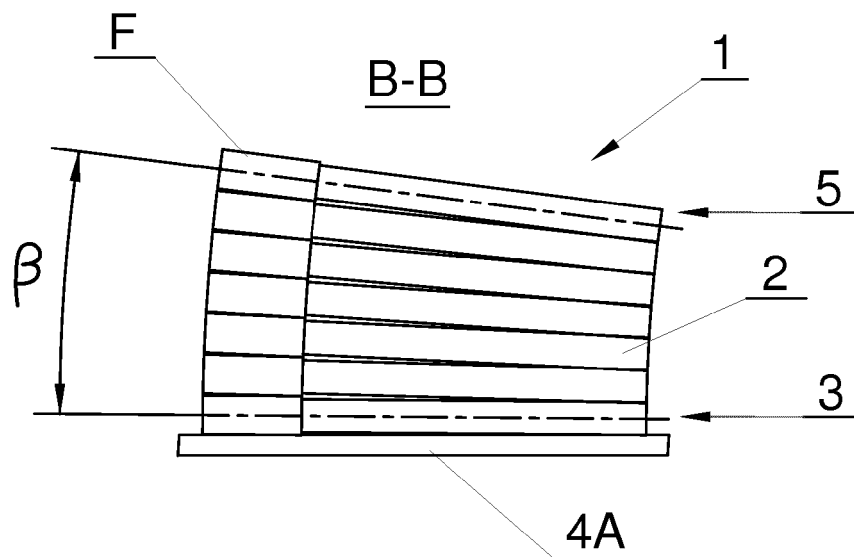


Fig. 2b

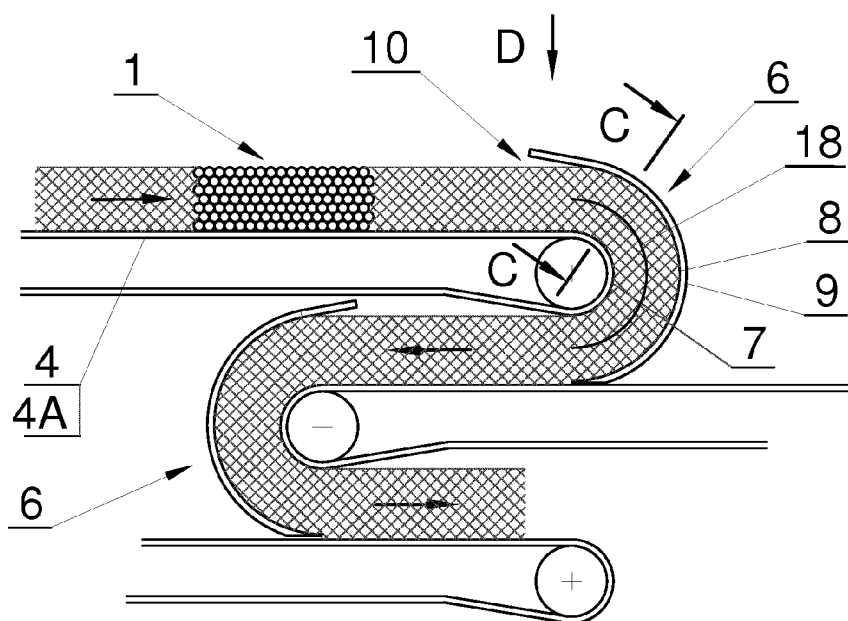


Fig. 3

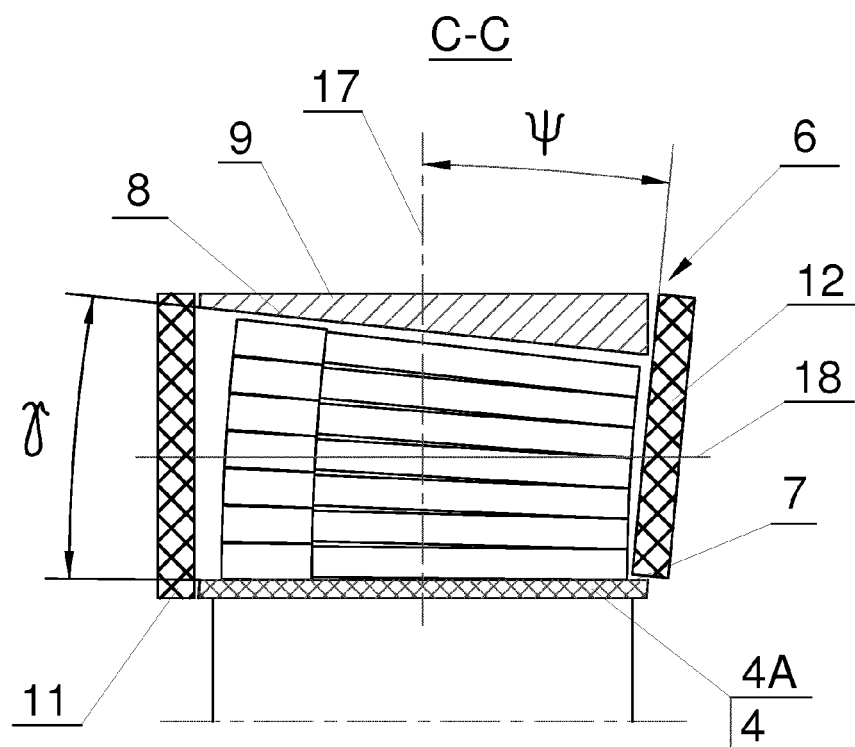


Fig. 4

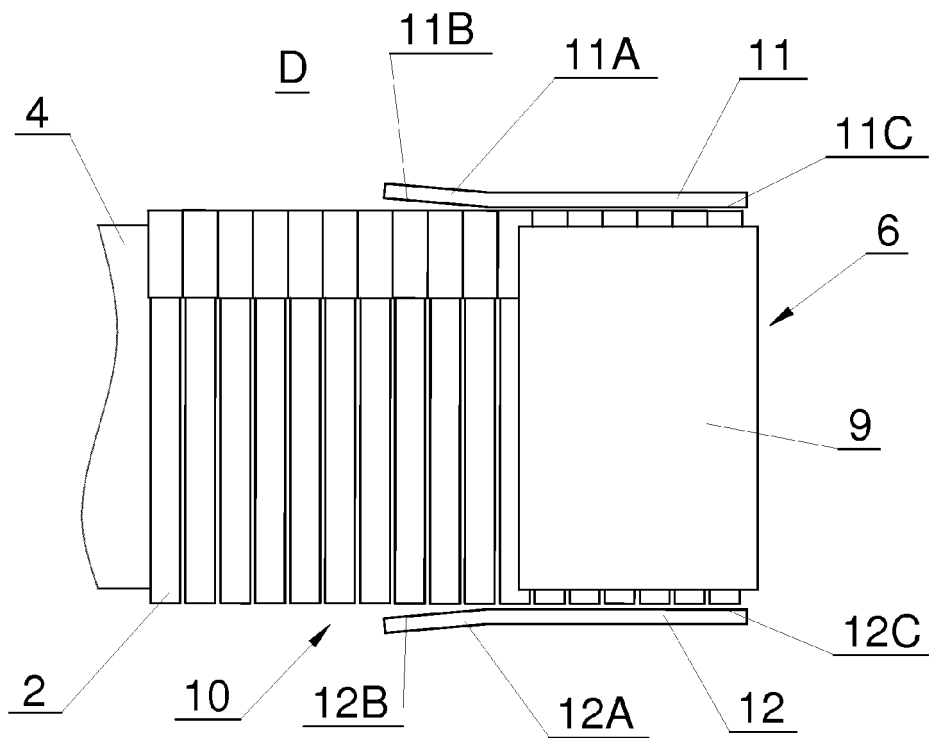


Fig. 5

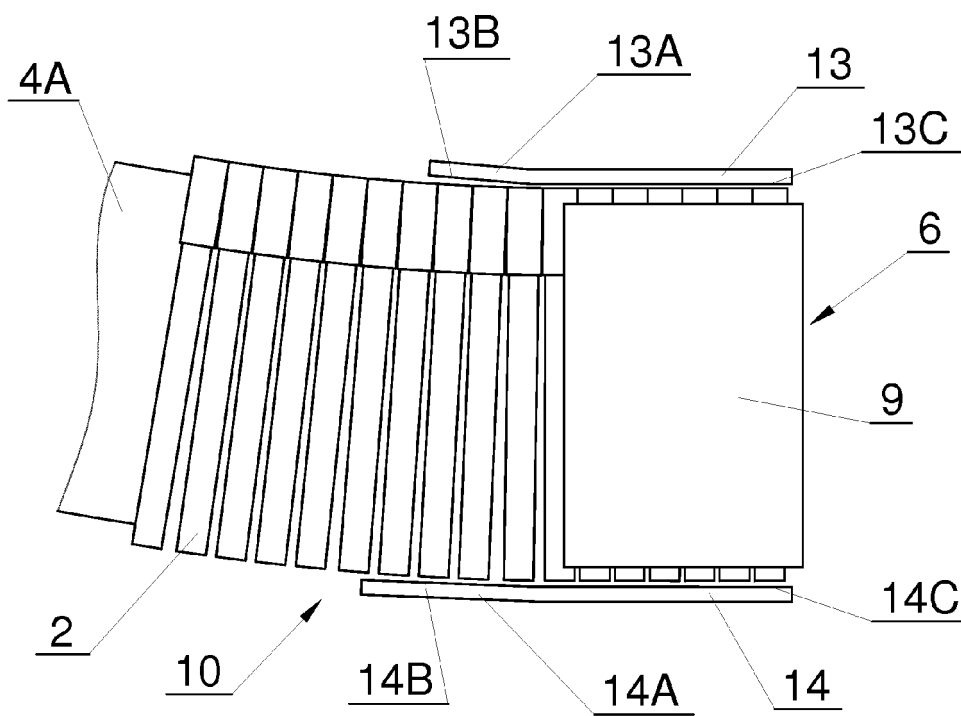


Fig. 6

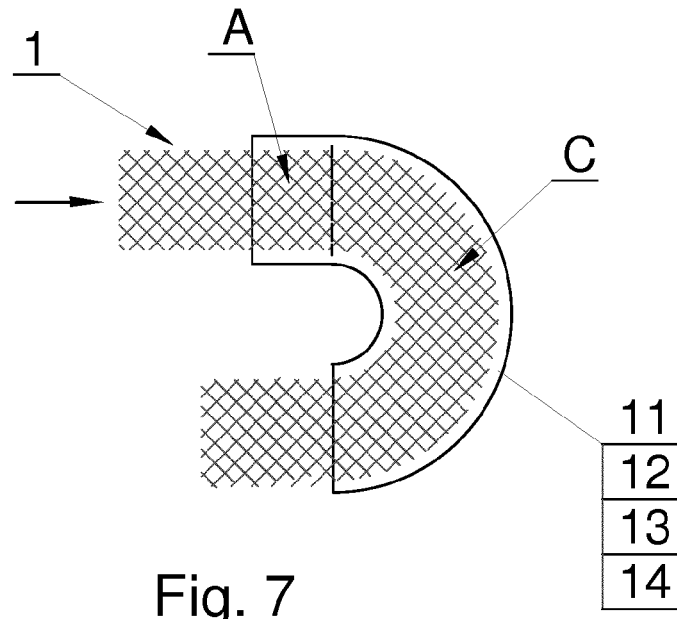


Fig. 7

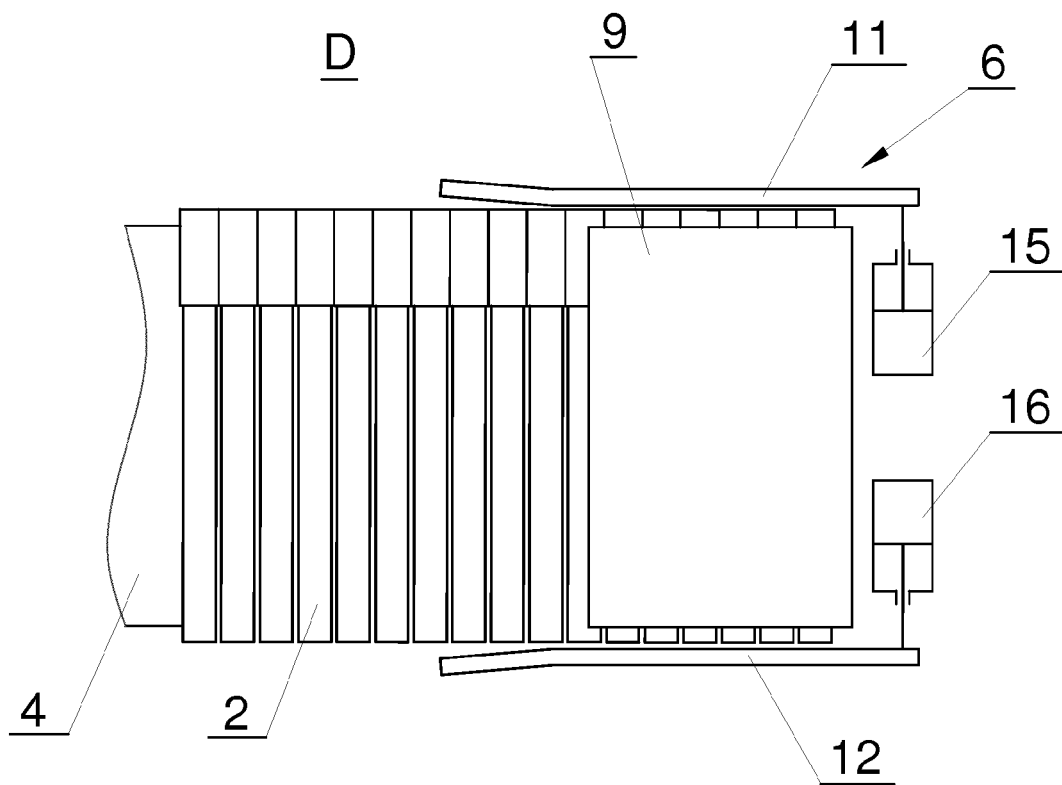


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 4526

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Place of search		Date of completion of the search	Examiner
The Hague		18 February 2015	Martin, Benoit
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			

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