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(54) Benævnelse: **ANORDNING TIL UDSKILLELSE OG POSITIONERING AF STIFTFORMET STYKGODS**

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Description

The present invention relates to an apparatus for separating and orienting pin-shaped piece goods, in particular rivets, having a head and a shank, according to the preamble of Claim 1.

An apparatus of the generic type is known from WO 2007/068129 A1. The apparatus known from WO 2007/068129 A1 comprises a funnel-shaped container for receiving piece goods, having a front wall and a rear wall, which are arranged opposite one another and in each case so as to be inclined outwardly at an angle to the vertical, and at least two side walls, which extend between the front wall and the rear wall. Within an aperture in the front wall is arranged a driven conveyor belt, which is arranged at an inclination to the vertical at a same angle as the front wall and conveys the piece goods, preforms of plastics bottles or screws from a receiving plane in the container to a higher discharge plane. By means of the conveyor belt, which is divided into individual portions by drivers extending over the width of the conveyor belt, the piece goods are individually removed from the container. This is presentable in the case of the preforms of plastics bottles, since these, due to their size and shape, are easy to separate. Pin-shaped piece goods having a head and a shank, such as screws, are generally considerably smaller in terms of their dimensions and, due to their contour, are inclined to cling to one another, which makes a separation by the conveyor belt at least very much more difficult, since the portions between the drivers generally receive and transport away more than one screw.

The object of the present invention is to provide an apparatus for separating and orienting pin-shaped piece goods having a head and a shank in such a way that said apparatus is distinguished by a simplified and more cost-effective structure.

This object is achieved according to the invention by the features of Claim 1. Advantageous refinements are the subject of the sub-claims.

According to Claim 1, an apparatus for separating and orienting pin-shaped piece goods, in particular rivets, having a head and a shank is proposed. The apparatus comprises a substantially funnel-shaped container for receiving the piece goods, having two wall portions which delimit the container in its front region, and a rear wall, wherein the wall portions and the rear wall are arranged opposite one another in certain portions and in each case so as to be inclined outwardly at an angle to the centre transverse plane of the container. The container has an endlessly circulating conveying means which is arranged below an, in particular slot-shaped, aperture which spaces apart the wall portions, which conveying means conveys piece goods from a receiving plane to a higher discharge plane. The endlessly circulating conveying means has a conveying plane provided with drivers. For the separation and orientation of the pin-shaped piece goods having a head and a shank, it is provided that the slot-shaped aperture is delimited by mutually parallel running front edges of the wall portions which are arranged to taper in a V-shape towards the conveying means and which open above the conveying means or in a plane with the conveying means, and that the drivers take the form of cylindrical pins which are arranged spaced apart from one another in the direction of circulation of the conveying means and which extend substantially perpendicularly to the conveying plane of the conveying means. The wall portions have with respect to the centre transverse plane a first inclination, so that a first angle is formed between the rear wall and the wall portions. With respect to a longitudinal axis of the aperture, the wall portions have a second inclination, so that a second angle, which is less than 90°, is additionally formed between the mutually opposite wall portions spaced apart by the aperture. The conveying means takes up the piece goods, in particular rivets, which are lying on top of the container and which, at least in certain portions, jut onto the conveying means. The drivers take up the piece goods and transport them away. The additional inclination of the wall portions at the second angle here brings about an orientation of the piece goods in the longitudinal direction. Moreover, the

effect is produced that piece goods which are drawn along only by piece goods taken up by the conveying means or by the drivers thereof, i.e. have no direct contact with the drivers of the conveying means, detach themselves from this latter and slide back into the container. Preferably, the separated piece goods, after having passed the discharge plane, are transferred directly to a downstream apparatus for storage.

The width of the slot-shaped aperture between the wall portions should here correspond at least to the width of the drivers and at most to the length of the piece goods. A wedging of the piece goods between the front edges of the wall portions and the conveying means is thereby able to be avoided. It is particularly advantageous if the width of the aperture substantially corresponds to the width of the drivers, which is smaller than the head diameter of the piece goods. This enables the head of the piece goods to be taken up by the driver, whilst the head itself does not rest on the conveying means, but rather on the wall portions which delimit the aperture.

According to a preferred refinement, the drivers can have a circular-cylindrical or polygonal cross section. The drivers on the conveying means ensure a permanent movement of the piece goods in the container as they pass through the aperture in the funnel. In this way, the effect of a resulting arch or tunnel in the region of the aperture above the conveying means during the continuous evacuation of the piece goods can be avoided, since individual piece goods slide in the direction of the aperture.

It is advantageous if, in the direction of circulation of the conveying means, the drivers are offset alternately with respect to the longitudinal axis of the conveying means between its edge region and the longitudinal axis. The formation of coherent chains of piece goods which are transported away by the endlessly circulating conveying means can hereby be avoided.

In particular, piece goods conveyed from the conveying means to

the discharge plane are transferred to a downstream chute which is arranged inclined at an angle to the horizontal. To this end, the chute can have at least one channel, or two channels running side by side, having a substantially U-shaped profile, wherein the cross section of the respective channel is wider than the head and narrower than the length of the shank. The number of channels of the chute can be chosen in dependence on the design of the conveying means. In particular, this can be dependent on the arrangement of the drivers on the conveying means.

Preferably, the inclination of the conveying means can be greater than or equal to 30° and less than or equal to 60°. In accordance with the inclination of the conveying means and with the therefrom resulting change in the second angle at which the wall portions are inclined with respect to one another, the order of magnitude of the throughput of evacuated piece goods from the container is able to be varied. In particular, the adjustment of the inclination of the conveying means can be realized in dependence on the geometry of the piece goods.

In addition, the aperture can extend substantially from the lowest point of the container to the upper edge of the wall portions. The conveying plane of the conveying means, which is provided with the substantially pin-shaped drivers, thus ensures that the bulk cone of piece goods that tapers towards the lowest point of the container constantly undergoes a thorough mixing and loosening in order to avoid the formation of an arch, that is to say a section-wisel hollowing or tunnelling in the bulk cone, the formation of which prevents the transport of piece goods by the conveying means. Moreover, as a result of this arrangement, a complete or almost complete emptying of the container is able to be achieved.

According to a preferred refinement, the distance between two channels in the longitudinal direction of the chute can widen from the receiving region to the discharge region.

Hence an adaptation to a conveying width of apparatuses

downstream of the chute can be achieved.

Furthermore, in order to improve the anti-frictional properties, the at least one channel can have a coating which minimizes static friction, so that the piece goods can pass through the at least one channel in a largely trouble-free manner.

According to a preferred embodiment, it can be provided that a sensor arrangement is arranged in the discharge plane or at the height of the discharge plane or downstream of the discharge plane and is configured to detect geometric properties of the piece goods. By means of the sensor arrangement, the separated piece goods can be monitored in terms of the maintenance of predefinable geometric dimensions. The sensor arrangement is configured for the optical detection of the geometric dimensions of the piece goods, in particular of rivets.

In particular, the conveying means can be drivable electromechanically by an actuator. The actuator can take the form of an electric motor, which is drive-connected to a deflection pulley of the conveying means. The electric motor can in this case be integrated into the deflection pulley. The deflection pulley can here be designed as a rotor of the electric motor. Preferably, the electric motor can be designed as a stepping motor. As a result, a precise control is able to be ensured, since the respective position when the stepping motor is started and stopped is known. The sorting-out of piece goods, which has been identified by the sensor arrangement on the basis of varying geometric dimensions, can thus be enabled. Preferably, the sorting-out can be realized automatically.

Alternatively, the conveying means can be drivable mechanically or pneumatically. In particular, the pneumatic drive of the conveying means is advantageous, since this can be operated largely free from wear. This is advantageous in the light of a repeated starting and stopping of the conveying means in order to be able to sort out piece goods which do not conform to predefined geometric dimensions.

In addition, it is advantageous that the conveying speed of the endlessly circulating conveying means is adjustable. As a result, a customized adaptation to the piece goods to be conveyed, as well as to a throughput, is able to be adjusted.

In addition, the chute can have arranged downstream thereof a conveying device which transports away the piece goods coming from the chute at a conveying speed which is dependent on the drive speed of the conveying means arranged in the container.

Preferably, the endlessly circulating conveying means can take the form of a conveyor belt or link chain. The upper strand of the conveyor belt here forms the conveying plane.

The conveying device can in this case be drive-coupled to the conveying means. The conveying device can take the form of a further conveyor belt circulating endlessly around deflection pulleys and having a conveying surface. For the driving, one of the deflection pulleys of the conveyor belt arranged in the container can be connected by a belt drive to one of the deflection pulleys of the conveying device.

Advantageously, at least one separation element can be provided for sub-dividing a conveying surface of the conveying device into two mutually spaced, parallel conveying portion, which are adapted to the spacing of two channels from one another in the discharge region thereof.

The present invention is explained in greater detail below on the basis of an illustrative embodiment represented in the drawings, wherein:

Fig. 1 shows a perspective view of a separation apparatus;

Fig. 2 shows an isometric view of a container of the separation apparatus;

Fig. 3 shows a view from above into the container according to Fig. 2;

Fig. 4 shows a view of a schematically represented conveying surface of a conveyor belt of the separation apparatus;

Fig. 5 shows an alternative embodiment of a conveying means designed as a conveyor belt.

Fig. 1 shows a perspective view of a separation apparatus 1 for separating and orienting pin-shaped piece goods, in particular rivets, having a head and a shank. The apparatus 1 comprises a substantially funnel-shaped container 2 for receiving the piece goods designed as rivets. The container 2 has two wall portions 3, 4, which delimit the container 2 in a front region and laterally in certain portions, as well as a rear wall 5, which delimits the container 2 in a rear region. The rear wall 5 extending between the wall portions 3, 4 spaces apart the two wall portions 3, 4 in the rearward region. The wall portions 3, 4 and the rear wall 5 are in in certain portions arranged opposite one another and in each case inclined outwardly at angle to an imaginary centre transverse plane 6 of the container 2, so that the substantially funnel-shaped design of the container 2 is obtained.

The two wall portions 3 and 4 are spaced apart in the front region by a continuous, in particular slot-shaped, aperture 7 which extends from the lowest point of the container 2 to the upper edge of the wall portions 3, 4. The two wall portions 3, 4 have in each case a front segment 3a, 4a and a rear segment 3b, 4b. Starting from the aperture 7, the front segments 3a, 4a extend in certain portions in the direction of the rear wall 5. The front segments 3a, 4a are adjoined by the rear segments 3b, 4b, which are designed inclined at an angle to the front segments 3a, 4a. The rear segments 3b, 4b extend to the rear wall 5 and are arranged inclined at an angle of about 90° to the rear wall 5. The front segments 3a, 4a have an inclination β with respect to a longitudinal axis of the aperture 7, as can be seen from

the representation in Fig. 4.

Parallelly to the aperture 7 is arranged below the wall portions 3 and 4 an endlessly circulating conveying means configured as a conveyor belt 8, which circulates around mutually spaced deflection pulleys (not represented in detail). The conveying means can also take the form of a link chain, which circulates around corresponding pinions. The conveyor belt 8 is arranged inclined to the centre transverse plane 6 at a same angle α as the wall portions 3, 4. The conveyor belt 8 conveys the piece goods from the container 2 from a receiving plane inside the container 2 to a higher discharge plane above the container 2. The receiving plane is variable, since it is defined by the respective fill level of the container 2. The discharge plane is formed by the upper deflection point of the conveyor belt 8. For the transport of the piece goods, the conveyor belt 8, on its conveying surface 9 formed as an upper strand, is provided with drivers 15. The conveyor belt 8 has an inclination α which is greater than or equal to 30° and less than or equal to 60°. In the discharge plane or at the height of the discharge plane or downstream thereof is positioned a sensor arrangement 22, which serves for the optical detection of geometric dimensions of the separated piece goods. By means of the sensor arrangement 22, piece goods having a dimension that differs from a predefinable geometric dimension are identified, whereby an, in particular automated, sorting-out of the identified piece goods is enabled. The sensor arrangement 22 is signal-connected to a control apparatus - not represented - which analyzes the signals generated by the sensor arrangement 22. Depending on the result of the analysis, the control apparatus serves to control the, in particular automated, sorting-out. In the simplest case, an interruption of the conveyance of the piece goods is realized by a stoppage of the conveyor belt 8. The last separated piece goods whose geometric dimension differs from the predefined geometric dimension can thus be removed manually or in an automated manner.

The aperture 7 is delimited by mutually parallel front edges 10,

11 of the wall portions 3, 4 arranged to taper in a V-shape towards the conveyor belt 8. The front edges 10 and 11 open above the conveyor belt 8 or in a plane with the conveying surface 9 of the conveyor belt 8. For fastening to a frame 13 receiving the conveyor belt 8, brackets 12 are provided. The frame 13 receives actuating elements for driving one of the deflection pulleys in order to drive the conveyor belt 8 in an endlessly circulating manner. The inclination of the front edges 10, 11 which delimit the, in particular slot-shaped, aperture 7 corresponds with the inclination α of the conveyor belt 8. The drive of the deflection pulley can be realized electromechanically, for instance by a stepping motor, mechanically, or pneumatically. For the sorting-out of piece goods which do not conform to the predefined geometric dimensions, the drive of the deflection pulley is briefly interrupted.

The discharge plane is adjoined by a chute 13. The chute 13 has two channels 14, to which the piece goods, i.e. the rivets, are transferred from the conveyor belt 8. The channels 14 have a substantially U-shaped profile. The cross section of the channels 14 is wider than the head and narrower than the length of the shank of the rivets which are due to be separated. The distance between the channels 14 widens in the longitudinal direction of the chute from the receiving region to the discharge region. The channels 14 have a coating that minimizes the static friction.

Downstream of the chute 13 is arranged a conveying device 17, which transports away the piece goods coming from the chute 13. at a conveying speed which is dependent on the drive speed of the conveyor belt 8 arranged in the container 2.

In this case, the conveying device 17 is drive-coupled to the conveyor belt 8. The conveying device 17 can take the form of a further conveyor belt 19 circulating endlessly around deflection pulleys and having a conveying surface. For the driving, one of the deflection pulleys of the conveyor belt 8 arranged in the

container 2 can be connected by a belt drive 18 to one of the deflection pulleys of the conveying device 17.

For the division of a conveying surface of the conveying device 17 into two mutually spaced, parallel conveying portions which are tailored to the spacing existing in the discharge region of the two channels 14 one to another, at least one separation element 20 is provided.

In the represented illustrative embodiment, the conveying device 17 is adjoined by a discharge apparatus 21 which enables an individual removal of the rivets.

The representation in Fig. 2 shows an isometric view of the container 2 of the separation apparatus 1. In Fig. 3, a view from above into the container 2 is represented. The aperture 7 has a width B which corresponds at least to the width of the drivers 15, and at most to the length of the piece goods.

In Fig. 4, a view of the schematically represented conveying surface 9 of the conveyor belt 8 of the separation apparatus 1 is represented. The drivers 15 are arranged on both sides of the longitudinal axis 16 of the conveyor belt 8 between a respective edge region and the longitudinal axis 16. In the longitudinal direction of the conveyor belt 8, the drivers 15 are arranged mutually offset from one another. The drivers 15 take the form of cylindrical pins which extend substantially perpendicularly to the conveying surface 9 of the conveyor belt 8. The drivers 15 can here have a circular or polygonal cross section.

Fig. 5 shows an alternative embodiment of the conveying means designed as a conveyor belt 8. The conveyor belt 8a is designed narrower than the conveyor belt 8 represented in Fig. 4. In the longitudinal direction of the conveyor belt 8a, the drivers 15 are arranged in alignment one behind another. This embodiment of the conveying means limits the transport of the pin-shaped piece goods onto an individual element in the region of the respective driver 15.

Depending on the design of the conveyor belt 8 or 8a according to Fig. 4 or 5, the chute 13 has two or, in the case of the conveyor belt 8a, only one channel 14.

Reference symbol list

1	separation apparatus
2	container
3	wall portion
3a	front segment
3b	rear segment
4a	front segment
4b	rear segment
5	rear wall
6	centre transverse plane
7	aperture
8	conveyor belt
9	conveying surface
10	front edge
11	front edge
12	bracket
13	chute
14	channel
15	drivers

16 longitudinal axis of 8

17 conveying device

18 belt drive

19 conveyor belt

20 separation element

21 discharge apparatus

22 sensor arrangement

α inclination

β inclination

B width of 7

Patentkrav

1. Anordning (1) til udskillelse og positionering af stiftformet stykgods med et hoved og et skaft, navnlig nitter, omfattende:
- en i det væsentlige tragtformet beholder (2) til optag af stykgodset med to vægafsnit (3, 4), som begrænser beholderen (2) i et område foran, og en bagvæg (5), idet vægafsnittene (3, 4) og bagvæggen (5) afsnitsvist er placeret liggende over for hinanden og hver især hældende udad mod et tværniveau (6) i midten af beholderen (2) i en vinkel;
- et under en navnlig slidsformet fordybning (7), som har afstand til de to vægafsnit (3, 4), placeret endeløst omløbende transportmiddel (8), som er placeret i en samme vinkel (α) som vægafsnittene (3, 4) hældende mod tværniveauet (6) i midten og transporterer stykgodset fra et modtagerniveau til et højere liggende udledningsniveau;
- idet transportmidlet (8) har et med medbringere (15) forsynet transportniveau (9);
kendetegnet ved,
- at fordybningen (7) er begrænset af parallelt med hinanden liggende forkanter (10, 11) på de V-formede vægafsnit (3, 4) forløbende mod transportmidlet, og som munder ud oven over transportmidlet (8) eller i et niveau med transportmidlet (8); og
- at medbringerne (15) er udformet som i omløbsretningen for transportmidlet (8) med indbyrdes afstand placerede cylindriske stifter, som i det væsentlige strækker sig lodret på transportniveauet (9) for transportmidlet (8).

2. Anordning (1) ifølge krav 1, kendetegnet ved, at fordybningen (7) mellem vægafsnittene (3, 4) har en bredde (B), som i det mindste svarer til bredden på medbringerne (15) og højst til længden på stykgodset.

3. Anordning (1) ifølge et af kravene 1 eller 2, kendetegnet ved, at medbringerne (15) har et cirkelformet eller polygonalt tværsnit.

4. Anordning (1) ifølge et af kravene 1 til 3, kendetegnet ved, at medbringerne (15) er placeret i omløbsretningen for transportmidlet (8) forskudt skiftevis i forhold til længdeaksen (16) på transportmidlet (8) mellem dettes randområde og længdeaksen (16).

5. Anordning (1) ifølge et af kravene 1 til 4, kendetegnet ved, at af transportmidlet (8) på udledningsniveauet transporteret stykgods overgives til en efterfølgende, i en vinkel hældende mod det horisontale niveau placeret sliske (13), som har i det mindste en rende (14) med en i det væsentlige U-formet profil, idet tværsnittet på renden (14) er bredere end hovedet og smallere end længden på skaftet.

6. Anordning (1) ifølge krav 1 til 5, kendetegnet ved, hældningen på transportmidlet (8) er større end eller lig med 30° og mindre end eller lig med 60°.

7. Anordning (1) ifølge et af kravene 1 til 6, kendetegnet ved, at fordybningen (7) i det væsentligste strækker sig fra det dybeste punkt på beholderen (2) til den øverste kant på vægafsnittene (3, 4).

8. Anordning (1) ifølge et af kravene 5 til 7, kendetegnet ved, at den i det mindste ene rende (14) har en vedhæftningsminimerende belægning.

9. Anordning (1) ifølge et af kravene 1 til 8, kendetegnet ved, at en sensoranordning (22) er placeret i udledningsniveauet eller på højde med udledningsniveauet eller efter udledningsniveauet, som er indrettet til at registrere geometriske egenskaber i stykgodset.

10. Anordning (1) ifølge et af kravene 1 til 9, kendetegnet ved, at transportmidlet (8) kan drives elektromekanisk ved hjælp af en aktuator.

11. Anordning (1) ifølge et af kravene 1 til 9, kendetegnet ved, at transportmidlet (8) kan drives mekanisk eller pneumatisk.

12. Anordning (1) ifølge et af kravene 5 til 11, kendetegnet ved, at der efter slisken (13) er placeret en transportanordning (17), som transporterer det fra slisken (13) kommende stykgods væk med transporthastighed, der er afhængig af drivhastigheden på det i beholderen (2) placerede transportmiddel (8).

13. Anordning (1) ifølge et af kravene 1 til 12, kendetegnet ved, at transportmidlet er udformet som transportbånd (8) eller lameltransportør.

14. Anordning (1) ifølge krav 12 eller 13, kendetegnet ved, at transportanordningen (17) er koblet drivbart sammen med transportmidlet (8).

15. Anordning (1) ifølge et af kravene 12 til 14, kendetegnet ved, at der til underinddeling af en transportflade på transportanordningen (17) i to med indbyrdes afstand parallelle transportafsnit, som i udledningsområdet for to render (14) er tilpasset med indbyrdes eksisterende afstand, er tilvejebragt i det mindste et separationselement (20).

Fig. 1

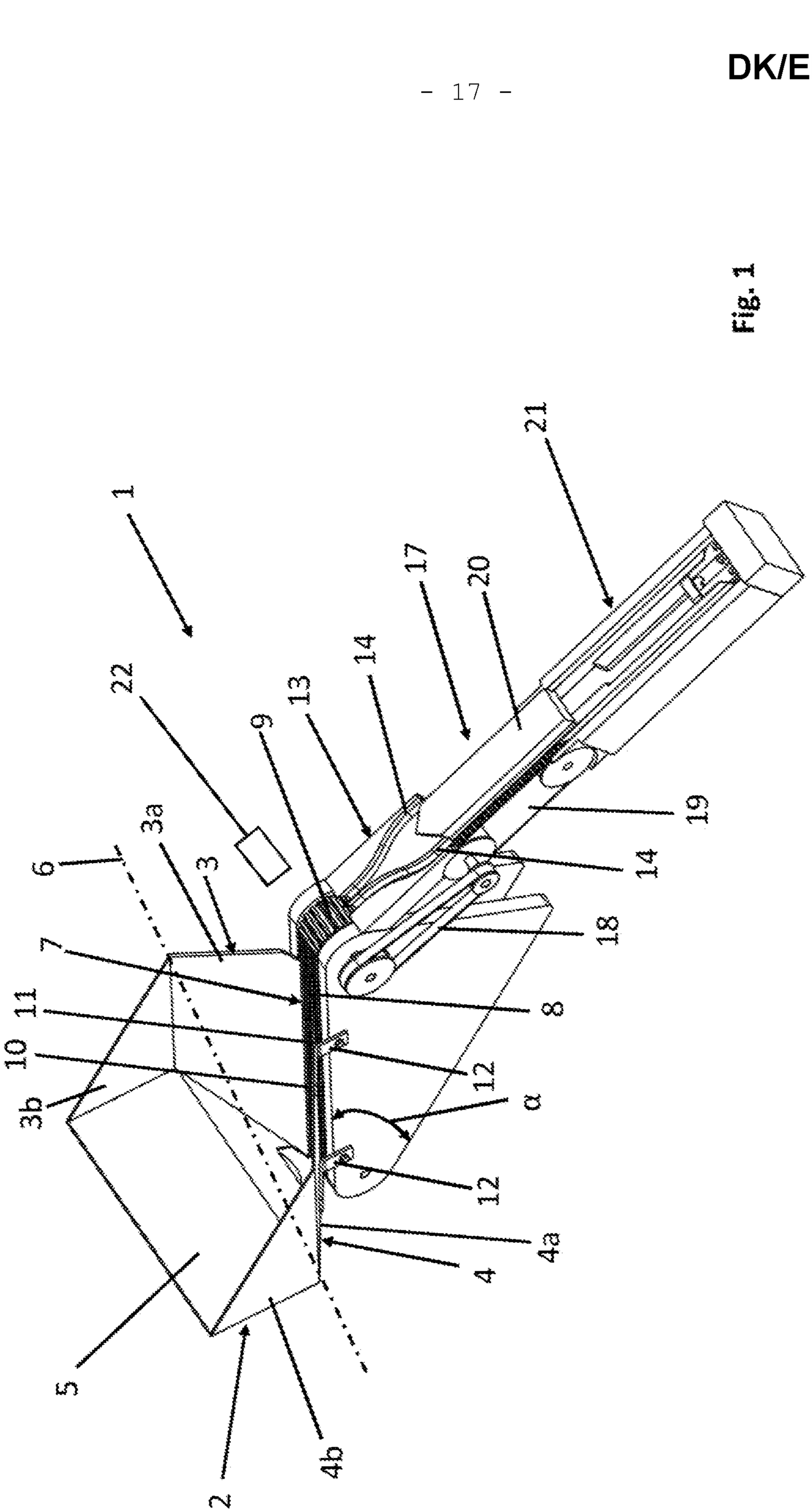
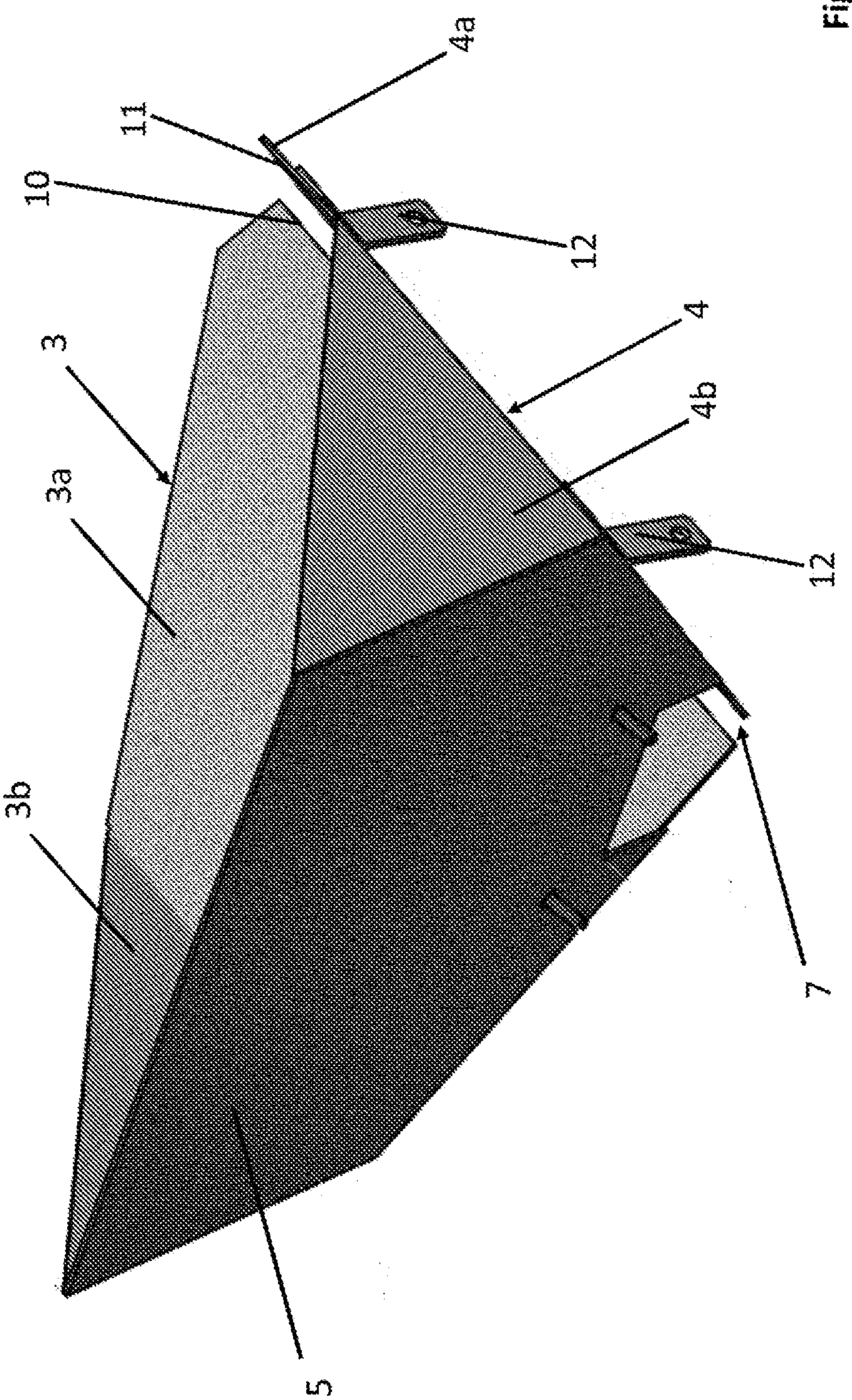


Fig. 2



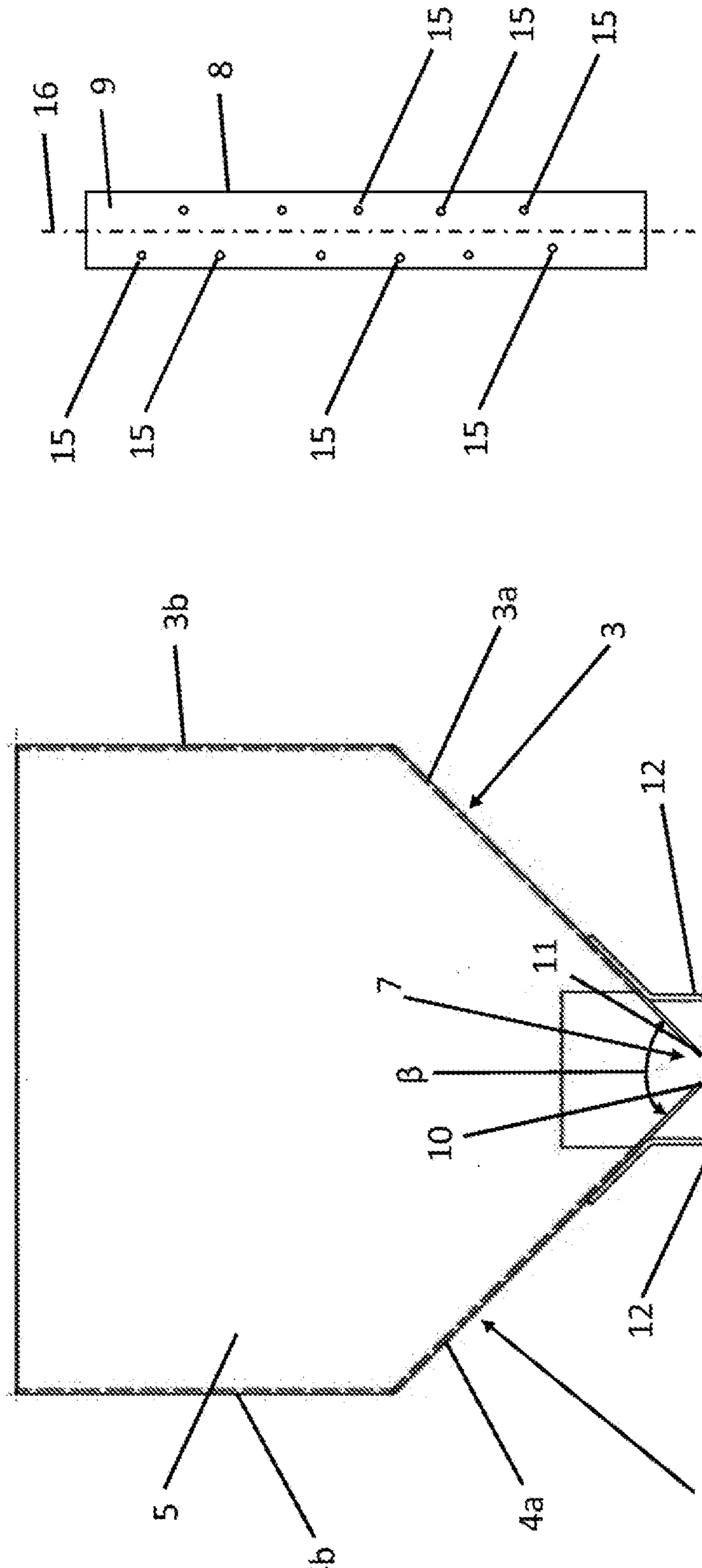


Fig. 3

Fig. 4

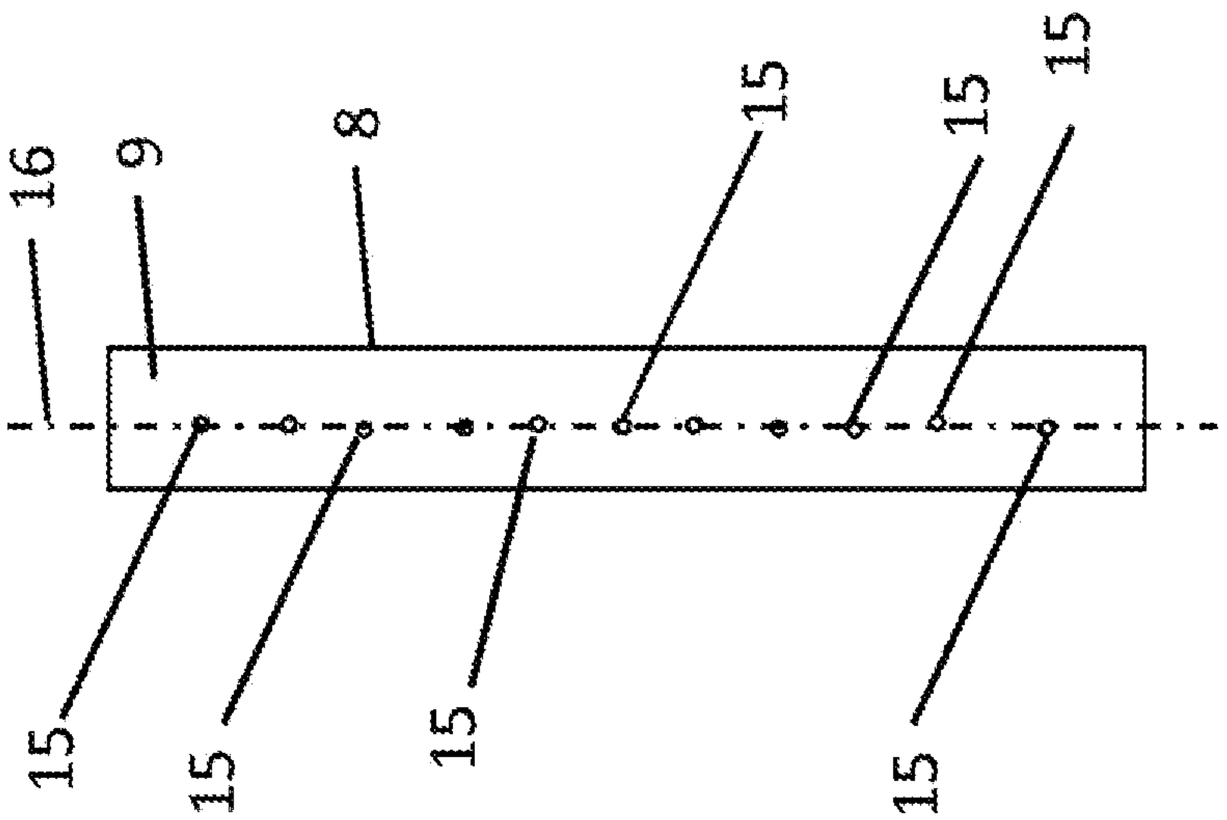


Fig. 5