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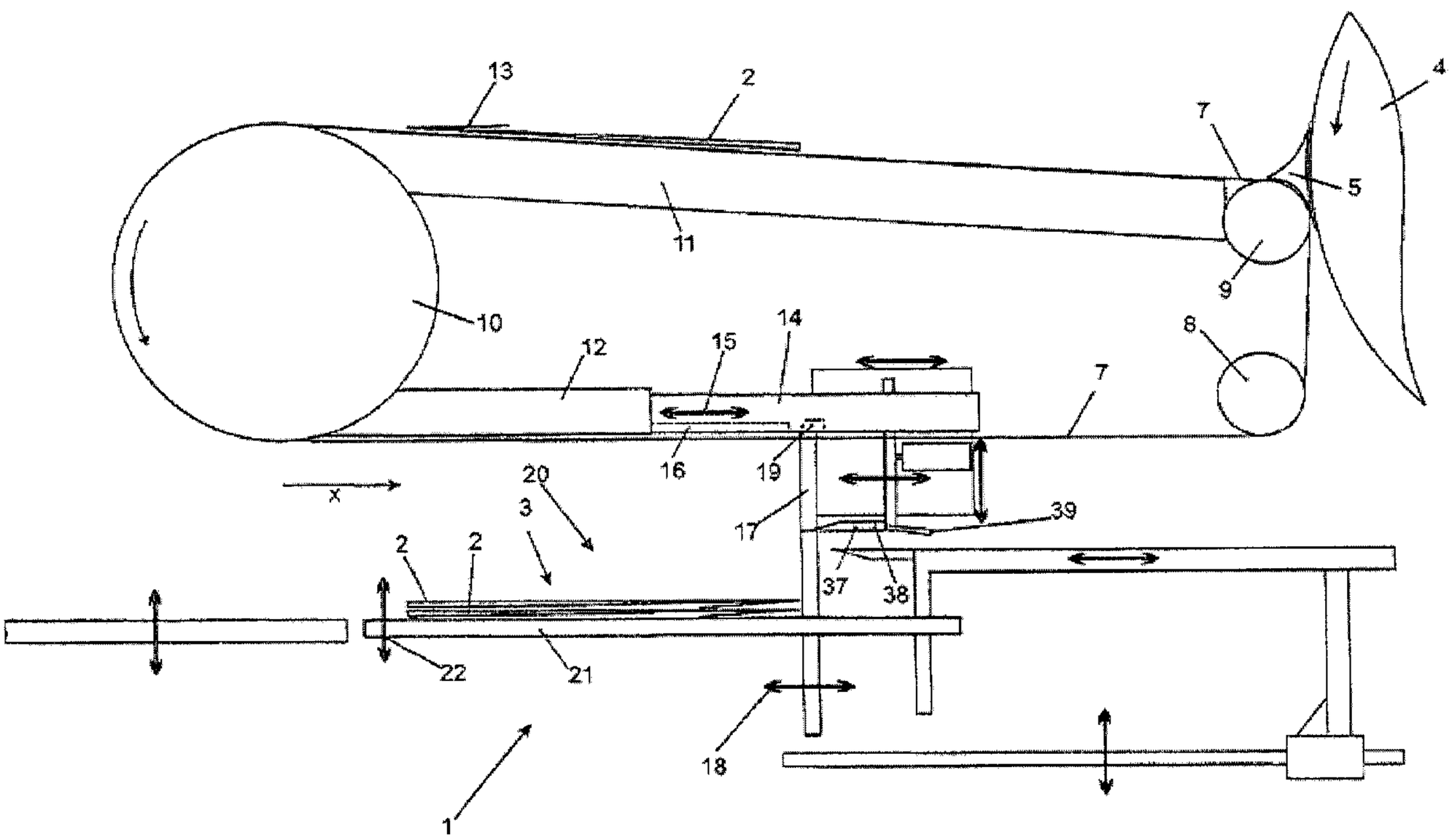
(72) **Inventeurs/Inventors:**
THIES, JOERG CHRISTIAN, DE;
BERLIN, HEINZ, DE

(73) **Propriétaire/Owner:**
WINDMOELLER & HOELSCHER KG, DE

(74) **Agent:** SHAPIRO COHEN LLP

(54) **Titre : DISPOSITIF ET PROCEDE POUR LA FORMATION DE PILES DE SACHETS**
(54) **Title: DEVICE AND METHOD FOR FORMING STACKS OF BAGS**



(57) **Abrégé/Abstract:**
The invention describes a device for forming stacks of bags, preferably from paper bags, which can be fed individually, comprising: - at least a first transport device, with which individual bags can be handed off, - a gathering station, to which the bags can be fed by the transport device and in which a stack of bags can be created, - a detaching device, with which the bags can be detached from the transport device and dropped at the gathering station. At least one separating device is provided, which can be brought into the gathering station in or above the stack and which divides the stack into a first and a second stack.

ABSTRACT

The invention describes a device for forming stacks of bags, preferably from paper bags, which can be fed individually, comprising:
- at least a first transport device, with which individual bags can be handed off,
- a gathering station, to which the bags can be fed by the transport device and in which a stack of bags can be created,
- a detaching device, with which the bags can be detached from the transport device and dropped at the gathering station.

At least one separating device is provided, which can be brought into the gathering station in or above the stack and which divides the stack into a first and a second stack.

DEVICE AND METHOD FOR FORMING STACKS OF BAGS

The invention pertains to a device for forming stacks of bags.

Bags are individually produced in devices for the production of bags. Film bags are provided with welded seams and are usually singled out at the same time. For the production of paper bags, at first tubes of paper webs are formed and tube pieces are singled out from them. A bottom is formed at the leading end of each piece of paper tube.

The bags thus formed are stacked in a device for forming of stacks, so that the bags can be carried away and packed in stacks and/or undergo further processing.

One such device for the making of stacks is disclosed in patent application laid open DE 30 40 021 A1. It shows a transport device, which fixes a single bag from above by means of vacuum with the bottom run of a suction belt and drags it to a gathering point. The bag is freed by a detaching device from the suction belt, such that a depositing unit forces the bag onto the gathering place. The bag is pulled off from the suction openings of the suction belt. After a stack with the desired number of bags has been created in this way, a conveyor belt on which the stack has been formed is moved. Now, a new stack is created at a free gathering place on the conveyor belt.

The drawback to this mechanism is that the feed rate and thus the speed of the bag making machine are greatly limited. If the feed rate is increased, the previous stack might not be transported sufficiently far away when starting a new stack. This drawback is acceptable when making film bags, since the manufacturing speed is limited by other factors.

When making paper bags with speeds of over 1000 bags per minute, however, this limitation due to the stack limit is undesirable.

DE 20 2007 002 477 U1 therefore calls for two gathering units, although this leads to a large space requirement and should furthermore be costly.

The problem of the present invention is therefore to propose a device and a method for forming stacks of bags in which the stack forming

speed is sufficiently high and which occasion little space requirement.

According to one aspect of the invention, there is provided a device for forming stacks of individually supplied bags, comprising: a first transport device for transporting the bags; a collection point to which the bags are fed by the transport device and at which a stack of the bags is formed; a release device with which the bags are released from the transport device and deposited at the collection point; a separation device that is insertable into a portion of the stack at the collection point so as to provide a first stack and a second stack; and a slider that, after insertion of the separation device, (i) removes the first stack from the collection point in a lateral direction that is substantially perpendicular to a direction in which the bags are deposited at the collection point and (ii) supports the second stack forming during removal of the first stack.

According to another aspect of the invention, there is provided a method of forming stacks of individually supplied bags with a device that includes a first transport device for transporting the bags, a collection point to which the bags are fed by the transport device and at which a stack of the bags is formed, a release device with which the bags are released from the transport device and deposited at the collection point, a separation device that is insertable into a portion of the stack at the collection point so as to provide a first stack and a second stack, and a slider that, after insertion of the separation device, (i) removes the first stack from the collection point and (ii) supports the second stack forming during removal of the first stack, said method comprising: transporting the bags to the collection point; releasing the bags from the transport device and depositing the bags at the collection point; inserting the separation device into the portion of the stack at the collection point so as to provide the first stack and the second stack; and using the slider to (i) remove the first stack from the collection point in a lateral direction that is substantially perpendicular to a direction in which the bags are deposited at the collection point and (ii) support the second stack forming during the removal of the first stack.

According to yet another aspect of the invention, there is provided a device for forming stacks of individually supplied bags, comprising: a first transport device for transporting the bags; a collection point to which the bags are fed by the transport device and at which a stack of the bags is formed; a release device that releases the bags from

the transport device and deposits the bags at the collection point; a separation device that is insertable into a portion of the stack at the collection point so as to provide a first stack and a second stack; and a slider that, after insertion of the separation device, (i) removes the first stack from the collection point and (ii) supports the second stack forming during removal of the first stack.

According to another aspect of the invention, there is provided a device for forming stacks of individually supplied bags, comprising: a first transport device for transporting the bags; a collection point to which the bags are fed by the transport device and at which a stack of the bags is formed; a release device that releases the bags from the transport device and deposits the bags at the collection point; a separation device that is insertable into a portion of the stack at the collection point so as to provide a first stack and a second stack adjacent the first stack; and a slider that, after insertion of the separation device, (i) removes the first stack from the collection point and (ii) supports the adjacent second stack forming during removal of the first stack.

Accordingly, a separating device is provided, which can be brought into the gathering station in or above the stack and which divides the stack into a first and a second stack.

A separating device can be brought with high speed into the stack or above the already formed stack. Preferably, this separating device is brought in above the stack, when the stack has reached the desired number of bags. Thus, the next bags are set down above the separating device. Portions of the bags lie on the separating device. The first stack formed in this way, situated beneath the separating device, can now be hauled away, without noticeably influencing the second stack begun above the separating device. Since the separating device can be brought in within a few milliseconds, this process is generally completed before the first bag of the second stack has reached the gathering station. The separating device does not need to cover the entire surface of a bag. It is enough to cover only an edge, preferably the leading edge during the transport of the bag.

It is especially advantageous for the separating device to comprise at least one holding device, with which at least the lower bag of the second stack can be held. Thus, with this holding device, the second already started stack can be fixed in its position. This further minimizes the influence of the first stack while being hauled away.

In one advantageous modification of the invention, the separating device comprises at least one wedge-shaped finger. Such a wedge-shaped element can be easily inserted between two bags without causing any problems. This shape is advantageous when the first bag of the second stack is already dropped off while the element is still moving.

In one preferred embodiment of the invention the separating device comprises at least one borehole, which can be subjected to partial vacuum. This suction borehole thus serves as a holding device. This embodiment is attractive because there are several suction openings in bag making devices and therefore a vacuum producing unit is already present, for example, in the form of a vacuum pump.

Further sample embodiments of the invention will appear from the specification and the claims.
The individual figures show:
Fig. 1, side view of a device according to the invention
Fig. 2, device per Fig. 1 during the forming of a stack
Fig. 3, device per Fig. 1 after bringing in a separating device
Fig. 4, device per Fig. 1 while forming a second stack
Fig. 5, device per Fig. 1 while hauling away the first stack
Fig. 6, device per Fig. 1 after hauling away the first stack
Fig. 7, device per Fig. 1 during the retraction of the slider
Fig. 8, device with an alternative direction of displacement of the separating device.

Figure 1 shows a device 1 according to the invention for forming stacks 3 of bags 2. These bags 2 are made in a bag making machine, whose delivery cylinder 4 is indicated. With the peeling finger 5, individual bags are lifted off from the delivery cylinder and swung onto the transport belt 7 or belts of the transport device 6. Each bag is delivered with its turned-over end facing forward. The turned-over end 13 forms the bottom and points to the outside, so that the bag lies with its back side entirely on the transport belt.

The transport device 6 comprises several transport belts 7 lying next to each other, rotating at the same speed. They run around pulleys 8, 9 and 10, and more or fewer pulleys can be provided. The bags 2 can be fixed to the transport belts 7 in various ways during the transport. One possible embodiment is a suction by partial vacuum, as is already described in DE 30 40 021 A1. In this case, the transport belts comprise suction openings, whose respective spacing is greater than the largest length of a bag that can be made with the bag making machine. For this, the transport belts 7 are led across suction boxes 11, 12, each of which is connected to a partial vacuum source, which is not shown more closely. The pulley 10 is likewise designed so that the suction openings of the transport belt 7 can be subjected to a partial vacuum.

In order also to lead bags of variable length entirely around the pulley 10, the suction box 12 comprises an extension 14 which can move in the direction of the double arrow 15. The broken line indicates the recess 16 lengthening the groove of the suction box 12 (not shown). Thus, the bag can be held for as long as the suction opening of the transport belt is situated above this recess 16. Only at the end of the recess is a dropping of the bag 2 possible. The end stop 17 which limits the transport path of the bag 2 can also move in the direction of the double arrow 18 with the extension 14. The end stop 17 can be

in the shape of a rake or a fork and reach between the individual transport belts 7. The extension 14 and the end stop 17 can be moved by a suitable adjustment mechanism (not shown more closely). This adjustment mechanism can be a combination of spindle and spindle nut, which can be operated manually and/or by motor, such as an electric motor. Other adjustment mechanisms are also conceivable. The adjustment mechanism can be fastened to a wall or column of the machine frame, not shown.

So as not to damage the bags when dropped after the vacuum disappears, the extension 14 also comprises an additional opening 19, which can be subjected to excess pressure. Thus, when the suction openings of the transport belts 7 pass this opening, the bags 2 are properly ejected.

The bags 2 delivered in this way to the end stop 17 and ejected there are arranged into a stack 3 at the gathering station 20. The gathering station 20 comprises a gathering table 21, which comprises several parallel straps, which are not visible in the representation shown. These straps, in turn, reach through the end stop 17. The gathering table 21 can move along the double arrow 22 and after each bag is dropped it can move downward by a small amount, correlated with the thickness of the bag 2. In the described manner, a stack 3 of bags 2 is now created, until this comprises the desired number of bags. Such a condition is shown in Fig. 2.

Now, in order to begin a new stack, separating fingers constituting separating devices are brought into the region of the gathering station 20. Figure 3 shows the device after the bringing in of the separating fingers 23. For this, the separating fingers 23 are arranged able to move relative to a holding device 24, such as a holding plate. The directions of movement are indicated by the double arrow 25. A piston and cylinder unit can be provided as the movement drive 26. However, any other fast-response drive can be used. Linear motors would be advantageous here, having speed in addition to a very good positioning quality. The movement drive 26 is supported against the holding device 24. The separating finger 23 is brought in so quickly that the next bag 2′ can be dropped onto the separating finger 23. In this way, the separating finger separates the first finished stack from the newly begun stack 3′.

As the stack 3′ grows in size, the separating fingers 23 must also be moved down simultaneously to the gathering table 21. For this, the holding plate 24 can be movable in the vertical direction, indicated by the double arrow 27. Here as well, various suitable movement mechanisms are conceivable. The holding plate can be actively engaged

with the gathering table 21 to make possible a joint movement. The holding plate and/or the separating finger 23 must in this case be able to move with the movement drive 26 relative to the gathering table in order to adjust the desired height of stack. But this adjustment must only be done prior to production. On the other hand, the movement of the gathering table and the holding plate occurs during the bag making. Accordingly, a motor-operated, precision-positioning movement mechanism should be provided. Finally, the holding plate 24 must be able to move synchronously with the end stop 17 and/or the extension 14 along the double arrow 28 for the adjustment to the bag length.

The first stack 3, which is now located beneath the stack 3′ being built up, can be hauled away.

For this, there is provided a slider 29, comprising several bars (only the front one can be seen). Bearing elements 31 are provided perpendicular to these, which can grab like a fork between the strips of the gathering table 21. There also protrudes from the bearing elements 31 a wedge 30 or several wedges, which can be introduced between the stack 3 and the stack 3′ in the free space created by the separating fingers 23. The slider 29 is braced against a supporting device 32, which in turn is connected to a carriage 33. This carriage 33 can move along a rail system 34, for example, a single rail is shown here, in the direction of the double arrow 35. The rail system, furthermore, can move in the direction of the double arrow 36, so that the vertical position of the slider 29 can be adjusted to the position of the aforesaid free space. After being adapted to this position, as shown in Fig. 4, the slider can be moved along the direction of movement 35. This is shown in Fig. 5. During the movement process, the new stack 3′ can be formed on the surface facing the stack 3′. Thus, the slider can take on the function of the gathering table 21 during this time.

It is important that at least the lower bag of the stack 3′ can be held in its position relative to the gathering station 20 with a holding device, so that the stack 3 once started does not shift. Any shifting of bags leads to a poor quality of stack, which needs to be prevented. For this reason, the separating fingers 23 shown in the sample embodiment comprises openings 37 on the top side, which can be subjected to a partial vacuum. This partial vacuum can already be switched on when the first bag 2′ of the new stack 3′ lies against the separating finger 23. This can result in better quality of the stack 3′ as it is being formed. The opening 37 as well as the channels 38 and the suction line 39 are shown in Fig. 1. The holding device can

also be mechanical in design, for example. One or more grabs could grasp at least the lower bag. Holding devices working by other physical principles are also conceivable. Thus, an electrostatic force of attraction can be used for the mentioned purposes. This is especially applicable when the bags have, say, viewing windows made of a plastic material.

The stack 3 is moved by the slider opposite the transport direction x of the bag 2 shortly before being ejected. This direction points away from the separating fingers 23, so that the lower bag 2′ of the new stack 3′is smoothed out and protected from being damaged. The stack 3 is pushed onto a tray 40, from which it can be further transported or removed. After the stack 3 has completely left the gathering table 21, this is again raised and moved underneath the lower bag of the new stack 3′. This state is shown in Fig. 6. The stack 3′ now lies on the gathering table 21, so that the separating fingers 23 can be brought back to the starting position, as shown in Fig. 7. The slider 29 can also be driven back to its starting position, so that now the condition per Fig. 1 is again created.

The individual parts needed for the described method and the described device can be arranged in various fashion and joined together if need be, without leaving the notion of the invention. The mentioned movement devices and the required drive units also can be configured in various fashion. However, the use of linear motors is especially worthy of note: these make possible rapid movements and what is more they can be positioned very accurately. Linear motors can be used for all the aforementioned movement devices.

Figure 8 shows a device in which the separating finger 23 is designed to move not horizontally, but vertically. This is advantageous, because there is no danger of shifting the bags when the separating finger is introduced. Furthermore, the separating finger 23 can be moved with the ejecting of the top bag 2 of the stack 3, so that one does not have to wait until the dropping bag lies entirely on the stack. Thus, this brings a time advantage. In the top position, the separating finger is located between or above the suction channels 12 and/or the extension 14, so that the forming of the stack 3 is not disturbed.

Thus, with the device depicted and described, one can form stacks of bags with a desired number of bags and haul them away without interrupting the gathering process in the device or having to operate at least with reduced speed.

List of reference symbols

1	device for forming stacks of bags
2	bag
3	stack
4	delivery cylinder
5	peeling finger
6	transport device
7	transport belt
8	pulley
9	pulley
10	pulley
11	suction box
12	suction box
13	turned-over end of bag 3
14	extension of the suction box 12
15	direction of movement of the extension 14
16	lengthening recess
17	end stop
18	direction of movement of the end stop 17
19	opening
20	gathering station
21	gathering table
22	direction of movement of the gathering table 21
23	separating finger
24	holding device
25	double arrow
26	movement drive
27	direction of movement of the holding plate 24
28	double arrow
29	slider
30	wedge
31	bearing element
32	supporting device
33	carriage
34	rail system
35	direction of movement of the slider
36	double arrow
37	opening
38	channel
39	suction line
40	tray
x	transport direction of bag just before being ejected

What is claimed is:

1. A device for forming stacks of individually supplied bags, comprising:

a first transport device for transporting the bags;

a collection point to which the bags are fed by the transport device and at which a stack of the bags is formed;

a release device with which the bags are released from the transport device and deposited at the collection point;

a separation device that is insertable into a portion of the stack at the collection point so as to provide a first stack and a second stack; and

a slider that, after insertion of the separation device, (i) removes the first stack from the collection point in a lateral direction that is substantially perpendicular to a direction in which the bags are deposited at the collection point and (ii) supports the second stack forming during removal of the first stack.

2. The device according to claim 1, wherein the separation device includes at least one holding device with which at least a first-stacked bag of the second stack can be held.

3. The device according to claim 1, wherein the separation device includes at least one wedge-shaped finger.

4. The device according to claim 3, wherein the at least one wedge-shaped finger is insertable above the first stack, before a first-stacked bag of the second stack is deposited at the collection point.

5. The device according to claim 1, wherein the separation device includes at least one hole that is subject to a negative pressure.

6. The device according to claim 5, wherein the negative pressure is applied to a first-stacked bag of the second stack so as to secure the first-stacked bag in place during the removal of the first stack.

7. The device according to claim 1, wherein the separation device includes at least one gripper.

8. The device according to claim 1, wherein the bags are paper bags.

9. The device according to claim 1, wherein the slider includes a plurality of bars, and a plurality of positioning elements that are oriented at a right angle to the plurality bars.

10. The device according to claim 9, wherein each of the positioning elements is superposed by at least a wedge that is insertable in a free space produced by the separation device between the first stack and the second stack.

11. A method of forming stacks of individually supplied bags with a device that includes a first transport device for transporting the bags, a collection point to which the bags are fed by the transport device and at which a stack of the bags is formed, a release device with which the bags are released from the transport device and deposited at the collection point, a separation device that is insertable into a portion of the stack at the collection point so as to provide a first stack and a second stack, and a slider that, after insertion of the separation device, (i) removes the first stack from the collection point and (ii) supports the second stack forming during removal of the first stack, said method comprising:

transporting the bags to the collection point;

releasing the bags from the transport device and depositing the bags at the collection point;

inserting the separation device into the portion of the stack at the collection point so as to provide the first stack and the second stack; and

using the slider to (i) remove the first stack from the collection point in a lateral direction that is substantially perpendicular to a direction in which the bags are deposited at the collection point and (ii) support the second stack forming during the removal of the first stack.

12. The method according to claim 11, further comprising a step of applying a vacuum to a first-stacked bag of the

second stack so as to secure the first-stacked bag in place during the removal of the first stack.

13. A device for forming stacks of individually supplied bags, comprising:

a first transport device for transporting the bags;

a collection point to which the bags are fed by the transport device and at which a stack of the bags is formed;

a release device that releases the bags from the transport device and deposits the bags at the collection point;

a separation device that is insertable into a portion of the stack at the collection point so as to provide a first stack and a second stack; and

a slider that, after insertion of the separation device, (i) removes the first stack from the collection point and (ii) supports the second stack forming during removal of the first stack.

14. The device according to claim 13, wherein the slider removes the first stack from the collection point in a lateral direction that is substantially perpendicular to a direction in which the bags are deposited at the collection point.

15. The device according to claim 13, wherein the separation device includes an aperture that is subject to a vacuum, or a gripping element, configured to secure a

first-stacked bag of the second stack in a stationary position during the removal of the first stack.

16. The device according to claim 15, wherein the release device continues to release the bags from the transport device and deposit the bags on the first-stacked bag of the second stack in the stationary position, so as to form the second stack while the slider removes the first stack from the collection point.

17. The device according to claim 13, further comprising a collection table upon which the first stack is deposited, the collection table being vertically movable after the first stack has been removed therefrom so as to support the second stack as the slider retracts from the second stack as the second stack forms.

18. A device for forming stacks of individually supplied bags, comprising:

a first transport device for transporting the bags;

a collection point to which the bags are fed by the transport device and at which a stack of the bags is formed;

a release device that releases the bags from the transport device and deposits the bags at the collection point;

a separation device that is insertable into a portion of the stack at the collection point so as to provide a first stack and a second stack adjacent the first stack; and

a slider that, after insertion of the separation device, (i) removes the first stack from the collection point and (ii) supports the adjacent second stack forming during removal of the first stack.

19. The device according to claim 18, wherein the adjacent second stack is located above the first stack.

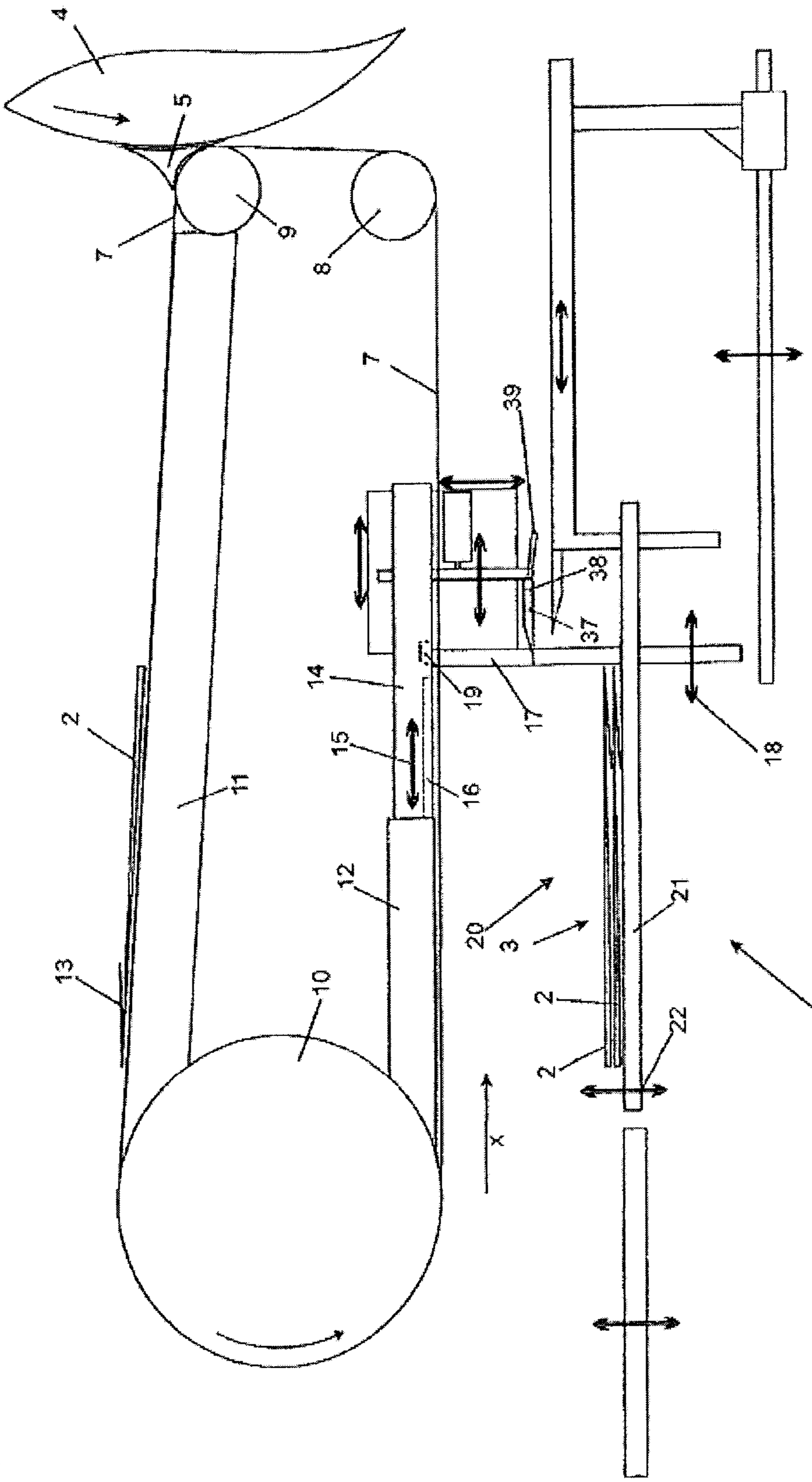


Fig. 1

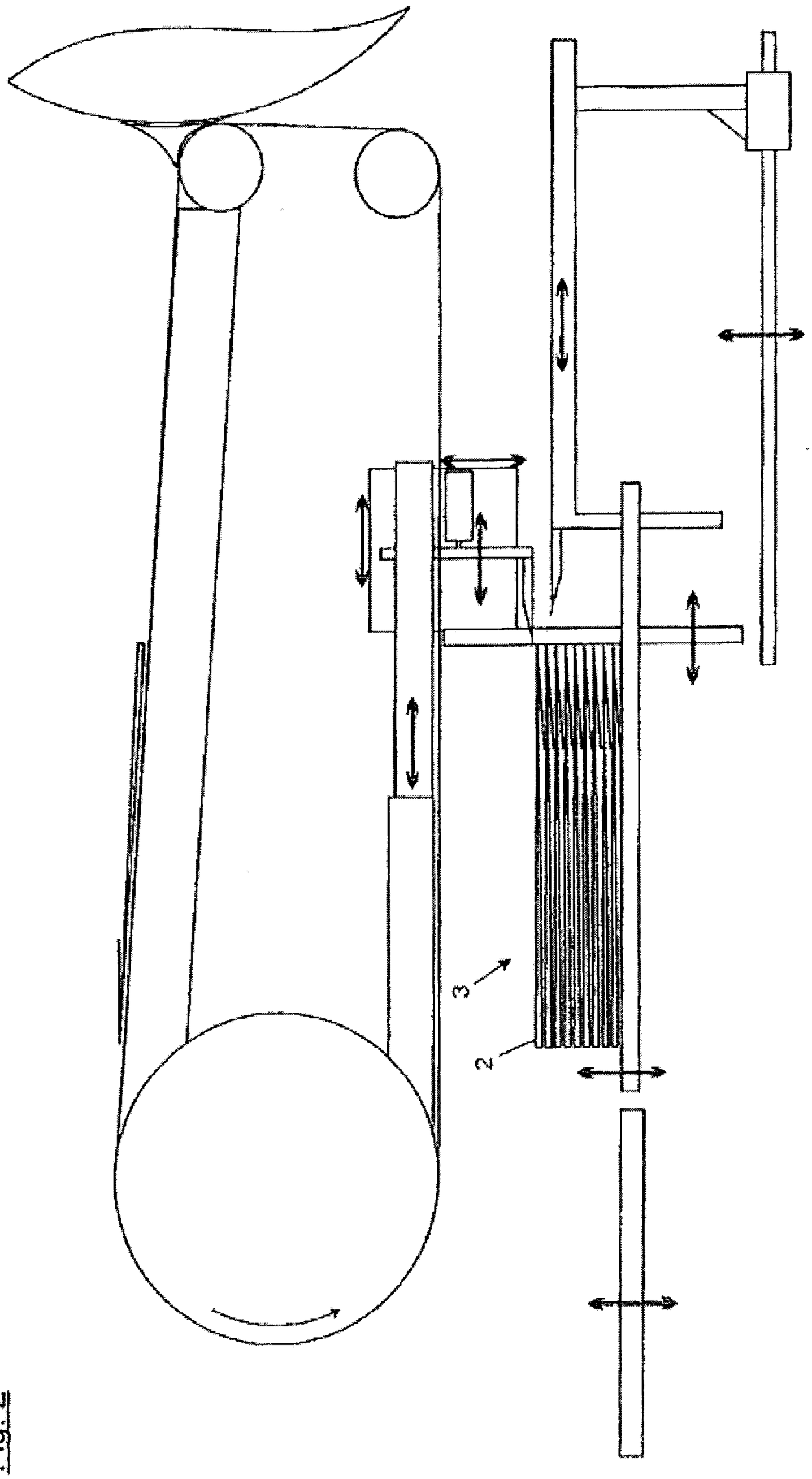


Fig. 2

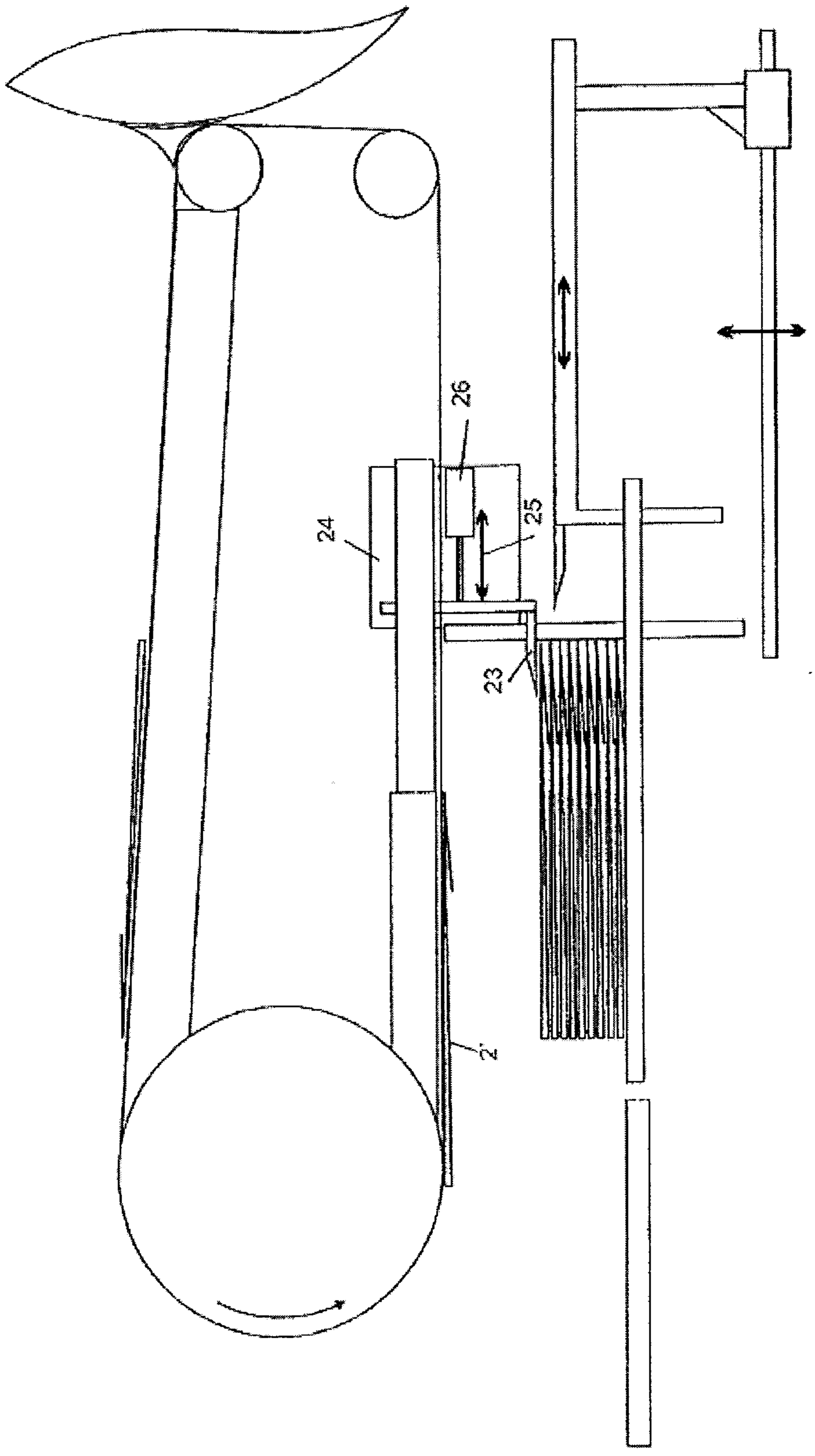


Fig. 3

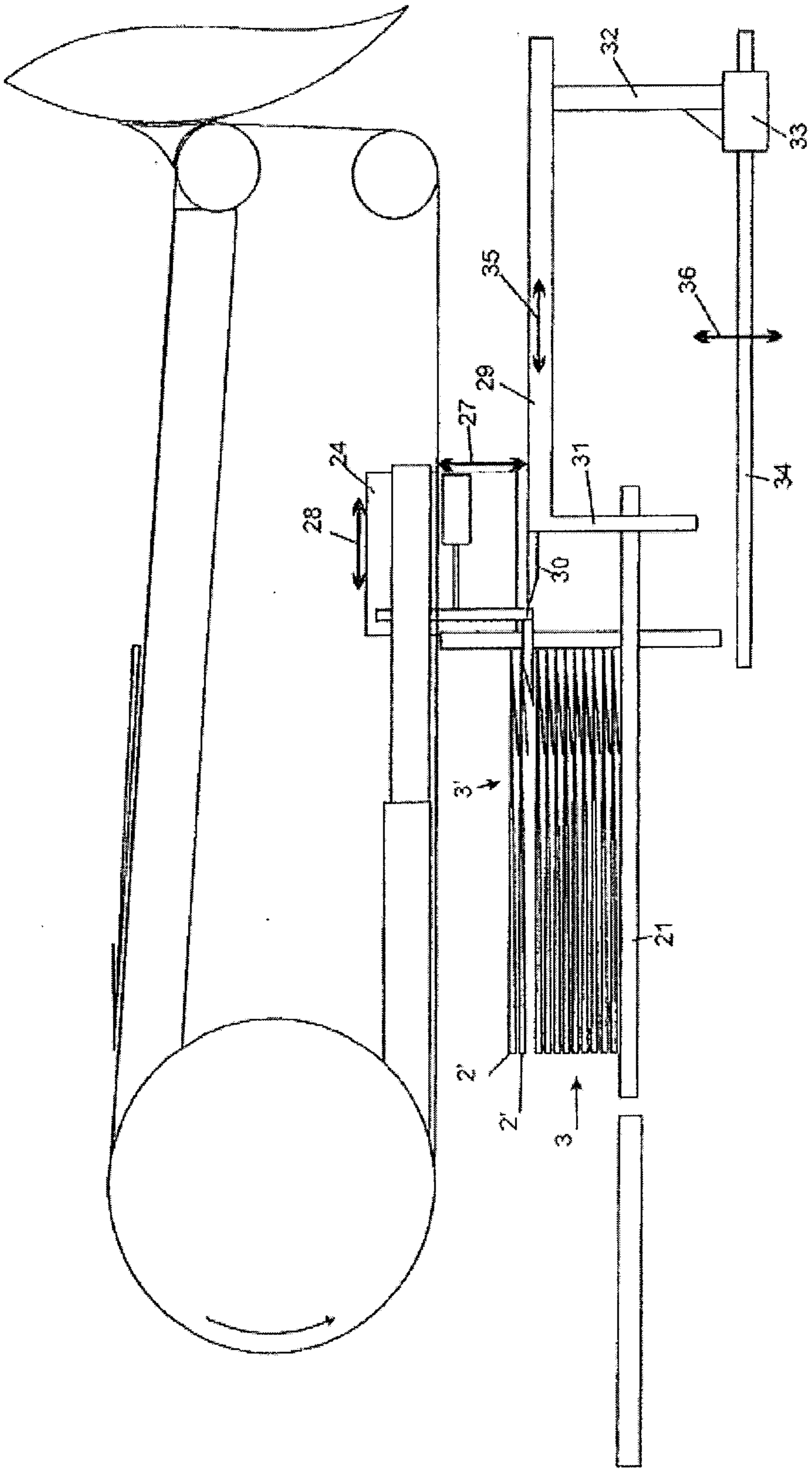


Fig. 4

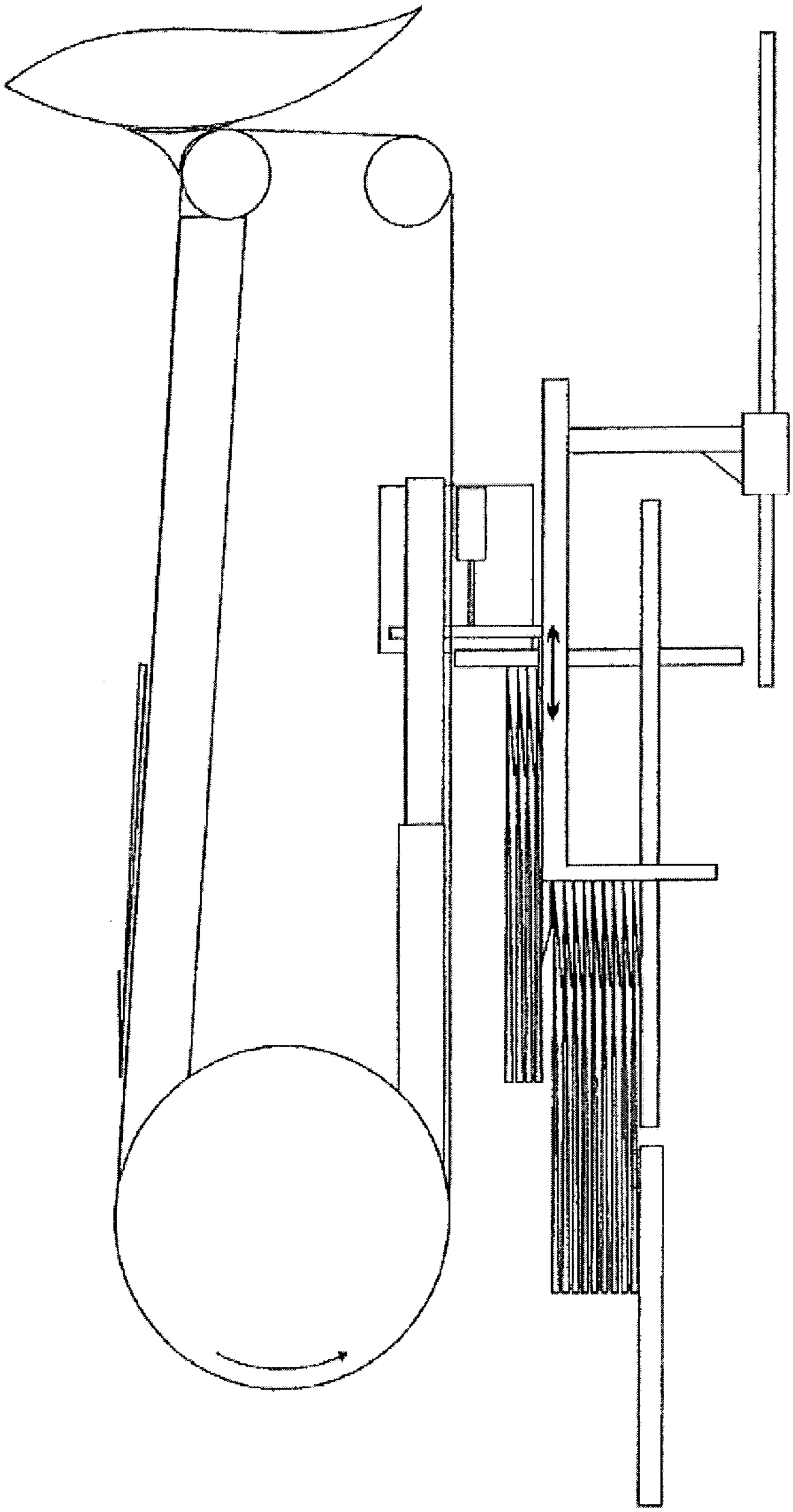


Fig. 5

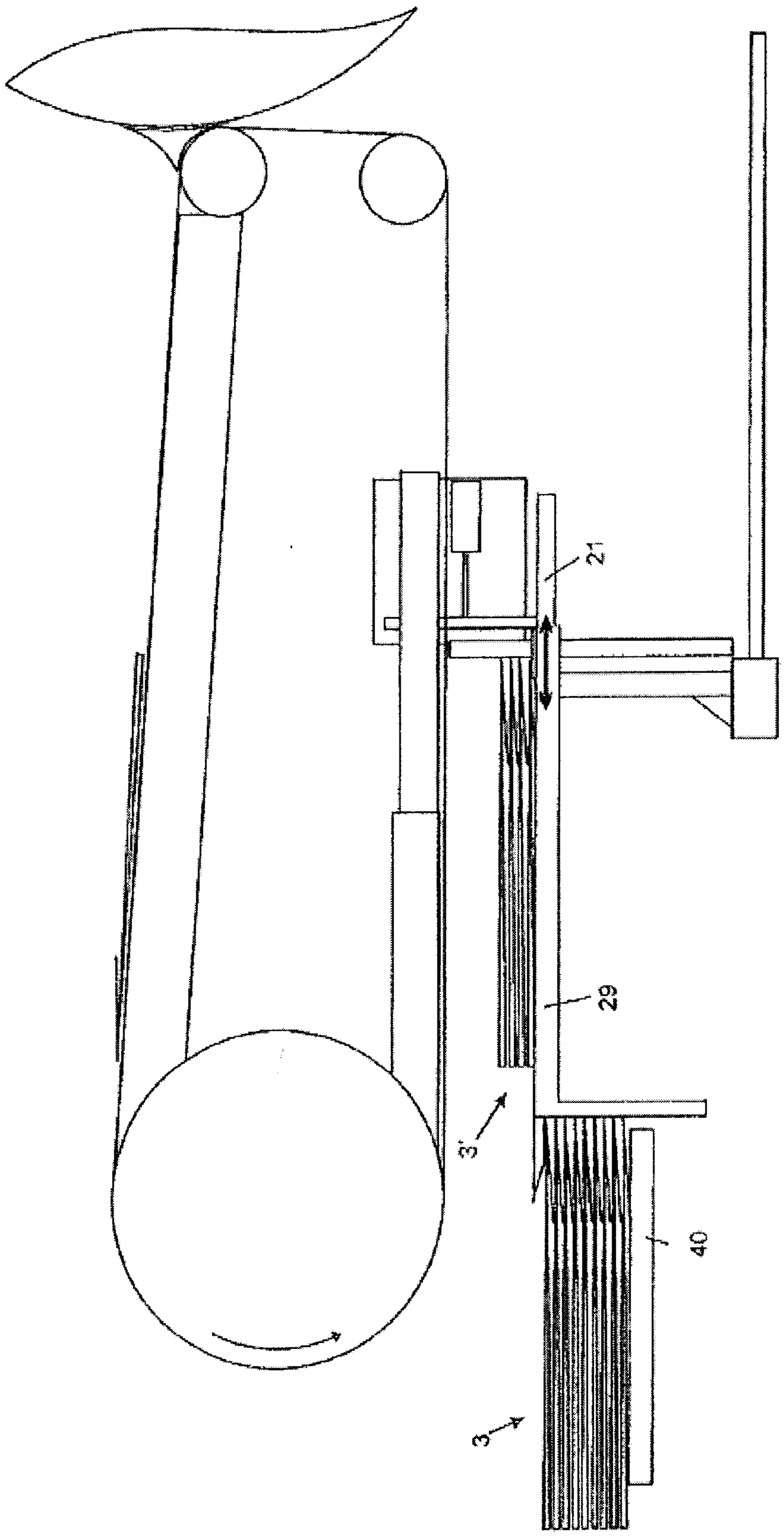


Fig. 6

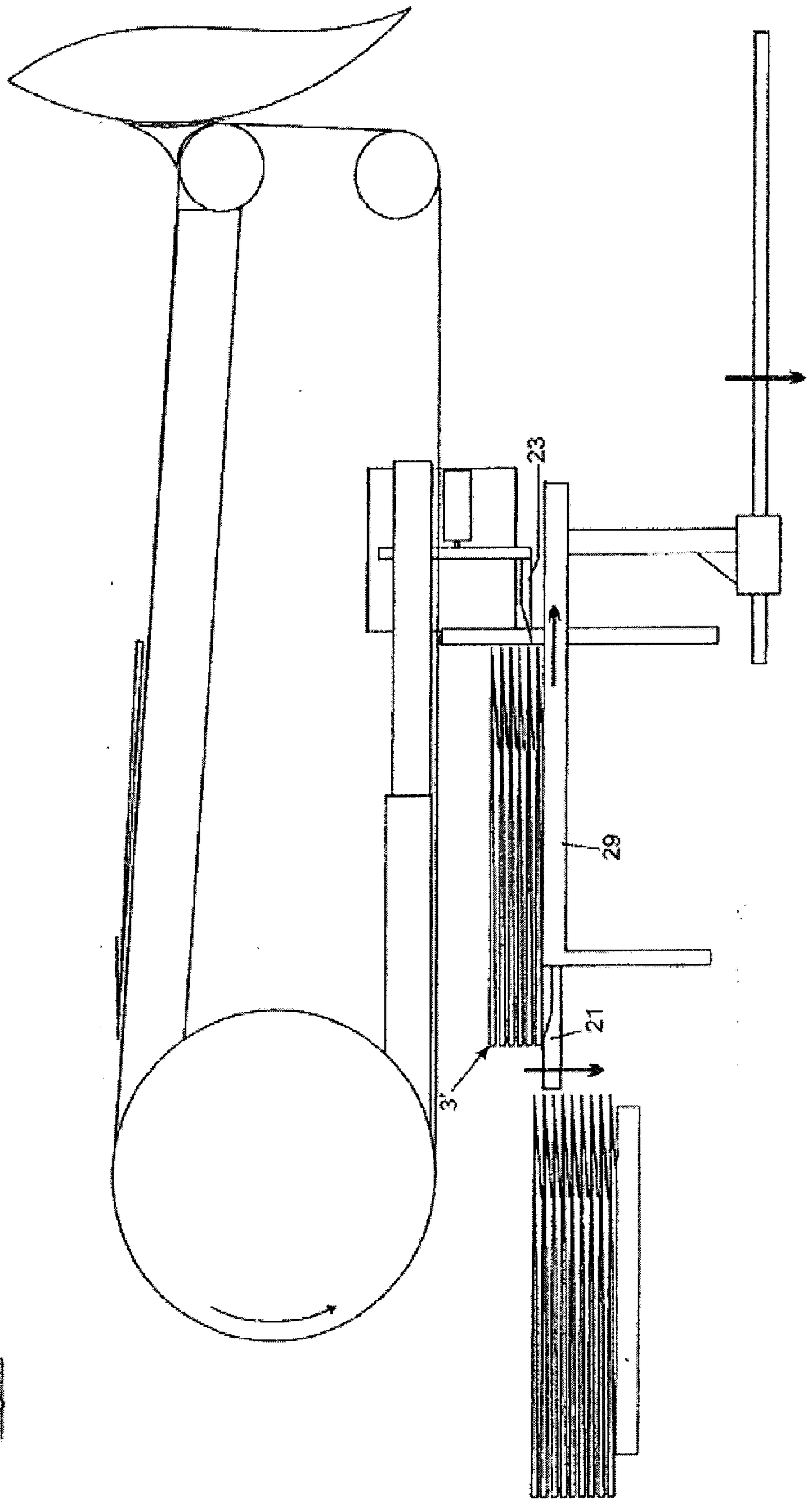


Fig. 7

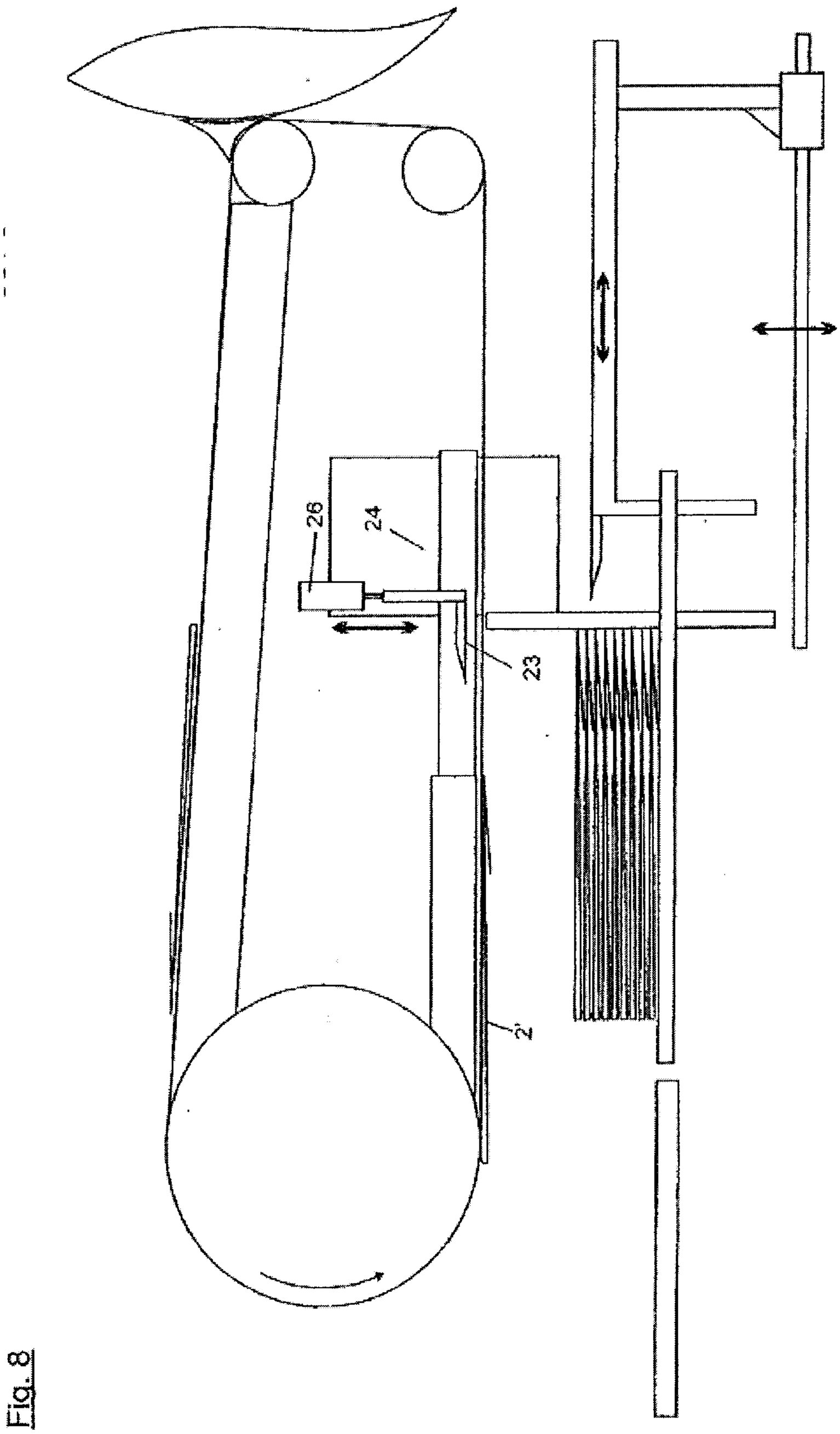
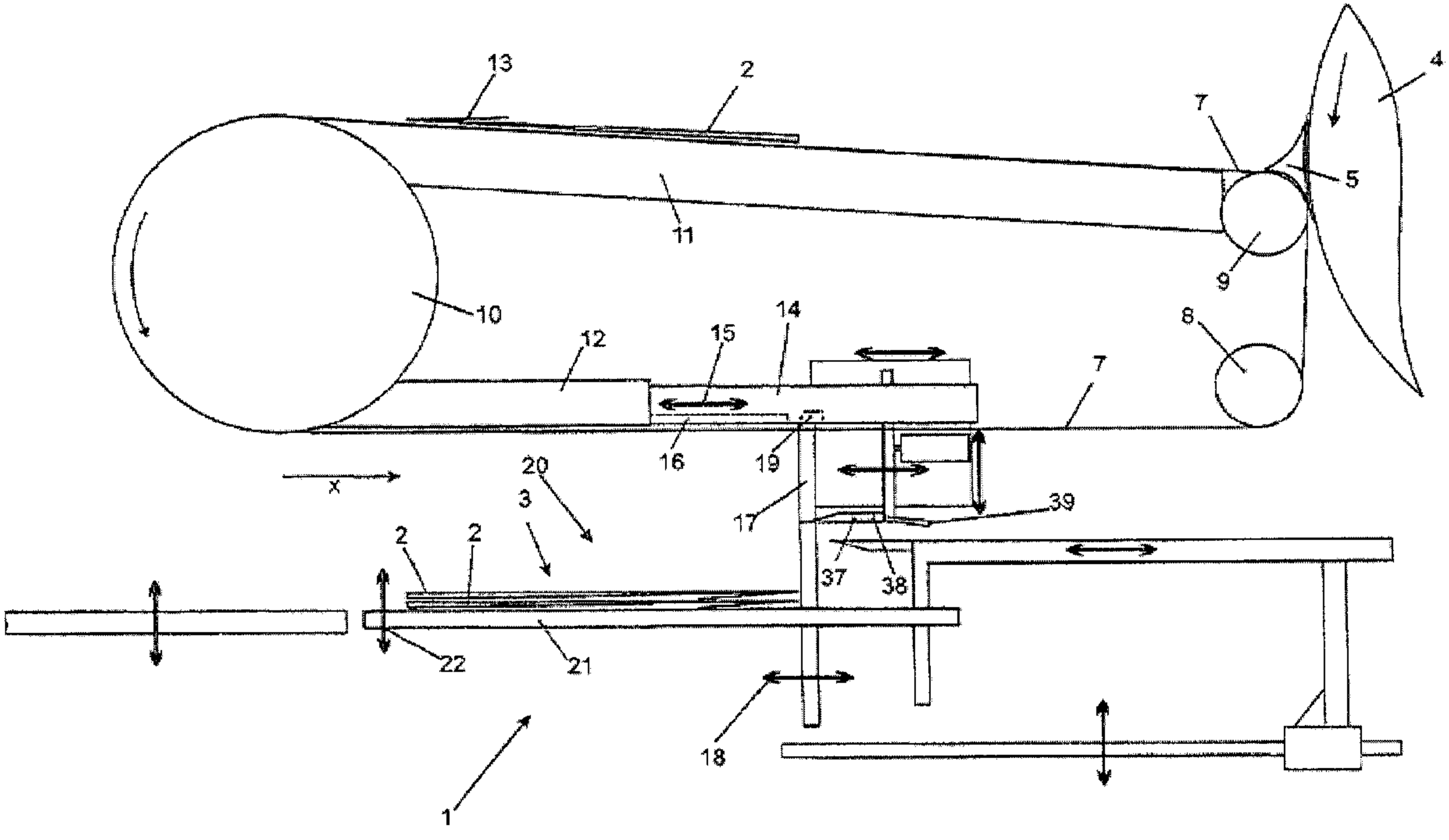


Fig. 8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