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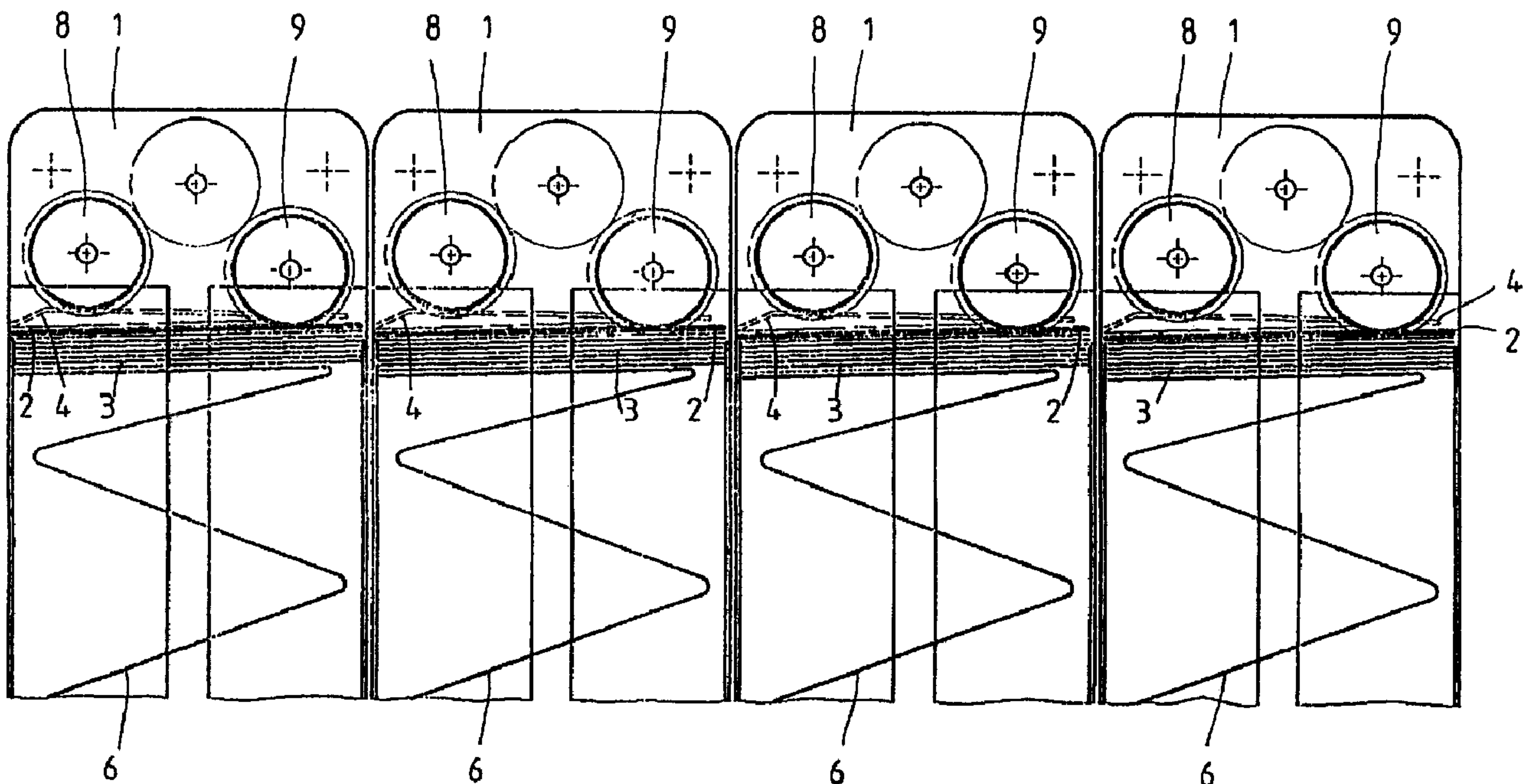
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(54) Title: SELF-FILLING STORAGE DEVICE FOR CARD-TYPE DATA CARRIERS



(57) Abrégé/Abstract:

The present invention relates to a self-filling storage device for data carrier cards with at least one storage shaft and at least one roller for outputting or drawing in data carriers, wherein the storage shaft has at its input and output side a closing plate that has a cutout for at least one isolating roller that can be introduced into the storage shaft against a restoring force and acts either on the data carrier that is closest to the closing plate within the storage shaft, or on a data carrier that is to be drawn into the storage shaft; and in that a transport roller that works in conjunction with the outer side of the closing plate to move the data carriers that are passing the storage shaft is also provided.

ABSTRACT

The present invention relates to a self-filling storage device for data carrier cards with at least one storage shaft and at least one roller for outputting or drawing in data carriers, wherein the storage shaft has at its input and output side a closing plate that has a cutout for at least one isolating roller that can be introduced into the storage shaft against a restoring force and acts either on the data carrier that is closest to the closing plate within the storage shaft, or on a data carrier that is to be drawn into the storage shaft; and in that a transport roller that works in conjunction with the outer side of the closing plate to move the data carriers that are passing the storage shaft is also provided.

SELF-FILLING STORAGE DEVICE FOR CARD-TYPE DATA CARRIERS

The present invention relates to a self-filling storage device for data carriers in the form of cards, which has at least one storage shaft and at least one roller for issuing or for drawing in data carriers.

Storage devices of this kind, used for card-type data carriers, are known in various forms, for example, for receiving and issuing user-fee cards for parking facilities. Certainly, these known storage devices provide for the reliable issue or reliable intake of the data carriers into the storage shaft by way of the output or intake rollers that are arranged within the storage device; however, practice has shown that when a plurality of storage shafts are arranged in a storage device, these storage shafts are not emptied and/or filled evenly, so that, at times, the storage shaft that is closest to the output opening can be empty even though there are still data carriers contained in the other storage shafts and that, because of the empty front storage shaft, no more data carriers can be issued. In the same way, in the case of the known storage devices, it can happen that because of a front storage shaft that is full, the input of additional data carriers will be prevented, even though the rear storage shafts have not yet been loaded, or are not yet full.

It is the task of the present invention to create a self-filling storage device that permits automatic filling and or emptying of all the storage shafts and, at the same time, avoids the disadvantages discussed above.

According to the present invention, the technical

solution to this task is such that at its input and output side, the storage shaft is provided with a closing plate that has a cutout for at least one isolating roller that can be introduced into the storage shaft against a restoring force and which acts either on the data carrier that is closest to the closing plate within the storage shaft or on a data carrier that is to be drawn into the storage shaft; and in that a transport roller that works in conjunction with the outer side of the closing plate to move data carriers passing from the storage shaft is also provided.

The advantage of the development according to the present invention is that all the storage shafts are completely filled or can be completely emptied for issuing or for receiving data carriers. In the event that a plurality of storage shafts are arranged one behind the other, output is effected beginning at the storage shaft that is furthest from the output opening and ends after this and the storage shafts that are arranged before it have been emptied, at the storage shaft that is arranged immediately adjacent to the output opening. When the storage shafts are being loaded during the input of data carrier cards, the sequence is reversed, which is to say that it begins at the foremost storage shaft, which is arranged adjacent to the input opening.

According to a preferred embodiment of the present invention, the isolating roller can be moved out of the cutout in the closing plate by data carriers that are passing the storage shaft. In this way, it is ensured that, initially, data carriers are moved only from the last data shaft that

still has data carriers to the output opening. The data carriers that are guided along the closing plate raise the isolating roller out of the cutout in the closing plate and thus disengage this from the uppermost data carrier that is arranged within this storage shaft.

10 In order to ensure that the isolating roller exerts sufficient force on the data carriers that are passing the storage shaft and to ensure that the isolating roller pivots back into the cutout in the closing plate after the data carrier has passed, the isolating roller is supported so as to be able to rotate on a rocker arm that is acted upon by a restoring force. According to a preferred embodiment of the present invention, this rocker arm can pivot about the axis of the transport roller, the restoring force acting through a spring.

According to the present invention, the transport roller can adapt to cards of various thicknesses in that the transport roller is supported in such a way that it can slide transversely to the closing plate.

20 According to a further embodiment of the present invention, the isolating roller and the transport roller are connected to each other by a drive belt, by means of which the rotation of the transport roller is transmitted to the isolating roller. More advantageously, the isolating roller is configured as a type of camshaft that has a cam in the shape of a circular segment, so that when the isolating roller rotates, the data carrier is moved only by a part step, namely, that which is defined by the circular segment.

Finally, the present invention proposes that the card-like data carriers be arranged on (or below) an intermediate base that is spring-loaded in the direction of the closing plate. This ensures that the data carrier cards that are arranged within the storage shaft are always picked up by the isolating roller, which can be moved into the cutout in the closing plate, and can then be transported to the output opening.

10 In order to ensure that the storage shaft that is closest to the output and input opening is the first one to be filled with data carriers when the storage shaft is being loaded, before the subsequent data carriers are fed to the next storage shaft, a further embodiment of the present invention proposes that the outer side of the closing plates of the individual storage shafts can be closed against the input of data carriers by means of closing elements that are controlled depending on the position of the intermediate bases of the individual storage shafts. Each closing element is activated by a spring-loaded rocker that is activated by a
20 control slide only when the particular intermediate base is in its end positions.

According to the present invention, the connection between the control slide and the intermediate base can be effected by way of a peg-and-slot control.

According to a further embodiment of the present invention, the rocker is released by way of stops that are arranged on the control slide or on the rocker. Because of these stops and the connection between the control slide and

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the intermediate base, it is simple to ensure that the rocker is activated only when the intermediate base is in its end positions.

Finally, the present invention proposes that the
5 spring for the rocker be a spring wire.

In accordance with a broad aspect, there is provided a self-filling storage device for memory cards, said storage device comprising: at least one storage container having a storage compartment; said storage
10 compartment having a common opening for receiving and releasing memory cards; a cover plate for covering said common opening; said cover plate having a first face facing said storage compartment and a second face facing away from said storage compartment; said cover plate having a cutout;
15 a first spring mounted in said storage compartment; at least one separating roller positioned in said storage container at said second face and having a first position in which said separating roller projects through said cutout into said storage compartment against a return force generated by
20 said first spring; said separating roller acting on a memory card positioned in said storage compartment at said first face or acting on a memory card positioned at said second face for insertion into said storage compartment; at least one transport roller positioned in said storage container at
25 said second face and cooperating with said second face for transporting a memory card across said cover plate.

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Additional details, features, and advantages of the present invention are described in greater detail below on the basis of the drawings appended hereto, in which one embodiment of the self-filling storage device for data carrier comments is shown diagrammatically. The drawings show the following:

Figures 1a to 1d: a longitudinal cross section through a storage device consisting of four storage shafts, during the sequential phases of the output of data carrier cards;

Figure 2: a diagrammatic side view of the upper part of a storage shaft that performs the output and intake of data cards;

Figure 3: a cross section on the section line III-III in Figure 2;

Figure 4: a plan view of a closing plate;

Figure 5: a diagrammatic side view of the drive unit that is interposed between the transport roller and the isolating roller;

Figure 6: a diagrammatic plan view of the drawing at Figure 5;

Figures 7a to 7e: longitudinal cross sections through a storage shaft during the sequential phases of data card output and intake.

The storage device that is shown in Figures 1a to Figure 1d comprises four storage shafts 1 that are arranged one behind the other, in each of which a plurality of data carrier cards 2 are arranged on an intermediate base 3. The actual storage space of each storage shaft 1 is provided on its input and output side with a closing plate 4 that incorporates an intake slot 5 for accepting or issuing the data carrier cards 2. The intermediate base 3 that accommodates the data carriers 2 is spring loaded in the direction of the closing plate 4. To this end, in the vertical arrangement below the intermediate base 3 that is shown, the storage shaft 1 has a spring 6, so that the uppermost data carrier 2 of each storage shaft 1 lies directly against the underside of the closing plate 4.

In order to move the data carriers from the storage shafts 1 to an output and input opening 7 in the storage device 1, a transport roller 8 and an isolating roller 9 are arranged above the closing plate 4 of each storage shaft 1. The construction of this upper section of each storage shaft 1 is shown in Figures 2 and 3. As can be seen from Figure 2, the transport roller 8 and the isolating roller 9 are supported so as to be able to rotate on a common rocker arm 10.

The plan view of the closing plate 4 in Figure 4 shows that in the area of the isolating roller 9 the closing plate 4 has a cutout 11 that provides direct access to the data carriers that are arranged within the storage space of the storage shaft 1. As viewed in the direction of movement,

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the cutout 11 of the closing plate 4 makes a transition to become the output and intake slot 5.

As can be see from Figure 2, the rocker arm 10 that supports the transport roller 8 and the isolating roller 9 can pivot about an axis 12 of the transport roller 8. Because of this pivoting support of the rocker arm 10 about the axis 12 of the transport roller 8, the isolating roller 9 can pivot into and out of the cutout 11 in the closing plate 4. This makes it possible for the isolating roller 9 to act on the uppermost data carrier 2 within the storage shaft 1 and move it out of the storage shaft 1 through the output and intake slot 5. In order to ensure that the isolating roller 9 can exert sufficient contact pressure on the data carrier 2 that is to be moved along the upper side of the closing plate 4 towards the outlet and input opening 7 or on the data carrier 2 that is to be moved out of a storage shaft 1, the rocker arm 10 that supports the isolating roller 9 is spring loaded by a spring 13 in the direction of the closing plate 4 that rests against one end on the housing of the storage shaft 1, as is shown in Figure 3.

The transport roller 8 is driven by a drive system (not shown herein) on the rear of each storage shaft 1. The transport roller 8 and the isolating roller 9 are connected to each other at the front of each storage shaft 1 by a drive belt 14, by which the rotation of the driven transport roller 8 is transferred to the isolating roller 9. As can also be seen from Figure 2, the isolating roller 9 incorporates a cam 9a in the shape of a circular segment. Because of this cam

9a, the isolating roller 9 is only effective as a transport roller in a small area.

The movement of data carriers 2 to the output and input opening 7, shown in Figures 1a to 1d, is effected as follows:

Figure 1a shows a storage device that comprises four storage shafts 1, in which a plurality of data carrier cards 2 is arranged between the intermediate base 3 and the closing plate 4 in each storage shaft 1. The uppermost data carrier 2 of each storage shaft 1 is indicated by bold lines. The data carriers 2 are pressed against the underside of the closing plate 4 by the spring 6 that acts on the intermediate base 3. As can also be seen from Figure 1a, at the beginning of the output of data carriers 2, all the isolating rollers 9 extend through the cutouts 11 in the closing plates 4 and into the interior of the storage shaft 1, and act on the uppermost data carriers 2. As soon as the isolating rollers 9 are moved by the transport rollers 8 and the drive belt 14 that is interposed between them, the uppermost data carrier 2 is moved out of the storage shaft 1 by way of the output and intake slot 5 onto the surface of the next closing plate 4, where it engages with the transport rollers 8, as is shown in Figure 2a. The data carrier 2 that is moved out of the foremost storage shaft 1 moves across two output and intake rollers 15 to the output and input opening 7.

As can be seen from Figure 1c, on further movement of the data carrier 2 along the surface of the closing plate 4, the isolating rollers 9 are moved out of the cutout 11 in

the closing plate 4 by the passing data carrier 2, and then assume the function of additional transport rollers. In a further step--as can be seen in Figure 1d--the next uppermost data carrier 2 is moved over the isolating roller 9 that acts on this data carrier 2 through the cutout 11 in the closing plate 4, through the output and intake slot 5 and out of the last storage shaft 1. This data carrier once again moves across the surface of the closing plate 4 of the next storage shaft 1 and engages with the transport rollers 8. As can also
 10 be seen from this drawing, further movement of the data carrier 2 along the surface of the closing plate 4 is effected by the transport rollers 8 and the isolating rollers 9 that has been moved out of the cutout 11 in the closing plate 4.

Now, after the start of the output process, the data carriers 2 are moved out of the storage device beginning at the storage shaft 1 that is furthest from the output and intake opening 7. Only when the rearmost storage shaft 1 has been completely emptied can the isolating rollers 9 act on the uppermost data carrier 2 of the next to last storage shaft 1
 20 through the cutout 11 in the closing plate 4 of this next to last storage shaft 1, and move it out of the storage shaft 1 through the output and intake slot 5.

As can be seen from Figures 1a to Figure 1d, the output of the data carriers 2 from the storage shaft 1 is thus performed in the following sequence: last storage shaft 1, next to last storage shaft 1, . . . , as far as the foremost storage shaft 1, i.e., the one that is closest to the output and input opening 7. The intake of data carriers 2 through

the output and input opening 7 into the storage shafts 1 is effected in the reverse sequence, i.e., such that the storage shaft 1 that is closest to the output and input opening 7 is first filled with data carriers 2 before data carriers 2 are delivered to the next storage shaft 1.

In order to ensure that, initially, it is in fact only the storage shaft 1 that is closest to the output and input opening 7 that is filled with data carriers 2 when said data carriers 2 are taken in through the output and input opening 7, and that no data carriers 2 can move into the storage shaft 1 that is behind this, the outer sides of the closing plate 4 of the rear storage shafts 1 can each be closed by a closing element 16 that is controllable as a function of the position of the intermediate base 3 of each storage shaft 1. Figures 7a to 7e show, as an example using a storage shaft 1, the manner in which the closing element 16 operates in a chronological sequence as a function of the position of the intermediate base 3.

As can be seen from Figures 7a to Figure 7e, each intermediate base 3 is attached rigidly to a pin 17 that is guided in a slot 18 of a plate 19 that is arranged on a long side of the storage shaft 1. When the data carriers are removed from the storage shaft 1, the pin 17 that is connected rigidly to the intermediate base 3 is moved upwards out of the storage shaft 1 by the intermediate base 3 that is spring loaded in the direction of the closing plate 4, as is shown in Figure 7a. Pivoting arm 20 is arranged at the upper end of the plate 19 and this extends into the slot 18 and the pin 17

stops against this when the intermediate base 3 is in its end position. As can be seen from Figure 7b and Figure 7c, the pivoting arm 20 is moved upward in the longitudinal direction by the pin 17, whereby the closing element 16 that is hinged to the pivoting arm 20 is moved downward against the direction of movement of the pivoting arm 20. In the end position of the intermediate base 3, which is to say in the position in which all data carriers 2 have been removed from the storage shaft 1, the closing element 16 has been deflected so far by the pivoting arm 20, or the pin 17 that is connected to the intermediate base 3, respectively, that the closing element 16 blocks the outer side of the closing plate 4 against the movement of data carriers 2. The fact that when the storage shaft 1 has been completely emptied, the movement of data carriers 2 along the upper side of the closing plate 4 is prevented by the closing element 16 ensures that data carrier cards 2 that are put into the storage device cannot be delivered to a rear storage shaft 1, but have to be loaded into the front storage shaft 1 first.

In order to ensure that the closing element 16 permits the movement of data carriers 2 along the surface of the closing plate 4 once again when the storage shaft 1 has been filled, the closing element 16 is connected to a spring loaded rocker 21 that can be activated by a control slide 22 only when the intermediate base 3 is in its end positions.

As can be seen from Figures 7a to 7e, the closing element 16 and the rocker 21 are so connected by a pin 23 at the unattached end of the closing element 16 that the rocker

21 can be deflected by the pin 17 that is moving upwards, or the pivoting arm 20, against the direction of movement of the intermediate base 3, and is deflected downward against the action of a spring. In order to generate the spring force that acts on the rocker 21, it is supported on a spring wire 24 that is secured to the underside of the storage shaft 1.

As is shown in Figures 7b and 7c, when the storage shaft 1 has been completely emptied, the plate 19 that forms the control slide 22 is in its uppermost position. In this position--as shown in Figure 7c--the closing element 16 and the rocker 21 have been deflected by the greatest possible distance, which is to say downward. In this extreme position, stops 25 that are arranged on the rocker 21 and on the outer side of the control slide 22 enter into detent in such a way that the rocker 21 and the closing element 16 remain in the deflected position, which locks the closing plate 4, even if the intermediate base 3, and thus the pin 17, is no longer resting against the pivoting arm 20.

The rocker 21, and thus the closing element 16, is only released when the pin 17 that is connected to the intermediate base 3 stops against the lower end of the slot 18 of the control slide 22 and the whole plate 19 moves downward when the storage shaft 1 is being filled with additional data carriers 2. In the filled state of the storage shaft 1 that is shown in Figures 7d and 7e, the stops between rocker 21 and control slide 22 are once again disengaged from each other by the downward movement of the control slide 22, by the pin 17. Because of the tension of the spring wire 24, the rocker 21

immediately springs back into its starting position and presses the closing element 16 upwards once again through the pin 23, away from the closing plate 4, so that data carrier cards 2 that have been put into the storage device can be moved over the surface of the closing plate 4 to a rear storage shaft 1.

Because of the control of the closing element 16 described above, it is ensured that it is possible for the rear storage shafts 1 to be filled with data carrier cards 2 only after the front storage shaft 1 has been completely filled.

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CLAIMS:

1. A self-filling storage device for memory cards,
said storage device comprising:

at least one storage container having a storage
5 compartment;

said storage compartment having a common opening
for receiving and releasing memory cards;

a cover plate for covering said common opening;

said cover plate having a first face facing said
10 storage compartment and a second face facing away from said
storage compartment;

said cover plate having a cutout;

a first spring mounted in said storage
compartment;

15 at least one separating roller positioned in said
storage container at said second face and having a first
position in which said separating roller projects through
said cutout into said storage compartment against a return
force generated by said first spring;

20 said separating roller acting on a memory card
positioned in said storage compartment at said first face or
acting on a memory card positioned at said second face for
insertion into said storage compartment;

at least one transport roller positioned in said
25 storage container at said second face and cooperating with
said second face for transporting a memory card across said
cover plate.

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2. A storage device according to claim 1, wherein said at least one storage container further comprises a pivot member, wherein said separating roller is connected to said pivot member and is pivoted from said first position
5 into a second position outside of said storage compartment by a memory card passing across said cover plate, and wherein said first spring acts on said pivot member.
3. A storage device according to claim 2, wherein said pivot member is pivotable about an axis of rotation of
10 said transport roller.
4. A storage device according to claim 1, wherein said transport roller is adjustable in a direction perpendicular to said cover plate in order to accommodate memory cards of different thickness.
- 15 5. A storage device according to claim 1, wherein said storage container further comprises a drive belt for connecting said transport roller and said separating roller.
6. A storage device according to claim 1, wherein said separating roller has a cam in the shape of a circular
20 ring segment, wherein said separating roller acts only with said cam, acting as a transport roller, on the memory cards.
7. A storage device according to claim 1, wherein said storage container further comprises a bottom plate positioned in said storage compartment and a second spring
25 biasing said bottom plate in a direction toward said cover plate, wherein memory cards stored in said storage compartment are positioned between said bottom plate and said cover plate.
8. A storage device according to claim 7, wherein
30 said storage container further comprises a locking element

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for locking said cover plate to prevent insertion of memory cards into said storage compartment, wherein said storage container further comprises a control slide and a spring-loaded pivot lever, wherein said control slide is
5 connected to said bottom plate and acts on said pivot lever in a first and second end position of said bottom plate for controlling said locking element.

9. A storage device according to claim 8, wherein said control slide comprises a slot and wherein said bottom
10 plate comprises a pin engaging said slot.

10. A storage device according to claim 8, wherein said control slide has abutments for activating said pivot lever.

11. A storage device according to claim 8, wherein
15 said pivot lever has abutments cooperating with said control slide for activating said pivot lever.

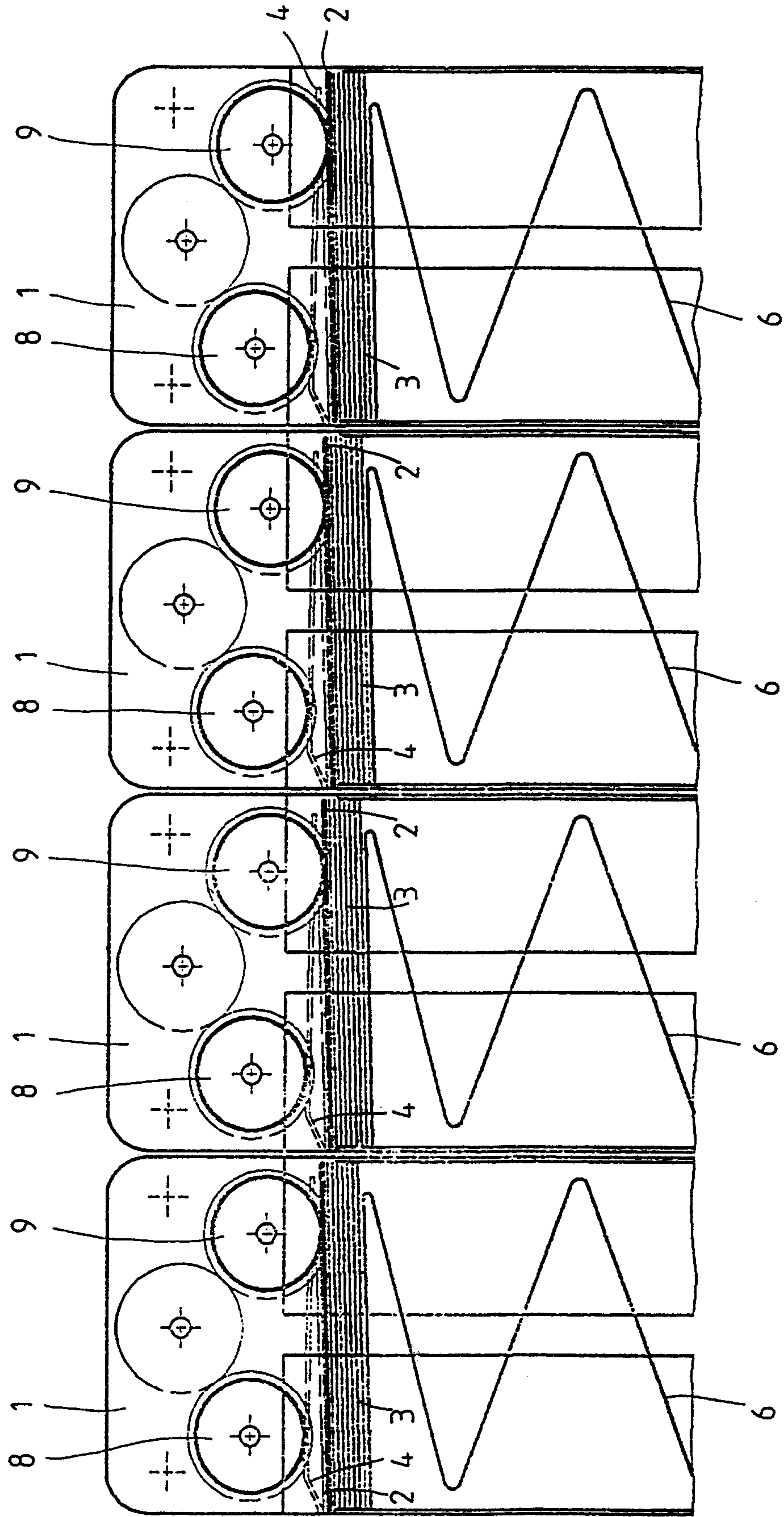
12. A storage device according to claim 8, wherein said pivot lever comprises a spring wire for spring-loading said pivot lever.

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Fig. 1a



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Fig. 1b

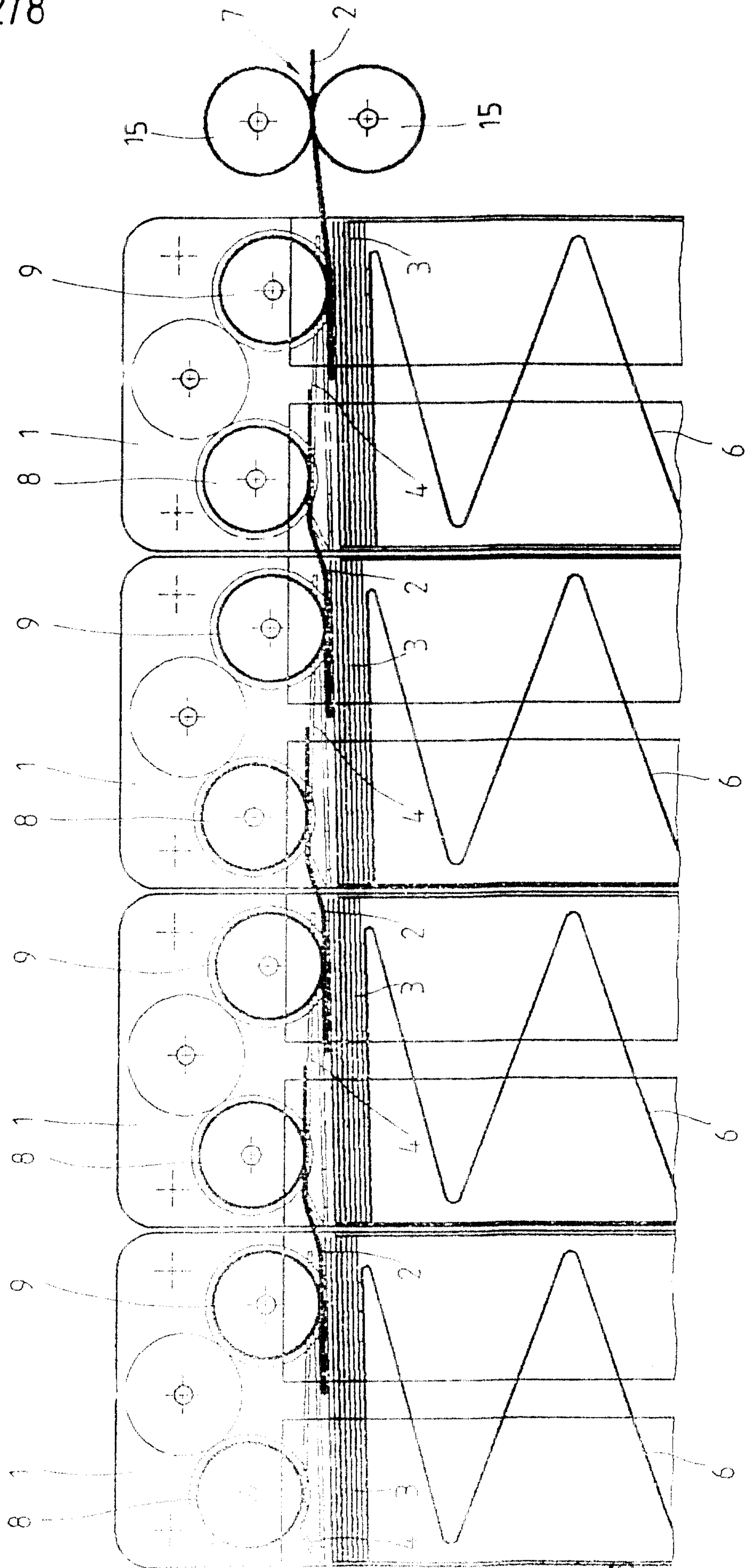
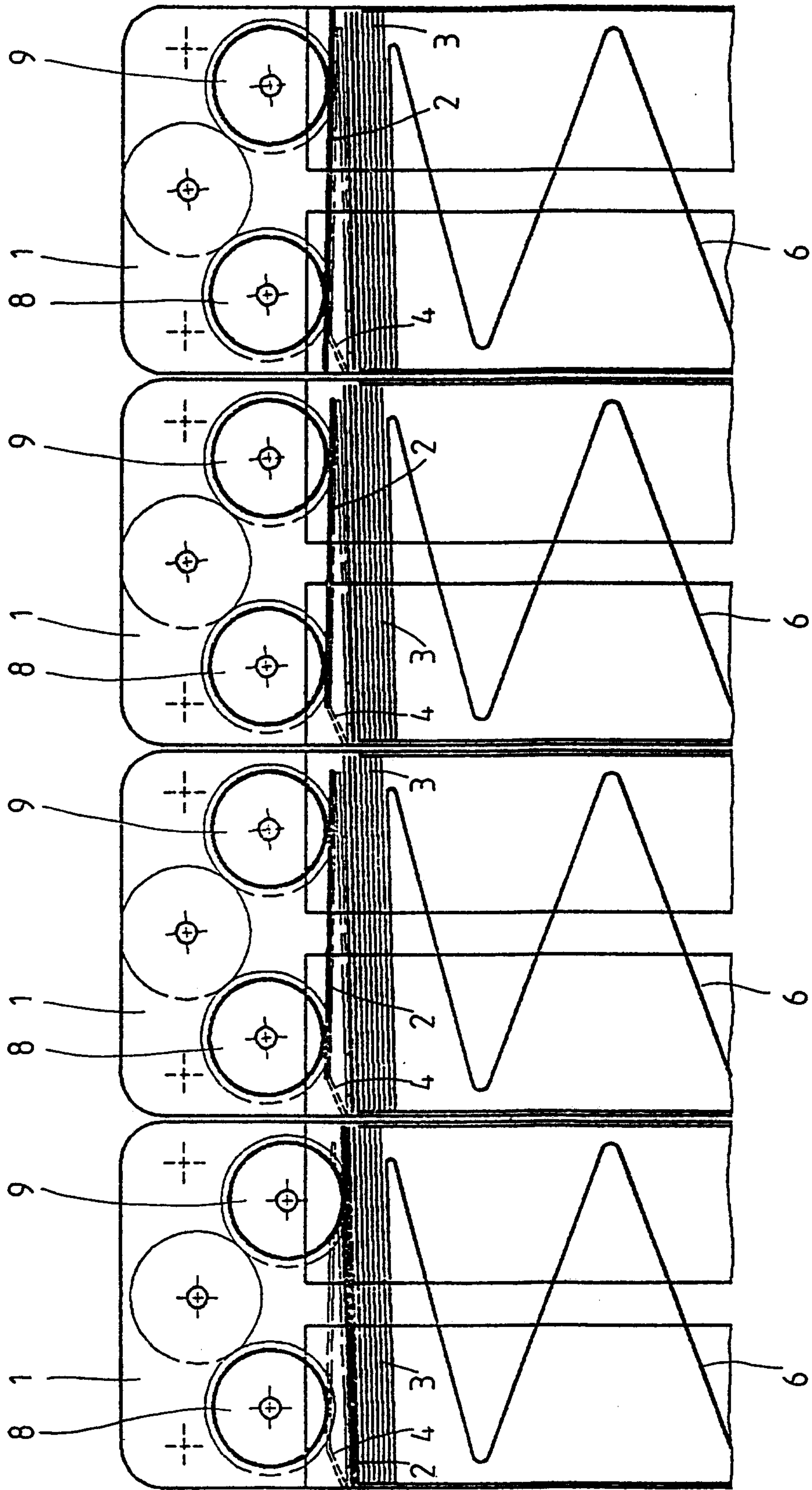
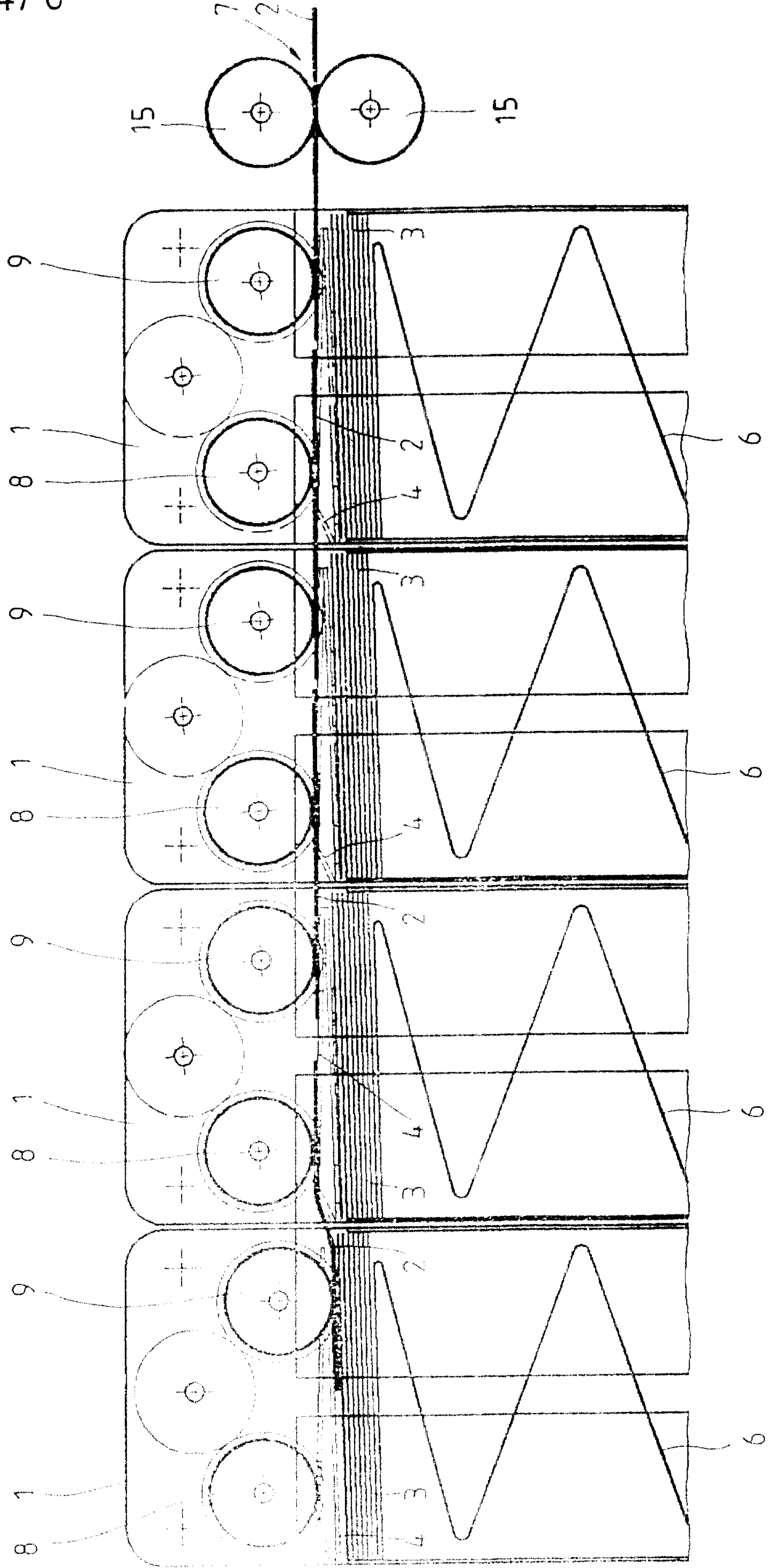


Fig. 1c



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Fig. 1d



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Fig. 2

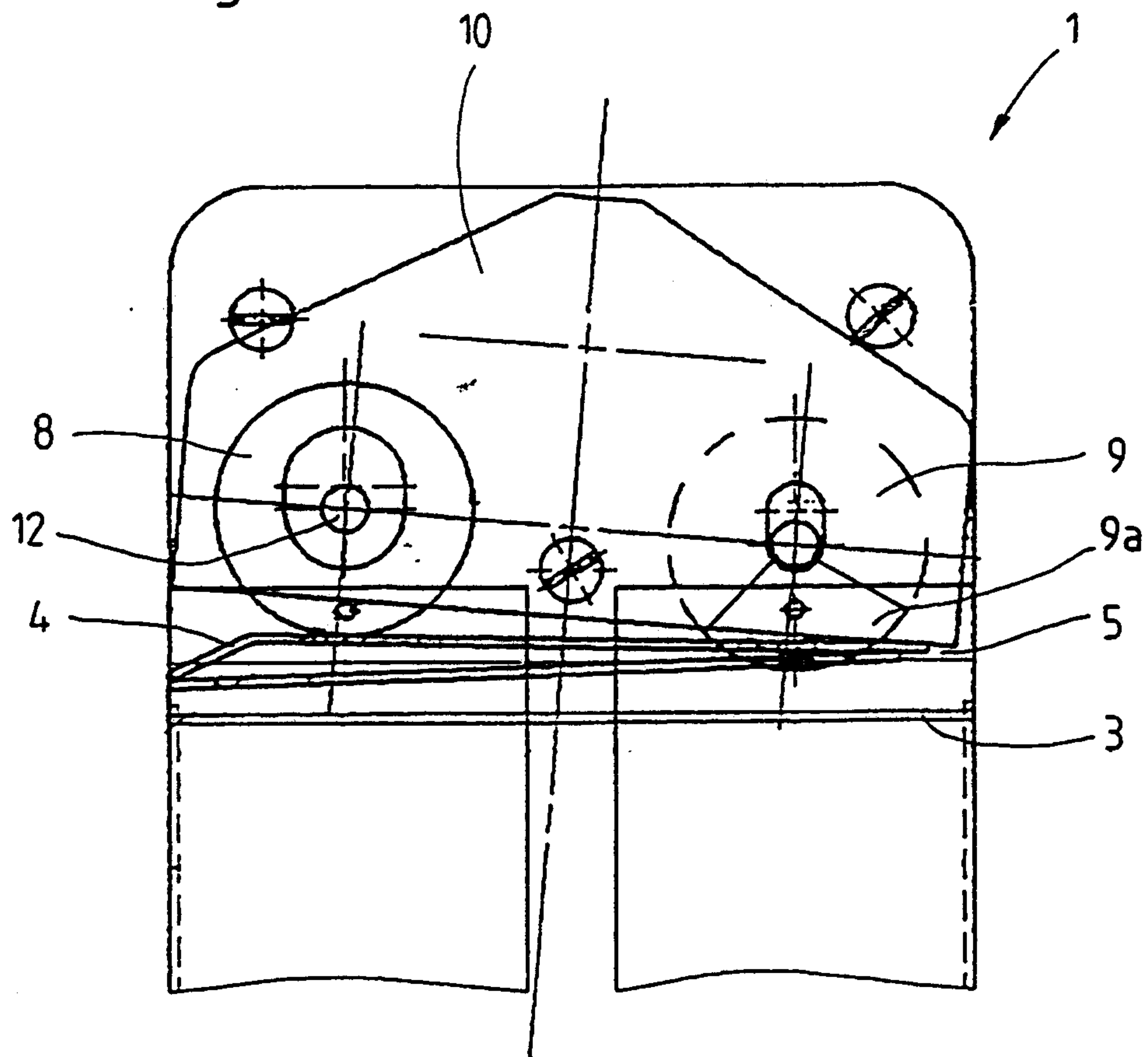


Fig. 5

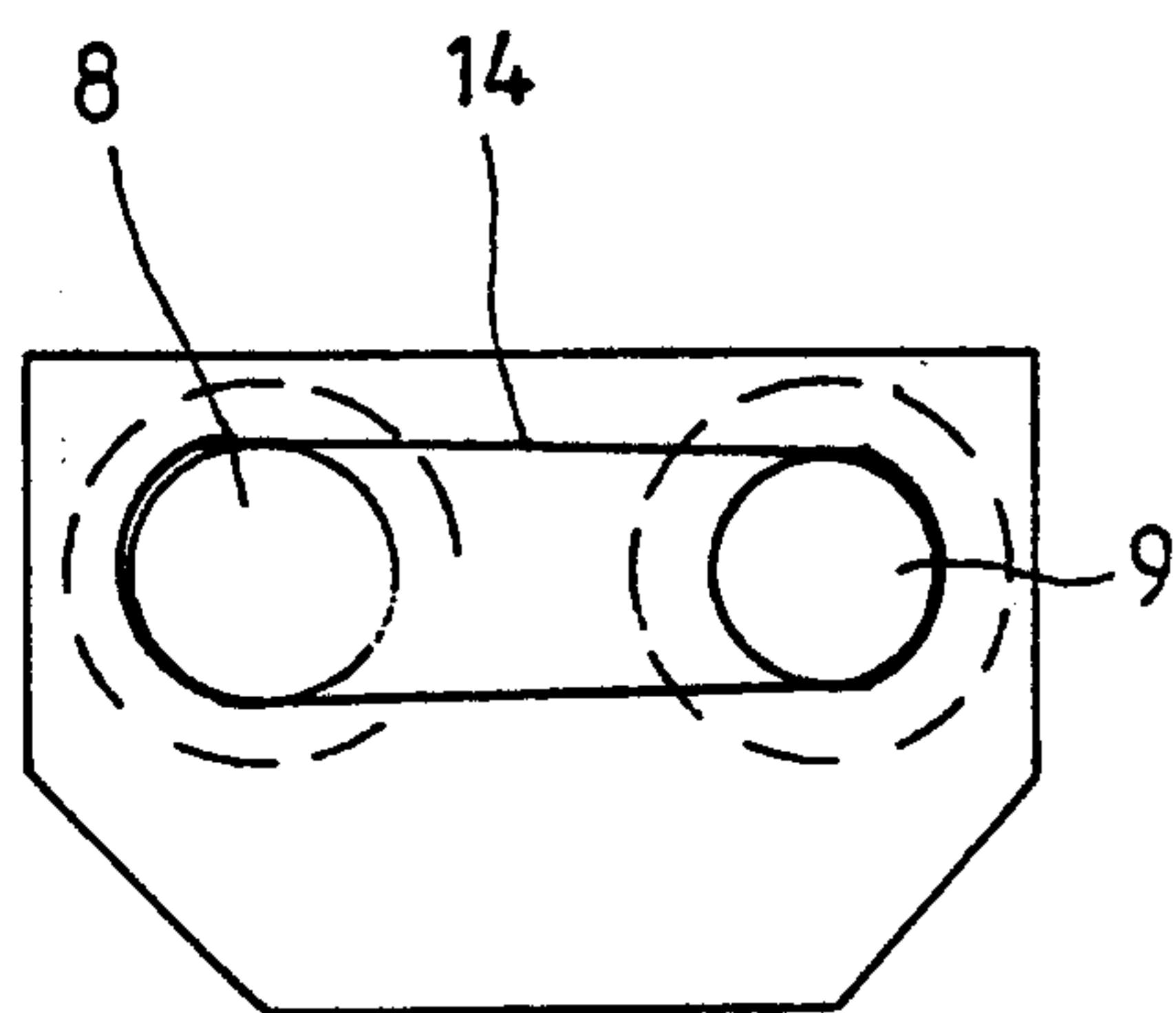
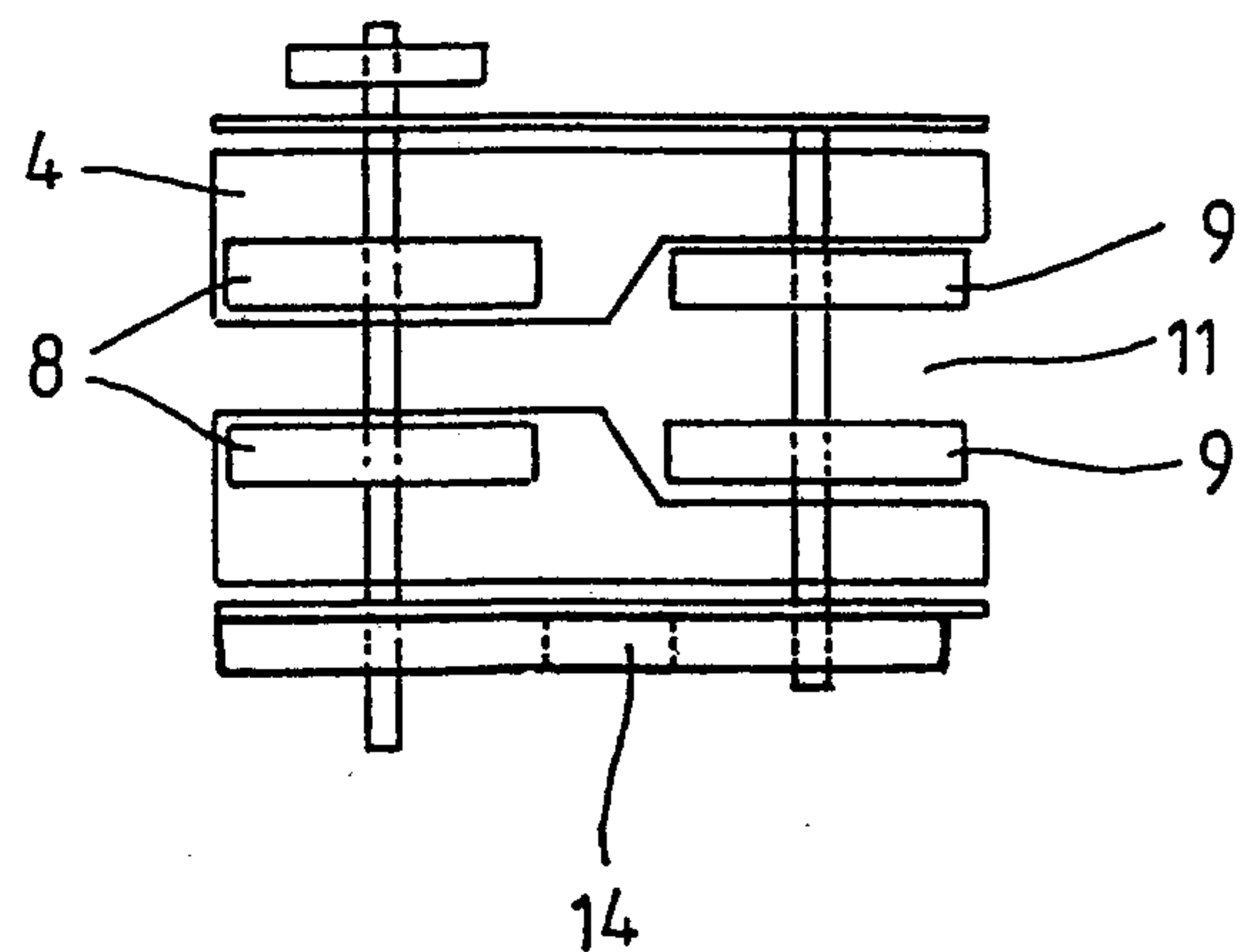


Fig. 6



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Fig. 3

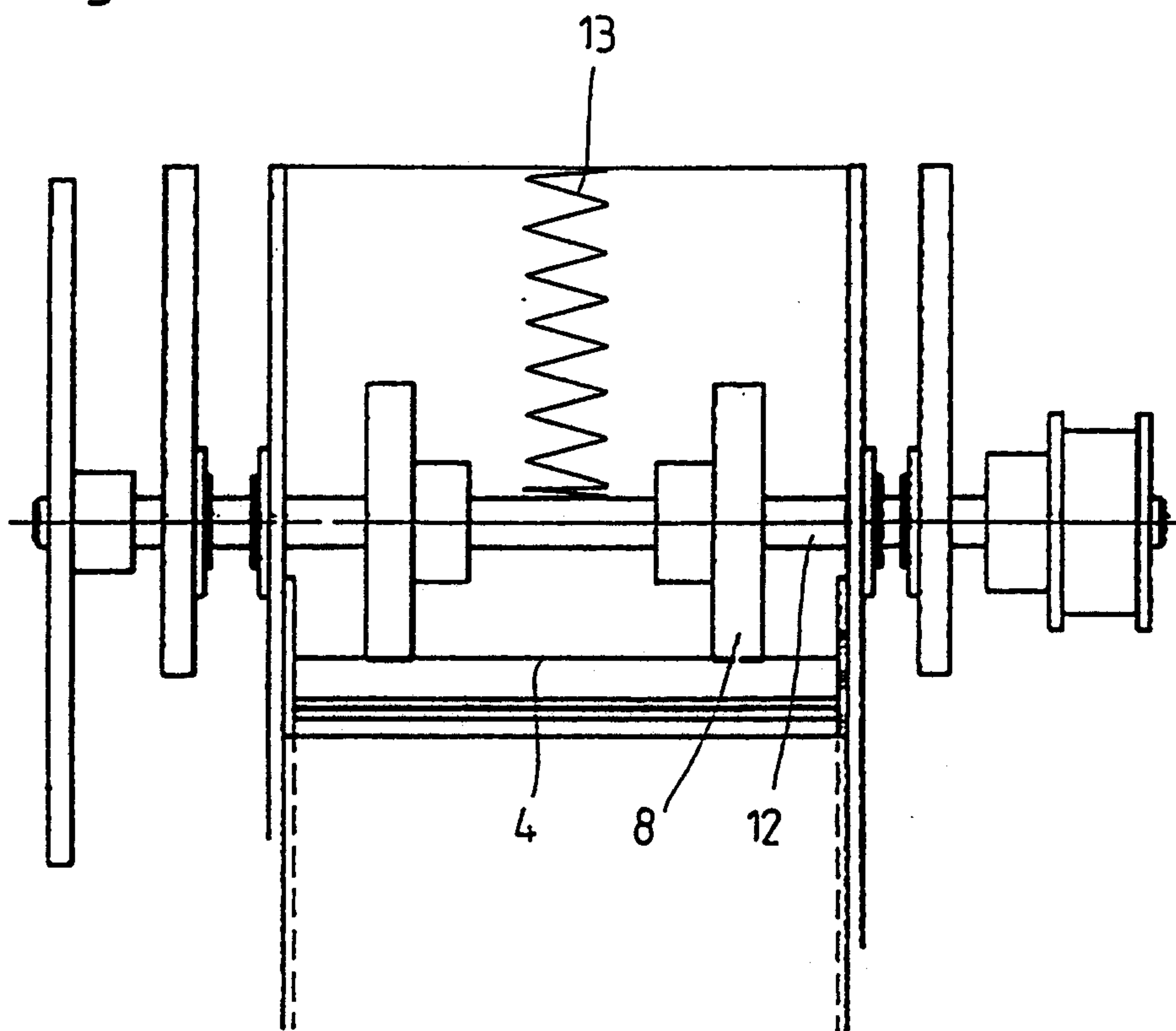


Fig. 4

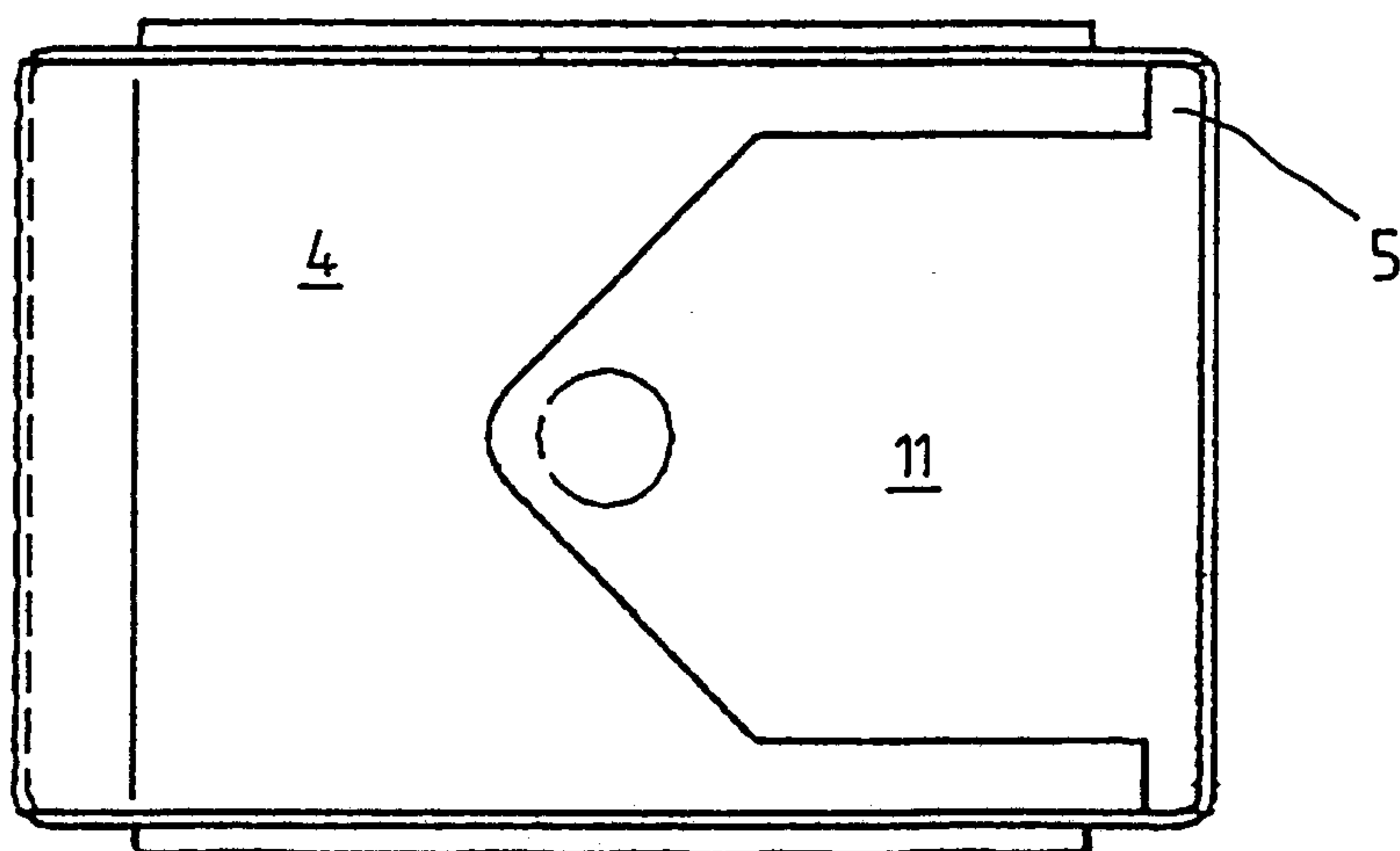


Fig. 7c

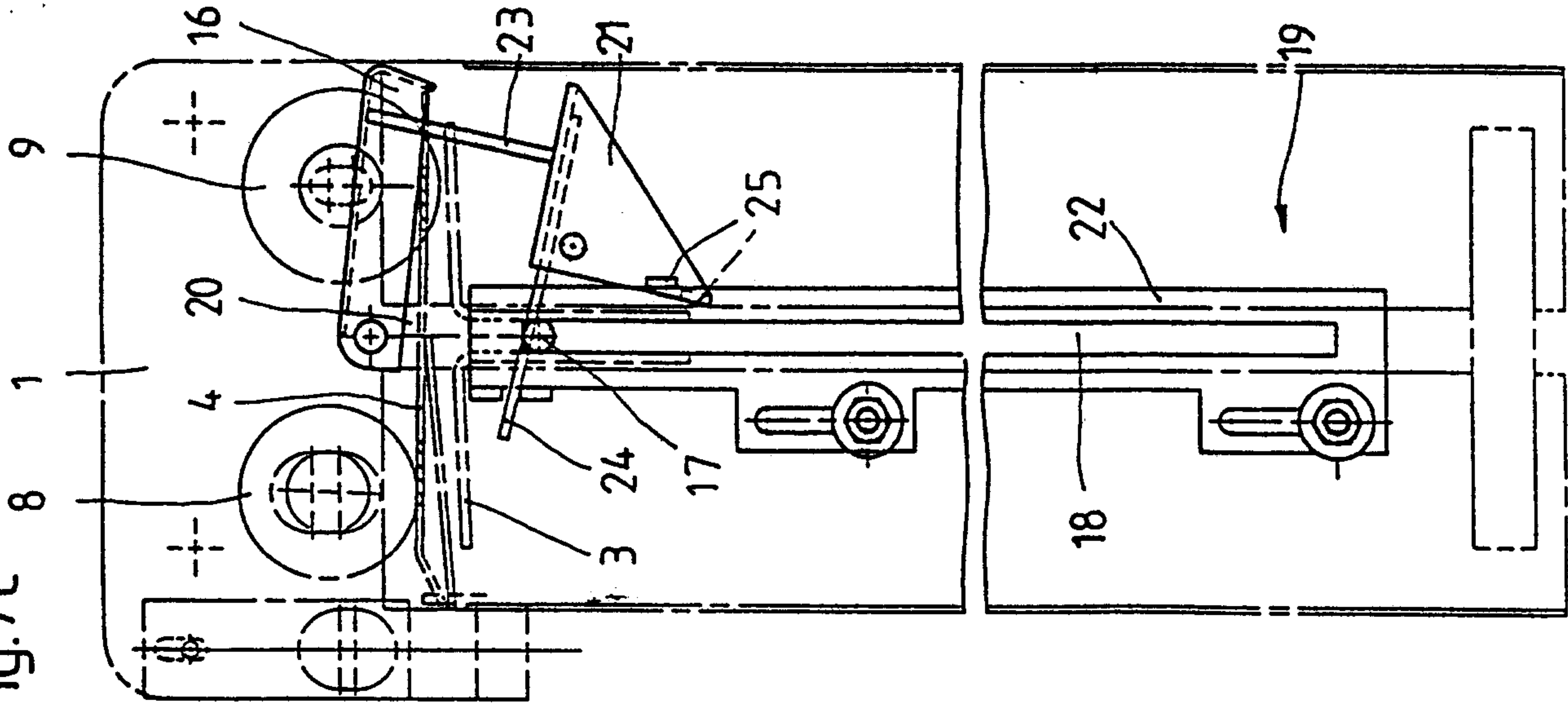


Fig. 7b

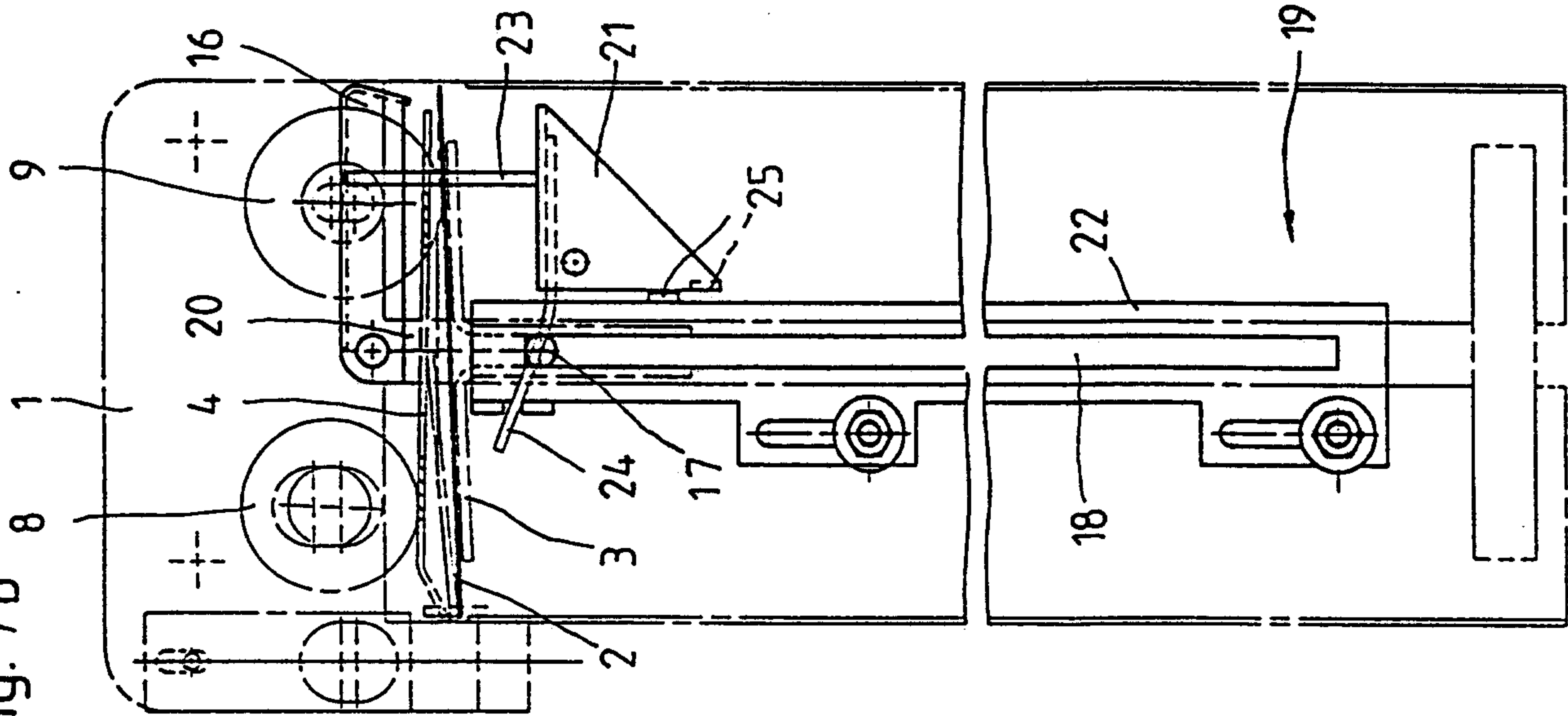
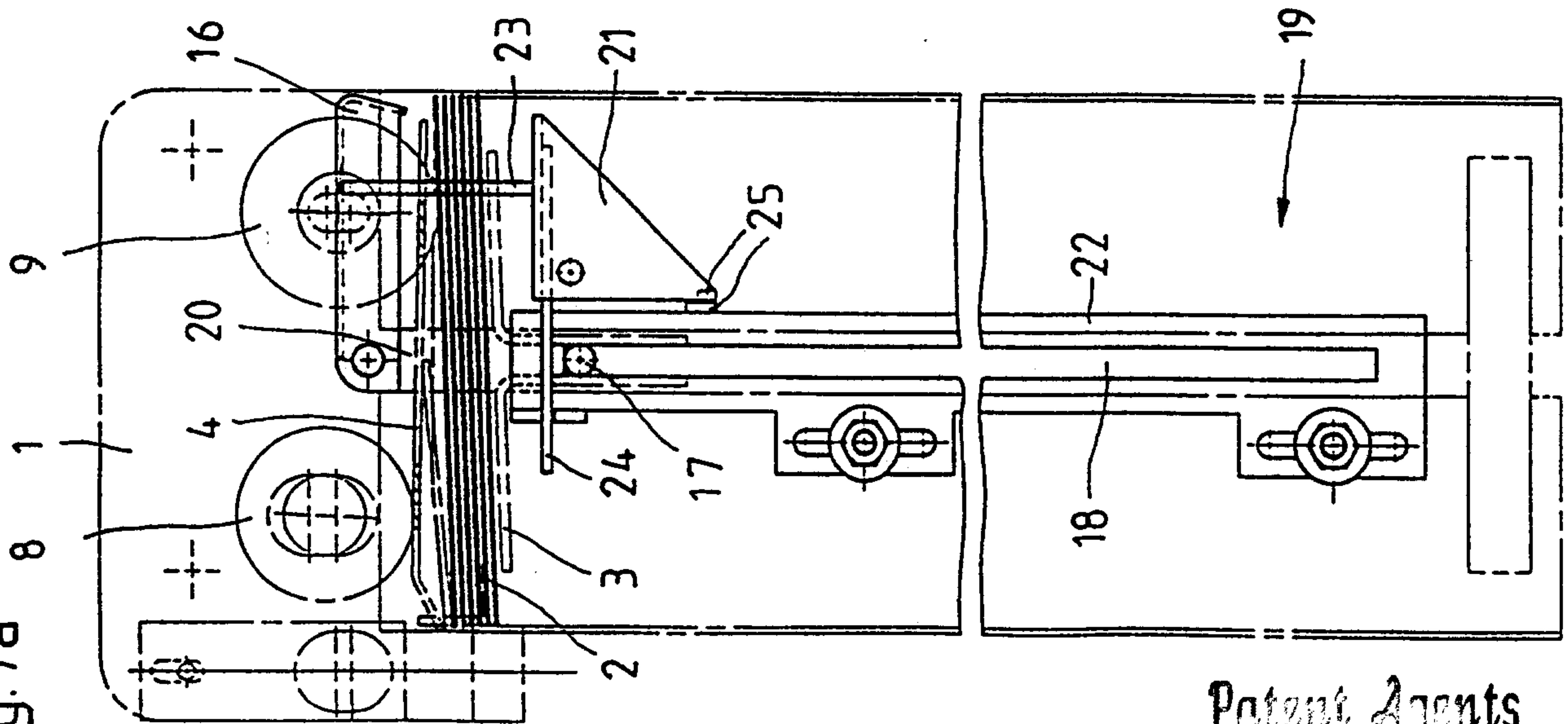
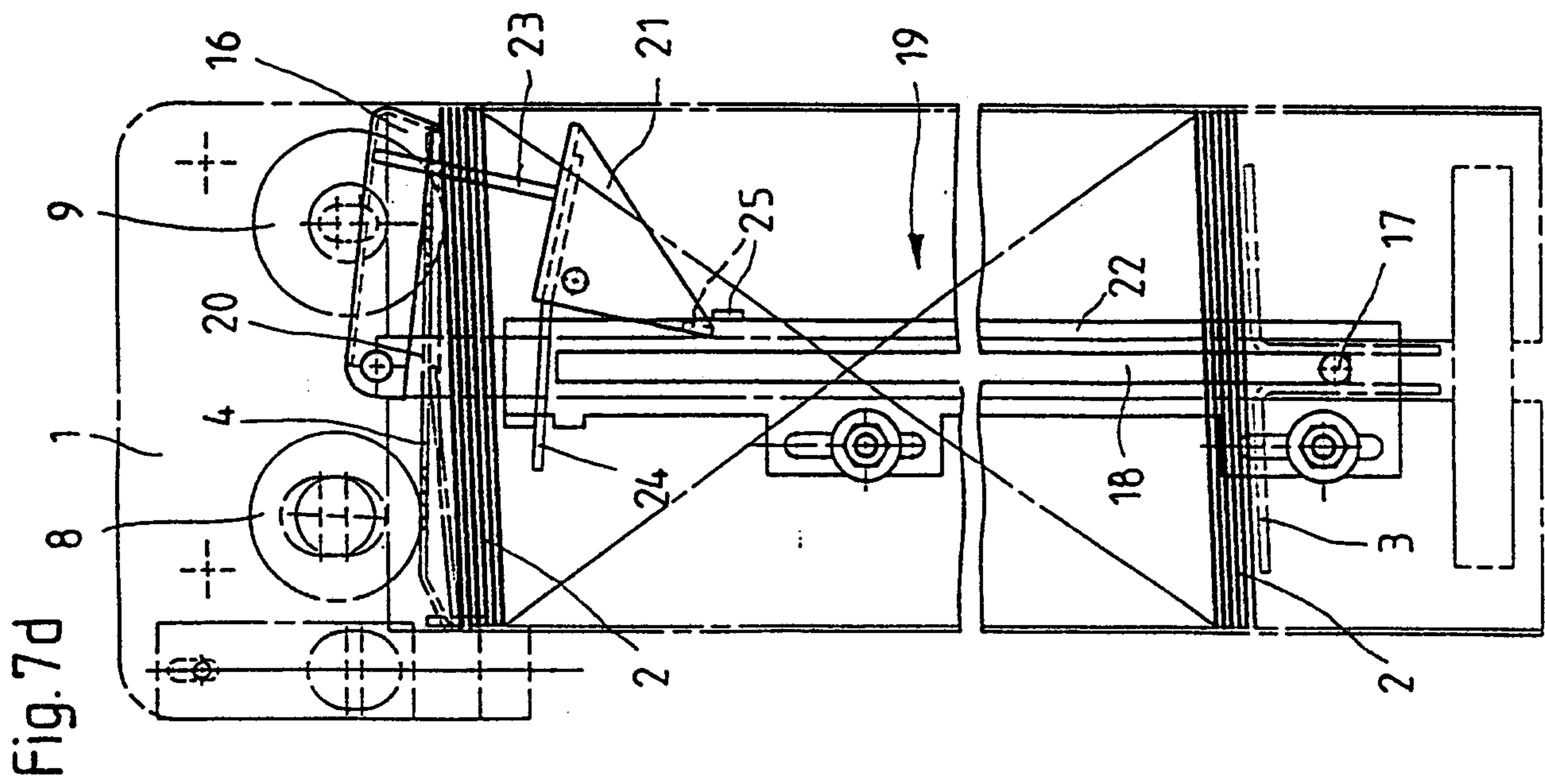
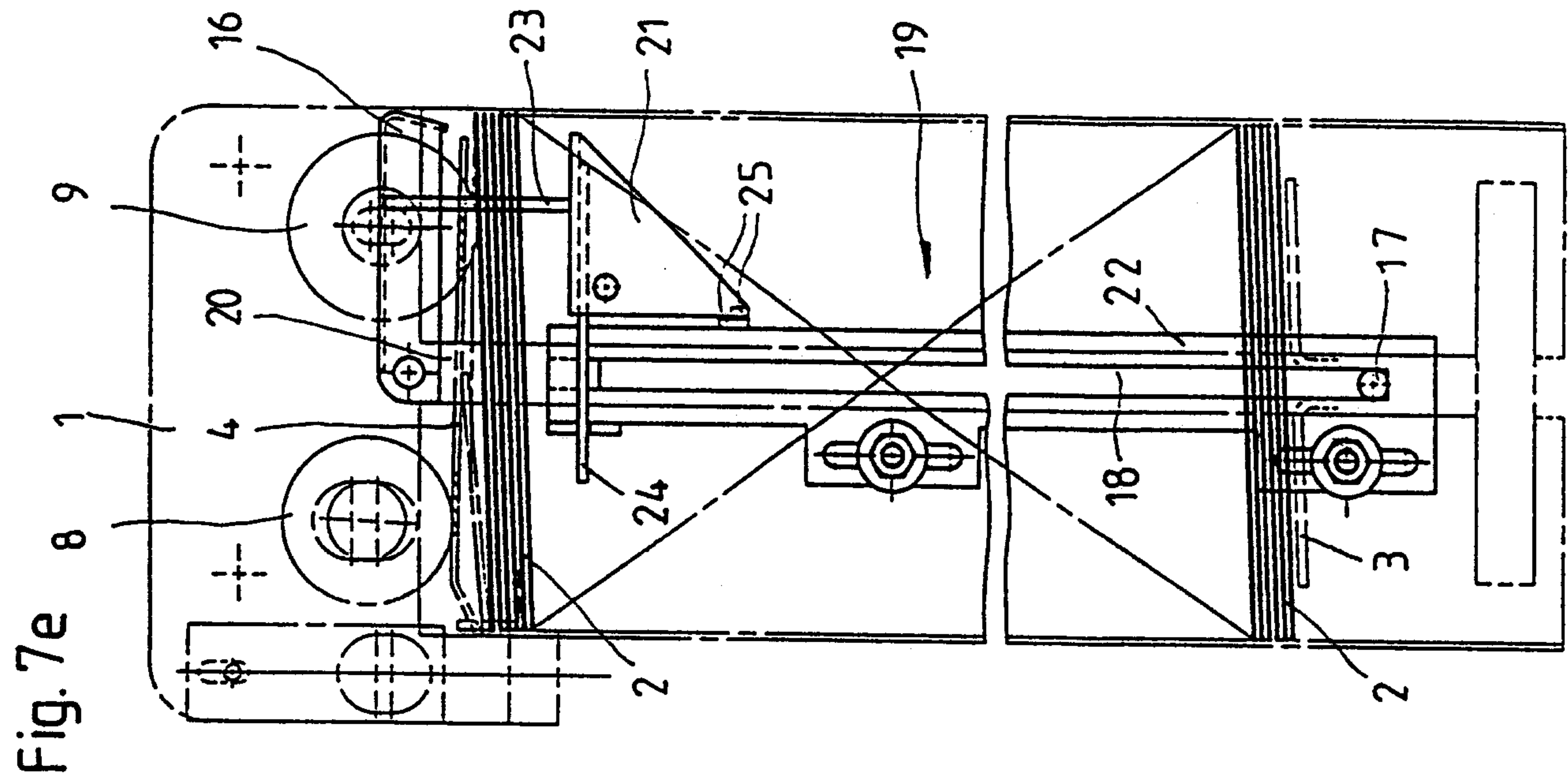


Fig. 7a



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