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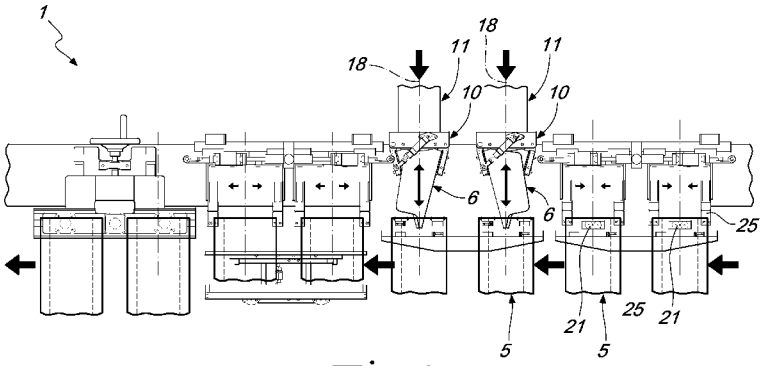

Fig. 1

(57) Abstract: A packaging machine (1) with increased functionality, particularly for small preformed bags, comprising a plurality of processing stations which are arranged along at least one advancement line (2) and which are provided with retention means (3) and opening means (4) for at least one bag (5) to be filled which are connected functionally to means for the advancement of the bag (5) to be filled along the advancement line (2). The processing stations comprise at least one filling station that is provided with at least one filling cone (6) adapted to discharge loose products (7) into the bag (5) to be filled, which is opened and shaped before-hand. The particularity of the invention consists in the fact that the filling cone (6) is of the type with variable opening, so that it can move between an active configuration of minimum opening, in which the filling cone (6) assumes a substantially pyramid-like shape with an acute angle, and an active configuration of maximum opening, in which the filling cone (6) assumes a shape substantially like a parallelepiped with a rectangular cross- section. There are also means for lifting and lowering either or both of the bag to be filled and the filling cone (6) for the partial insertion of the filling cone (6) into the bag (5) to be filled.

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PACKAGING MACHINE WITH INCREASED FUNCTIONALITY, PARTICULARLY FOR SMALL PREFORMED BAGS

The present invention relates to a packaging machine with increased functionality, particularly for small preformed bags, and a packaging method, particularly for packaging small preformed bags, which can be carried out with the packaging machine.

Conventional packaging machines are generally provided with discharge outlets that are designed as a function of the size or of the shape of the bags to be filled and which must be totally or at least partially substituted with every change of format.

With such conventional packaging machines, disassembly operations are therefore necessary in order to be able to adapt the outlet to the format of the bag to be filled during operation.

In fact, the packaging lines present on the market are not capable of packaging all the kinds of bags (of different types, sizes and materials) that are present on the market with a single model of machine.

For example, some of these conventional packaging machines process the bag to be filled while leaving it standing isolated along the advancement line, hence not permitting the processing of all kinds of bags, because some kinds of bags are not self-supporting.

Other conventional packaging machines, for filling the bag, necessitate the deformation of the lateral accordion portions, which must then be restored along the advancement line. This type of execution is reliable enough when the bags are made of paper and the sizes do not differ greatly; but it is impossible to process all the other types of bags, made from different materials or with bottoms that do not allow the bag to remain in the vertical position.

In addition, another drawback common to all kinds of conventional packaging machines consists in the fact that a large amount of air remains inside the packages and, no systems being available which are adapted to

the elimination thereof, the packages must be perforated, with the consequence that the package is no longer perfectly sealed, thus losing its fragrance and emitting unpleasant odors to the outside.

The aim of the present invention consists in providing a packaging machine with increased functionality which is capable of overcoming the above-mentioned drawbacks and limitations.

Within this aim, an object of the present invention consists in providing a packaging machine that is particularly adapted to the packaging of small preformed bags.

Another object of the present invention consists in providing a packaging machine that is capable of offering the widest guarantees of reliability and safety of use.

This aim and these and other objects which will become more apparent hereinafter are all achieved by a packaging machine with increased functionality, particularly for small preformed bags, comprising a plurality of processing stations which extend along at least one advancement line and which are provided with retention means and opening means for at least one bag to be filled which are connected functionally to means for the advancement of said at least one bag to be filled along said advancement line, said processing stations comprising at least one filling station that is provided with at least one filling cone adapted to discharge loose products into said at least one bag to be filled, which is opened and shaped beforehand, characterized in that said at least one filling cone is of the type with variable opening, so that it can move between an active configuration of minimum opening, in which said at least one filling cone assumes a substantially pyramid-like shape with an acute angle, and an active configuration of maximum opening, in which said at least one filling cone assumes a shape substantially like a parallelepiped with a rectangular cross-section, there being also means for lifting and lowering either or both of said at least one bag to be filled and said at least one filling cone for the

partial insertion of said at least one filling cone into said at least one bag to be filled.

Further characteristics and advantages of the present invention will become more apparent from the detailed description of a preferred, but not exclusive, embodiment of a packaging machine with increased functionality, particularly for small preformed bags, which is illustrated for the purposes of non-limiting example with the assistance of the accompanying drawings wherein:

Figure 1 is a schematic side elevation view of the packaging machine according to the present invention;

Figure 2 is a schematic plan view from above of the packaging machine shown in Figure 1;

Figures 3 and 4 are two schematic side elevation views of the filling cone of the packaging machine shown in the previous figures, respectively, before and after its insertion into the bag to be filled in its active configuration of opening;

Figure 5 is a schematic side elevation view of the filling cone shown in the previous figures during the step of discharging the product into the bag to be filled;

Figure 6 is a schematic plan view from above of the bag to be filled during the discharging step mentioned previously;

Figure 7 is a schematic side elevation view of the filling cone shown in the previous figures, illustrating its operation;

Figure 8 is a schematic side elevation view of the bag to be filled during the step of sealing and elimination of the remaining air contained in it;

Figure 9 is a schematic view of the mouth of the bag to be filled.

With reference to the figures, the packaging machine with increased functionality, particularly for small preformed bags, generally designated with the reference numeral 1, comprises a plurality of processing stations

which are arranged along at least one advancement line 2 and which are provided with retention means 3 and opening means 4 for at least one bag 5 to be filled which are connected functionally to means for the advancement of the bag 5, which are not shown since they are conventional.

For example, the bag 5 can be a preformed bag of the type with an open mouth with or without lateral accordion portions, an open mouth with or without a bottom, an open mouth with or without a handle, or an open mouth of the Doy Pack type, or stand-up pouch, or Top Slider, etc.

These preformed bags can furthermore be made from materials of different types, and the sizes of the bags that can be processed can vary from 300 grams up to 7 kilograms.

More precisely, the processing stations comprise at least one filling station that is provided with at least one filling cone 6 that is adapted to discharge loose products 7 into the bag 5, which is opened and shaped beforehand.

In the embodiment proposed, there are two filling stations which are arranged in series in order to increase the productivity of the packaging machine 1.

According to the invention, each filling cone 6 is of the type with variable opening so that it can move between an active configuration of minimum opening, in which it assumes a substantially pyramid-like shape with an acute angle as shown in Figures 3 and 4, and an active configuration of maximum opening, in which it assumes a shape substantially like a parallelepiped with a rectangular cross-section as shown in Figures 5 and 7.

Furthermore, also according to the invention, means are provided, also not shown, for lifting and lowering either or both of the bag 5 and the filling cone 6 in order to partially insert the filling cone 6 into the bag 5 along a line of ascent/descent 18.

Advantageously, each filling cone 6 is defined by at least two half-shells 8 and 9, which are pivoted at the outlet 10 of a duct 11 for feeding the

loose products 7 so that they can move between the active configuration of minimum opening, in which these half-shells 8 and 9 are closed against each other so as to give the filling cone 6 the substantially pyramid-like shape with an acute angle, and the active configuration of maximum opening, in which the two half-shells 8 and 9 are open with respect to each other so as to give the filling cone 6 substantially the shape of a parallelepiped with a rectangular cross-section.

More precisely, the two half-shells 8 and 9 are both substantially shaped like an open vat, which is delimited by a central wall 12, which extends substantially parallel to the discharge direction of the loose products 7, and by two side walls 13, with the central walls 12 being mutually opposite and the central walls mutually offset so as to define a male-female coupling and allow the insertion of the two half-shells 8 and 9 one inside the other and delimit laterally each filling cone 6 in all of its active configurations.

It is important to note that the above-mentioned walls 12 and 13 are furthermore shaped so as to define, at the outlet of each filling cone 6, two beaks 14 and 15 which define the vertex of the filling cone 6 and are adapted to be inserted into the bag 5 during the step for filling it.

Conveniently, means 16 are provided for adjusting the opening angle of the two half-shells 8 and 9, which comprise, for each half-shell 8 and 9, a pneumatic actuator 17 that is interposed between an abutment 19 that is integral with the feeding duct 11 and an element 20 for supporting the respective half-shell 8 or 9.

The acute angle of the filling cone 6, which is directed downward, penetrates the bag 5 with extreme ease, allowing the coupling and the packaging of a plurality of bags, some of which are increasingly in demand by the European market; for example bags that have the lateral accordion portions locked into place, or mini packs of formats varying from 300 grams to 800 grams. The filling mouth that is defined enables the packaging, with

high productivity, of any bag, irrespectively of the shape, type and size.

The above-mentioned opening means 4 comprise at least two mutually opposite sets of suckers 21 that can move toward and away from each other at right angles to the advancement line 2, so as to grip the bag 5 by adhering to the lateral surfaces 23 thereof, following their mutual approach, and so as to open the selvage 24 thereof, following their mutual spacing.

As far as the retention means 3 are concerned, they comprise at least two sets of grippers 25 which are mutually opposite and movable toward and away from each other at right angles with respect to the advancement line 2 so as to retain the bag 5 to be filled at its lateral accordion portions 26.

As will be described in more detail later, the two sets of grippers 25 are movable toward and away from each other parallel to the advancement line 2 so as to allow the complete opening of the bag 5 with the lateral accordion portions 26 retained by the sets of grippers 25 following the thrust applied on the selvage 24 by the beaks 14 and 15 that are inserted into the bag 5, so as to make the selvage 23 adhere to the entire external perimeter of the filling cone 6.

With particular reference to Figure 8, at least one sealing station is provided which is arranged behind the filling station or stations and is provided with at least one set of heat-sealing bars 27, which are provided with liquid cooling means of the heat-sealing, for the heat-sealing of the selvage 24 of the bag 5.

Conveniently, means are provided for the height adjustment of the heat-sealing bars 27 so as to be able to provide a plurality, for example up to four, of types of closure for different types of bags and/or to be able to provide a plurality, for example three, of different types of closure on the same bag.

Also with particular reference to Figure 8, advantageously, air

removal means 28 are provided for removing the residual air contained in the bag 5, in the transfer thereof from the filling station to the sealing station, which comprise, at their upper part, a series of pressers 29 that are adapted to retain the bag 5 and to make the selvage 24 descend and, at their lower part, a pair of rollers 30 that are adapted to operate vertically on the lateral surfaces 23 of the bag 5, until they reach the level of the product contained therein, so as to eliminate the air between the product and the selvage 24.

The packaging method, obtainable with the packaging machine 1 described above, particularly for packaging small preformed bags, is described below.

According to the invention, the packaging method comprises the following steps:

- retaining the bag 5 to be filled by way of the retention means 3,
- advancing the bag 5 to be filled until it is arranged in at least one of the filling stations described previously,
- opening the selvage 24 of the bag 5 to be filled by way of the opening means 4, an operation that can also occur before or during the previous step of advancement.

More precisely, the retention means 3 and the opening means 4 comprise respectively the sets of grippers 25 for retaining the lateral accordion portions of the bag 5 to be filled and the sets of suckers 21 for opening the bag 5; the former operate on the sides of the selvage 24 of the bag 5 to keep the accordion portions closed, and move toward each other on the horizontal axis while, simultaneously, the latter once adhered to the bag 5 move away from each other so that it can be opened in order to make the selvage 5 define an oval-shaped opening.

Subsequently, after the advancement, the following steps are executed:

- partially inserting each filling cone 6 into the bag 5 to be filled by

way of the lifting and lowering means,

- opening each filling cone 6, and moving the retention means 3 so as to make the selvage 24 adhere to the entire external perimeter of the filling cone 6,

- discharging the loose products 7 into the bag 5 to be filled.

Advantageously, at least two steps of:

- the step of partially inserting the filling cone 6,

- the step of opening the filling cone 6,

- the step of discharging the loose products 7,

can also occur simultaneously.

More precisely, the outlet of each filling cone 6 and the selvage 6 of the bag 5 to be filled can be mutually coupled and uncoupled thanks to the vertical and horizontal movements of the mouth or of the retention means 3 of the bag 5 which are connected to the supporting frame of the outlet 10.

After the bag 5 to be filled, with the selvage 24 open in an oval shape, has been positioned under the outlet of the respective filling cone 6, it is gripped and held by an additional set of bag-retaining grippers, which are positioned under the discharge outlet or outlets.

The filling cone 5 can thus partially penetrate the bag 5 and then open horizontally toward the accordion portions and discharge the product 7 into the bag 5.

During the step of opening, the outlet of the filling cone 6 deforms the initially oval cross-section of the selvage 24 causing it to take on the shape of the outlet itself, i.e. a shape very similar to that of the transverse cross-section of the bag 5 that is now filled, almost rectangular.

In this way, the outlet of the filling cone 5, during the step of opening, moves a part of the accordion portions that are not held in place by the retention means 3 so that the outlet of the filling cone 6 can define a bigger opening, thus exploiting approximately 80% of the width of the selvage 24 of the bag 5.

More precisely, during the step of opening the filling cone 6 and of discharging the products 7, the retention means 3 that hold the selvage 24 of the bag 5 with the accordion portions held in place move apart in order to put the selvage 24 of the bag under tension and make it adhere to the entire external perimeter of the outlet of the filling cone 6.

In this way, the opening of the outlet of the filling cone 6, in addition to allowing the product 7 to enter the bag 5, also modifies the original, oval-shaped opening of the selvage 24 by making it take on an almost rectangular shape.

When the filling is completed, the filling cone 6 and the selvage 24 are separated and the bag 5 is then gripped by the retention means 3, so that they can hold, align and transport the bag 5, which retention means have a pair of claws or jaws that rotate on a vertical falling plane, in moving apart and coming together.

More precisely, such means of retention, alignment and transport enable the alignment of the selvage 24, by way of a mutual spacing movement along the horizontal axis, and the alignment can be achieved both under the outlet of the filling cone 6, and in a subsequent station.

Subsequently, the bag is translationally moved to the subsequent station, for the operations of discharging the air contained in the bag 5 to be filled by way of the air removal means 28 and to heat-seal the selvage 24 by way of the set of heat-sealing bars 27.

More precisely, such translational motion occurs by way of the grippers for retaining, alignment and transport, accompanied by auxiliary movement means which operate on the bottom of the bag, such as for example conveyor belts and moving arms.

The bag is moved to the heat-sealing station directly by the air removal means 28.

Once the operations of the air removal means 28 are completed, the bag 5 is immediately heat-sealed by way of the set of heat-sealing bars 27.

Such heat-sealing stations can be one or more in number, and on each assembly it is possible to have sets of bars that are adjustable in height, so as to be able to execute up to four different types of closure for different types of bags, or to be able to execute up to three different types of closure for the same bag.

In practice it has been found that the packaging machine with increased functionality, particularly for small preformed bags, and the packaging method obtainable with it, achieve the intended aim and objects since they allow the packaging of different kinds of bags, without the necessity of changing the discharge outlets, so that the machine is adapted for the packaging of both food and chemical products, as well as pet food.

For example, it enables the packaging of bags of different types such as: bags with accordion portions, or without accordion portions, bags with outer handles, bags with punched handles, Doy Pack bags, Stand-Up Pouch bags, Single Life Top Zip bags, Mini Pet Pack bags, Internal Front Zipper bags, Top Slider bags, Hidden Front Slider bags, Easy Open bags.

Furthermore, it is possible to process bags of any shape, size and material.

Another advantage of the packaging machine, according to the present invention, consists in the fact that the handling of the bags on the advancement line always occurs with the accordion portions held in place, so as to ensure the 100% perfect closure of the package.

In fact, the handling of the bags on the advancement line occurs while they are constantly kept in grip and with the accordion portions held in place, so as to ensure a production process that is reliable and without interruptions, and a perfect packaging of the bags.

Another advantage of the packaging machine, according to the present invention, consists in the fact that it allows an optimal sealing of the bags which is such as to preserve the fragrance and quality of the product.

In fact, thanks to the air removal means, oxygen is removed from

inside the sealed package; thus it is not necessary to perforate the package in order to palletize it.

Furthermore, thanks to the presence of the liquid cooling means of the heat-sealing, it is possible to prevent the material of the bag from deforming with the heat, thus taking on an unpleasant appearance; furthermore the system prevents variation in the colors of the bag in contact with the heat sources.

Another advantage of the packaging machine, according to the present invention, consists in the fact that it is easy to use and quick to effect the change of format, being furthermore reliable from the point of view both of the process and of the work elements over time.

The packaging machine with increased functionality, particularly for small preformed bags, and the packaging method obtainable with it, thus conceived, are susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

Moreover, all the details may be substituted by other, technically equivalent elements.

In practice the materials employed, provided they are compatible with the specific use, and the contingent dimensions and shapes, may be any according to requirements.

The disclosures in Italian Patent Application No. AR2012A000036 from which this application claims priority are incorporated herein by reference.

Where the technical features mentioned in any claim are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference numerals and/or signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference numerals and/or signs.

CLAIMS

1. A packaging machine (1) with increased functionality, particularly for small preformed bags, comprising a plurality of processing stations which are arranged along at least one advancement line (2) and which are provided with retention means (3) and opening means (4) for at least one bag (5) to be filled which are connected functionally to means for the advancement of said at least one bag (5) to be filled along said advancement line (2), said processing stations comprising at least one filling station that is provided with at least one filling cone (6) that is adapted to discharge loose products (7) into said at least one bag (5) to be filled, which is opened and shaped beforehand, characterized in that said at least one filling cone (6) is of the type with variable opening, so that it can move between an active configuration of minimum opening, in which said at least one filling cone (6) assumes a substantially pyramid-like shape with an acute angle, and an active configuration of maximum opening, in which said at least one filling cone (6) assumes a shape substantially like a parallelepiped with a rectangular cross-section, means being also provided for lifting and lowering either or both of said at least one bag (5) to be filled and said at least one filling cone (6) for the partial insertion of said at least one filling cone (6) into said at least one bag (5) to be filled.

2. The packaging machine (1) according to the preceding claim, characterized in that said at least one filling cone (6) is defined by at least two half-shells (8, 9), which are pivoted at the outlet (10) of a duct (11) for feeding said loose products (7) so that they can move between said active configuration of minimum opening, in which said at least two half-shells (8, 9) are closed against each other so as to give said at least one filling cone (6) said substantially pyramid-like shape with an acute angle, and said active configuration of maximum opening, in which said at least two half-shells (8, 9) are open with respect to each other so as to give said at least one filling cone (6) said shape substantially like a parallelepiped with a

rectangular cross-section.

3. The packaging machine (1) according to claims 1 or 2, characterized in that said at least two half-shells (8, 9) are both substantially shaped like an open vat, which is delimited by a central wall (12), which extends substantially parallel to the discharge direction of said loose products (7), and by two side walls (13), said central walls (12) of said at least two half-shells (8, 9) being mutually opposite and said central walls (12) of said at least two half-shells (8, 9) being mutually offset so as to allow the insertion of said at least two half-shells (8, 9) one inside the other and delimit laterally said at least one filling cone (6) in all of its active configurations, said walls (12, 13) of said at least two half-shells (8, 9) being furthermore shaped so as to define, at the outlet of said at least one filling cone (6), two beaks (14, 15), which define the vertex of said at least one filling cone (6) and are adapted to be inserted into said at least one bag (5) to be filled during the step for filling said bag.

4. The packaging machine (1) according to one or more of the preceding claims, characterized in that it comprises means (16) for adjusting the opening angle of said at least two half-shells (8, 9), which comprise, for each one of said at least two half-shells (8, 9), a pneumatic actuator (17) interposed between an abutment (19) that is integral with said feeding duct (11), and an element (20) for supporting said half-shell (8, 9).

5. The packaging machine (1) according to one or more of the preceding claims, characterized in that said opening means (4) comprise at least two mutually opposite sets of suckers (21) that can move toward and away from each other at right angles to said advancement line (2), so as to grip said at least one bag (5) to be filled by adhering to the lateral surfaces (26) of said at least one bag (5) to be filled, following their mutual approach, and so as to open the selvage (24) of said at least one bag (5) to be filled, following their mutual spacing.

6. The packaging machine (1) according to one or more of the

preceding claims, characterized in that said retention means (3) comprise at least two sets of mutually opposite grippers (25) that can move toward and away from each other at right angles to said advancement line (2) so as to retain said at least one bag (5) to be filled at its lateral accordion portions (26), said at least two sets of grippers (25) being furthermore movable toward and away from each other parallel to said advancement line (2) so as to allow the complete opening of said at least one bag (5) to be filled with said lateral accordion portions (26) being retained by said at least two sets of grippers (25) following the thrust applied to said selvage (24) by said beaks (14, 15) that are inserted in said at least one bag (5) to be filled, so as to make said selvage (24) adhere to the entire external perimeter of said at least one filling cone (6).

7. The packaging machine (1) according to one or more of the preceding claims, characterized in that it comprises at least one sealing station that is arranged behind said filling station and is provided with at least one set of heat-sealing bars (27) for heat-sealing said selvage (24).

8. The packaging machine (1) according to one or more of the preceding claims, characterized in that it comprises means for the height adjustment of said heat-sealing bars (27) so as to be able to provide a plurality of types of closure for different types of bags and/or to be able to provide a plurality of different types of closure on the same bag.

9. The packaging machine (1) according to one or more of the preceding claims, characterized in that it comprises air removal means (28) for removing the residual air contained in said at least one bag (5) in the transfer of said at least one bag (5) from said at least one filling station to said sealing station.

10. The packaging machine (1) according to one or more of the preceding claims, characterized in that said air removal means (28) comprise, at their upper part, a series of pressers (29) that are adapted to retain said at least one bag (5) to be filled and to make said selvage (24)

descend and, at their lower part, a pair of rollers (30) that are adapted to operate vertically on the lateral surfaces (23) of said at least one bag (5), until they reach the level of the product contained therein, so as to eliminate the air between said products (7) and said selvage (24).

11. The packaging machine (1) according to one or more of the preceding claims, characterized in that it comprises two filling stations arranged in series.

12. A packaging method, particularly for packaging small preformed bags, using a packaging machine (1) according to one or more of the preceding claims, characterized in that it comprises the following steps:

- retaining said at least one bag (5) to be filled by way of said retention means (3),

- advancing said at least one bag (5) to be filled until it is arranged in at least one of said filling stations,

- opening said selvage (24) of said at least one bag (5) to be filled by way of said opening means (4),

- partially inserting said at least one filling cone (6) into said at least one bag (5) to be filled by way of said lifting and lowering means,

- opening said at least one filling cone (6), and moving said retention means (3) so as to make said selvage (24) adhere to the entire external perimeter of said at least one filling cone (6),

- discharging said loose products (7) into said at least one bag (5) to be filled,

- eliminating the air contained in said at least one bag (5) by way of said air removal means (28),

- heat-sealing said selvage (24) by way of said at least one set of heat-sealing bars (27).

13. The packaging method according to claim 12, characterized in that said step of opening said selvage (24) occurs before said step of advancing said at least one bag (5) to be filled.

14. The packaging method according to claim 12, characterized in that at least two steps of:

- said step of partially inserting said at least one filling cone (6),
- said step of opening said at least one filling cone (6),
- said step of discharging said loose products (7),

occur simultaneously.

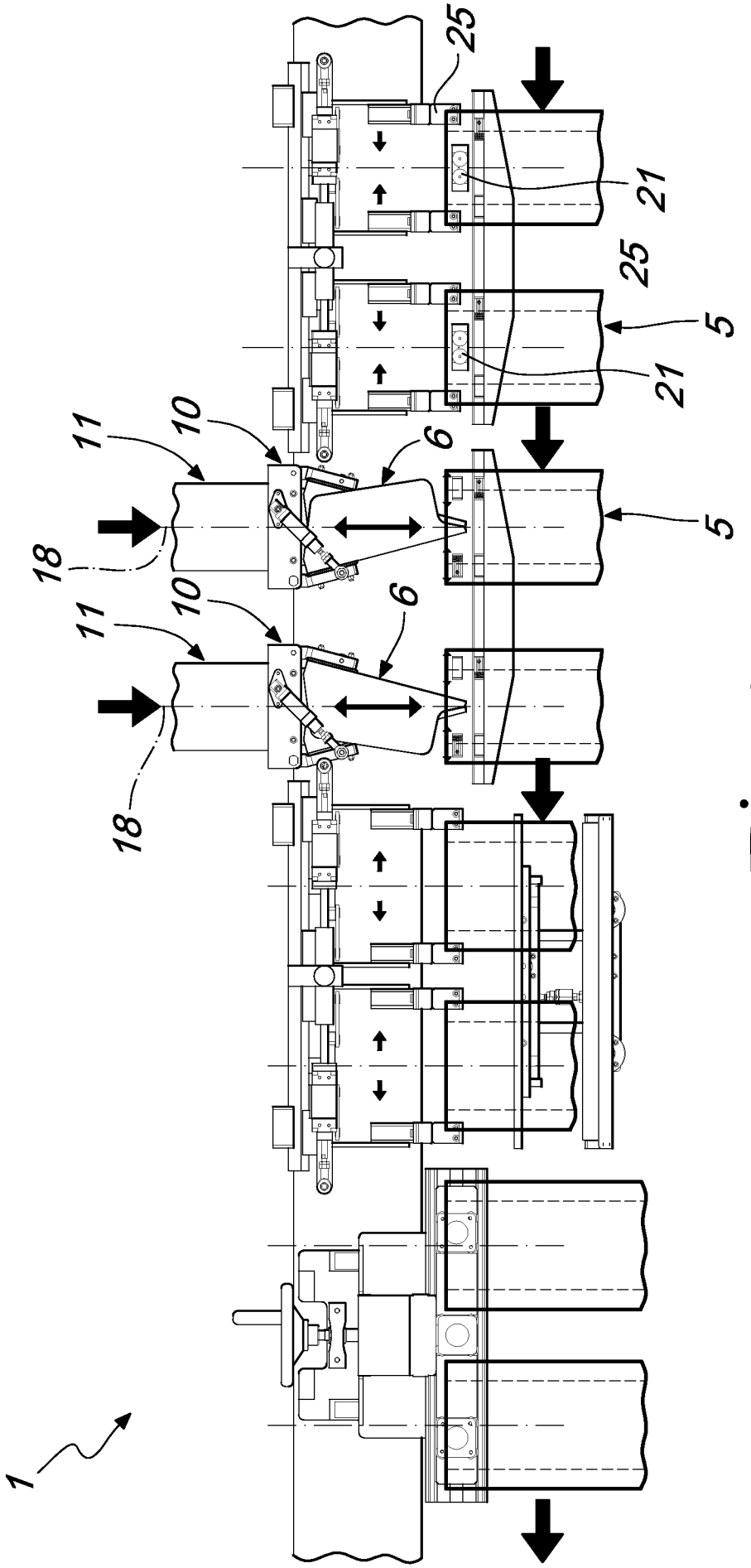

Fig. 1

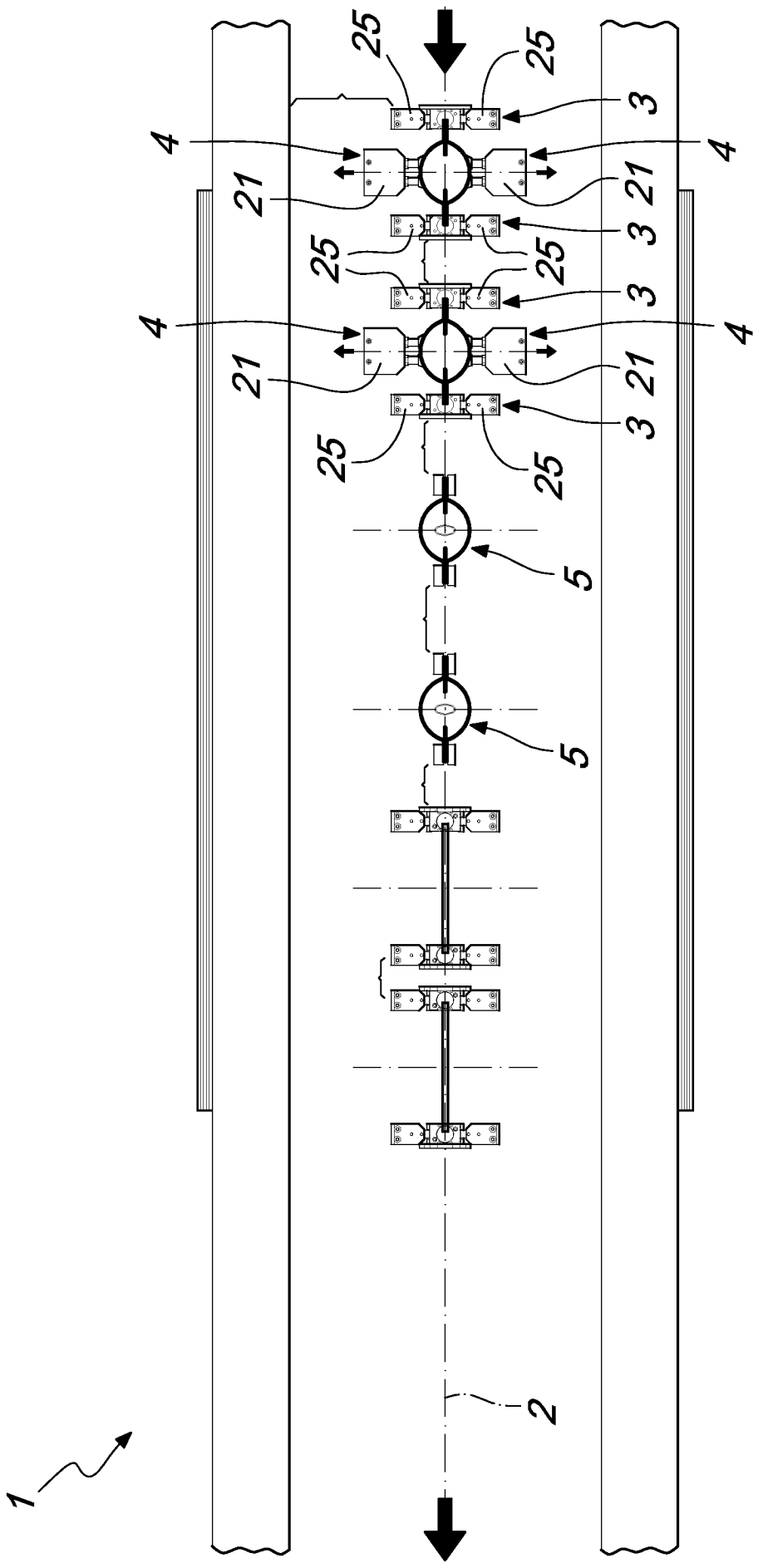

Fig. 2

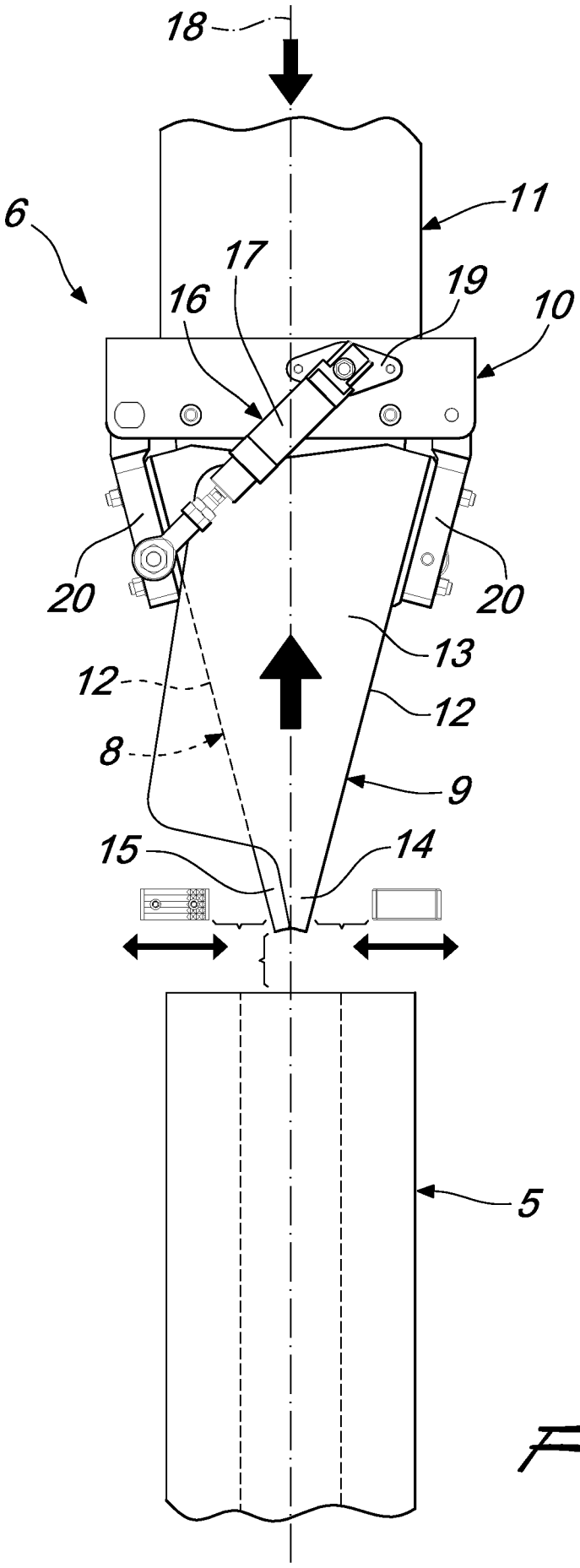

Fig. 3

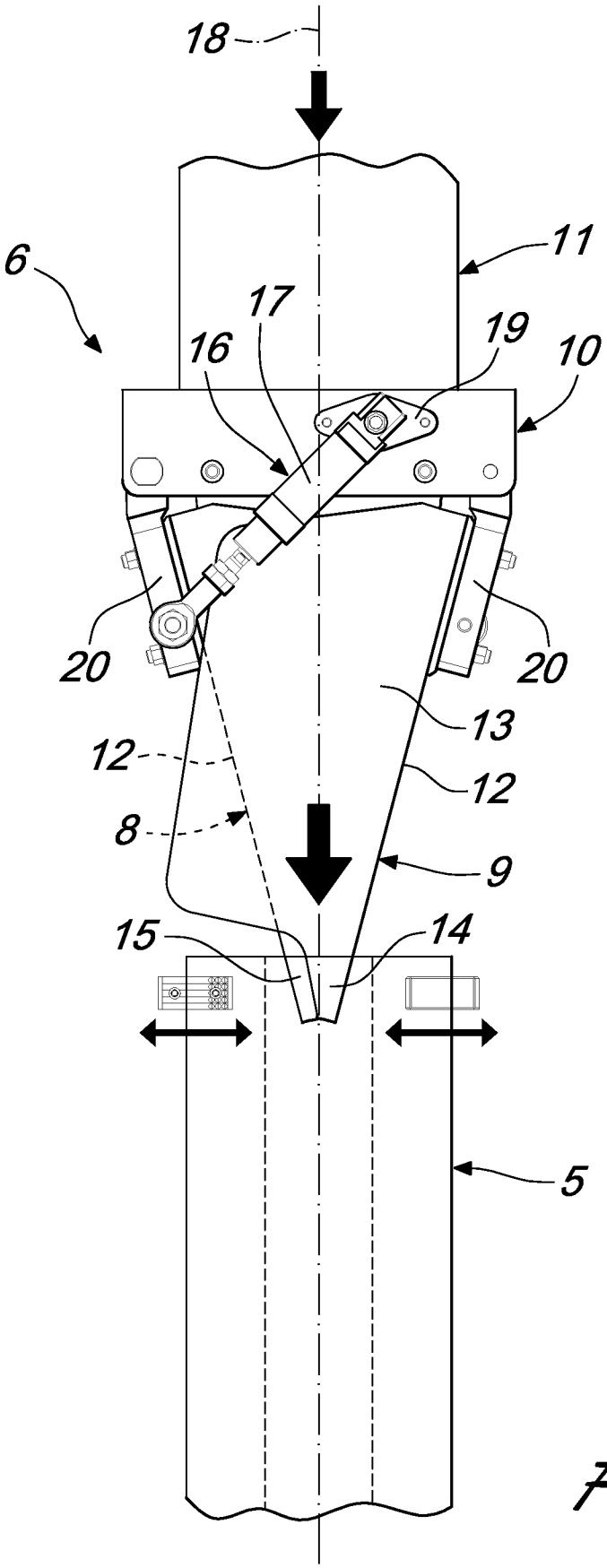

Fig. 4

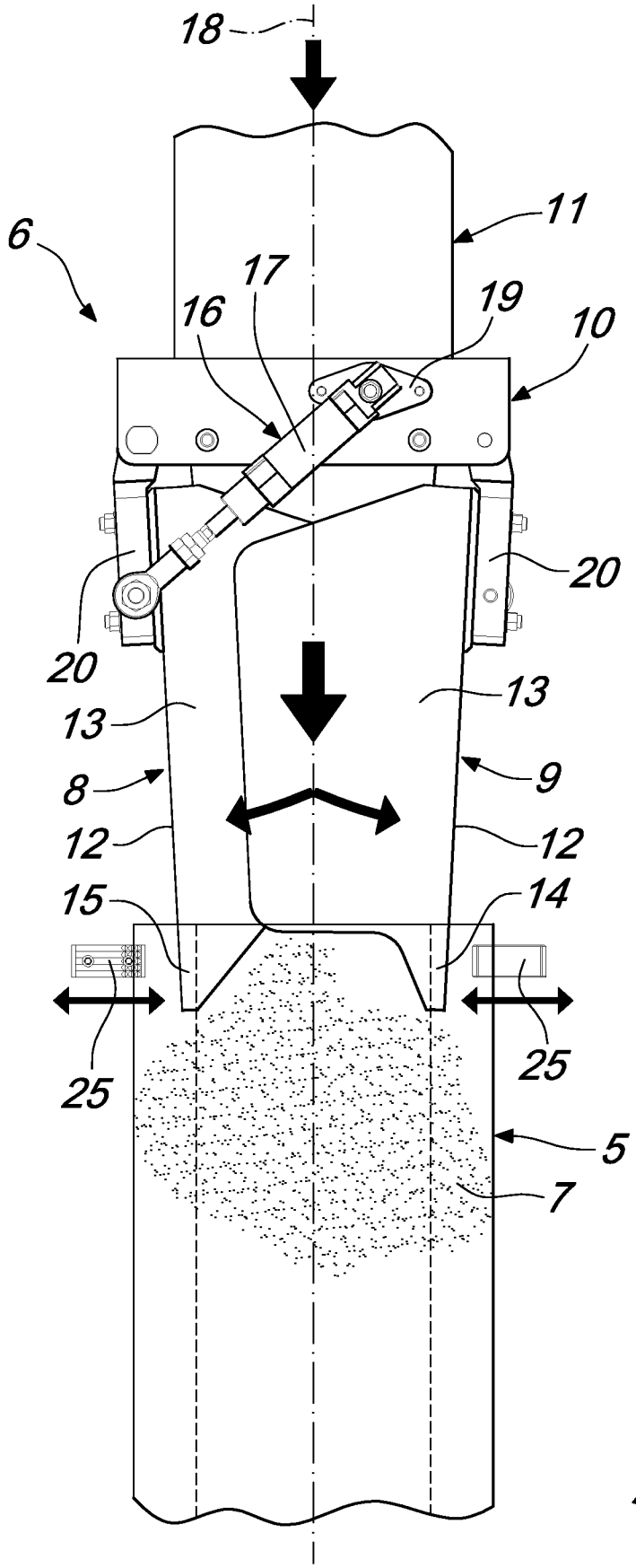

Fig. 5

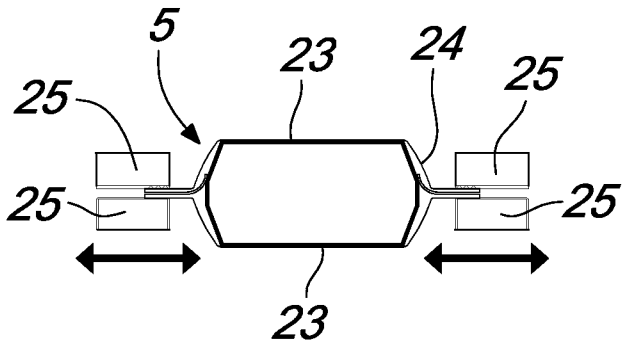

Fig. 6

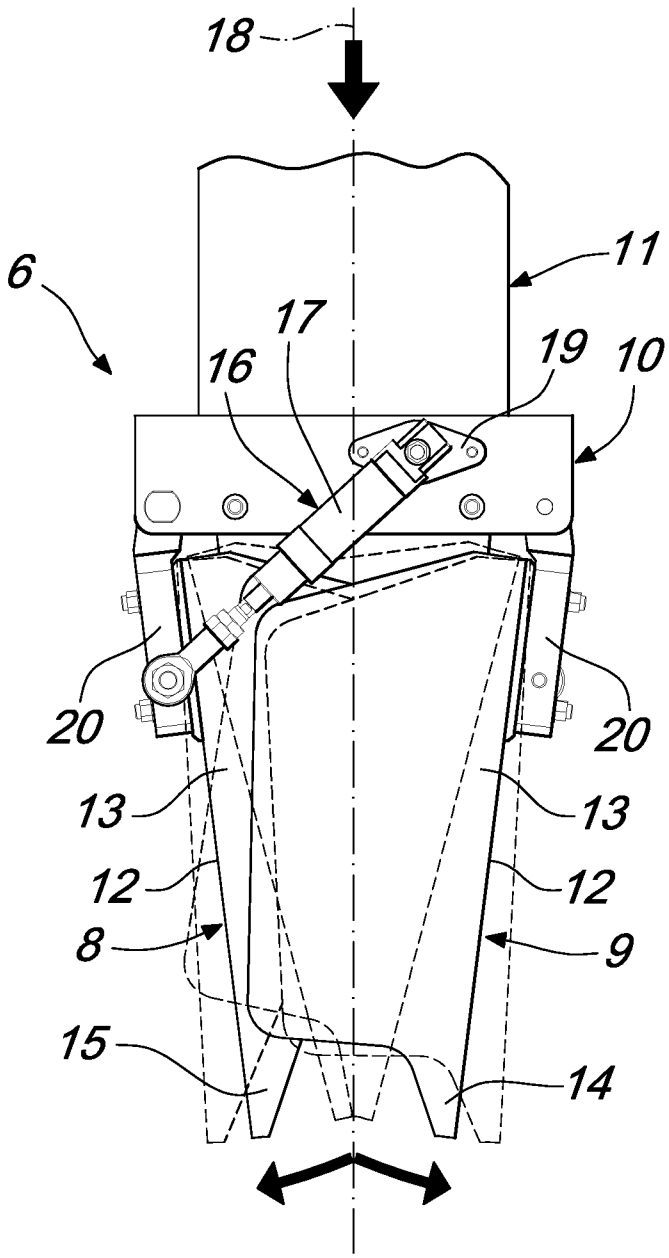

Fig. 7

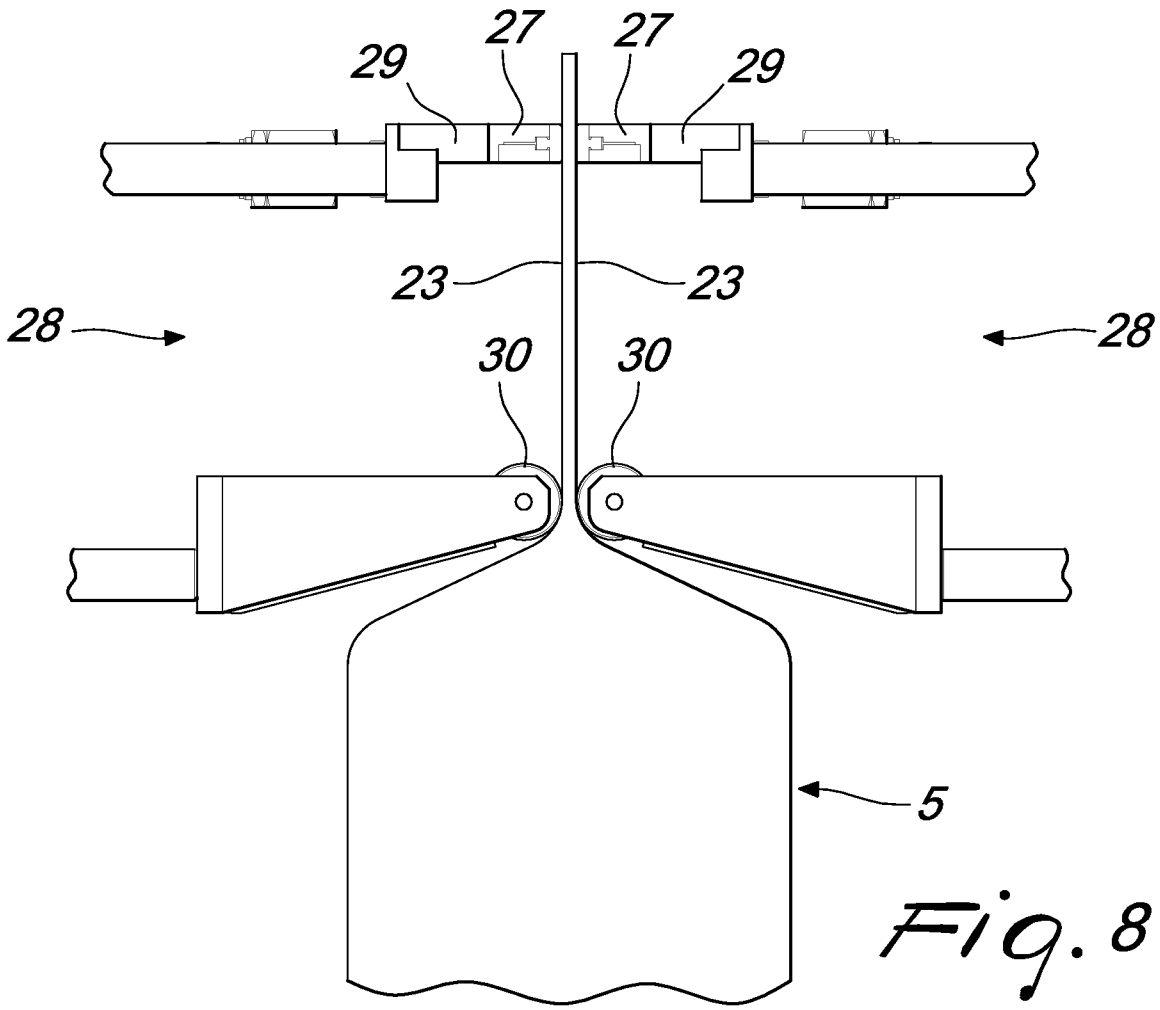

Fig. 8

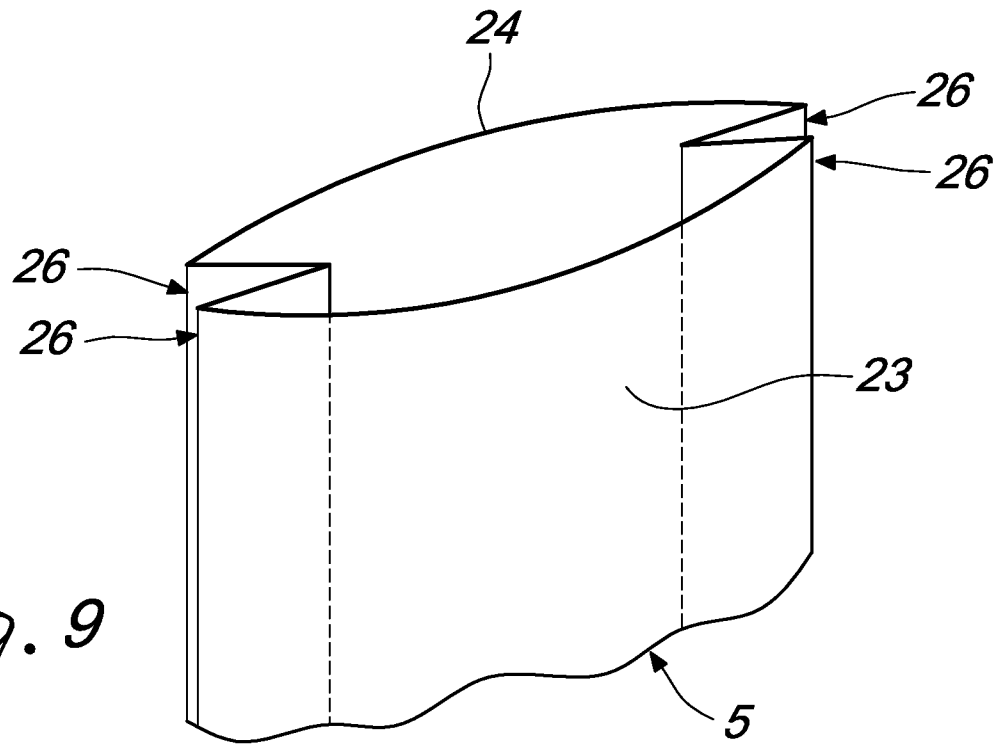

Fig. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/060009

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65B39/02 B65B39/12 B65B43/46 B65B43/56 B65B1/06
ADD. B65B39/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	BE 515 333 A (BARTELT, H.L.) 6 August 1954 (1954-08-06) the whole document	1-4,6-14 5
X	FR 2 780 027 A1 (CIF [FR]) 24 December 1999 (1999-12-24) the whole document	1-10, 12-14
Y	EP 0 082 955 A2 (WINDMOELLER & HOELSCHER [DE]) 6 July 1983 (1983-07-06) figures 1-3	5

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 January 2014	10/02/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Dick, Birgit

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2013/060009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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