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(11) Publication number:

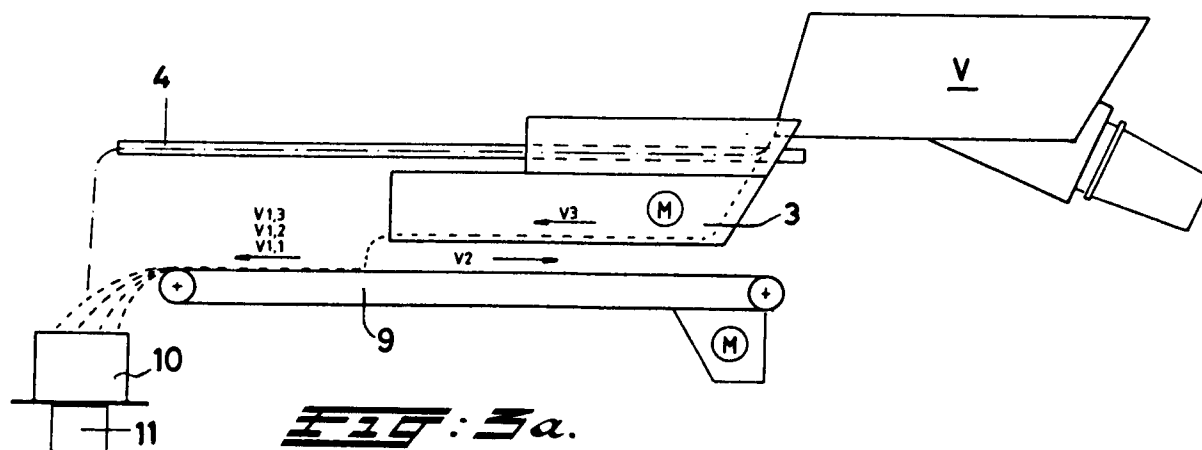
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EUROPEAN PATENT APPLICATION(21) Application number: **92201757.9**(51) Int. Cl.⁵: **B65B 19/34, B65B 1/34**(22) Date of filing: **15.06.92**(30) Priority: **17.06.91 NL 9101043**(43) Date of publication of application:
23.12.92 Bulletin 92/52(84) Designated Contracting States:
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NL-2280 GE Rijswijk(NL)(54) **Packaging device.**

(57) The invention relates to a device for continuous metering and delivering into packaging units (10) of products ready for use, such as screws, nuts, bolts etc. The device comprises a stock container (V), a conveyor system comprising at least two trough conveyors (3, 4) provided with vibrating elements, means (M) for regulating the speed of conveyance of the products to be metered, and means (11, 12) for weighing and metering the products. Connected to at least one trough conveyor (3, 4), the device is

provided with a buffer element which is preferably an endless belt (9). The buffer action of an endless belt (9) takes place through reversal of its direction of conveyance. The use of such a buffer element makes it possible to limit considerably the falling height of the products for metering, and thus to reduce the risk of damage, while the supply of products from the stock container (V) need not be interrupted at any stage at all.

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The invention relates to a device for continuous metering and delivering into packaging units of products ready for use, of the same shape and weight and of limited size, comprising a stock container, a conveyor system comprising at least two trough conveyors provided with vibrating elements, means for regulating the speed of conveyance of the products to be metered, and also means for metering by weighing and delivering the conveyed products into packaging units.

Such a device is known in various forms, and is used for packing products such as screws, nuts, bolts, nails, washers etc. made from ferrous or non-ferrous metals or from plastics into small packaging units.

More particularly, the known device comprises a conveyor system, comprising two or three trough conveyors which are set in vibration independently of each other by means of electromagnetic vibrators. The width of the trough conveyors present can vary between 80/150/200/250/300 and 400 mm, and depends on the weight per volume to be metered within a certain weight range.

For the abovementioned trough widths, weight ranges of the products of 10 - 500 g, 50 - 3500 g, 100 - 6000 g, 500 - 10,000 g, 5000 - 25,000 g and 10,000 - 35,000 g respectively are normally used. The weight range in question is, however, partly determined by the weighing system present.

According to a first variant of such a device, the products to be packed are transferred from the stock container to trough conveyors, of which at least one trough is used for coarse metering and weighing of, for example, about 80% of the total quantity of products to be metered by weighing, while at least one other trough conveyor, which is placed parallel to the first trough conveyor, and is also supplied from the stock container, is used for accurate metering of the required remaining quantity.

The speed of the products to be conveyed can be varied in the trough conveyors if desired.

The desired quantity to be delivered into the packaging unit is metered from the trough conveyors into a weighing pan fitted on a weighing system. When the required weight is reached, the contents of said weighing pan are metered in their entirety into the packaging unit.

The disadvantage of such a device lies in the fact that the required quantity of the products to be metered is collected in the weighing pan and discharged in its entirety out of this weighing pan into the packaging unit. The falling height of the products is considerable here, with the result that the risk of damage to, for example, the screw thread of fixing materials to be metered is great.

Besides, this known device operates discontinuously: when the required weight has been largely

reached by means of the coarse stream, the supply thereof is stopped, and material is then supplied only by means of the fine stream from the trough conveyor placed parallel to the trough conveyor for the coarse stream. This fine stream usually provides approximately 10 - 20% of the quantity to be metered after stopping of the supply from the coarse stream. The product stream capacity in the supply system therefore falls considerably already during this fine stream, while on reaching the required quantity in the weighing pan it has fallen right down to zero.

In order to some extent to overcome stagnation of the supply stream, a device is known in which the supply system is the same as that of the device described above, but in which the weighing system is made double, i.e. a first weighing pan in which the coarse weighing is carried out, for example up to about 85%, and a weighing pan into which the difference from the desired weight is metered, in this case about 15%. During the fine stream the product stream capacity does not fall, because the first weighing pan can be refilled in the overlap time. The product stream is stopped only when the outlet of the first weighing pan is opened, in order to ensure that products do not fall between the pan lids.

The disadvantage of this device with two weighing pans is, however, that the falling height of the products from the weighing pan to the packaging unit has increased: namely from the first weighing pan to the second weighing pan, and then to the packaging unit.

A device of the type described in the preamble has now been found, by which a higher metering capacity per unit time can be obtained, with an acceptable falling height of the products to be metered.

The device according to the invention is characterised in that the device connected to at least one trough conveyor is provided with a buffer element.

Providing a buffer element in the present invention makes it possible to maintain a high metering capacity, through the fact that fluctuations resulting from changing the packaging units are eliminated by this buffer element.

The buffer element is preferably a horizontal buffer element. This horizontal buffering makes it possible to place the packaging units a short distance from the outlet of the buffer element, with the result that the falling height of the products to be metered and delivered can be limited considerably compared with the known devices described above.

In a particularly expedient embodiment the buffer element is an endless belt.

The use of an endless belt makes a continuous

metering process from the metering system possible. The buffering action of an endless belt takes place through changing of its conveying speed.

The endless belt is more particularly provided with means for reversing the direction of conveyance of the belt. Reversing the direction of conveyance means that - of course, depending on the supply speed of products and on the speed of conveyance of the belt - the part of the belt lying behind the supply point is used as a storage area. Such a horizontal buffering has the advantage that the exact number of products deposited on the belt is known.

This reversal of the direction of conveyance of the endless belt takes place, of course, during changing of the packaging units to be filled. After placing of a new packaging unit to be filled, the direction of conveyance of the endless belt is reversed again, so that the products deposited on the belt, including those which were deposited during the buffering stage, can be delivered to the packaging unit.

The use of a horizontal buffer element therefore makes continuous and essentially constant supply of products from a stock container possible.

For certain products to be metered and delivered into a packaging unit, it is desirable for the products all to be delivered in the same position. For such applications the device is provided with product position influencing devices. These product position influencing devices expediently comprise a directing magnet. A directing magnet makes it possible to meter magnetisable products parallel to each other into a packaging unit.

The invention will be explained in greater detail below with reference to a drawing, in which:

Fig. 1 shows schematically a known one-pan metering device;

Fig. 2 shows schematically the same device as that shown in Fig. 1, but with two weighing pans;

Fig. 3a shows in longitudinal section a first embodiment of a device according to the invention, and Fig. 3b gives a top view thereof;

Figs. 4a, 4b show a second embodiment of a device according to the invention, also in longitudinal section and top view respectively;

Figs. 5a, 5b show schematically a device according to the invention provided with a directing magnet.

Fig. 1 shows schematically a device of a known type for metering and delivering into packaging units, such as boxes etc., of products which are ready for use.

More particularly, this known device comprises in succession a stock container V, two vibrating troughs 1, 2, a vibrating trough 3 for coarse metering of the material to be metered and, parallel thereto, a vibrating trough 4 for fine metering of the

material to be metered, a weighing pan 6 connected to a weighing system 5, and a packaging unit 7, for example a box.

This device works as follows:

From a schematically shown stock container V the products to be metered and packed, for example screws, nuts or bolts and the like, are delivered to a conveyor system which in the device shown here comprises two trough conveyors 1, 2 which are provided with (electro-magnetic) vibrators. On discharge from the second trough conveyor 2, a substantial part of the product stream is conveyed to vibrating trough 3, and a (smaller) part to vibrating trough 4. The required weight is metered by means of the coarse stream from vibrating trough 3 (approx. 85%) and the fine stream from vibrating trough 4 (approx. 15%) into a weighing pan 6 (the weighing is recorded here by weighing cell 5). This weighing pan 6 is opened when the required weight has been reached, and the total quantity of weighed product is discharged into box 7. Due to the fact that the falling height of the products is considerable, the chance of damage to, for example, the screw thread is great during metering of fixing materials.

Besides, as the required weight is approached, the supply by way of the coarse stream is ended, and material is supplied to the weighing pan only by means of the fine stream. This means that the product stream capacity in the supply system falls during the fine stream.

Fig. 2 shows a variant of the device shown in Fig. 1, which more particularly comprises a double weighing of the quantity of products to be metered, i.e. a weighing pan 6 in which the weighing of the larger quantity takes place, for example approximately 90% of the required total weight, which weighing pan is supplied by vibrating trough 3. The weighing of the quantity present in weighing pan 6 takes place by means of weighing

cell 5a. In addition to weighing pan 6, a weighing pan 7 is present (placed below weighing pan 6 in Fig. 2), which is supplied with the quantity metered into weighing pan 6, after metering has taken place into weighing pan 7 with the fine stream coming out of vibrating trough 4, by weighing with weighing cell 5b. By means of this system the coarse stream is therefore weighed in weighing pan 6, the difference from the desired weight (for example, approximately 10%) is metered into weighing pan 7, the desired total quantity is weighed out in weighing pan 7 by discharging the contents of weighing pan 6 into weighing pan 7, and the total weight quantity is discharged into packaging unit 8.

The advantage of such a system is that during the fine stream the product stream capacity does not fall, because the first weighing pan is filled

roughly in the overlap period. Only when the first weighing pan is opened does the product stream capacity fall to zero, in order to prevent products from falling between the pan lids.

The disadvantage is, however, that the falling height of the products has increased; from vibrating trough 3 into weighing pan 6, from weighing pan 6 to weighing pan 7, and from weighing pan 7 to packaging unit 8.

Figs. 3a and 3b show schematically a device according to the invention. Essential in the invention is the presence of the buffer element connected to at least one trough conveyor. In the present case this buffer element comprises a conveyor belt 9 which is provided with means for making the belt run forwards or backwards (these means are shown schematically by M). Conveyor belt 9 is placed directly below the outlet of vibrating trough 3 of the coarse stream. From conveyor belt 9 the product is metered directly into the packaging unit 10 placed on weighing cell 11.

When the required weight has been approximately reached by the coarse stream in the packaging unit 10, the conveyor belt 9 is reversed, and the product is deposited on the belt and therefore stored. During this time the desired weight is obtained by means of metering via the fine stream 4. When the fine metering is completed, the pack 10 is changed, and conveyor belt 9 is reversed again. The product buffered on the belt is then metered preferably at 3 different speeds of the conveyor belt into the packaging unit 10. These speeds are selected depending on the quantity of product present on the belt, which quantity can be one, two or three layers, due to the buffering.

The device shown here makes it possible to obtain a higher metering capacity per unit time, with a low falling height of the products to be metered. This device is suitable in particular when the buffering time of the coarse stream is shorter than the fine stream and pack changing time, i.e. for large portions from about 15 - 25 kg. The advantage of the present invention is that the product stream in the vibrating trough supply system is constant, and need not be interrupted.

Figs. 4a and 4b show a different embodiment of the device according to the invention shown in Figs. 3a and 3b, the difference being that the quantity of product supplied by vibrating trough 4 for the fine stream is weighed by weighing cell 12. The buffering on belt 9 then takes place only during the pack change, it being assumed that the fine stream time is shorter than the coarse stream time.

Finally, Figs. 5a and 5b show the same device as that shown in Figs. 4a and 4b, but provided with a directing magnet 14 in order to meter products parallel to each other through magnetism into pack-

aging unit 10 during the coarse metering from buffer belt 9, and thus to exert a product position influence. At the end of coarse metering, which is carried out by means of weighing with weighing cell 11, packaging unit 10 is moved to the position of packaging unit 13, and supplementing to the desired weight from the fine stream takes place.

Of course, there is no point in using a directing magnet other than for magnetisable materials; other means which influence the position of the products to be metered in the packaging unit can, however, also be used.

It can be seen from the embodiments of the device according to the invention shown in Figs. 3, 4 and 5 that the use of a buffer element, and in particular a horizontal buffer element, has the following advantages:

- low falling height;
- the filling position can be influenced in one plane through regulation of the speed of conveyance of the buffer belt, as a result of which a trajectory can be created;
- low overall height;
- high metering capacity;
- low dynamic weighing cell load;
- continuous metering process from the metering system.

Claims

1. Device for continuous metering and delivering into packaging units (10) of products ready for use, of the same shape and weight and of limited size, comprising a stock container (V), a conveyor system comprising at least two trough conveyors (3, 4) provided with vibrating elements, means (M) for regulating the speed of conveyance of the products to be metered, and also means (11, 12) for metering by weighing and delivering the conveyed products into packaging units (10), characterised in that the device connected to at least one trough conveyor (3, 4) is provided with a buffer element.
2. Device according to claim 1, characterised in that the buffer element is a horizontal buffer element.
3. Device according to claim 1 or 2, characterised in that the buffer element is an endless belt (9).
4. Device according to claim 3, characterised in that the endless belt (9) is provided with means (M) for reversing the direction of conveyance.

5. Device according to claims 1 - 4, characterised in that the device is also provided with product position influencing means.
6. Device according to claim 5, characterised in that the product position influencing means comprise a directing magnet (14).

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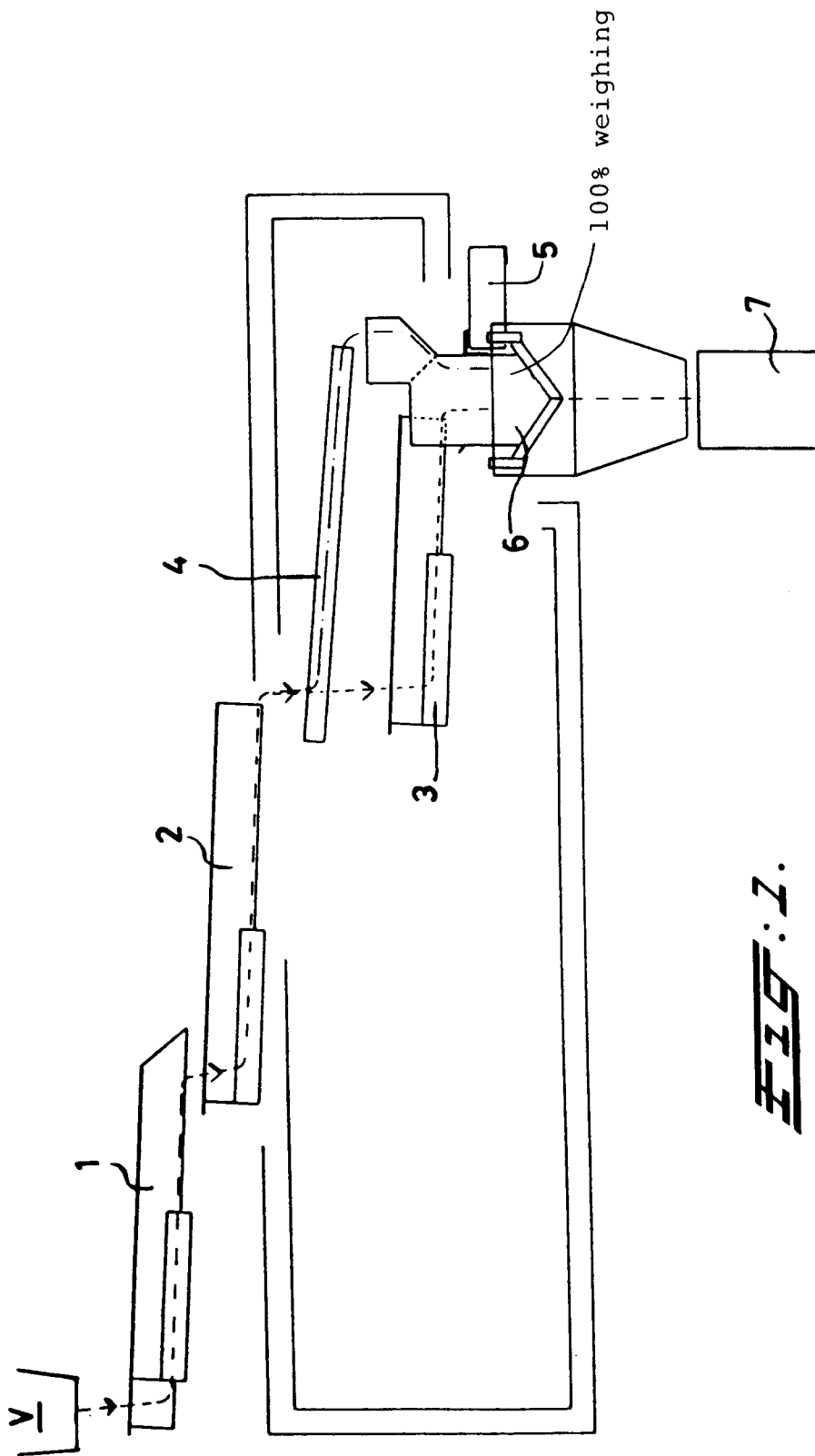
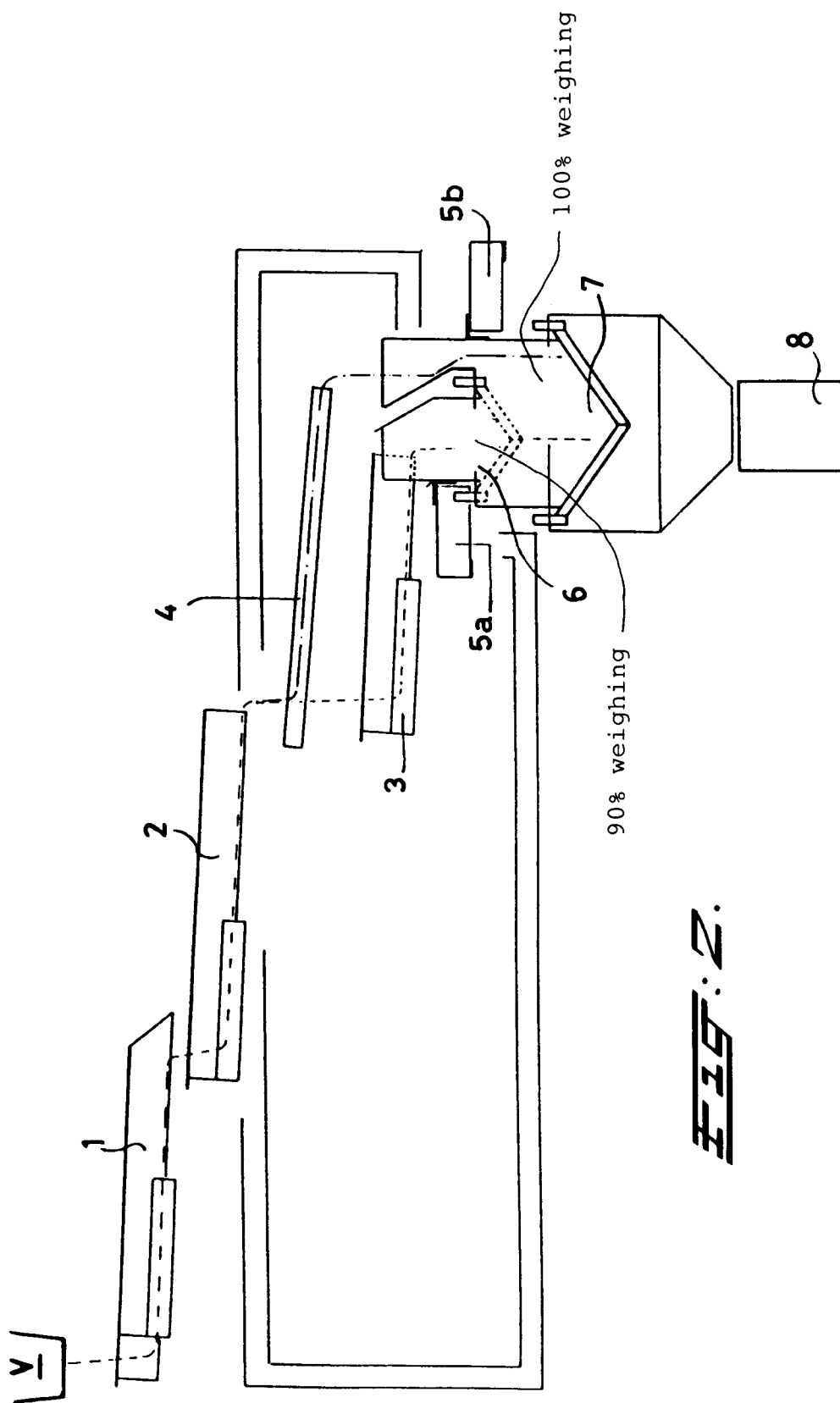
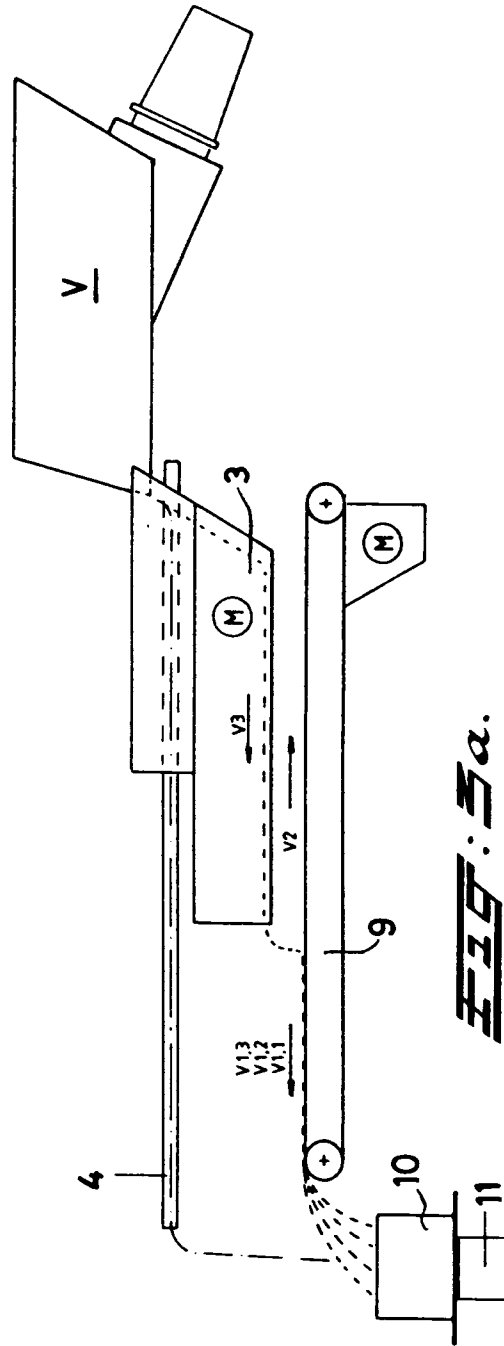
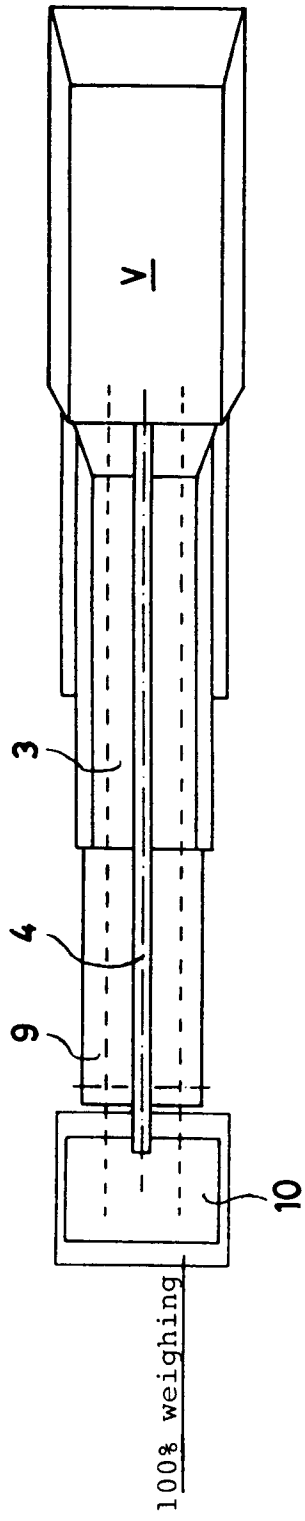
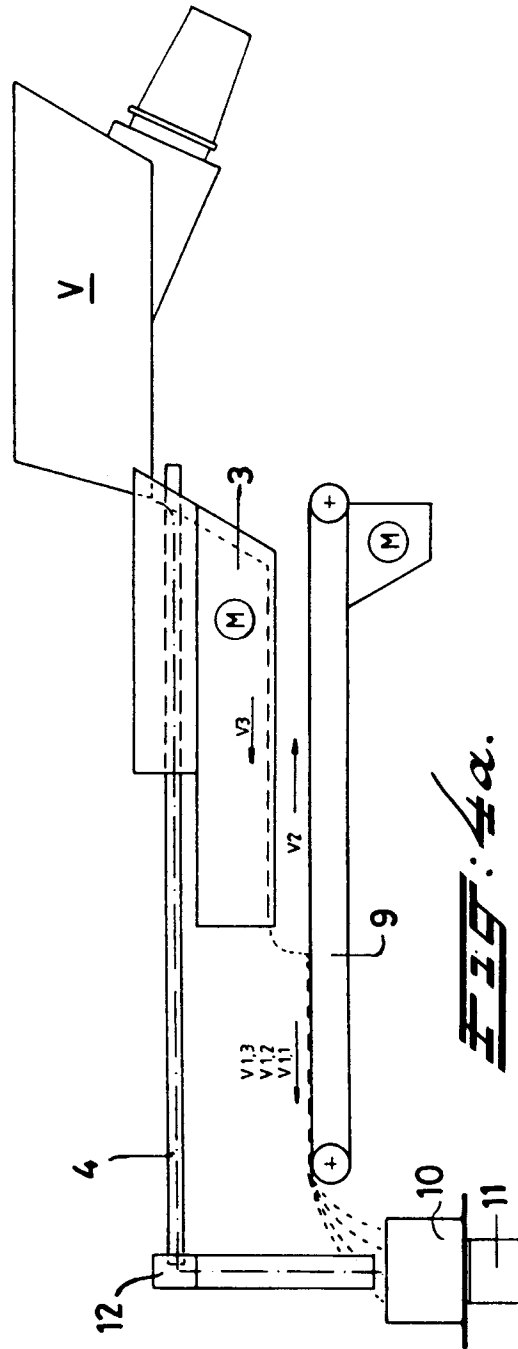
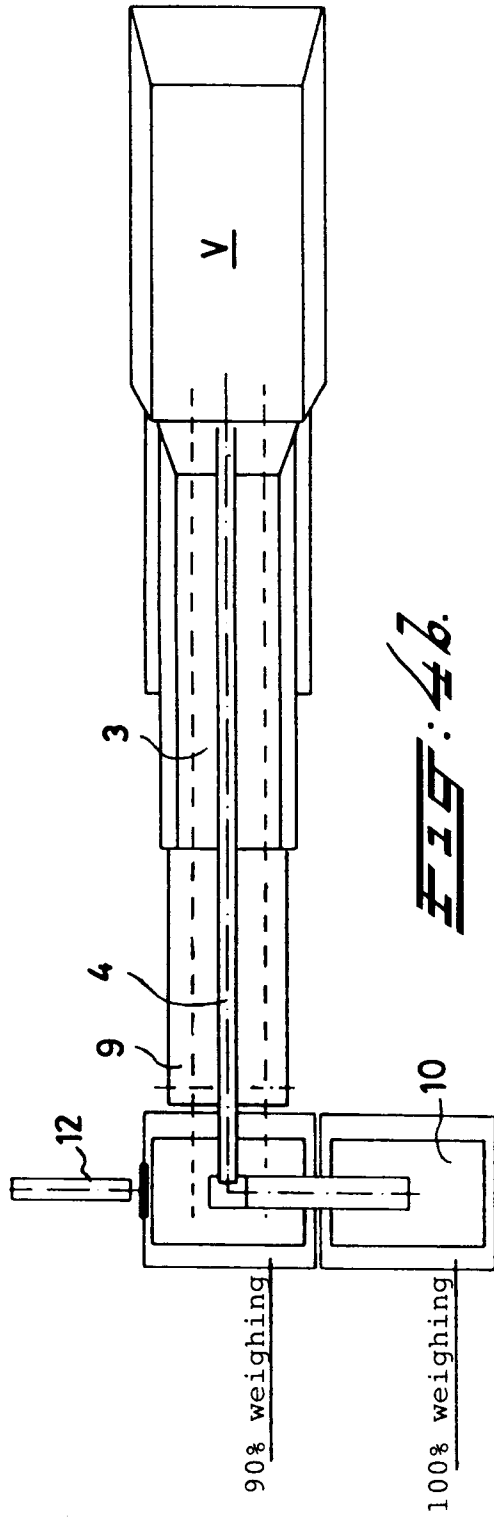
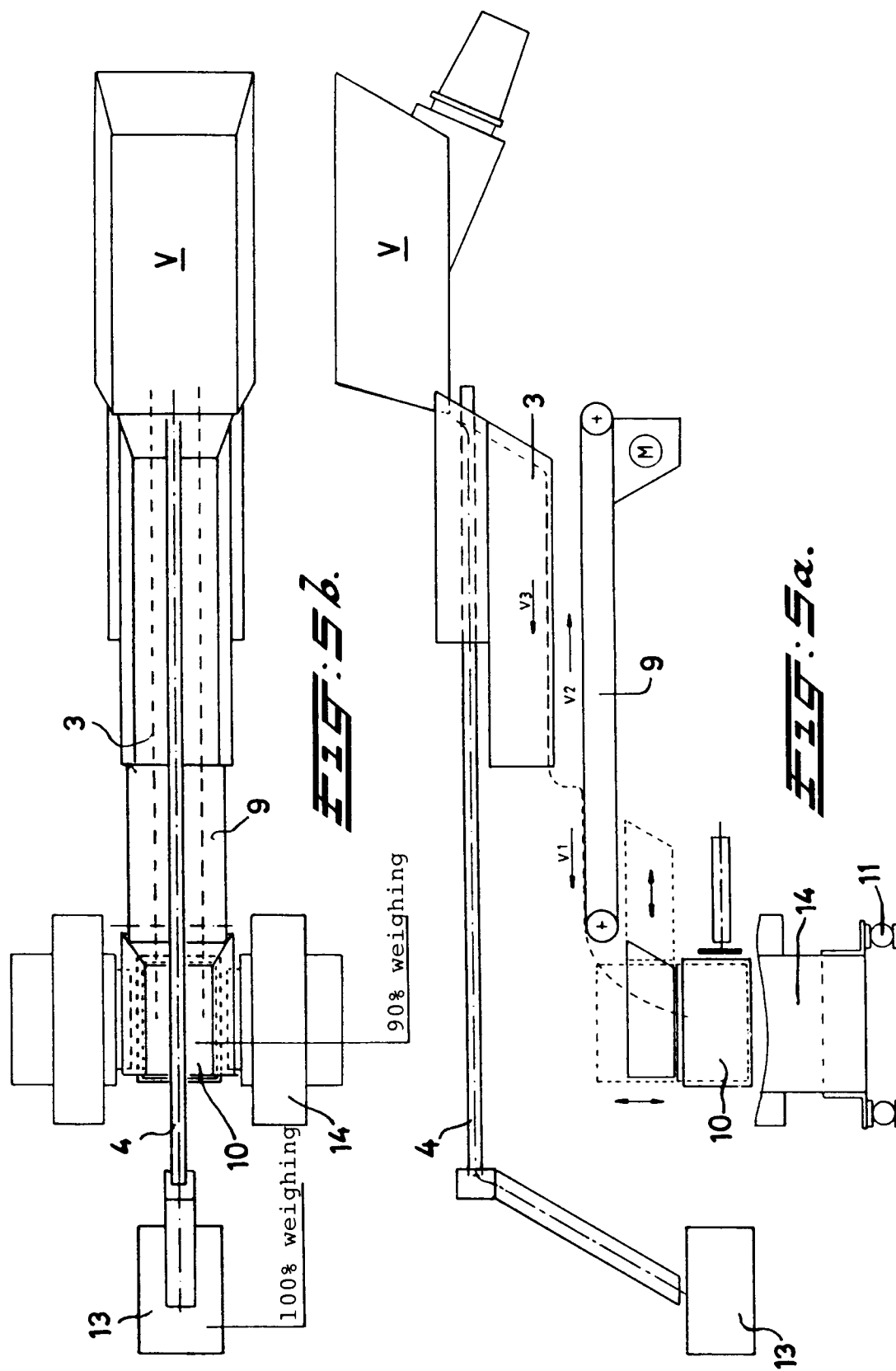


Fig. 1.











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EUROPEAN SEARCH REPORT

Application Number

EP 92 20 1757

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-C-607 458 (E. QUESTER) * page 2, line 64 - line 106; figures *	1,2,3	B65B19/34 B65B1/34
Y	---	4,5,6	
X	US-A-3 416 619 (S. MCCLUSKY) * column 3, line 31 - column 5, line 18; figures *	1	
X	GB-A-772 677 (PACKAGE MACHINERY) * page 2, line 5 - page 3, line 15; figures *	1,2	
Y	FR-A-2 390 334 (G. GILLENKIRCH) * page 2, line 15 - page 3, line 6; figures *	4	
Y	FR-A-1 512 411 (E. DAMOND) * page 2, column 1, line 30 - column 2, line 31; figures *	5,6	
A	DE-A-3 708 078 (ROVEMA) ---		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-2 614 786 (L. CARON) -----		B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 SEPTEMBER 1992	Examiner JAGUSIAK A.H.G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			