



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.12.2003 Bulletin 2003/49

(51) Int Cl.7: **B65B 63/02**, B65B 25/14,
B65B 11/10

(21) Application number: **03425339.3**

(22) Date of filing: **26.05.2003**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR**
Designated Extension States:
AL LT LV MK

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(30) Priority: **27.05.2002 IT BO20020323**

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(54) **Method and device for obtaining packs of compressed rolls**

(57) The method for obtaining packs of compressed rolls (2) involves feeding a set of rolls (2), positioned side by side with parallel axes, to a receiving station (R) formed by an elevator part (3) and then compressing said set of rolls (2), positioned at the receiving station

(R), in a direction perpendicular to their axis. The elevator part (3) then lifts the set of rolls (2), kept compressed, so that they strike a sheet (10) of packaging material and so that the compressed rolls (2) and the sheet (10) partially wrapped over them are transferred into a hopper (4).

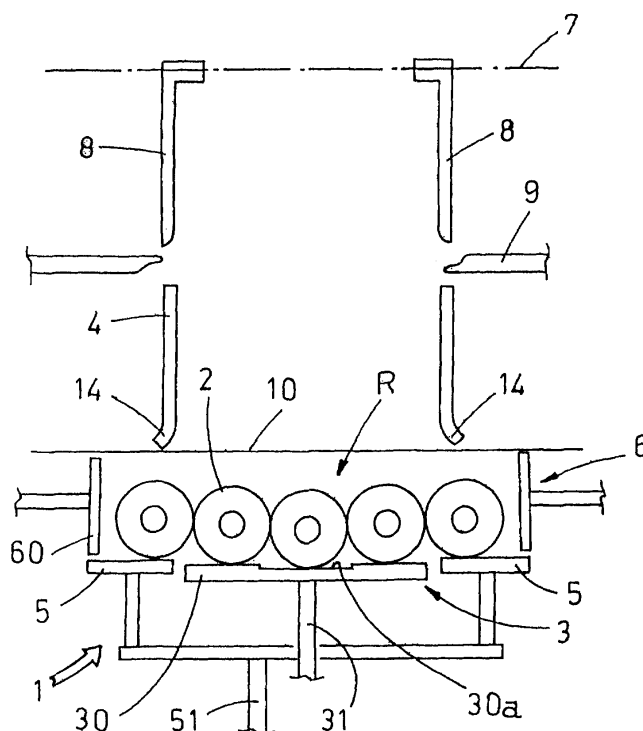


FIG.1

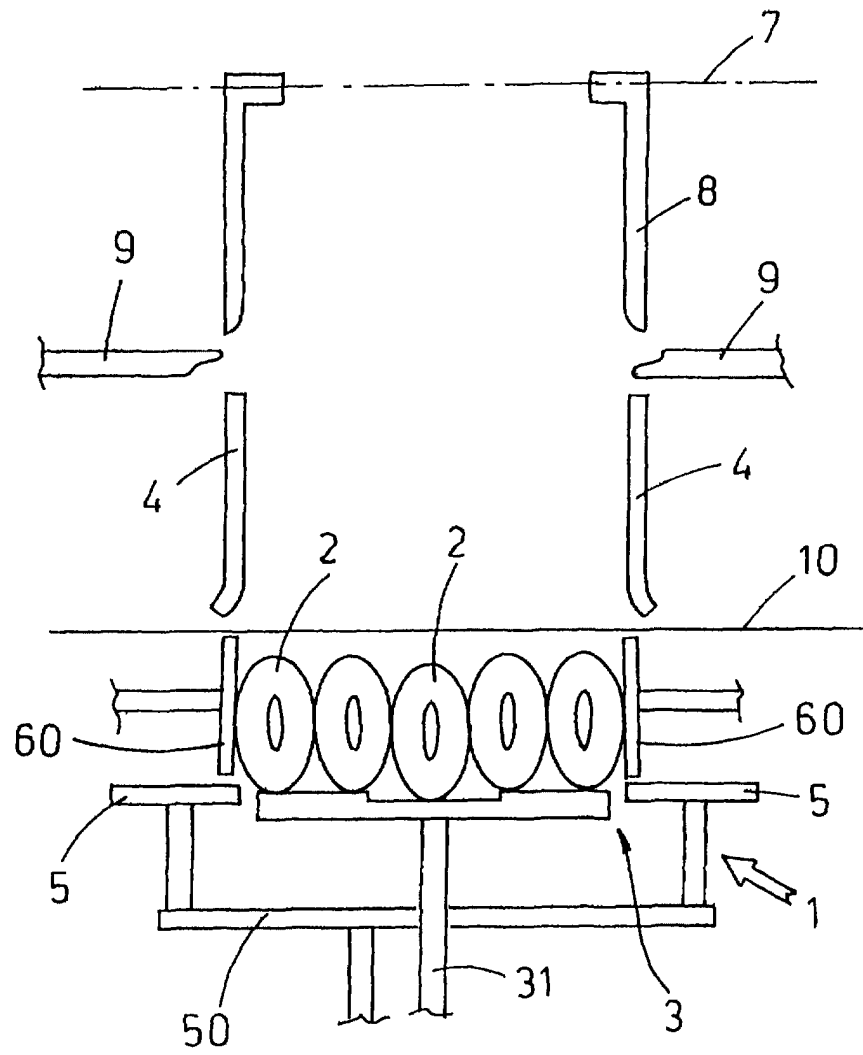


FIG. 2

Description

[0001] The present invention relates to a method for obtaining packs of rolls compressed in a direction perpendicular to their axis and a device for implementing the method.

[0002] In the sector for packaging items having the shape of cylindrical rolls, for example, toilet paper, the need for compressing such rolls in a direction perpendicular to their axis in order to produce packs of such rolls is known. The packs of compressed rolls are packaged in a wrapper consisting of a sheet of material such as cellophane.

[0003] The cylindrical rolls exit the production line lying on a horizontal axis, aligned with the direction of feed of the line, in two or more parallel rows. At the outfeed of said line, suitable pusher means intercept the rolls forming the batch to be packaged in a single pack, that is to say, a set of rolls positioned side by side in the parallel rows, and feed the rolls forward to separate them from the next batch. Such pusher means consist, for example, of a bar transversal to the line, driven by suitable conveyor means.

[0004] The batches of rolls to be packaged are transferred by the pusher means to an elevator part, which moves the rolls, gathered in a pack, upwards into a sort of hopper. During the upward movement, the rolls intercept a sheet of packaging material, for example cellophane, which is partially wrapped around them. Suitable folder means, operating in conjunction with pick up means for the pack of rolls, then complete the wrapping of the sheet of cellophane around the rolls. The pack is then completed by sealing the flaps of the sheet of cellophane closed.

[0005] At present the rolls to be packaged are compressed upstream of the elevator part which causes the sheet of cellophane to be wrapped around the pack.

[0006] More precisely, such compression normally takes place at the outfeed zone of the production line, during a step before formation of the pack to be packaged.

[0007] The above-mentioned compression of the rolls to be packaged, performed upstream of the elevator part action zone, is currently a particularly critical step and is the source of significant disadvantages.

[0008] The rolls are pressed on both sides in a direction perpendicular to the axis, so that, during the transfer step towards the elevator part, they rest on a narrow longitudinal portion. Therefore, during said transfer step the rolls assume an unstable position and must be held in said position by special guide means. However, compressed roll feed is difficult.

[0009] Another disadvantage is the fact that during the transfer to the elevator part, at the moment when the guide means release the compressed rolls, the latter partially recover their original shape, which must then be compensated, for example using mobile walls or similar devices.

[0010] In addition to obvious construction and functional complexity, said known solution involves noticeable disadvantages when changing the size of the items to be packaged. This requires the substitution of various mechanical parts and a series of adjustments consequently involving manpower and loss of productivity.

[0011] The aim of the present invention is to overcome the above-mentioned disadvantage by providing a method which allows packs of compressed rolls to be obtained in the optimum way, in particular avoiding complex steps of feeding the compressed rolls before packaging.

[0012] Another aim of the invention is to provide a method which prevents the compressed rolls from recovering their original shape during the packaging steps.

[0013] Yet another aim of the invention is to provide a device which allows the production of packs of compressed rolls according to the method disclosed, having a structure with simple design and reliable and versatile operation, in particular allowing easy size changeovers.

[0014] The above-mentioned aims are fulfilled as described in the claims.

[0015] The features of the invention will now be described with reference to the accompanying drawings, in which:

- Figure 1 is a schematic side view of the device for obtaining packs of compressed rolls using the method according to the present invention;
- Figures 2 and 3 illustrate the same side view of the device in successive operating steps of the method according to the present invention.

[0016] With reference to the figures, the numeral 1 denotes as a whole a device for obtaining packs of compressed rolls 2.

[0017] The cylindrical rolls 2, fed out of the production line, are fed to a receiving station R formed by an elevator part 3 designed to move the rolls 2 upwards, to insert them in a suitably calibrated hopper 4. The elevator part 3 is designed to receive a set of cylindrical rolls 2 positioned side by side with the axes parallel.

[0018] The elevator part 3 consists of a plate 30 connected to the rod 31 of actuator means which move vertically, not illustrated in the drawings.

[0019] The plate 30 preferably has a lowered central zone 30a.

[0020] The plate 30 is contained between a pair of outer panels 5, positioned in a horizontal plane. The panels 5 are supported by a frame 50 connected to the rod 51 of actuator means which move vertically, not illustrated, designed to adjust the operating position of the panels 5 according to the size of the rolls 2 to be packaged.

[0021] It should be noticed that in the home condition, that is to say the position in which they receive the rolls 2 to be packaged, the plate 30 and the outer panels 5

are at different heights to one another, according to a curved profile with the concave part facing upwards, to which the lowered zone 30a contributes. In practice, the roll 2 on the lowered zone 30a of the plate 30 is positioned at a level slightly lower than the rolls on the side zones of the plate 30, which in turn are positioned at a level slightly lower than the rolls on the outer panels 5 (see Figure 1).

[0022] Obviously, said curved profile may be created using a set of independent plates driven by respective actuator parts which move vertically.

[0023] At the elevator part 3 there is a compactor part 6 designed to compress the set of rolls 2 in a direction perpendicular to their axis. The compactor part 6 consists of a pair of opposite blades 60, designed to be driven by relative actuator means, not illustrated, in the above-mentioned direction perpendicular to the axis of the rolls 2. In practice, the blades 60 move above the panels 5 of the elevator part 3.

[0024] It should be noticed that the blades 60 are slightly angled, so that they converge upwards, forming a component of the thrust for compression of the rolls 2 directed downwards.

[0025] Below the hopper 4 a sheet 10 of packaging material, for example cellophane, is stretched, designed to be struck by the set of rolls 2 moved vertically by the elevator part 3.

[0026] The bottom of the hopper 4 has an opening 14 designed to facilitate the insertion in the hopper of the compressed rolls 2 and the sheet 10 of cellophane partially wrapped over them.

[0027] Above the hopper 4 a conveyor line, for example of the chain type, moves with a stepping motion, schematically illustrated in the drawing with a dashed line 7, having a set of prongs 8. The prongs 8 are designed to pick up the pack of compressed rolls 2, partially wrapped in the sheet 10 of cellophane in the known way, to start them on their way to the further packaging steps.

[0028] Folder means 9 are designed to operate in conjunction with the prongs 8, the folder means designed to fold the flaps of the sheet 10 of cellophane under the pack of rolls 2.

[0029] The method disclosed for obtaining packs of compressed rolls therefore involves feeding a set of cylindrical rolls 2 positioned side by side with the axes parallel into the receiving station R, to the elevator part 3.

[0030] The cylindrical rolls 2 are positioned in such a way that they rest on the plate 30 and on the outer panels 5 of the elevator part 3.

[0031] It should be noticed that the rolls 2 are positioned with the parallel axes distributed at different heights, according to the curved profile with the concave part facing upwards, formed by the plate with the lowered central zone 30a and the panels 5 outside the elevator part 3 (Figure 1).

[0032] A command then is then issued to drive the opposite blades 60 of the compactor part 6, in a direction

perpendicular to the axis of the rolls 2. The blades 60 compress the set of rolls 2, positioned at the receiving station R (Figure 2).

[0033] The positioning of the rolls 2 in the above-mentioned concave profile has the function of preventing, during the compression step, the possible escape of one or more of the rolls 2 from the pack from above, due to the side thrust. This is also contributed to by the reciprocal angle of the blades 60, which forms a component of the thrust for compression of the rolls 2 directed downwards, so as to push the rolls 2 towards the plate 30 of the elevator part.

[0034] The compression of the set of rolls 2 is continued until the blades 60 are substantially aligned with the walls of the hopper 4. In this configuration the blades 60 form a downward continuation of the hopper, guiding the subsequent movement of the compressed rolls 2.

[0035] A command is then issued to drive the plate 30, which lifts the compressed rolls 2 into the hopper 4. During this lifting, the compressed rolls 2 strike the sheet 10 of cellophane which is partially wrapped around them (Figure 3).

[0036] It should be noticed that the plate 30 is narrower than the pack of compressed rolls 2, whose width is determined by the width of the hopper 4, so as to avoid interference.

[0037] At the end of the lifting step, the compressed rolls 2 are inserted between the prongs 8 of the conveyor line 7, stationary above the hopper 4, which lift the pack of compressed rolls 2 in the known way to start them on their way to the further packaging steps. In suitable steps, the folder means 9 tuck the flaps of the sheet 10 of cellophane around the pack.

[0038] The method and device described fulfil the aim of obtaining optimum packaging of the compressed rolls, thanks in particular to the innovative solution by which the pack of rolls is compressed at the station R which receives the rolls, by the elevator part 3 which then wraps them with the sheet 10 of cellophane.

[0039] This allows complex compressed roll feed steps to be avoided, as well as the consequent need for guide means which would maintain the compressed configuration, before proceeding with packaging.

[0040] One advantage of the present invention is that the compressed rolls 2 do not recover their original shape. The rolls 2 are compressed at an elevator part 3 receiving station R located at the base of the hopper 4 then moved directly into the hopper 4.

[0041] During lifting of the compressed rolls 2 by the plate 30 the blades 60 of the compactor part 6 basically constitute a continuation of the hopper 4 walls, therefore, the compressed rolls 2 cannot recover their original shape.

[0042] All of this simplifies the size change-over of the rolls to be packaged, which does not require the substitution of mechanical parts or complex adjustments.

[0043] It should be noticed that this result is obtained by means of a device with a structure which has a simple

design, with reliable and versatile operation.

[0044] It will be understood that the above description of the invention is supplied by way of example and in a non-restricting way, therefore any alternative embodiments do not depart from the scope of the inventive concept, as described above and in the claims herein.

Claims

1. A method for obtaining packs of compressed rolls, **characterised in that** it comprises the steps of

- feeding a set of rolls (2) to be packaged in a pack, positioned side by side with parallel axes, to a receiving station (R) formed by an elevator part (3);
- compressing the set of rolls (2), positioned at the receiving station (R), in a direction perpendicular to their axis;
- the elevator part (3) lifting the set of rolls (2), kept compressed, so that it strikes a sheet (10) of packaging material and transferring the compressed rolls (2) and the sheet (10) of packaging material partially wrapped over them into a hopper (4).

2. The method according to claim 1, **characterised in that** the set of rolls (2) is positioned on the elevator part (3), at the receiving station (R), with the parallel axes at different heights to one another, according to a curved profile with the concave part facing upwards.

3. The method according to claim 1, **characterised in that** the set of rolls (2) is compressed by opposite compactor means (60), reciprocally angled so that they converge upwards, forming a component of the thrust for compressing the rolls (2) directed downwards.

4. The method according to claim 1, **characterised in that** the set of rolls (2) is compressed by compactor means (60) until the compactor means (60) are substantially aligned with the hopper (4) walls.

5. A device for obtaining packs of compressed rolls, **characterised in that** it comprises an elevator part (3) designed to form a station (R) for receiving a set of rolls (2) to be packaged in a pack, the rolls positioned side by side with parallel axes; compactor means (60) designed to compress the set of rolls (2), positioned at the receiving station (R), in a direction perpendicular to their axis; a hopper (4) positioned above the receiving station (R), into which the elevator part (3) is designed to transfer the compressed rolls (2).

6. The device according to claim 5, **characterised in that** the elevator part (3) consists of a plate (30) connected to actuator means which move vertically, having a lowered central zone (30a) forming a supporting surface for the rolls (2) curved according to a profile with the concave part facing upwards.

7. The device according to claim 6, **characterised in that** at the receiving station (R) the elevator part (3) plate (30) is contained between a pair of outer panels (5), positioned in a horizontal plane and contributing to the formation of the curved profile with the concave part facing upwards.

8. The device according to claim 5, **characterised in that** the compactor means (60) consist of a pair of opposite blades reciprocally angled so as to converge upwards, forming a component of the thrust for compression of the rolls (2) directed downwards.

9. The device according to claim 5, **characterised in that** the compactor means (60) are designed to be positioned substantially in alignment with the hopper (4) walls at the end of the roll (2) compression step.

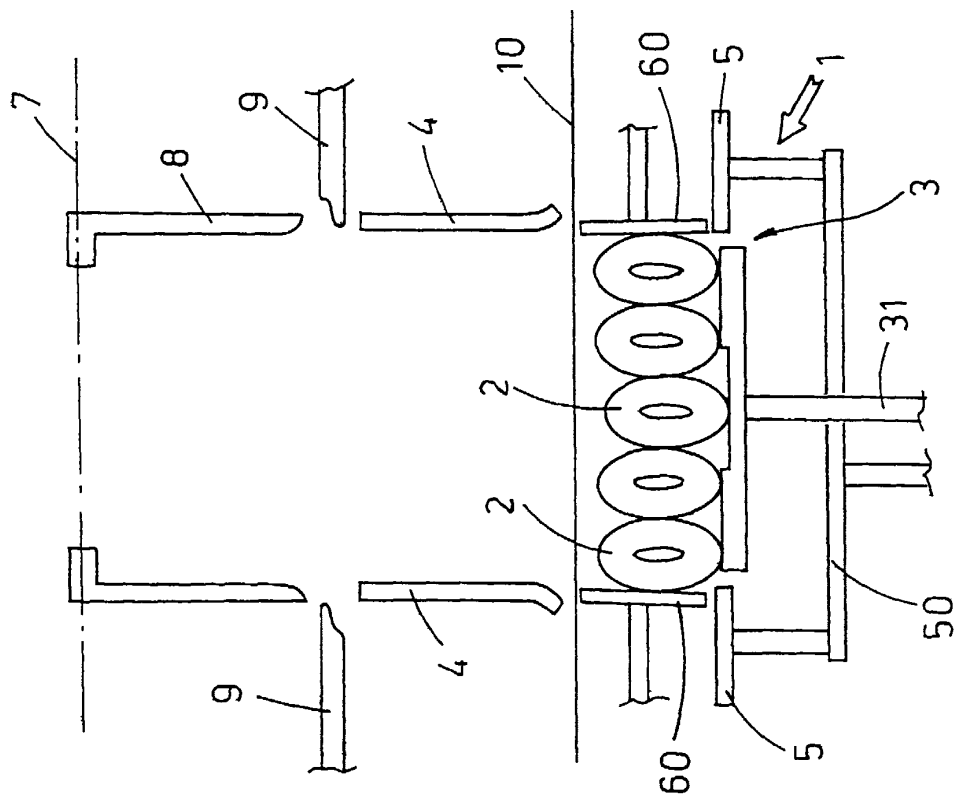


FIG. 2

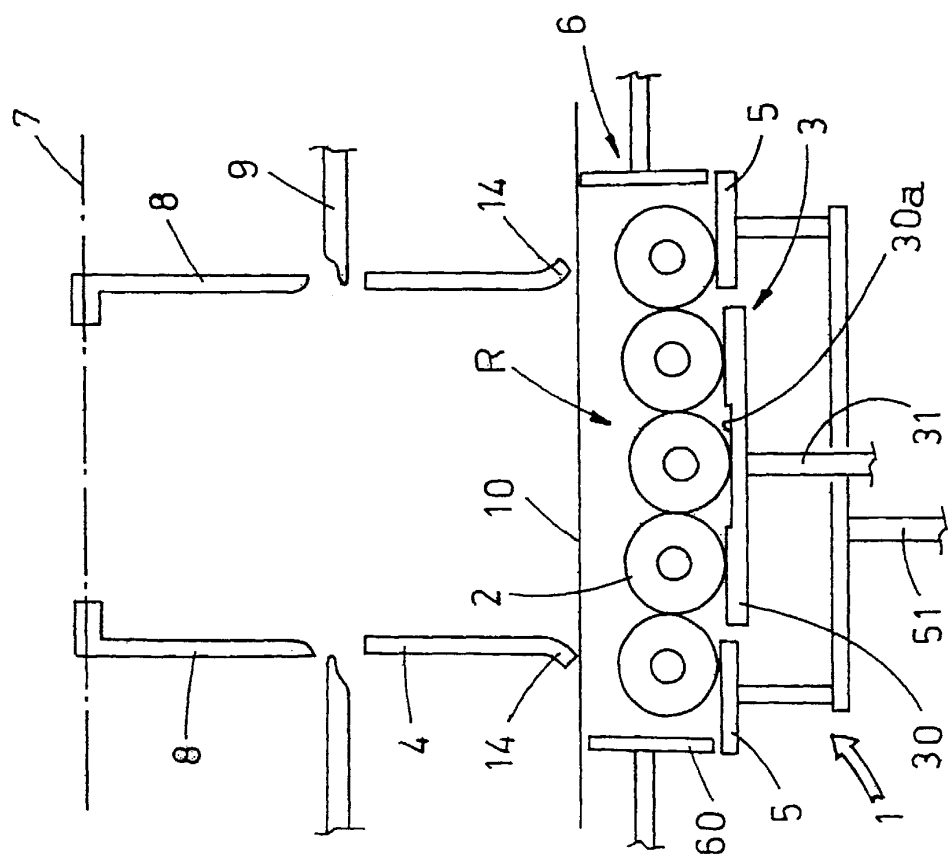


FIG. 1

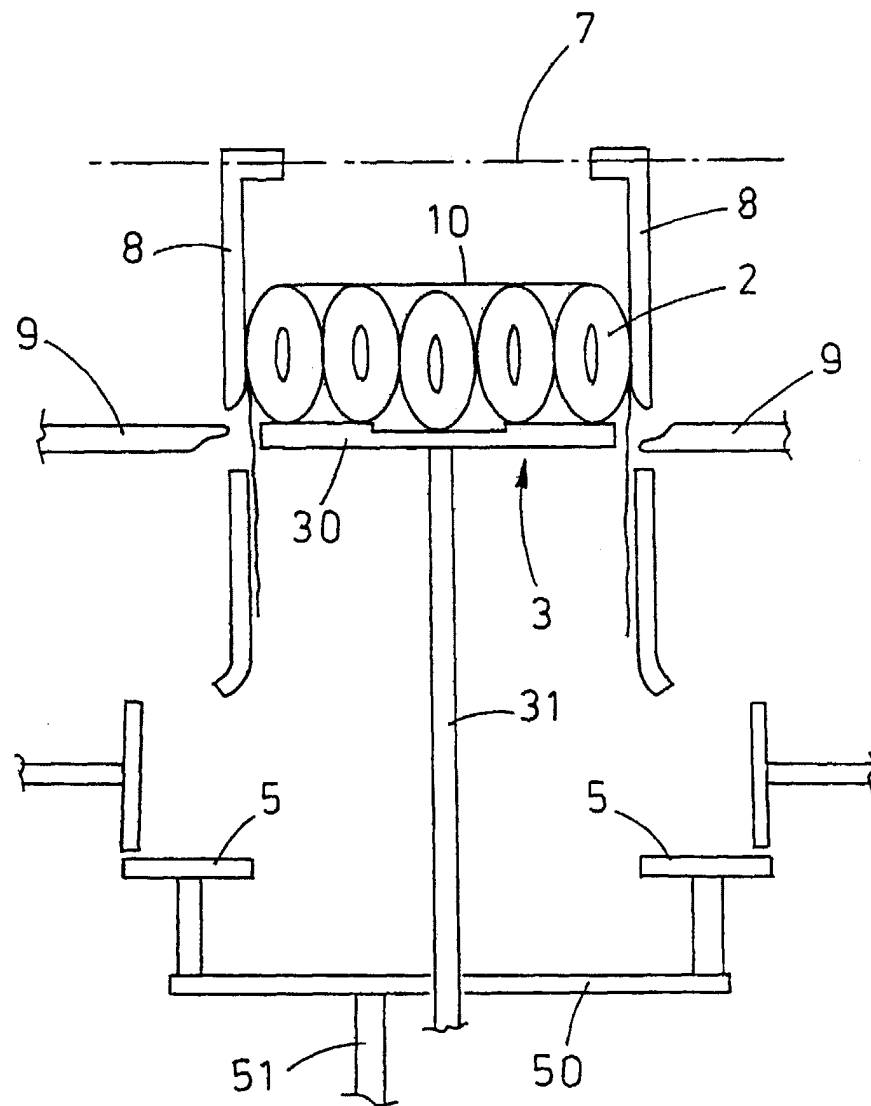


FIG. 3



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 42 5339

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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B65B
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 3 September 2003	Examiner Farizon, P
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			

EPO FORM 1503 03 82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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