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(54) **A CLEANING UNIT FOR CLEANING PACKS IN A PACKAGING MACHINE, A PACKAGING MACHINE AND A METHOD FOR PRODUCING PACKAGES**

(57) The invention relates to a cleaning unit (3) for cleaning packs (6) in a packaging machine (1). The cleaning unit (3) comprises a guiding track (7) for guiding said packs (6) in said packaging machine (1), and at least one fluid emitting element (8) arranged in connection with said guiding track (7). The at least one fluid emitting el-

ement (8) is arranged to emit fluid onto said packs (6) travelling along said guiding track (7), so as to clean an outer surface of said packs (6). The invention also relates to a packaging machine (1) and a method for producing packages.

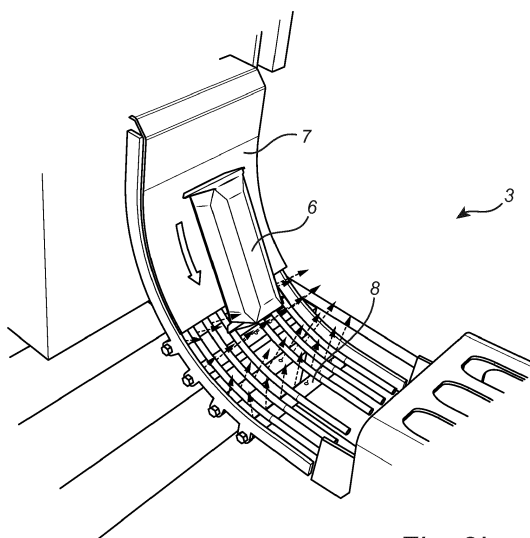


Fig. 2b

Description

Technical field

[0001] The invention relates to a cleaning unit for cleaning packs in a packaging machine, a packaging machine and a method for producing packages.

Background art

[0002] As is known, many food products, such as fruit juice, pasteurized or UHT (ultra-high-temperature treated) milk, wine, tomato sauce, etc., are sold in packages made of sterilized packaging material.

[0003] A typical example of this type of package is the parallelepiped-shaped package for liquid or pourable food products known as Tetra Brik Aseptic (registered trademark), which is made by folding and sealing laminated sheet packaging material.

[0004] The packaging material has a multilayer structure substantially comprising a base layer for stiffness and strength, which may comprise a layer of fibrous material, e.g. paper, or of mineral-filled polypropylene material; and a number of layers of heat-seal plastic material, e.g. polyethylene film, covering both sides of the base layer.

[0005] In the case of aseptic packages for long-storage products, such as UHT milk, the packaging material also comprises a layer of gas- and light-barrier material, e.g. aluminium foil or ethyl vinyl alcohol (EVOH), which is superimposed on a layer of heat-seal plastic material, and is in turn covered with another layer of heat-seal plastic material forming the inner face of the package eventually contacting the food product.

[0006] As is known, packages of this sort are produced on fully automatic packaging machines, on which a continuous tube is formed from the web-fed packaging material; the web of packaging material is sterilized on the packaging machine, e.g. by applying a chemical sterilizing agent, such as a hydrogen peroxide solution, which, once sterilization is completed, is removed from the surfaces of the packaging material, e.g. evaporated by heating; and the web of packaging material so sterilized is maintained in a closed, sterile environment, and is folded and sealed longitudinally to form a vertical tube.

[0007] The packaging machines comprise a forming unit, wherein the tube is filled continuously downwards with the sterilized or sterile-processed food product, and is sealed and then cut along equally spaced cross sections to form pillow packs, which are then fed to a folding unit to form the finished, e.g. substantially parallelepiped-shaped packages.

[0008] More specifically, the pillow packs substantially comprise a parallelepiped-shaped main portion; and a top end portion and a bottom end portion, opposite to each other and projecting laterally on opposite sides of the main portion and defining respective triangular end flaps to be folded onto the main portion.

[0009] A longitudinal sealing strip, formed when sealing the packaging material to form the vertical tube, extends along the pillow packs; and the top end portion and bottom end portion of each pillow pack have respective transverse sealing strips perpendicular to the longitudinal sealing strip and defining respective end flaps projecting from the top and bottom of the pack.

[0010] The top end portion and the bottom end portion of each pillow pack taper towards the main portion from the respective end flaps.

[0011] Folding units are known, substantially comprising a conveyor for feeding pillow packs along a forming path from a supply station to an output station, and a plurality of folding devices which cooperate with each pillow pack along the forming path to flatten the respective top end portion and bottom end portion of the pillow pack and so fold the respective end flaps onto the top end portion and bottom end portion.

[0012] The folding units comprise heating means arranged for heating the pillow packs and melting the plastic material forming the outer plastic layer of the pillow packs at the top end portion and bottom end portion.

[0013] In practice, the pillow packs are usually formed and sealed with their longitudinal axis arranged vertically.

The newly formed pillow packs are subsequently cut from the tube and let slide along a curved-profile chute so as to be brought from the vertical position to a substantially horizontal position, in which they are received by a feeding unit, arranged immediately downstream of the chute and which drives the pillow packs to the folding unit.

[0014] Once the pillow packs are cut from the tube, they move down to the chute and advance along the chute by gravity.

[0015] The feeding unit comprises two guides that extend between an inlet zone, where the packs coming from the chute are received, and an outlet zone, where the packs are delivered to the folding unit. The feeding unit further comprises a conveyor belt and a plurality of carriers projecting from the conveyor belt and arranged to interact with the packs to advance the packs along the guides.

[0016] When the web of packaging material is transported, folded, formed and cut residues of oil, food product, and other substances present in the packing machine and particles from the cutting process may stick to the parts forming the outer surface of the packs. The outer surfaces will thus not be completely clean. This is a problem, e.g. when, at a later stage, attaching an opening device to the packages made from the packs. The opening device may be fastened either to the normal laminated packaging material or to a Pre-Laminated Hole (PLH) of the packaging material of the packages. A Pre-Laminated Hole is a part of a laminated packaging material where some layers are omitted.

[0017] Opening devices are attached to the packages by heating and melting an outer polymer layer of the packaging material to adhere the opening device or the opening device is adhered by using glue. In that process it is

important that the surface of the package is clean so that the opening device attaches as intended to the surface. Particles, oil or other residues will cause problems for the fastening of opening devices.

[0018] When an opening device is eventually opened by a user the attached opening device will usually penetrate the packaging material, e.g. when the opening device is lifted or screwed off. The parts of the packaging material that are situated inside the opening device will then get in contact with the food. It is thus important for hygienic reasons that the outer surface of the packaging material where the opening device is intended to be placed is clean.

Summary of the invention

[0019] It is an object of the present invention to mitigate, alleviate or eliminate one or more of the above-identified deficiencies in the art and disadvantages singly or in any combination and solve at least the above mentioned problem.

[0020] According to a first aspect of the invention, these and other objects are achieved in full, or at least in part, by a cleaning unit for cleaning packs in a packaging machine. The cleaning unit comprises a guiding track for guiding the packs in the packaging machine, and at least one fluid emitting element arranged in connection with the guiding track. The at least one fluid emitting element is arranged to emit fluid onto the packs travelling along the guiding track, so as to clean an outer surface of the packs.

[0021] The inventive cleaning unit allows having a clean outer surface of the packs by removing any potential residues or other impurities from the outer surface by means of the fluid emitting element. In turn, the problems associated with adhesion in the final folding or in the application of opening devices is thus reduced or eliminated.

[0022] The at least one fluid emitting element is preferably fixedly arranged to the guiding track. Further, the at least one fluid emitting element may be arranged to emit fluid when being passed by the packs.

[0023] In one variant, the fluid emitting element emits a continuous flow of fluid.

[0024] In another variant, in order to avoid unnecessary waste of the fluid, the emitting process is preferably limited to when the packs is physically passing the fluid emitting element.

[0025] A fluid emitting direction of the at least one fluid emitting element may be inclined in relation to a guiding direction of the guiding track. Thus, the at least one fluid emitting element will be arranged to emit fluid onto a top portion of the packs. This is namely where the opening devices are normally attached after the final folding of the packs into packages.

[0026] In a preferred embodiment of the invention, the at least one fluid emitting element may comprise a nozzle and/or a sprinkle, and the guiding track may comprise a

drop chute and/or a conveyor. These are simple and cost efficient yet effective solutions for the invention.

[0027] In one embodiment of the invention, the at least one fluid emitting element ejects a continuous flow of fluid.

[0028] In another embodiment of the invention, the cleaning unit may further comprise a control unit connected to the at least one fluid emitting element and to a sensor arranged to detect the packs on the guiding track. The control unit is here arranged to control the at least one fluid emitting element based on information from the sensor. Such an arrangement will make the entire process automated and efficient.

[0029] In another embodiment of the invention, the cleaning unit may further comprise a switch connected to the at least one fluid emitting element and arranged to control the at least one fluid emitting element based on a mechanical engagement with the packs. Also this arrangement will make the cleaning process automated and efficient. However, no electronics will be required.

[0030] Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc.]" are to be interpreted openly as referring to at least one instance of the element, device, component, means, step, etc., unless explicitly stated otherwise.

Brief description of the drawings

[0031] The above objects, as well as additional objects, features and advantages of the present invention, will be more fully appreciated by reference to the following illustrative and non-limiting detailed description of preferred embodiments of the present invention, when taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a perspective view of a packaging machine according to an exemplary embodiment of one aspect of the invention;

Figure 2a is a perspective view of a cleaning unit according to an exemplary embodiment of another aspect of the invention;

Figure 2b is a perspective view of the cleaning unit during use.

Detailed description of preferred embodiments of the invention

[0032] Figure 1 illustrates a packaging machine 1 according to one exemplary embodiment of the invention. The packaging machine 1 comprises a forming unit 2, a cleaning unit 3, a feeding unit 4, and a folding unit 5. The forming unit 2 folds, fills and seals a packaging material to obtain pillow-shaped packs 6. In particular, the forming unit 2 produces the packs 6 from a tube of packaging material (not shown). The tube is formed in a known man-

ner by longitudinally folding and sealing a web of heat-seal sheet material that may comprise a base layer for stiffness and strength. The tube of packaging material is then filled with the food product, and is sealed and cut along equally spaced cross sections to form the packs 6.

[0033] The cleaning unit 3 is further illustrated in Figures 2a and 2b, and comprises a chute 7 interposed between the forming unit 2 and the feeding unit 4 which in turn feeds the packs 6 to the final folding unit 5. The cleaning unit 3 is arranged to clean the packs 6 in the packaging machine 1 before reaching the folding unit 5. The cleaning unit 3 comprises a plurality of nozzles 8 which are arranged along the chute 7 in order to emit a fluid, particularly water, onto the outer surface of the packs 6 when passing the nozzles 8.

[0034] In one embodiment, the nozzles 8 emit a continuous flow of fluid.

[0035] In another embodiment, the cleaning unit 3 has a control unit (not shown) which is connected to the nozzles 8 and to a sensor (not shown). The sensor is arranged to detect the packs 6 when passing the nozzles 8 on the chute 7. When the packs 6 are detected in the vicinity of the nozzle 8 they are sprayed with fluid so that the outer surface of the same are cleaned.

[0036] In another embodiment, the sensor described above is replaced with a mechanical switch that is connected to the nozzles and arranged to control the nozzles based on a mechanical engagement with the packs. Specifically, the nozzles are turn on to emit fluid onto the outer surface of the packs when the switch is turn on through mechanical engagement with the packs.

[0037] Owing to the fluid emitted by the nozzle 8, any possible residues or other impurities are removed from the outer surface of the packs 6. In turn, the problems associated with adhesion in the final folding or post application of opening devices is thus eliminated.

[0038] The nozzles 8 are preferably arranged to emit fluid in a direction that is inclined in relation to the travelling direction of the packs 6. Specifically, it is the top portion of the packs 6 that is the primary target in the cleaning process. The top portion of the pack 6 is intended to form the top portion of the final package obtained by folding the pack 6, i.e. the portion that will receive the opening device.

[0039] When the packs 6 have been cleaned by the cleaning unit 3 and have reached the end of the chute 7, the feeding unit 4 transports the packs to the folding unit 5. Here, the packs 6 are formed into packages (not shown). To form a package from a pack 6 the folding unit 5 folds (and attaches) the protruding flaps of the packs 6 to provide it with its final shape. As a final step, the package might be equipped with an opening device to be used when consuming the product present in the package. The attachment process of the opening device to the package is also sensitive to any impurities that might be present on the outer surface of the package. Thus, function of the cleaning unit 3 is relevant also in this regard.

[0040] In one embodiment of the invention, the packaging machine 1 further comprises a drying unit (not shown) arranged downstream of the cleaning unit 3 and upstream of the final folding unit 5. The drying unit is preferably arranged with heating elements to dry the outer surface of the packs 6 after being sprayed with water by the nozzles 8.

[0041] It is understood that other variations in the present invention are contemplated and in some instances, some features of the invention can be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly in a manner consistent with the scope of the invention.

[0042] For instance, in the packaging machine, all the different units described above are not necessary for the machine to operate functionally. In one embodiment, the packaging machine only includes the forming unit, the cleaning unit, and the folding unit. All of them are designed according to the structural and functional features described above.

[0043] Also, the forming unit, the feeding unit (if any) and the folding unit present in the packaging machine can have any suitable structural features and appearance as long as they can perform the functions required by the same (described more in detail above).

[0044] Further, the components included in the cleaning unit may be varied when it comes to size, shape and number. The at least one fluid emitting element is disclosed as four nozzles in the figures but could naturally be constituted by another number of nozzles or the like without departing from the scope of the invention.

[0045] The same applies to the guiding track which is described as a curved chute above. However, other embodiments are also possible, such as for example, a straight guiding track, a conveyor belt or the like.

Claims

1. A cleaning unit (3) for cleaning packs (6) in a packaging machine (1), comprising a guiding track (7) for guiding said packs (6) in said packaging machine (1), and at least one fluid emitting element (8) arranged in connection with said guiding track (7), wherein said at least one fluid emitting element (8) is arranged to emit fluid onto said packs (6) travelling along said guiding track (7), so as to clean an outer surface of said packs (6).
2. The cleaning unit (3) according to claim 1, wherein said at least one fluid emitting element (8) is fixedly arranged to said guiding track (7).
3. The cleaning unit (3) according to claim 1 or 2, wherein said at least one fluid emitting element (8) is arranged to emit fluid when being passed by said packs

- (6).
4. The cleaning unit (3) according to anyone of the preceding claims, wherein a fluid emitting direction of said at least one fluid emitting element (8) is inclined in relation to a guiding direction of said guiding track (7). 5
 5. The cleaning unit (3) according to anyone of the preceding claims, wherein said at least one fluid emitting element is arranged to emit fluid onto a portion of said packs. 10
 6. The cleaning unit (3) according to anyone of the preceding claims, wherein said at least one fluid emitting element (8) comprises a nozzle and/or a sprinkle. 15
 7. The cleaning unit (3) according to anyone of the preceding claims, wherein said guiding track (7) comprises a drop chute and/or a conveyor. 20
 8. The cleaning unit (3) according to anyone of the preceding claims, wherein said at least one fluid emitting element (8) emits a continuous flow of fluid. 25
 9. The cleaning unit (3) according to anyone of claims 1 to 8, and further comprising a control unit connected to said at least one fluid emitting element (8) and to a sensor arranged to detect said packs (6) on said guiding track (7), wherein said control unit is arranged to control said at least one fluid emitting element (8) based on information from said sensor. 30
 10. The cleaning unit (3) according to anyone of claims 1 to 8, and further comprising a switch connected to said at least one fluid emitting element (8) and arranged to control said at least one fluid emitting element (8) based on a mechanical engagement with said packs (6). 35
 11. A packaging machine (1) for producing packages, comprising a forming unit (2) arranged to form packs (6), a folding unit (5) arranged to fold said packs (6) so as to obtain folded packages, a feeding unit (4) arranged between said forming unit (3) and said folding unit (5) and arranged to receive sealed packs (6) of pourable food products from said forming unit (3) and feed said packs (6) to said folding unit (5), and a cleaning unit (3) according to anyone of claim 1 to 9, said cleaning unit (3) being arranged downstream of said forming unit (2) and upstream of said folding unit (5). 40
 12. The packaging machine (1) according to claim 11, and further comprising a drying unit arranged downstream of said cleaning unit (3) and arranged to dry said packs (6) or packages. 45
 13. The packaging machine (1) according to claim 11 or 12, wherein said cleaning unit (3) is integrally formed with said feeding unit (3). 50
 14. A method for producing packages in a packaging machine (1), comprising the steps of forming packs (6) by means of a forming unit (2) feeding said packs (6) from said forming unit (2) to a folding unit (5) by means of a feeding unit (2), cleaning at least a top portion of said packs (6) by means of a cleaning unit (3) arranged downstream of said forming unit (2) and upstream of said folding unit (5), and folding said packs (6) so as to obtain folded packages by means of said folding unit (5). 55
 15. The method according to claim 14, and further comprising the step of attaching an opening device onto a top portion of said packages, said top portion of said packages being defined by said top portion of said packs (6).

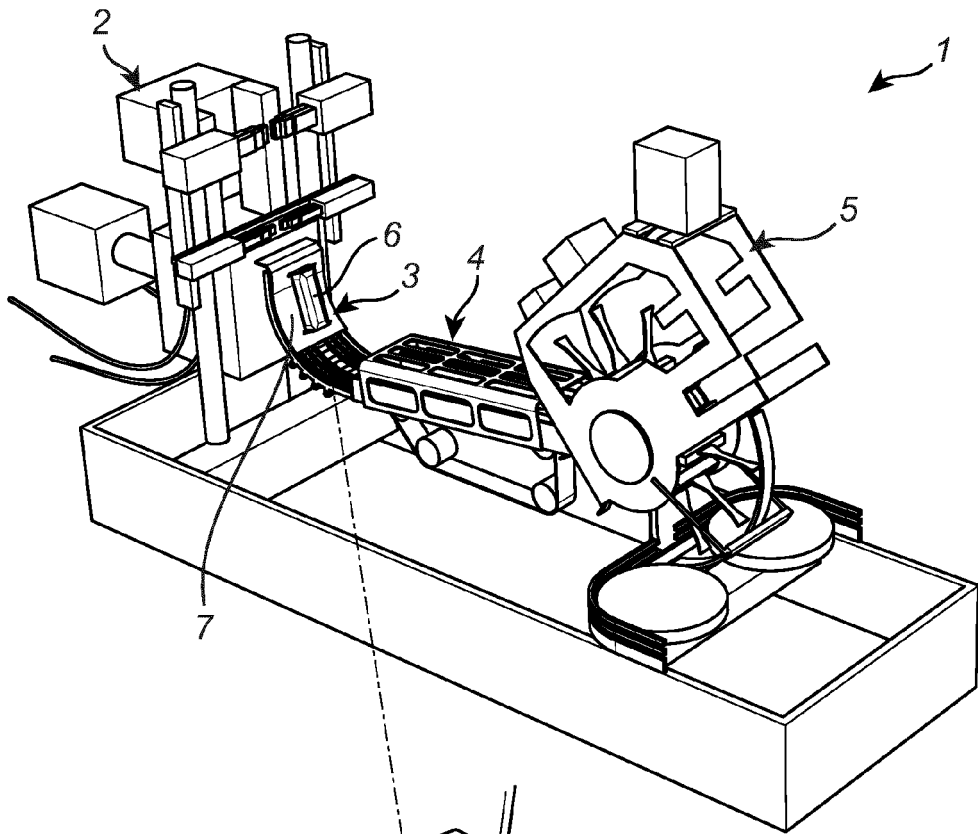


Fig. 1

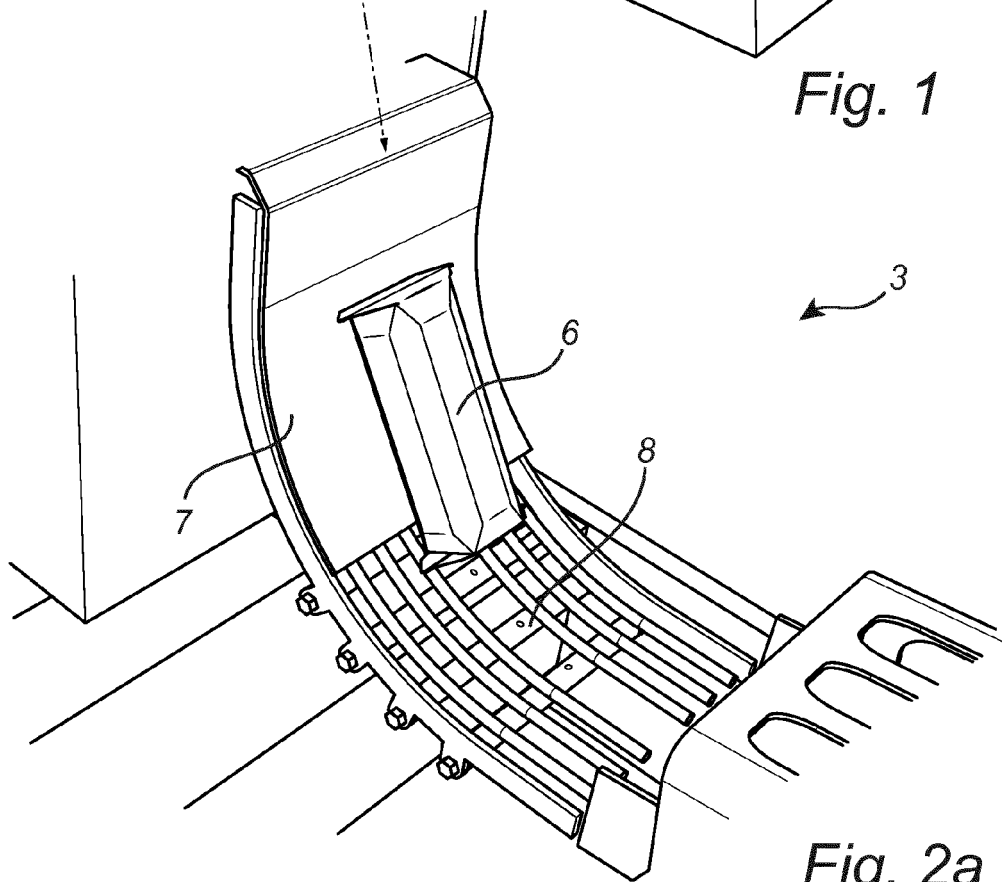


Fig. 2a

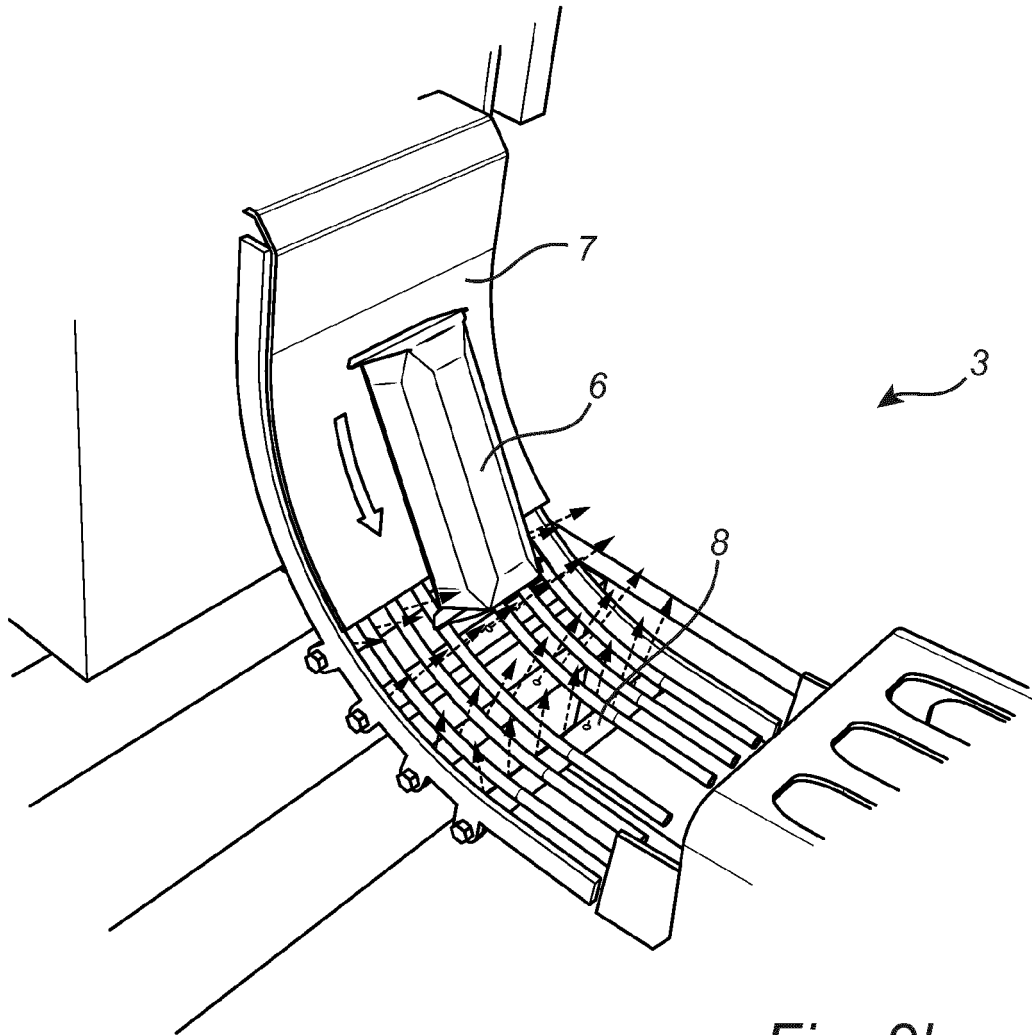


Fig. 2b



EUROPEAN SEARCH REPORT

 Application Number
 EP 15 19 5791

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2001/029972 A1 (KAJIURA MASATOSHI [JP] ET AL) 18 October 2001 (2001-10-18)	1,2,4-8	INV. B65B55/24 B65B57/02 B65B61/28 B65B61/18 B65B61/24
Y	* the whole document *	14,15	

X	WO 01/19717 A1 (SEARLE MATTHEW JOHN [GB]; GOAR MICHAEL EDWIN [GB]) 22 March 2001 (2001-03-22)	1	
Y	* the whole document *	14,15	

X	WO 2007/083398 A1 (SUNTORY LTD [JP]; ITO DAISUKE [JP]) 26 July 2007 (2007-07-26)	1,3,9-13	TECHNICAL FIELDS SEARCHED (IPC) B65B

X	WO 99/28193 A1 (LOSCHI SERGIO [IT]; MAZZONI PAOLO [IT]) 10 June 1999 (1999-06-10)	1,3,9-13	

X	US 5 195 298 A (BARANOWSKI JOHN [US]) 23 March 1993 (1993-03-23)	1	

X	US 2012/055116 A1 (NEIHEISER KATHRYN JEANNE [US]) 8 March 2012 (2012-03-08)	1	

A	EP 2 586 715 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 1 May 2013 (2013-05-01)	7	

The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 February 2016	Examiner Yazici, Baris
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
ON EUROPEAN PATENT APPLICATION NO.**

EP 15 19 5791

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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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55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2001029972 A1	18-10-2001	ID 29337 A US 2001029972 A1	23-08-2001 18-10-2001
WO 0119717 A1	22-03-2001	AU 7301100 A CA 2385143 A1 EP 1224146 A1 MX PA02002860 A US 2002119222 A1 WO 0119717 A1	17-04-2001 22-03-2001 24-07-2002 14-10-2003 29-08-2002 22-03-2001
WO 2007083398 A1	26-07-2007	CN 101360677 A JP 3927990 B1 JP 2007191184 A WO 2007083398 A1	04-02-2009 13-06-2007 02-08-2007 26-07-2007
WO 9928193 A1	10-06-1999	AU 1234499 A IT B0970687 A1 WO 9928193 A1	16-06-1999 26-05-1999 10-06-1999
US 5195298 A	23-03-1993	NONE	
US 2012055116 A1	08-03-2012	NONE	
EP 2586715 A1	01-05-2013	CN 103635391 A EP 2586715 A1 ES 2493926 T3 JP 2014532593 A KR 20140086965 A RU 2014121987 A US 2014131173 A1 WO 2013064291 A1	12-03-2014 01-05-2013 12-09-2014 08-12-2014 08-07-2014 10-12-2015 15-05-2014 10-05-2013