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(54) Title: METHOD FOR PACKING LIQUID POUCHES INTO PACKAGING CARTONS, AND AN ARRANGEMENT FOR PROTECTING THE LIQUID POUCHES

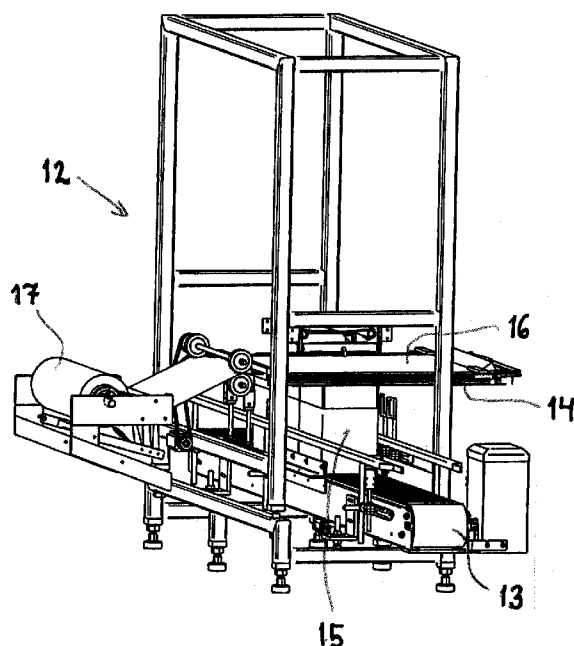


Fig. 1

(57) Abstract: Method for packing liquid pouches, e.g. pouches of milk, into packaging cartons (15), in which method the liquid pouches are manufactured in their manufacturing machine, transferred to a packing station (12), where they are dropped into packaging cartons (15). The invention is implemented in such a way that dropped into the packaging carton (15) along with the liquid pouches is a film (16), more particularly a plastic film, with which the liquid pouch or liquid pouch group is protected on at least some of its surfaces during the dropping and which in the packaging carton (15) settles between the liquid pouches and the inside surfaces of the packaging carton (15).

METHOD FOR PACKING LIQUID POUCHES INTO PACKAGING CARTONS, AND AN ARRANGEMENT FOR PROTECTING THE LIQUID POUCHES

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The object of the present invention is a method for packing liquid pouches, e.g. pouches of milk, into packaging cartons, in which method the liquid pouches are transferred to a packing station, where they are dropped into packaging cartons in liquid pouch groups. The object of the invention is also an arrangement for protecting the liquid pouches in the packing phase.

The invention thus relates to the packing of liquid pouches. The term liquid pouches refers to pouches containing liquid that are manufactured from a film-type material. The liquid can be milk, buttermilk, juice or corresponding. The film-type material generally in question is a polyolefin, e.g. polyethylene or a K-polymer of polyethylene, or possibly nylon or some corresponding material. Liquid pouch thus refers also in the claims to a pouch that easily changes its shape and that contains liquid.

Liquid pouches are manufactured in a machine, in which the film-type material is discharged from a roller disposed in the machine, is folded into a pouch, seamed at the bottom end, filled with the desired liquid, seamed and truncated at the top end, in which case a finished liquid pouch is formed. The manufacturing machine of a liquid pouch is not described in more detail in this context because it can be any prior-art machine whatsoever that is suited for this purpose. The invention relates to the packing of finished liquid pouches coming from the machine.

The liquid pouches are transported from their manufacturing machine by means of conveyors and finally dropped in the packing station into packaging cartons, which in turn travel on their own conveyor. A packaging carton is generally a cardboard carton, but other packagings are, of course, possible within the scope of the invention. The number of liquid pouches in each carton is limited,

of course, by their weight. A one-liter pouch weighs approx. 1 kg. In many countries a maximum weight, which e.g. an employee of a factory or shop may lift, is defined. This weight is often approx. 8-12 kg, which thus dictates the number of liquid pouches in each
5 carton.

When the pouches are dropped freely from a conveyor into a carton, they drop into an arbitrary attitude and location in the carton. There are many factors affecting the attitude in which a
10 pouch finally drops into a carton. The biggest effective factor is the attitude in which the pouch starts its dropping motion. Another important factor is the dropping height, which it is preferable to keep as small as possible.

15 Nowadays the pouches can be collected into groups in the packing station before being dropped as a single group into a packaging carton. The size of a group can vary and the pouches can be in a vertical attitude or in a horizontal attitude in it, and there can be the desired number of them side-by-side and consecutively.

20 Some publications relating to the packing of liquid pouches are e.g. Finnish patent FI 122024 and Finnish patent application FI 20095210.

25 When a liquid pouch drops into a packaging carton, in particular the pouches hitting against the inside edges of the packaging carton are at risk of being damaged. Especially when dropping pouches in a vertical attitude into a packaging carton, a particularly critical point is the bottom corner of the liquid pouch, which during
30 the dropping rubs against the inside surface of the packaging carton. The bottom corner folds when friction is exerted on it during the dropping. More particularly, it is precisely the area of the bottom corner where leakage points have been detected more often than usual. In addition, the top edge of the packaging carton
35 is sharp and a pouch can be damaged when hitting it.

The aim of the present invention is to achieve a method with which the drawback described in the preceding can be avoided and the durability of the pouches improved. The method according to the invention is characterized in that dropped into the packaging carton
5 along with the liquid pouches is a film, more particularly a plastic film, which is cut before the dropping, and with which film the liquid pouch group is protected on at least some of its surfaces during the dropping and which in the packaging carton settles between the liquid pouches and the inside surfaces of the
10 packaging carton.

One preferred embodiment of the method according to the invention is characterized in that the cutting of the film is performed by heat sealing and by exerting a tearing motion on the
15 film.

Another preferred embodiment of the method according to the invention is characterized in that the film is pulled from the film roller onto the packing table to above the aperture in the table and
20 is cut, after which the packing group that has been assembled above the packing table is dropped, together with the film, through the aperture into the packaging carton below.

The arrangement according to the invention is characterized in that
25 in the packing station are arranged devices for pulling the film from the film roller and for cutting it to the specified dimension before the dropping of the liquid pouches into a packaging carton, and in that in the packing station is a packing table, onto which the film is spread and cut before the dropping of the liquid pouches, and in
30 that the packing table has an aperture, via which the liquid pouches and film are together dropped into a packaging carton.

One preferred embodiment of the arrangement according to the invention is characterized in that the arrangement also comprises a
35 film gripper, with which the film can be held in its position and can be released before dropping.

Yet another preferred embodiment of the arrangement according to the invention is characterized in that the arrangement comprises a film-spreading device, which straightens the film into an attitude wherein the film-holding device gets a grip on the film.

5

One advantage of the invention that can be mentioned is that the intermediate film protects the liquid pouches from stresses during the dropping, such as from friction and sharp edges. The intermediate film also helps the liquid pouches to stay in order
10 during the dropping, in which case the cartons are filled evenly and later handling of the cartons is easier. In addition, the lower friction of an intermediate film, more particularly compared to a cardboard box, facilitates removal of the liquid pouches from the carton.

15 In the following, the invention will be described in more detail by the aid of some preferred embodiments with reference to the attached drawings, wherein

Fig. 1 presents a packing station of liquid pouches.

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Fig. 2 presents one detail of the packing station.

Fig. 3 presents another detail of the packing station.

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Fig. 1 presents a packing station 12 of liquid pouches, to which packing station the finished liquid pouches are brought on a conveyors. The conveyors are not presented in this context, but examples of them can be found e.g. in Finnish patent FI 122024
30 and Finnish patent application FI 20095210. In the bottom part of the packing station is a conveyor 13, which conveys the packaging cartons 15 to the packing station and away from it. The liquid pouches are dropped into packaging cartons 15 one at a time or in groups through an aperture in the packing table 14. It is
35 advantageous to form a group from the pouches above the packing table and to drop the whole group in one go into the packaging carton.

What is novel in the invention is that film 16 from the film roller 17 is spread onto the packing table, the film is cut in such a way that a detached sheet of film remains on the packing table covering at the same time an aperture in the table, and the liquid pouches are dropped into the packaging carton 15 in such a way that the film 16 drops along with the pouches. The size of the film is sufficiently large for it to surround the pouches or the pouch group for the whole of their height in the packaging carton, in which case no contact between a liquid pouch and an inside surface of the packaging carton occurs at any point. This film 16 settling between the liquid pouches and the inside surface of the packaging carton thus protects the liquid pouches, not only during the dropping but also during transportation, and thus reduces damaging of the liquid pouches. The film 16 does not indeed always need to be so wide/long that it protects the whole of the side(s) of a liquid pouch. The highest pressure and stress is in the bottom part of the pouch. The liquid in a pouch tries to form a drop shape and what is most essential is to protect the portion of it where the surface pressure, and consequently friction, is greatest.

The film is preferably plastic film, but also other materials suited to the purpose can be used. The film-pulling apparatus pulls the film 16 from the roller 17 and cuts the film into suitably long sheets, along with which the liquid packages are dropped into a packaging carton 15.

The plastic film 16 to be used is discharged from the roller 17 with an unwinder 1, which in this case is a shaft disposed in a fork. The film roller is installed on the shaft and locked. The shaft is mounted on bearings, in which case it rotates easily when pulling the film, and does not cause stretching of the film. Owing to inertia forces, the film roller 17 tries to rotate a little itself after cessation of the pulling of the film. To avoid unintended over-rotation, the unwinder has a roller brake 2. A simple band brake can be used as a roller brake. The band brake can be statically or dynamically loaded. With a dynamically-loaded brake the rotation of the film roller and

unintended stretching of the film can be prevented better. In this case the operation of the dynamic brake is linked to the operation of a film loosener 3. A cylinder solution is used as the film loosener 3, wherein a part of the cylinders is rigidly installed and the other
5 part of the cylinders is disposed at the end of a rocker arm. In this case the movement of the rocker releases and tightens the roller brake. The motion of the rocker reduces the moment of inertia of the film roller and, on the other hand, the force exerted by the fast-acting film-pulling device 4 by distributing the pulling over a
10 longer time, in which case hard stretching is not exerted on the film. The film-pulling device is formed from pulling cylinders, which are driven in this case with a servomotor (not presented).

During the pulling and cutting of the film there are many situations
15 when the film might be driven out from the claws of the film-holding device 6. For this reason it is good to have for the film a film-spreading device 5, which straightens the film into an attitude in which the film-holding device gets a grip. In this case the spreading takes place on the ejector-type principle. The film-
20 holding device 6 is, at its simplest, a pincer-type gripper, which in this case is provided with a pneumatic actuator. The task of the film-holding device 6 is to keep hold of the film when the film-displacing device 9 makes its work movement. After this the film-holding device 6 releases its grip and returns to the home station
25 to await a new work cycle. The film-displacing device 9 is a linear actuator, which can be pneumatic or electrically driven. The film 16 can also be straightened with compressed air, in which case the film-holding device 6 gets a grip on the film.

30 The film-displacing device 9 pulls the film to above the packaging carton 5 to await the dropping of the liquid packages into the packaging carton. Before the dropping of the liquid packages into a packaging carton, the film-displacing device 9 returns to the home station and the film 16 coming from the roller 17 is cut to its
35 dimensions with the cutting device 7. The cutting in the cutting device in this case takes place by means of heat.

Static electricity is very easily produced when handling plastic film, which static electricity is very harmful when handling extremely thin plastic film. More particularly, after the cutting of the film 16, when the thin film is in sheet form, static electricity causes side effects. For this reason, downstream of the cutting device is a device 8 for eliminating static electricity.

Cutting the plastic film 16 into sheets requires special procedures. Cutting the film does not necessarily succeed perfectly on each time of cutting, in which case the film does not go evenly along with the liquid packages into the carton. At worst, a film that has gone into a poor attitude does not protect a liquid package at all points, which increases the risk of damage to the liquid package. After the film 16 is brought by the film-displacing device to await the dropping of the liquid packages, the film gripper 10 takes hold of the film. This also enables the return of the film-displacing device 9 to the home station. More important, however, is that the operation of the film gripper 10 is linked to the operation of the film-tearing device 11, which ensures cutting of the plastic film in every situation. The film gripper 10 is a certain pincer-type gripper device, which makes a linear movement as a result of the film-tearing device 11. In this case both devices are pneumatic. Tearing of the film is also associated with the reversing motion made by the film-pulling device. The film gripper 10 releases the film 16 just before the dropping.

It is obvious to the person skilled in the art that the invention is not limited to the embodiments presented above, but that it can be varied within the scope of the claims presented below. In the preceding the invention is described in connection with cardboard packaging, in which it is certainly of great advantage. Nothing, however, prevents its use in connection with some other type of packaging, such as plastic cartons. The film 16 does not always need to be so wide that it protects the whole side of a liquid pouch. The highest pressure and stress is in the bottom part of the pouch. The liquid in a pouch tries to form a drop shape and what is most

essential is to protect that portion where the surface pressure, and consequently friction, is greatest.

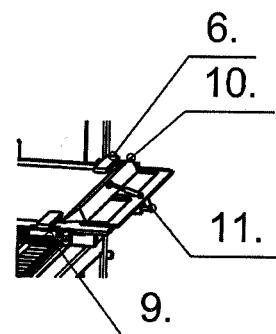
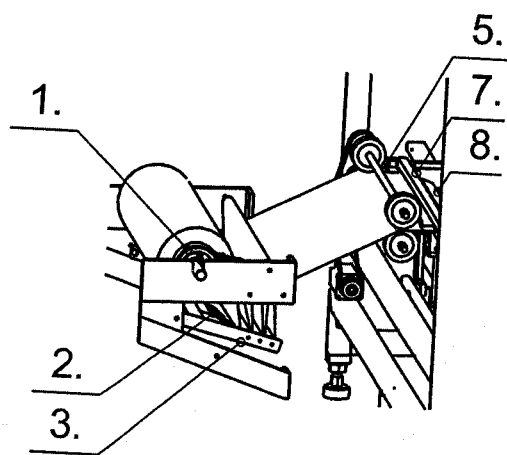
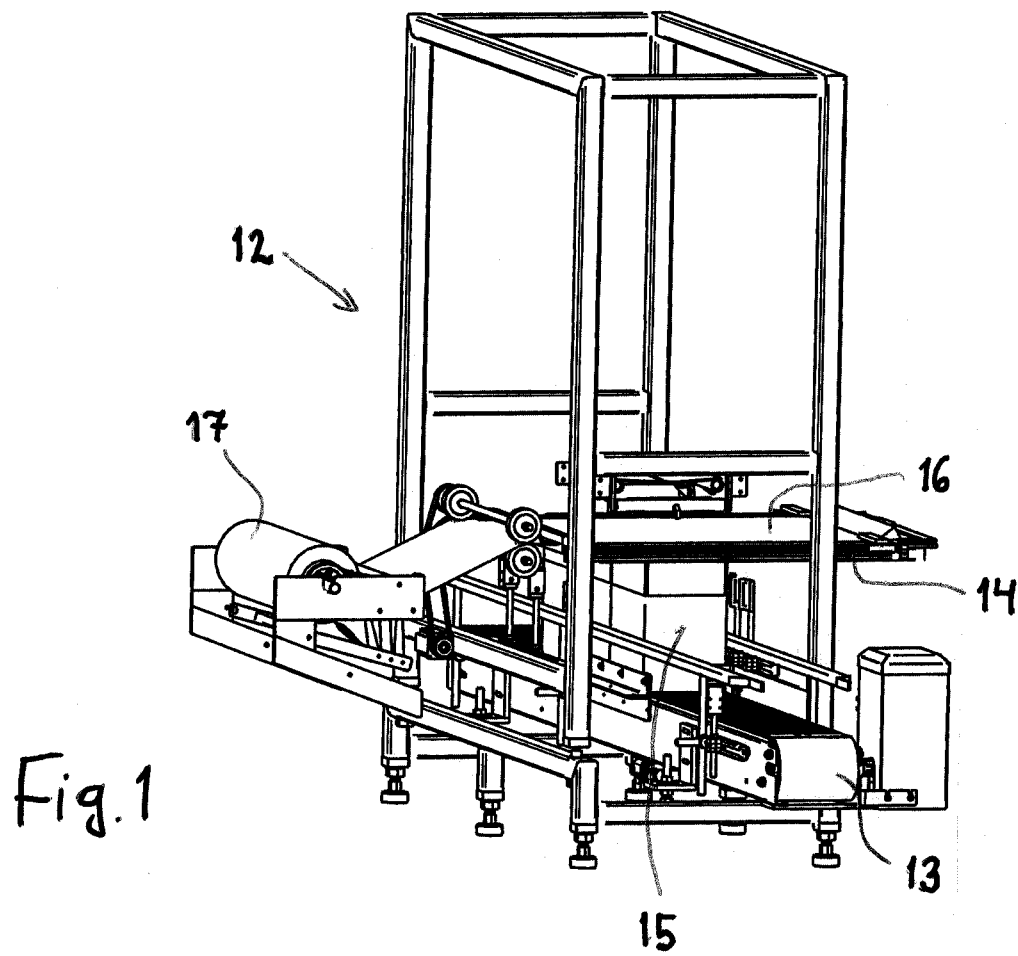
The characteristic features possibly presented in the description in
5 conjunction with other characteristic features can also, if
necessary, be used separately to each other.

CLAIMS

1. Method for packing liquid pouches, e.g. pouches of milk,
5 into packaging cartons (15), in which method the liquid
pouches are transferred to a packing station (12), where
they are dropped into packaging cartons (15) in liquid
pouch groups, **characterized** in that dropped into a
10 packaging carton (15) along with the liquid pouches is a
film (16), more particularly a plastic film, which is cut
before the dropping, and with which film the liquid
pouch group is protected on at least some of its surfaces
during the dropping and which in the packaging carton
15 (15) settles between the liquid pouches and the inside
surfaces of the packaging carton (15).
2. Method according to claim 1, **characterized** in that the
cutting of the film is performed by heat sealing and by
20 exerting a tearing motion on the film.
3. Method according to claim 1 or 2, **characterized** in that
the film (16) is pulled from the film roller (17) onto the
packing table (14) to on top of an aperture in the table
and is cut, after which the liquid pouch group that has
25 been assembled above the packing table is dropped,
together with the film, through the aperture into the
packaging carton (15) below.
4. Arrangement for protecting liquid pouches in the packing
30 phase, which arrangement comprises a packing station
(12) for the liquid pouches, in which packing station the
liquid pouches are dropped in groups into a packaging
carton (15), **characterized** in that in the packing
station (12) are arranged devices (4, 7) for pulling the
35 film (16) from the film roller (17) and for cutting it to
the specified dimension before the dropping of the liquid
pouches into a packaging carton (15), and in that the

packing station (12) has a packing table (14), onto which the film (16) is spread and cut before the dropping of the liquid pouches, and in that in the packing table (14) is an aperture, via which the liquid pouches and film (16) are together dropped into a packaging carton (15).

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5. Arrangement according to claim 4, **characterized** in that the arrangement also comprises a film gripper (10), with which the film (16) can be held in its position and can be released before dropping.
 6. Arrangement according to claim 4 or 5, **characterized** in that the arrangement comprises a film-spreading device (5), which straightens the film (16) into an attitude wherein the film-holding device (6) gets a grip on the film (16) when the film-displacing device (9) makes its working motion.
 7. Arrangement according to claim 4 or 5, **characterized** in that the arrangement comprises a compressed air device, which straightens the film (16) into an attitude wherein the film-holding device (6) gets a grip on the film (16) when the film-displacing device (9) makes its working motion.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2015/050069

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)

IPC: B65B, B65D

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

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base, and, where practicable, search terms used)

EPO-Internal, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 102008039099 A1 (ABB AG [DE]) 25 March 2010 (25.03.2010) claim 1; figures 1-3	1-7
A	FI 122024 B (ELECSTER OYJ [FI]) 29 July 2011 (29.07.2011) whole document document cited in the application	1-7
A	EP 0042199 A1 (DERCKX HENRICUS A J M) 23 December 1981 (23.12.1981) whole document	1-7

☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Name and mailing address of the ISA/FI Finnish Patent and Registration Office P.O. Box 1160, FI-00101 HELSINKI, Finland Facsimile No. +358 9 6939 5328	Authorized officer Kimmo Kuparinen Telephone No. +358 9 6939 500

INTERNATIONAL SEARCH REPORT
Information on Patent Family Members

International application No.
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Patent document cited in search report	Publication date	Patent family members(s)	Publication date
DE 102008039099 A1	25/03/2010	DE 102008039099 B4	23/08/2012
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FI 122024 B	29/07/2011	None	
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