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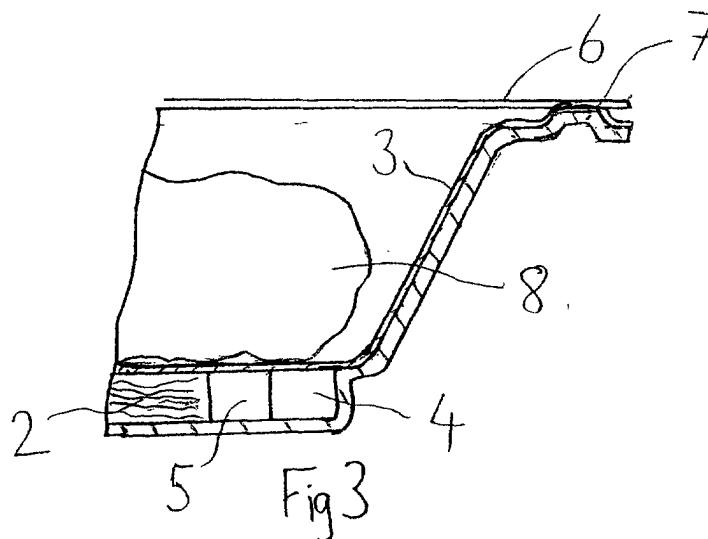
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(54) **Packaging tray and method of and apparatus manufacturing and loading same**

(57) A packaging tray (1) for example for a reheatable product comprises a central floor region (1a) on which is placed a moistened pad (2) of absorbent material. A liner film (3) is then placed over the pad and is bonded to the inside floor surface (1b) of the tray out-board of the central floor region (1a) in order to isolate the moistened pad (2) from atmosphere before use of

the tray.

Use of the packaging tray (1) involves penetrating the liner film (3) and placing a product article on the liner film, and then closing the tray with a lidding film to isolate the product and the moistened pad from the exterior of the pack, while leaving them in contact with one another so that the pad remains moist and can later serve to emit steam when subjected to microwave heating.



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Description

[0001] The present invention relates to a packaging tray and in particular to a tray which can include a moistened pad for releasing vapour, for example steam, when subjected to microwave heat, in order to cook or partially cook contents with the tray, enclosed by a lidding film over the tray.

[0002] WO-A-00/71421 discloses a tray in which the finished pack can include a moistened pad, and traditionally this is achieved by inserting a pad in the tray at the time of manufacture and then applying a predetermined amount of moisture to that pad at the time of loading a product into the tray and closing the tray with a lidding film. The result is that the tray with the moistened pad and product article can be subjected to microwave heating so that the moisture in the pad heats up and evaporates to form steam which permeates the pack and helps to cook the product in the pack, or at least to complete already partial cooking. Another application for such a tray is in the packaging of products such as vegetables which deteriorate if allowed to dry out, but benefit from being stored in a humid atmosphere. These processes have the disadvantage that with the known tray the pad needs to be moistened at the time of closing the pack and it presents an additional burden on the user of a tray, particularly where the tray has been preformed with a pad for such moistening. Alternatively, when produced in line the packer may need to introduce the pre-moistened pad into the tray before then applying the product article and the lidding film. Again this is a cumbersome operation for the packer.

[0003] In accordance with one aspect of the present invention there is provided a packaging tray including a moist pad placed on the floor of the tray, characterised by a rupturable water impermeable false floor enclosing the pad and at least locally spaced from the first-mentioned floor.

[0004] A second aspect of the present invention provides a package comprising a tray according to the first aspect, having the liner ruptured at one or more points to communicate the moistened pad with the interior of the tray, and having a lidding film enclosing product article on the liner which covers the moistened pad.

[0005] Yet a third aspect of the present invention provides a method of packaging comprising taking a tray having a moistened pad covered by a liner to isolate the pad from the atmosphere around the open tray, rupturing the liner at one or more points in order to provide means to communicate the moistened pad with the interior of the tray, then immediately inserting a product article in the tray on the liner covering the pad, and finally closing the tray with a lidding film to isolate the product article and the moistened pad from atmosphere.

[0006] A fourth aspect of the invention provides a method of treating food, comprising packaging the food by the method of the third aspect and including the further step of exposing the sealed lidded tray to micro-

wave radiation to cause the moisture in the pad to evaporate and to pass through the ruptured liner film to the space within the tray covered by the lidding film for the purposes of completing cooking of a product article in the tray.

[0007] A fifth aspect of the present invention provides an apparatus for packing a product article in a tray, comprising means for receiving a tray having a moistened pad therein sealed in place by a liner applied to the interior of the tray, means for rupturing said liner to provide at least one gas flow path between the pad and the space within the tray, means for introducing a product article to the tray with the thus ruptured liner, and means for applying a sealing lid to the tray.

[0008] In order that the present invention may more readily be understood, the following description is given, merely by way of example, with reference to the accompanying drawing in which:-

Figure 1 shows a perspective view of a tray in accordance with the present invention;

Figure 2 shows a general sectional view of the entire tray;

Figure 3 shows a detail of the righthand side of the tray of Figure 2;

Figure 4 is a schematic side view of apparatus for forming the packaging tray of Figures 1 and 2; and Figure 5 is a schematic side view of apparatus for loading and closing the packaging trays of Figures 1 to 3.

[0009] The tray shown in Figure 1 is an article of manufacture which can be produced in bulk and then supplied in nested form for subsequent use by a packer. Tray 1 is shown partway through manufacture and can be seen to have an upstanding rim 7 which facilitates the attachment of a lidding film to close the tray during the packaging operation. A central floor region 1a of the tray has a pad 2 thereon and is recessed below a bordering floor region 1b at the foot of the upstanding side wall of the tray. At the point of the shoulder between the central floor region 1a and the bordering floor region 1b are various cylindrical shafts 4 which communicate with the area immediately above the central floor region 1a by way of slots 5.

[0010] The process of manufacturing the tray comprises the steps of:-

- (a) thermoforming the tray 1;
- (b) placing a moist pad 2 in the tray;
- (c) moving the tray into a chamber which is provided with a heated plate over the tray above the level of its rim 7 and also has both overhead gas conduit and underneath gas conduit. A liner film is moved into the chamber to extend right across the tray top between the tray rim 7 and the level of the heated plate which is then heated;
- (d) applying suction to the upper part of the chamber

to draw the liner film 3 up into contact with the heated plate and also applying suction below the tray; (e) then releasing the suction and applying compressed air above the heat-softened liner film 3 that is drawn down into contact with the moistened pad and onto the surrounding floor region 1b to close off the shafts 4 and the upper mouths of the slots 5. The liner film 3 serves as a false floor to the tray. (f) when the liner film 3 has intimately contacted the inside of the tray the pack is ready for removal from the chamber and the next thermoforming-formed tray can be introduced and the abovementioned process repeated.

[0011] The trays can then be stored in nested form until they are shipped to a packer who needs only to introduce them into his loading machine which firstly pierces the film spanning the shafts 4 and then applies the lidding film after introduction of the product 8 and gas flushing of the space around the product 8.

[0012] The tray manufacturing process comprises applying the moist pad 2 onto the floor region 1a, or applying it dry and then moistening it as has been necessary on the part of the packer in the past, but this step is carried out during the tray manufacture and is not required to be carried out by the packer. Then, as part of the tray manufacturing process, before the tray is stored for subsequent sale and use a liner is applied as shown at 3 in Figure 2. This liner intimately contacts the whole of the inside of the tray and the upper surface of the pad 2 so as to enclose the pad 2 on the central floor region 1a. The liner also, therefore, closes off the upper mouths of the slots 5 and of the shafts 4 so that the moist pad 2 is completely isolated from atmosphere even before the lidding film is applied.

[0013] Figure 3 shows the lidding film 6 having been welded to the upstanding rim portion 7 and therefore fully closing the pack and enclosing a product article 8 in the tray between the liner 3 and the lidding film 6, thereby isolating the product 8 from atmosphere. This step is carried out by the packer.

[0014] The apparatus on which these process steps can be carried out is illustrated in Figure 4 which shows a supply roll 12 of thermoformable plastic web material, which preferably comprises polystyrene foam with a high impact polystyrene skin on the upper (radially outer) side of the web. The web paid off from the roll 12 passes through a thermoforming station 14 at which the film is deformed to have an upwardly concave configuration with the high impact polystyrene in the concave well of the tray shapes defined in the web. At this stage the web comprises several successive rows of side-by-side tray shapes which are later severed from one another by stamping out the trays from the web. However, leaving these concave tray shapes in the web provides a useful way of controlling movement of the tray shapes through the various stations of the apparatus.

[0015] After tray formation, the web then passes to a

loading station 16 at which each tray shape receives a moistened pad of water-absorbent material.

[0016] In continuous movement the formed trays then pass to a lining station 18 where a roll 20 of barrier film provides a continuous web 21 of the barrier film to be placed over the upwardly concave tray shapes with their moistened pads in place. The trays are then passed to an evacuation station at which vacuum is applied from beneath the tray to draw the lining film 21 down into the cavity of the tray to sit on the central floor region 1a of the tray and to seal around the peripheral floor region 1b. For this part of the process heat may have been applied to the lining film before it is drawn down into the tray floor, in order to enhance adhesion of the lining film to the tray floor.

[0017] Trimming of the material overhanging around the rim of each tray is then effected to complete the tray formation process and then to allow the trays to pass onwardly to a tray nesting station 22 at which the trays are placed one inside another to provide a stack such as is illustrated at 23.

[0018] A wind-up spool 25 receives the scrap tray-forming film which was originally on the roll 12 but was salvage around the individual trays at the tray severing point.

[0019] The tray stack 23 can then either be stored for subsequent use, or passed onwardly for immediate use, or transported to a separate location where the tray loading operation will be carried out.

[0020] In order that the moisture in the pad 2 may later escape and contact intimately the product 8 in the sealed tray, part of the packaging process involves penetrating the film of the liner 3 spanning the shafts 4 with individual pins or needles so that, at the time of inserting the product and applying the lidding film, the pad 2 is provided with means for communicating it with the atmosphere within the pack, but still it is isolated from the exterior of the pack defined by the tray 1 and lidding film 6.

[0021] The packer will have a machine including a chamber which defines a socket to conform with and to receive the exterior of the tray 1, and which is in register with an overhead needle plate having needles positioned in the appropriate places to penetrate the film spanning the top of the shafts 4. Retraction of that needle plate will then clear the floor of the tray for insertion of the product article 8 and for application of the lidding film 6, preferably with gas flushing to provide a modified atmosphere in the pack.

[0022] Figure 5 shows the tray loading- and closing-apparatus 36 which converts the individual trays of the stack 23 into finished packs with product articles safely contained therein. From the arrival point where the stack 23 reaches the apparatus, the individual trays are de-nested by a device (not shown) which then places each tray on a support plate for carrying the tray part a film piercing station 32 at which the holes mentioned above are punched in the floor liner of the tray near the inner

edge of the peripheral floor region 1b in order to communicate the moisture in the pad 2 with the main space within the well of the tray where a product article will shortly be positioned. From this film piercing station the pierced empty trays move leftwardly through a loading area 34 where individual product articles are placed in the open trays, either manually or by automated product placement devices, and from there the loaded trays move leftwardly towards a film lidding station at which a closure film is placed across the tray rim, and sealed thereto.

[0023] The preferred method of applying a closure film across the tray rim uses a sealing frame above and in register with the rim of each tray to press the closure film down onto the tray rim for welding it in place for sealing. This sealing frame may include heating means for ensuring the heat weld.

[0024] Alternatively, for applying the lid to the package it is possible to use a vacuum/gas injection chamber apparatus which is similar in operation to the lining station 19 of the tray manufacturing apparatus 10 of Figure 4 in that the film may be first of all heat-softened while above the tray to be closed, and then drawn downwardly as the influence of suction applied beneath the tray causes the lidding film to be driven down onto the tray rim. In this downward motion the lidding film is able to be thrust downwardly by the application of super-atmospheric pressure from above the film. The same action could be used on the lining film in the tray manufacturing apparatus 10 of Figure 4.

[0025] Where the lidding film has been softened by heating, as described above, it will self-adhere to the rim of the tray. Otherwise it may require the use of an adhesive applied to the tray rim prior to contact of the rim with the lidding film.

[0026] At the lidding station a modified atmosphere may be introduced into the space between the lidding film and the tray floor 1, and this may be supplied by way of individual feed conduits fed from a modified atmosphere supply manifold.

[0027] The lidding film is supplied from a roll 37 which is moved downwardly by extension of the pneumatic ram 35, thereby unwinding a length of the lidding film which can then be advanced towards the tray closing station as the ram 35 is again retracted to raise the supply roll 37 and thereby relax tension in the lidding film to allow it to be passed downwardly onto the tray rims to seal the trays.

[0028] The thus closed trays then move to a tray trimming station 38 where the individual sealed trays are severed from the continuous web of lidding film and are passed to a discharge station on a discharge conveyor 39 while the selvage lidding film 40 is taken up onto a wind-on spool 41.

[0029] Any suitable materials may be used for the thermoforming-formed tray, and one example would be polypropylene. Equally any suitable absorbent material may be used for the pad 2.

[0030] The liner film 3 needs to be compatible with any food articles which may be used as the product 8, but it is possible for a multilayer laminate to be used so that it includes an adhesive layer to bond to the (polypropylene) inner surface of the tray 1 and a facing layer which will be exposed to the interior of the tray and will be compatible with any food product to be introduced.

[0031] The lidding film may be of any suitable form and may be chosen in order to have barrier properties to ensure that substantially no gas transfer occurs between the atmosphere around the product article 8 and the exterior of the pack once the lidding film 6 has been applied.

[0032] If desired an easy open feature may be applied to the pack in order to facilitate peeling of the lidding film 6 from the liner 3 on the upstanding rim 7 of the tray. This may require modification of either the liner film 3 or the lidding film 6 in order to provide peelability of these two with a peel force less than the force required to separate the liner 3 from the main body of the thermoformed tray 1.

[0033] WO-A-00/71421 discloses several other advantageous features which can also be derived with the tray of this invention. For example, at the time of packaging an article in the tray the lidding film may be pierced to allow for venting of steam during microwave cooking and the location of the piercing may be closed by means of a peelable label to be removed by the consumer.

Claims

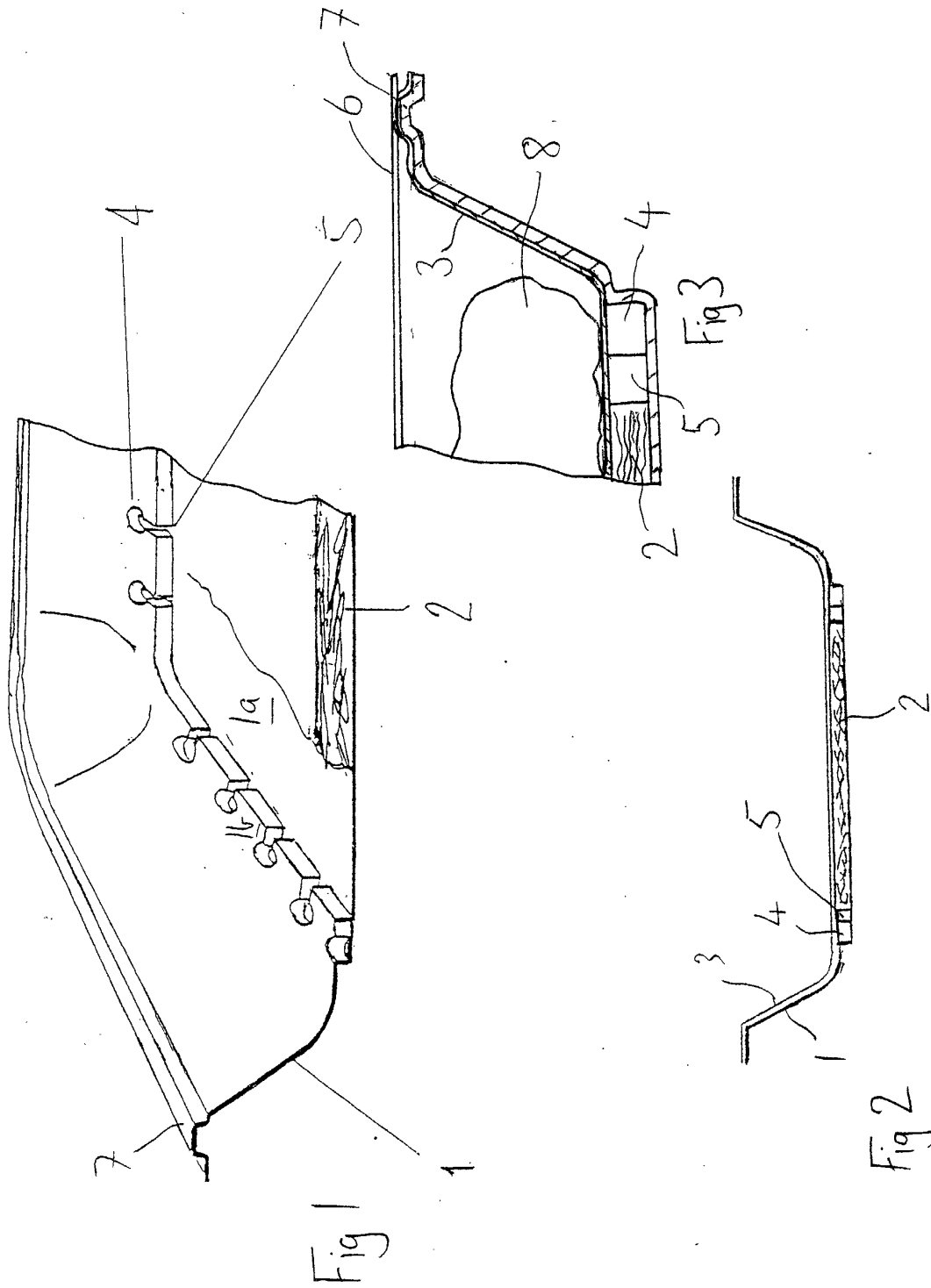
1. A packaging tray including a moist pad placed on the floor of the tray, **characterised by** a rupturable water impermeable false floor enclosing the pad and at least locally spaced from the first-mentioned floor.
2. A tray according to claim 1, wherein the false floor is a liner film applied over the moist pad and adhering to the inner surface of the tray outwardly of the pad in order to isolate the pad from atmosphere around the open tray.
3. A tray according to claim 2 including a plurality of zones communicating with the pad but closed by the liner such that penetration of the liner film at said zones facilitates opening of a passage to communicate the moistened pad with the interior of the tray.
4. A tray according to claim 3 wherein said zones comprise shafts extending upwardly from a floor level of the tray to a wall region which can be spanned by the liner film to close it during manufacture of the tray, whereby the or each shaft can receive a liner-penetrating needle without damage to the body of the tray in order to rupture the film to provide a passage to communicate the moistened pad with the

space within the tray.

5. A packaging tray according to any one of the preceding claims and including an upstanding peripheral rim to receive a lidding film sealed to the liner thereon. 5
6. A package comprising a tray according to any one of the preceding claims, having the liner ruptured at one or more points to communicate the moistened pad with the interior of the tray, and having a lidding film enclosing product article on the liner which covers the moistened pad. 10
7. A method of packaging comprising taking a tray having a moistened pad covered by a liner to isolate the pad from the atmosphere around the open tray, rupturing the liner at one or more points in order to provide means to communicate the moistened pad with the interior of the tray, then immediately inserting a product article in the tray on the liner covering the pad, and finally closing the tray with a lidding film to isolate the product article and the moistened pad from atmosphere. 15
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8. A method of treating food comprising packaging the food by the method according to claim 7, and including the further step of exposing the sealed lidded tray to microwave radiation to cause the moisture in the pad to evaporate and to pass through the ruptured liner film to the space within the tray covered by the lidding film for the purposes of completing cooking of a product article in the tray. 30
9. Apparatus for packing a product article in a tray, comprising means for receiving a tray having a moistened pad therein sealed in place by a liner applied to the interior of the tray, means for rupturing said liner to provide at least one gas flow path between the pad and the space within the tray, means for introducing a product article to the tray with the thus ruptured liner, and means for applying a sealing lid to the tray. 35
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10. A method according to claim 9, wherein said means for applying a sealing lid to the tray comprises means for applying a lidding film to the tray and for sealing it to the continuous rim of the tray. 45

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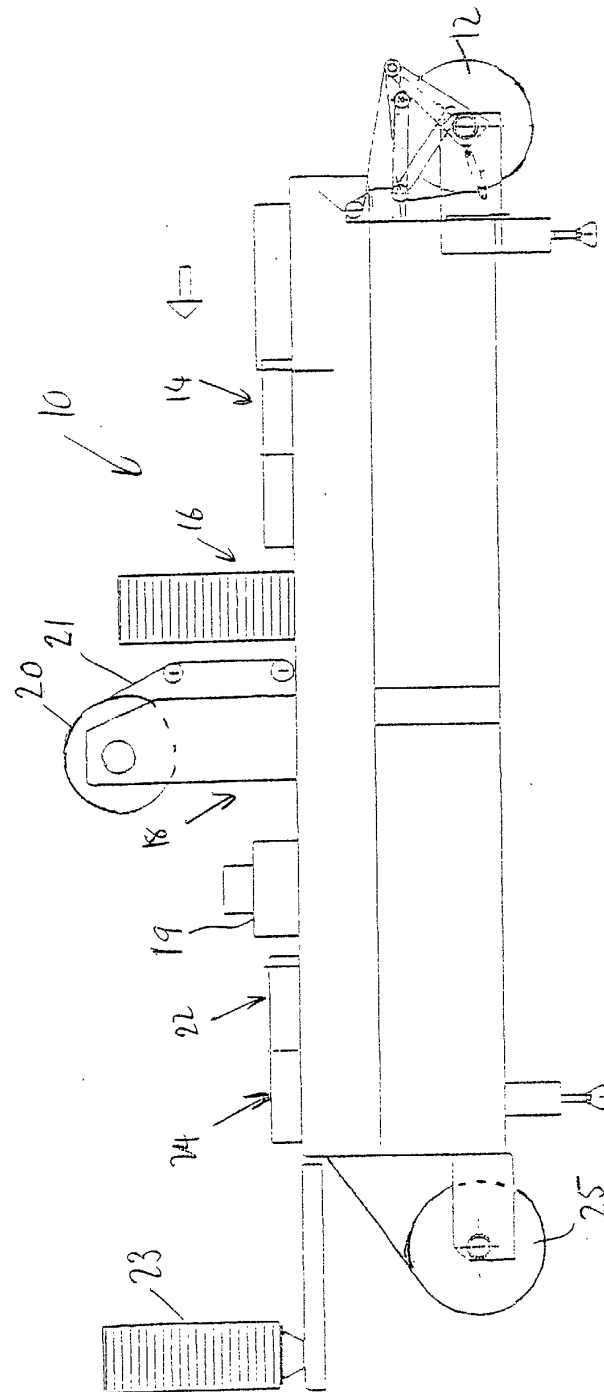


Fig 4

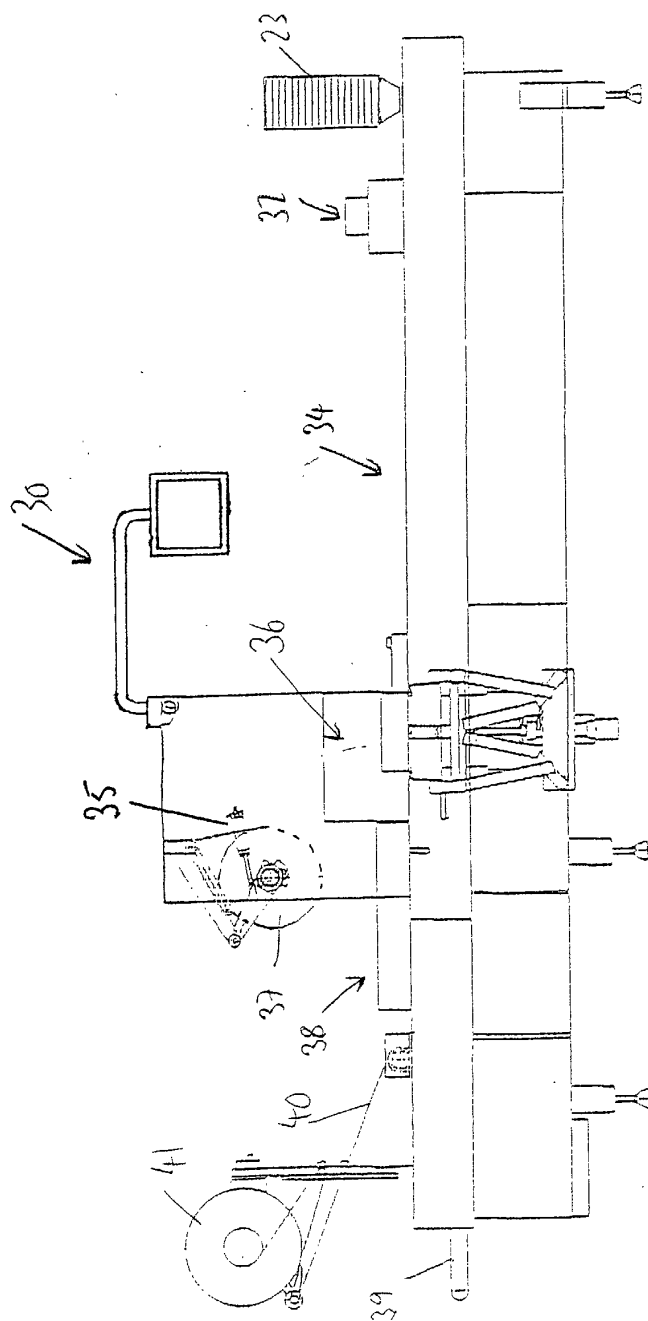


Fig 5



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 02 25 2558

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Y	* column 13, line 39 - line 62; figures 2,8 *	9,10	
	* column 11, line 63 - column 12, line 68 *		

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A	* page 3, line 8 - page 4, line 18; figure 1 *	7	

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A	* page 11, line 27 - page 12, line 31; figure 6 *	1,5	
	* page 10, line 18 - page 11, line 25 *		

A	EP 0 718 087 A (POLARCUP FRANCE SA) 26 June 1996 (1996-06-26)	9	
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A	WO 01 38196 A (KELBERMAN UZI ;S Z P PLASTIC PACKAGING PRODUC (IL)) 31 May 2001 (2001-05-31)	9	
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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 22 August 2002	Examiner Galli, M
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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