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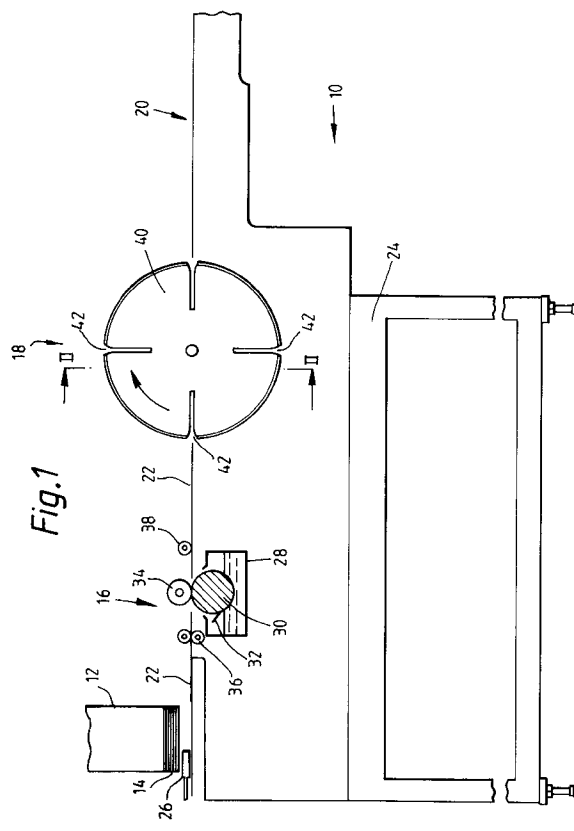
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(54) **Method for adhering packs for smoking articles.**

(57) An improved method for constructing a pack of smoking articles is provided in which the pack blank has applied two portions of it a pressure sensitive adhesive in a fluid state. The pressure sensitive adhesive is dried, and subsequently the pack is folded together to bring areas covered with the adhesive into contact with each other.

The invention further provides an apparatus 10 for putting the method into effect, in which ones of a stack 14 of blanks are supplied from a hopper 12 along a bed 22 to an adhesive application station 16, where adhesive is applied to portions of the lower surface of the blanks, and then along the bed to a turnover station 18, where they are turned over so that the adhesive coated side is uppermost. From there, the blanks move to a drying bed 20. They may then be constructed to form a pack.



The invention relates to a method for adhering packs for cigarettes and other smoking articles, for example so-called crush-proof cigarette packs.

Cigarette packs are erected from paper or card blanks, parts of which are glued to hold them in place. The foil wrapper surrounding the pack contents is commonly attached to the pack with adhesive, and the inner frame, if present, is also attached to the pack with adhesive.

The adhesive employed in the production of cigarette packs is generally a water based PVA adhesive. The adhesive is applied to one or both of the faces to be adhered, which are then brought together. The water gradually wicks out of the adhesive into the card or paper, and the remaining adhesive sticks the faces together. It is necessary to support the faces together for some time to allow this process to occur, and the finished pack must be dried, to remove the water wicked from the adhesive. Further, the faces must be brought together within a short time after application of the adhesive, otherwise they will not adhere; that is, the open time is very short.

A particular problem which occurs in the forming of cigarette packs is relative movement of parts of the pack which are to adhere to each other while the adhesive dries. This may give rise to packs which are not properly square. The problem is exacerbated if the natural resilience of the pack material, usually card, tends to separate the adhering faces.

According to the invention there is provided a method of constructing a pack for smoking articles, comprising:

- (a) providing a blank for the pack;
- (b) applying a pressure sensitive contact adhesive in a fluid state to selected portions of the pack blank;
- (c) causing the pressure sensitive contact adhesive to become dry; and
- (d) bringing together portions of the pack blank carrying the pressure sensitive contact adhesive to adhere them together.

Also according to the invention there is provided apparatus for the manufacture of packs for smoking articles from blanks, comprising:

- a supply of blanks;
- a supply of pressure sensitive contact adhesive;
- a first station at which contact adhesive in a fluid state is applied to selected portions of a blank;
- a second station at which the pressure sensitive contact adhesive is rendered dry; and
- a third station at which portions of the blank carrying pressure sensitive contact adhesive are brought together to adhere them together; and
- means for moving blanks from the supply successively to the first, second and third stations.

The pressure sensitive contact adhesive may be applied in solution or as a molten hot melt adhesive.

It may be applied by, for example, gravure, daubing, spray or hot melt gun techniques, and the drying stage may be by removal of solvent, for example with hot air, or cooling of a molten hot melt contact adhesive.

The invention also contemplates the application of pressure sensitive contact adhesive to the inner frame, if any, of the pack, and the inner wrapper, often of metal foil, wrapping the pack contents.

The invention provides a blank having a pressure sensitive contact adhesive on parts of its surface, which may be adhered together by the application of instantaneous pressure.

The invention will be further described, by way of example with reference to the drawings, in which:

Figure 1 shows, diagrammatically, part of a cigarette packing apparatus according to one embodiment of the invention, for applying pressure sensitive contact adhesive to pack blanks;

Figure 2 shows a section through one component of the apparatus of Figure 1, on line II-II of Figure 1;

Figure 3 shows an enlargement of part of Figure 1; and

Figure 4 shows a pattern of application of contact adhesive to a blank for a hinge-lid cigarette pack.

The apparatus part 10 of the apparatus of Figure 1 comprises a hopper 12 for holding a stack 14 of pack blanks, an adhesive applicator 16 at which adhesive is applied to the blanks, a turnover station 18 at which the blanks are turned over and a drying bed 20. The hopper 12 and the applicator 16, the turnover station 18 and the drying bed 20 are connected by a flat horizontal bed 22 forming the upper surface of a table 24.

In more detail, the hopper 12 comprises four vertical walls and is constructed to allow a blank to be drawn out of it from below. Known means are provided to remove blanks from the hopper 12, for example vacuum cups (not shown) which move up from below the bed 22 to attach to the lowest blank of the stack 14 in the hopper 12 and then move down, drawing the blank with them, and then release the blank onto the bed 22. A horizontally reciprocating push rod 26 is provided below the hopper 12, to push a blank drawn down from the hopper along the bed 22 towards the applicator 16.

The applicator 16 comprises a reservoir 28 of an aqueous solution of a PVA contact adhesive, below the level of the bed 22. A gravure roller 30, carrying an engraved pattern appropriate for the adhesive pattern to be applied to the blanks, is mounted in the reservoir, with its axis horizontal, perpendicularly to the line of travel of the blanks along the bed 22, and with its lower portion lying in adhesive and its upper portion extending above the reservoir. A doctor blade 32 is mounted in the reservoir 28 to remove excess adhesive from the gravure roller.

A backing roller 34 is located above and parallel to the gravure roller. The gap between the gravure

and backing rollers is slightly less than the thickness of a blank. For example in the case of a blank of card 0.3 mm (12/1000") thick, the gap will be 0.2mm (8/1000"). This ensures that, should the gravure roller rotate when a blank is not present in the applicator, adhesive will not be passed to the backing roller.

A pair of pinch rollers 36 is located in the bed 22 between the hopper 12 and the applicator 16, and a single pinch roller 38 is located immediately downstream of the applicator. A pair of continuous chains (not shown) run under the bed 22 downstream of the applicator. The chains carry dogs which pass through slots in the bed, for engaging blanks passing under the downstream pinch roller 38.

The turnover station 18 comprises an indexed rotatable disc 40 carrying radially extending pockets 42, the mouths of the pockets being coterminus with the circumference of the disc. The disc 40 is mounted with its axis horizontal and perpendicular to the line of travel of the blanks along the bed 22, and at the level of the bed. The mouths of the pockets 42 flare to facilitate entry of the blanks.

The disc 40 with its pockets 42 is shown in more detail in Figure 2 which has a section through the disc and in Figure 3, which shows part of the disc enlarged as compared with Figure 1. The pockets are formed by a first plate 44 of H shape fixed to the disc 40 and standing perpendicular thereto, a second plate 46 fixed perpendicularly to the disc 40 and having the same shape as and opposing the radially outer half of the first plate 44. The pocket 42 is defined by the two plates 44, 46 and a corresponding slot in the disc 40 (the wall of the slot is indicated at 48 in Figure 3). A leaf spring 50 overlies the radially inner portion of the first plate 44, to hold a blank in the pocket 42. The slot in the disc 40 and the first 44 and second 46 plates are shaped so that the mouth of the pocket 42 flares, to facilitate entry of a blank, as is best seen in Figure 3.

Another pair of chains (not shown) carrying dogs are provided downstream of the turnover station 18 under the bed 22 to carry the turned over blanks out of the pockets 42 and to the drying station 20, which comprises a warm air blower, not shown.

In use, the blanks are held in the stack 14 in the hopper 12, printed side uppermost. They are drawn, one at a time, out of the housing 12 and pushed by push rod 26 along the bed 22 to the pair of pinch rollers 36; which pass them to the applicator station 16.

At the applicator station 16, the blank is drawn through the nip between the rotating gravure 30 and backing rollers 34. The push rod 26 is timed to synchronise with the gravure roller 30. As the blank passes through the nip, it receives the pattern of adhesive from the gravure roller. The blank is then driven by the single pinch roller 38 and then by the chain dogs along the bed 22, to the turnover station 18. The portion of the bed 22 between the applicator 16 and

the turnover station 18 is grooved, so that those portions of the blank carrying adhesive are not in contact with the bed.

The disc 40 of the turnover station is indexed and is timed so that it stops for a moment with its upstream pocket 42 at the level of the bed, and so that a blank is being passed along the bed to enter the pocket, between the first 44 and second 46 plates, where it is held by the leaf spring 50. At the same time, a blank is drawn out of the downstream pocket, diametrically opposite the upstream pocket, by the chain dogs, and carried along to the drying bed 20. The disc then indexes round in the direction of the arrow, ready to receive another blank and to discharge another blank. It will be appreciated that as the blank passes through the turnover station 18 it is flipped over through 180°, so that the side carrying adhesive is uppermost.

The turned over blank then passes the warm air dryers of the drying station 20, where the water is driven off the adhesive, leaving a pressure sensitive contact adhesive on the blank. The blank is moved from the drying station 20 directly to a pack closing part of the apparatus, not shown.

Preferably, the portions of the bed 22 between the hopper 12 and the applicator station 16 and the turnover station 18 are covered by plates (not shown) to ensure that the blanks are flat as they pass from station to station.

The use of a pressure sensitive contact adhesive means that the portions of the blank which adhere together in the pack do so instantaneously; thus it is not necessary to support the formed blank in pockets in a packing bed, even if the 'spring back' caused by the resilience of the material such as card, would otherwise require provision of a support. Further, open time between the application of adhesive and the formation of the pack is acceptable, since the contact adhesive will not dry out or otherwise deteriorate, as a conventional dissolved adhesive would. Another advantage of using contact adhesive is that the finished pack does not have to be subjected to a drying step. This simplifies the machinery required, and avoids subjecting the cigarettes in the pack to heat. Further, there is no movement of a partially adhered pack, which can result in displacement of the pack walls leading to unsquare packs.

The part 10 of the apparatus, as shown in Figure 1, is particularly suited to applying pressure sensitive contact adhesive to a pack blank. The apparatus may include a part for applying contact adhesive to an inner frame blank. It is envisaged that a dissolved pressure sensitive contact adhesive, applied by a gravure roller, dauber or spray, will be used with pack blanks, where accuracy of application is desirable, while a hot melt pressure sensitive contact adhesive, applied by a hot melt gun, will be suitable for use with inner frames. If a hot melt adhesive is used, the drying bed 20 will be a cooling bed. The blank will then be

passed directly to the pack closing part of the apparatus, where it is formed together with the pack blank, into a cigarette pack.

The wrapper, usually of foil, which surrounds the cigarettes in the pack may also have pressure sensitive contact adhesive applied to it in a similar manner to the pack and inner frame blanks, and then be carried directly to the pack closing part of the apparatus and adhered to the pack.

It will be appreciated that the pack and inner frame blanks can be carried to the pack closing part of the apparatus without being turned over by a turnover station. It is also possible to apply the adhesive from above, especially if a dauber or spray or hot melt adhesive gun is used instead of a gravure roller.

Suitable water soluble pressure sensitive contact adhesives for use in apparatus and methods of the invention include PVA contact adhesives, such as that sold as CRODA 27-154, or that sold as SYNCOLL V2314. A suitable hot melt adhesive is that sold as LESSOTHERM 2077.

Figure 4 shows the inside surface of a pack blank for a conventional hinge lid cigarette pack. The shaded areas show where contact adhesive is applied, the broken lines represent creases and the solid lines cuts.

The blank will move through the part 10 of the apparatus as shown in Figure 1 in the direction of the arrow in Figure 4. It will be supported only under those parts which do not carry adhesive, by appropriate grooving of the bed 22, as far as the turnover station 18.

Claims

1. A method of constructing a pack for smoking articles, comprising:
 - (a) providing a blank for the pack;
 - (b) applying a pressure sensitive contact adhesive in a fluid state to selected portions of the pack blank;
 - (c) causing the pressure sensitive contact adhesive to become dry; and
 - (d) bringing together portions of the pack blank carrying the pressure sensitive contact adhesive to adhere them together.
2. A method of constructing a pack for smoking articles, further comprising:
 - (e) providing a blank for an inner frame of the pack;
 - (f) applying a pressure sensitive contact adhesive in a fluid state to selected portions of the inner frame blank;
 - (g) causing the contact adhesive to become dry; and
 - (h) bringing together portions of the pack

blank and portions of the inner frame blank carrying the pressure sensitive contact adhesive to adhere them together.

3. A method according to claim 1 or 2 further comprising:
 - (i) providing an inner wrapper for smoking articles to be contained in the pack;
 - (j) applying a pressure sensitive contact adhesive in a fluid state to selected portions of the wrapper;
 - (k) causing the pressure sensitive contact adhesive to become dry; and
 - (l) bringing together portions of the pack blank or inner frame blank and portions of the wrapper carrying pressure sensitive contact adhesive to adhere them together.
4. A method according to any preceding claim in which the contact adhesive used in step (b) is in solution prior to step (b), and in which step (c) comprises removing the solvent.
5. A method according to any preceding claim in which the contact adhesive is applied in step (b) by a gravure, daubing or spray technique.
6. A method according to any of claims 1 to 3 in which the contact adhesive used in step (f) is a hot melt adhesive, step (f) being carried out with the adhesive molten and step (g) comprising cooling the adhesive.
7. A method according to any preceding claim in which the contact adhesive is applied in step (f) by a hot melt gun.
8. Apparatus (10) for the manufacture of packs for smoking articles from blanks, comprising:
 - a supply (12) of blanks;
 - a supply (28) of pressure sensitive contact adhesive;
 - a first station (16) at which pressure sensitive contact adhesive in a fluid state is applied to selected portions of a blank;
 - a second station (20) at which the pressure sensitive contact adhesive is rendered dry;
 - a third station at which portions of the blank carrying pressure sensitive contact adhesive are brought together to adhere them together; and
 - means for moving blanks from the supply successively to the first, second and third stations.
9. Apparatus (10) according to claim 8 in which the supply (12) of blanks is a hopper for holding a stack (14) of blanks.

10. Apparatus (10) according to claim 9 or 10 in which the first station (16) comprises a gravure roller (30), a dauber or a spray gun supplied with a solution of pressure sensitive contact adhesive from the pressure sensitive contact adhesive supply (28). 5
11. Apparatus (10) according to claim 8, 9 or 10 in which the second station (20) comprises a heater. 10
12. Apparatus (10) according to claim 8 or 9 in which the first station (16) is a hot melt adhesive gun supplied with molten pressure sensitive contact adhesive from the pressure sensitive contact adhesive source. 15
13. Apparatus (10) according to claim 8, 9 or 12 in which the second station (20) is a cooling station to cool the pressure sensitive contact adhesive. 20
14. Apparatus (10) according to any of claims 8 to 13 in which pressure sensitive contact adhesive is applied at the first station (16) to the underside of the blanks and further comprising a turnover station (18) between the first and second stations at which the blanks are turned upside down. 25
15. Apparatus (10) according to claim 14 in which the turnover station comprises a rotatable disc (40) carrying pockets (42) for the reception and carriage of blanks. 30
16. A pack for smoking articles in which at least one of the blanks of the pack is adhered with a contact adhesive. 35
17. A blank for a pack for smoking articles carrying a dry pressure sensitive contact adhesive on a portion of one face. 40

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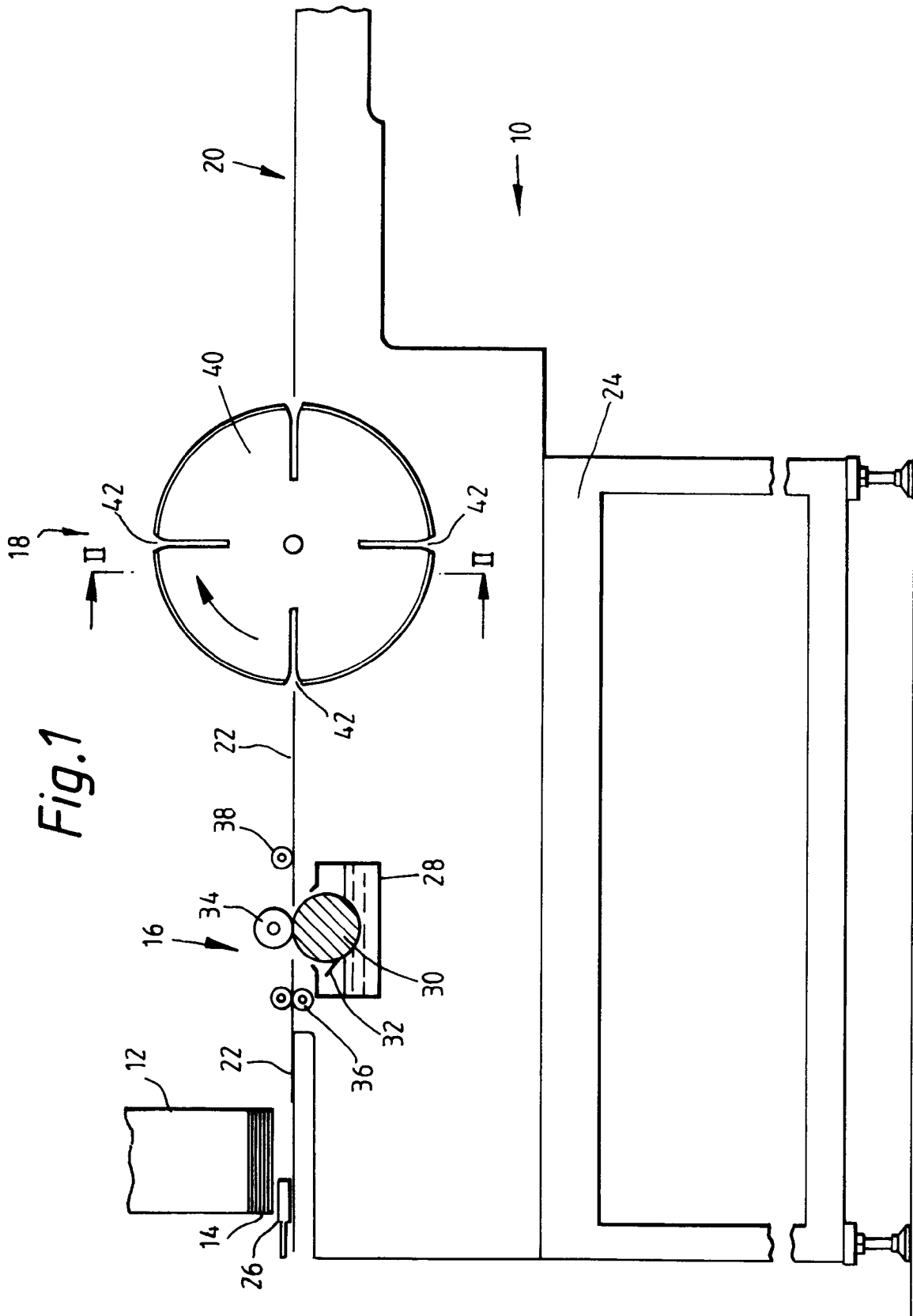


Fig.2

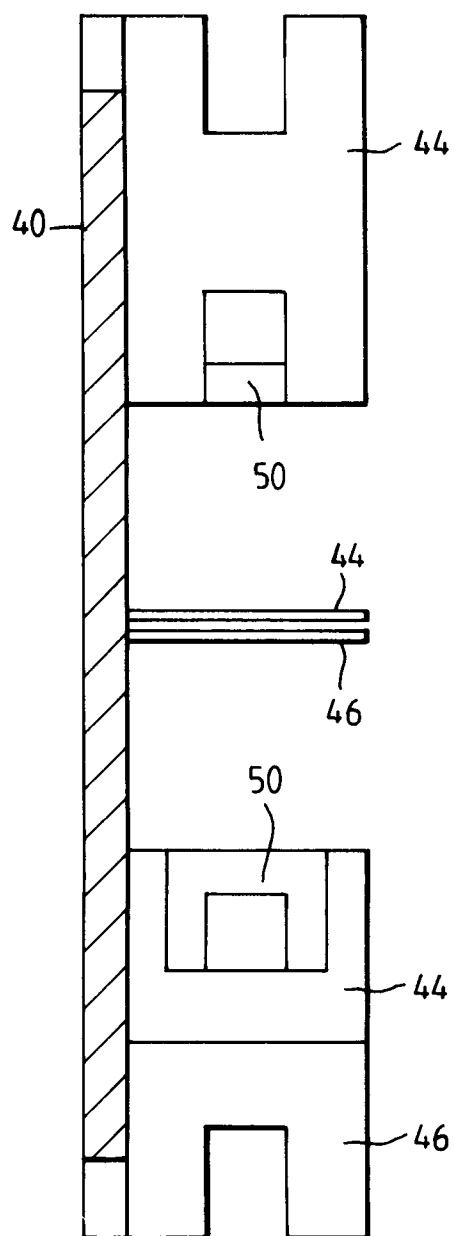


Fig.3

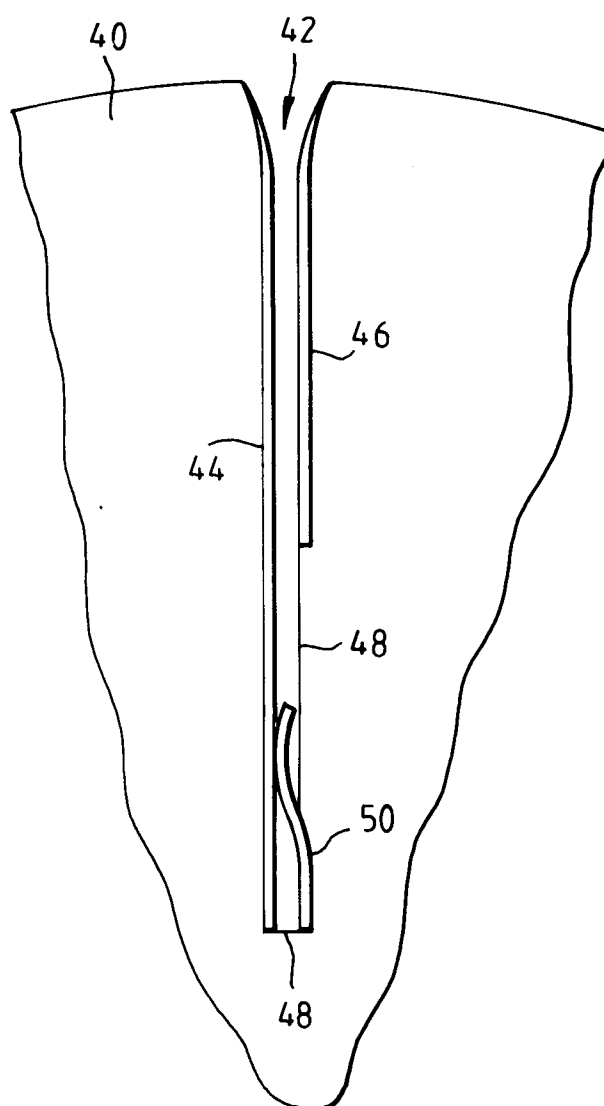
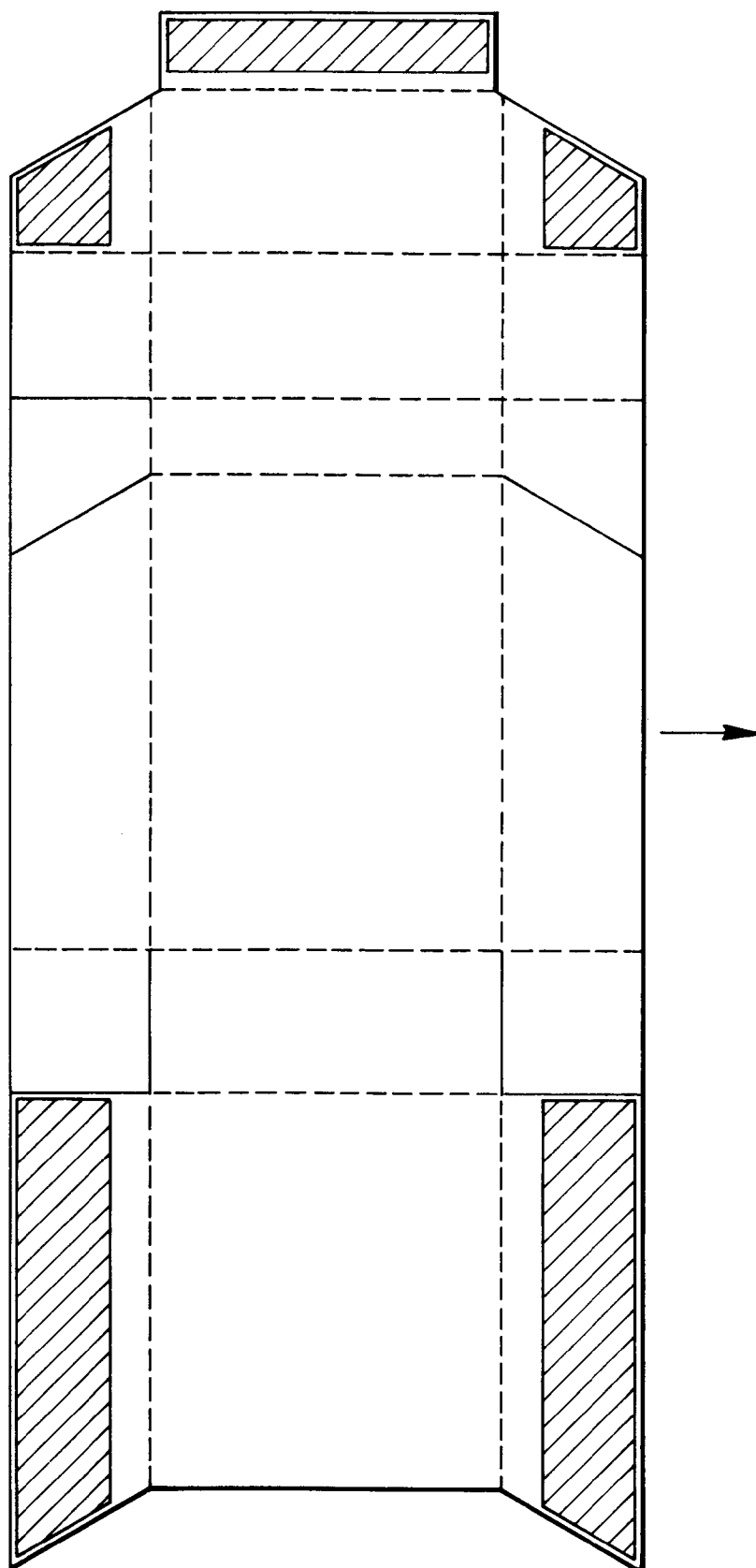


Fig.4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 31 1734

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	US-A-2 549 000 (C.E. PALMER) * column 3, line 5 - line 37; figures 1-3 * * column 7, line 39 - line 52; figure 9 * * column 9, line 26 - line 49; figures 3,9,10,15 *	1-17	B31B1/74 B31B1/02 B65G47/252
Y	DE-C-637 150 (JAGENBERG-WERKE AG) * page 2, left column, line 46 - right column, line 112; figure 3 *	1-3,8,14	
Y	US-A-3 677 859 (H.A. CLARK) * column 2, line 47 - line 55; figure 1 *	1-3,8,14	
A	US-A-3 636 920 (P.F. BOWMAN) * column 4, line 20 - line 47; figure 1 *	5,10	
A	US-A-3 747 480 (P. KALIKOW) * column 4, line 55 - line 67; figures 5-8 *	5,10	
A	EP-A-0 256 991 (OFF. MECCANICHE VIOTTO S.R.L.) * abstract; figure 2 *	14,15	
A	GB-A-22 057 A, D. 1913 (E.G STAUDE) * page 5, line 8 - line 19; figures 1-3 *	1-3	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5) B31B B65G B05C
Place of search THE HAGUE		Date of completion of the search 20 MARCH 1992	Examiner TOPALIDIS A.
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			

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