(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 321 179 A1**

# (12) EUROPEAN PATENT APPLICATION

(21) Application number: **88311768.1**

(22) Date of filing: **13.12.88**

(51) Int. Cl.[4]: **B65B 3/04 , C11D 13/16 , B65B 9/02**

(30) Priority: **15.12.87 GB 8729221**

(43) Date of publication of application:
**21.06.89 Bulletin 89/25**

(84) Designated Contracting States:
**CH DE ES FR GB IT LI NL SE**

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## (54) Casting method.

(57) Soap, a non-soap detergent or a mixture of both is cast directly into bars by casting into a pack made out of flexible film, airtightly sealing the pack while filling thereof is still liquid or semi-liquid and allowing to set. Preferably the pack is sealed by sealing through an excess of the filling material.

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# CASTING METHOD

The present invention relates to a method of casting a material, such as soap, non-soap detergent or mixture thereof, in a liquid or semi-liquid state into a pack.

US 3149188 describes a method of casting soap into a pre-formed mould which is designed to serve as a package or container for the ready-to-use cake and subjecting the liquid mass in the mould to cooling whereby the mass solidifies into a cake having the contour of the mould. The mould is airtightly sealed after casting. The moulds are preferably rigid or semi-rigid bodies whose shape determines the shape of the cake of soap. The mould can be plastic and can have flexible wall portions whose depression will facilitate the removal of the ready-to-use cake from the mould. The method is applicable to transparent soap and thus obviates the traditional open cast method of casting transparent soap into blocks and cutting the blocks into bars and overcomes the shrinkage, loss of perfume and surface deterioration problems associated with open cast bars.

Rather similarly, FR 910256 describes a method of casting liquid soap into a pre-formed mould which is retained as an envelope around the soap and thus delivered to the consumer. The mould should be sufficiently rigid to retain its shape when empty.

According to the present invention there is provided a method of casting material comprising soap, non-soap detergent or mixture thereof, the method comprising filling the material in a liquid or semi-liquid state into a pack made at least substantially of a flexible film, airtightly sealing the pack, allowing the material to set substantially and retaining the set material in the pack as an airtight storage means.

The present invention thus provides a method of casting and simultaneously packing a material such as soap. Use of flexible film can be economical with regard to the initial cost of the pack material. The method can be carried out on a continuous basis. Moreover, a supply of empty packs can be stored in a flat or rolled form, or a supply of flexible film for making packs can be stored and converted into packs only immediately prior to use. If desired forced cooling can be employed whilst the material is being allowed to set.

The present method can be carried out on a high speed packaging machine analogous to a conventional machine for forming and filling sachets. The method can thus not only be performed at high speeds, but also obviates the need to form and store rigid three-dimensional packs prior to use. Moreover, the invention enables a molten mixture to be made directly into a bar or the like having rounded corners and edges and of a pleasing shape. Thus unlike conventional casting of soap mixture into large slabs followed by cutting into blocks with prominent edges which require time consuming die stamping, the present method can readily and speedily produce suitably shaped bars or the like.

The present method can allow the shape of the pack to be controlled by contact with the exterior of the pack during the setting of the material. Thus for example a filled and sealed pack made substantially from flexible film could, for example, be lightly moulded in a die and/or have a motif impressed on it. A filled and sealed pack could be pressed between two surfaces in order to produce a bar or tablet-like shape. The surfaces could be flat or one or both of them could be, for example, concave so as to produce a substantially "cushion" shaped bar. The control need only be exerted for as long as necessary for the material to assume a permanent shape. Pressures in the range 0.1 to 0.3kgf/cm$^2$ are preferred, the actual pressure selected depending on the properties of the pack in each case.

In order to give an attractive appearance, it is very desirable that the pack shouid be a skin-tight wrinkle-free fit over the cast material within. To accomplish this, it can be beneficial to shape the pack by distending it with internal pressure, which can be done in various ways.

Pressing the exterior of a filled and sealed pack between two surfaces to control its shape will tend to reduce the volume to surface ratio and so pressurize the incompressible material within the pack. The internal pressure then distends and tensions the film material.

The pack may be of a heat-extendible material, i.e. a material which can stretch permanently when sufficiently hot. If stretching occurs at the temperature of the material filled into the pack, the pack will stretch and adjust its shape under the hydrostatic pressure of the hot material in the pack and/or pressure in that material arising from pressure on the pack exterior. Stretching of flat film to adjust its shape to that of the filling of the pack will of course mean that the film is no longer flat.

Another possibility is to use a heat-shrinkable flexible film. As this shrinks onto the material in the pack it will pressurize this material which will accordingly stretch the shrinking film taut.

Yet another possibility is that the pack could be at least partially shaped prior to filling. This could be carried out by blowing, e.g. into a mould, which

is a further instance of shaping the pack by distending it with internal pressure, and again stretching the film. The film will remain flexible, but the shaping of it will influence the shape which the pack takes when filled.

In order to achieve a skin-tight fit the material preferably occupies substantially the whole internal volume of the pack on being airtightly sealed. Contact between the material and air can thus be excluded which could be of importance in achieving a long shelf life. such an arrangement can also ensure that when the material is unpacked immediately prior to use, due to the close contact between the material and the pack, the material is presented to the consumer having an unblemished and even surface appearance.

The flexible film is preferably made of thermoplastic material. The pack suitably comprises two layers of its constituent film in the form of a bag or sachet having an open end into which to fill the material. In its unused for the pack material either preformed into sachets or as separate sheets of film can therefore be stored flat or for example in rolls as supplied from the manufacturers.

The two layers of film can, for example, be formed into a bag or sachet by sealing them together along one or more seams so as to define the flat (unfilled) shape of the pack while leaving an unsealed portion as the filling opening. The seal could extend around the total periphery of the pack or alternatively the pack could be derived from a tube of flexible film material having a transverse seal at one end and being open at the other end so as to allow the pack to be filled. For a thermoplastic material the seal can conveniently be performed by heat welding. Any "skirt" of the film material projecting outwardly from the seam(s) can be trimmed away from the set product. Alternatively a "skirt" of film may be avoided by employing knife-edge welding methods.

It is preferred that a film material is employed which allows the pack when filled to be airtightly sealed by heat welding through a slight excess of soap or the like at the opening to the pack. This can ensure that the material occupies the whole internal volume of the pack, and ensures exclusion of any air from the pack.

Preferably the pack is formed immediately prior to filling with both operations carried out on the same machine. Where the pack is formed from two layers of its constituent film, the pack can be filled with the material and airtightly sealed, with the sealing step conveniently forming at the same time at least a portion of the seam of the next pack to be filled. The present process can thus readily lend itself to operation on a continuous basis. For example a four side sealed sachet/vertical fill process could be employed.

The flexible film can readily be removed from the bar or the like immediately prior to use by a peeling action. If desired a tear strip(s) or the like can be included integral with the flexible film or attached for example glued to the flexible film in order to help initiate removal of the film from the bar. Alternatively the film can be made of a water-soluble material which dissolves during the first use of the bar or the like.

The actual film selected in any one case will depend on the circumstances of each case. Conveniently the film will be selected such that it can be heat-sealed. A variety of heat-sealing methods are available and generally involve melting the film layers in contact. The available methods include radio frequency or dielectric, bar, band, impulse, hot wire or knife and ultrasonic welding. As mentioned above, the film may have properties such that it can extend and/or shrink around the material being packed so as to provide a skin-tight and wrinkle-free fit at the temperatures encountered on contact with the liquids or semi-liquid material and/or during the time that the material is setting.

Suitable flexible film materials are commercially available. Examples include polyvinylchloride, polyvinylalcohol, polyethylene, Nylon (trade name for polyamide), Surlyn (trade name for ethylene methacrylate copolymer) and polyethyleneterephthalate mixtures thereof. The thickness of the film selected may depend inter alia on the degree of adjustment, if any, required in the film in order to provide a skin-tight and wrinkle-free fit. For polyvinylchloride film for example the preferred thickness range is from 20 to 60$\mu$m, with a more preferred thickness being from 30 to 50$\mu$m.

If desired laminated, co-extruded or other multilayer films can be employed. For example a multilayer film could be employed which is designed to combine the good heat-sealing characteristics of one polymer with the barrier/high melting point or other useful characteristics for example ease of printing of another. The film could for instance be printed with a motif, the product's name or advertising. In some applications it may be preferable to employ transparent film so that the cast soap bar or the like can be readily viewed.

The present method can be applicable to any castable soap, non-soap detergent or mixture thereof. The soap and/or non-soap detergent being packed can of course include any additional materials conventionally found in toilet or laundry bars. In particular, however, the method obviates the problems encountered in traditional pressing techniques as well as those itemised in US 3149188 having regard to transparent bars. The method can thus be especially applicable to transparent, translucent and low fatty matter soap bars..

It is to be understood that the present invention

extends to bars, tablets, cakes, blocks or the like of soap, non-soap detergent or mixtures thereof air-tightly sealed in a pack according to the present method.

Embodiments of the present invention will now be described by way of example only and with reference to the accompanying drawings in which:

Fig. 1 shows a pack formed by heat-sealing two sheets of flexible film;

Figs. 2a, 2b, 2c and 2d are side views of the pack seen in the direction of arrow II of Fig. 1 showing progressive stages from filling to finished product;

Fig. 3 diagrammatically illustrates the forming and filling of packs on a vertical forming and filling machine, and is a view on arrow III of Fig. 4;

Fig. 4 is a diagrammatic view of film being formed and filled on the machine, seen in the direction of arrow IV of Fig. 3.

Referring first to Fig. 1 of the drawings, a preformed pack 10 was prepared by overlaying two layers of flat polyvinylchloride film, each layer having a thickness of 130 micron, and radio frequency welding the two layers together along a seam 12 which is generally in the shape of a U narrowing at the top with a curvature substantially symmetrical to the closed bottom end of the U. Seam 12 defines a bag with a filling neck 14 at the top of the bag.

Molten soap at a temperature of about 80° C was poured down the neck 14 into this bag, so as to fill the bag to capacity and provide an excess extending up the neck 14 to the line indicated at 16. The pack was held upright and closed across its top opening by heat-sealing through the soap composition along the line 18.

The polyvinylchloride material of the bag stretched at the temperature of the soap poured into it so that as the bag was filled it distended and stretched to the shape shown by Fig. 2a. This shape is little changed by sealing as shown by Fig. 2b.

After sealing the filled pack was shaped so that its side view became as shown in Fig. 2d. One possibility for doing this was to place the pack in a mould completely surrounding it and allow cooling in the mould until the soap had set. Such a mould needed to be slightly larger than the filled pack so as to avoid destroying the pack by attempting to confine it in a space which was too small.

The alternative to this, which was preferred, was to press the pack between two plates 20 arranged substantially parallel to each other and to a plane containing the welded seam of the pack as shown in Fig. 2c. To do this, these plates and the filled pack were placed in a horizontal position. The upper plate carried a weight 22 so as to apply a pressure on the pack of about 0.2kgf/cm$^2$. The pressure so applied was maintained until the soap in the pack had cooled and set. This pressure applied to the pack served to maintain a pressure within the pack and thus to distend the film of the pack.

The resulting product had an attractive appearance, the cast bar being substantially "cushion" shaped and the polyvinylchloride film being a skin-tight and wrinkle-free fit, any creases which originally formed around the seam disappearing due to the film stretching and accommodating itself in order to conform to the contours of the pressed bar. The neck 14 was cut away, and a "skirt" of film projecting around the seam 12 was also readily cut away in order to improve the overall appearance of the product yet further.

Figs. 3 and 4 illustrate diagrammatically the continuous forming and filling of packs. The packs are formed from flexible film laminate comprising a supporting material and a heat-sealable material at one face of the laminate. Two webs of the film laminate are drawn off from a pair of supply reels 30 so that the heat-sealable faces of the film laminates contact each other and become the inside surfaces of packs. At a first station 32, the two layers of film are sealed together along a pair of side seams 34 which extend generally vertically and have curved upper and lower end portions, as shown in Fig. 4. Fig. 3 shows station 32 just before the seams 34 are formed at this station; accordingly they are shown in chain dotted lines in Fig. 4. After a pair of such seams 34 has been formed, the film is drawn downwardly to bring the seams 34 to the positions indicated 34′. A filling nozzle 36 projects downwardly between these seams. Horizontal sealing is carried out at a second station 42. Sealing at this station occurs across the line 44 shown chain dotted in Fig. 4. It closes one pack and simultaneously forms the bottom of the next pack in succession.

As shown by Fig. 4 the pack 46 which is currently immediately below the station 42 has its bottom closed by seam 44′ formed in a previous cycle of operation. Before sealing takes place at the station 42 this pack 46 is filled with molten soap from the nozzle 36. Filling continues until an excess of soap partially fills the pack 48 above, e.g. up to the level 50. Sealing at the station 42 seals through the soap along the line 44 so forming an airtight seal to close the pack 46. Simultaneously it forms the bottom seam for the pack 48 next in succession. The filled packs are separated by shears 52 cutting horizontally through a previously formed seam 44″.

Machinery for carrying out the process illustrated by Figs. 3 and 4 can be derived from conventional machinery for forming and filling four

sided sealed sachets. Figs. 3 and 4 illustrate a process carried out down a single vertical column but it is feasible to have a number of such columns arranged side by side.

For carrying out a process as illustrated by Figs. 3 and 4 a suitable film material is 50 micron Nylon (polyamide) laminated with a 40 micron layer of Surlyn which is a heat-sealable cross-linked ethylene methacrylate copolymer. The Nylon does not stretch at the temperature (80 °C) of the molten soap.

In a development of this process a further station is included at which the heat-sealable laminate is heated and stretched to a desired shape (while remaining flexible) by introducing air pressure between the two layers of film before a pack is filled with soap.

## Claims

1. Method of casting a material comprising soap, a non-soap detergent or a mixture thereof the method comprising filling the material in a liquid or semi-liquid state into a pack made at least substantially of a flexible film, airtightly sealing the pack while the material is still liquid or semi-liquid allowing the material to set to a substantially solid state and retaining the set material in the pack as an airtight storage means.

2. Method according to claim 1 wherein the pack comprises two layers of its constituent film sealed together along a seam at the boundary of the pack, defining a bag or sachet with an opening through which to fill the material.

3. Method according to claim 1 or claim 2 wherein the material occupies substantially the whole internal volume of the pack.

4. Method according to any one of the preceding claims wherein sealing of the pack is effected by sealing through the material.

5. Method according to any one of the preceding claims including forming the pack immediately prior to filling.

6. Method according to claim 5 wherein the sealing step defines at the same time at least a portion of the next pack to be filled.

7. Method according to any one of the preceding claims wherein sealing of the pack is effected by sealing through an excess of the material to form a seam which seals the pack wholly filled with the material and defines a portion of the boundary of the next pack to be filled.

8. A method according to any one of the preceding claims including distending the pack with internal pressure to shape the pack for obtaining a close fit to the material filled therein.

9. Method according to any one of the preceding claims wherein the pack is heat-extendible.

10. Method according to any one of claims 1 to 9 wherein the pack is heat-shrinkable.

11. Method according to any one of claims 1 to 9 including at least partly shaping the pack prior to filling.

12. Method according to any one of the preceding claims including contacting the exterior of the pack to control the shape of the pack during the setting of the material.

13. Bar, tablet, block, cake or the like of soap, non-soap detergent or mixture thereof airtightly sealed in a pack by a method according to any one of the preceding claims.

Fig.1.

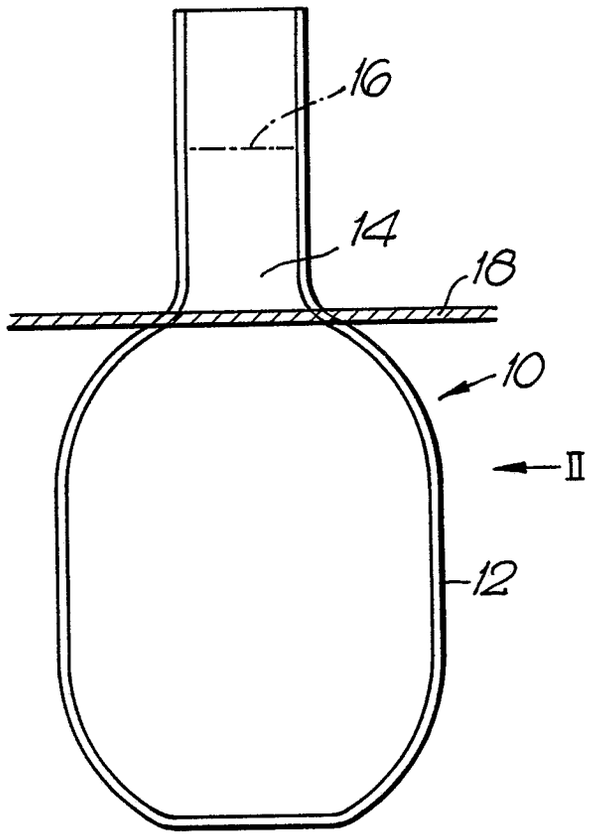



Fig. 2a.

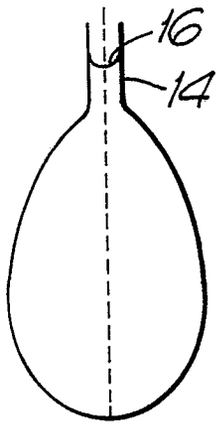



Fig.2b.

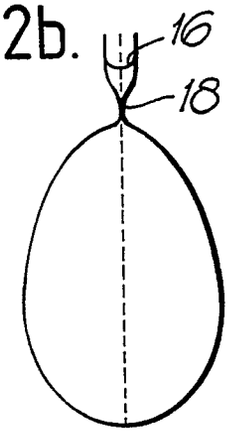



Fig. 2c.

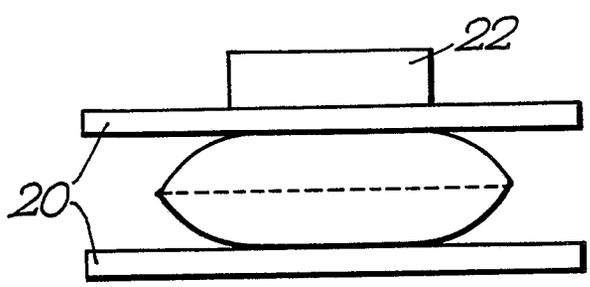



Fig. 2d.

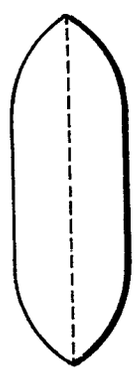


Fig.3.

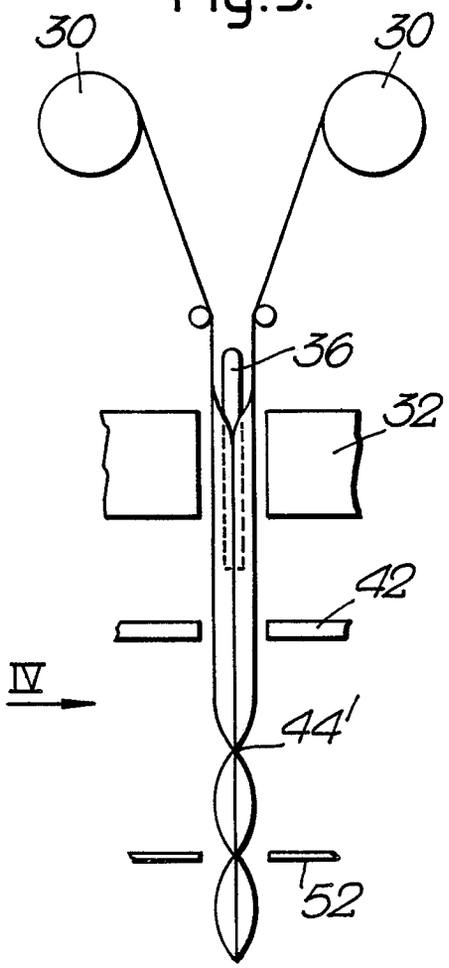
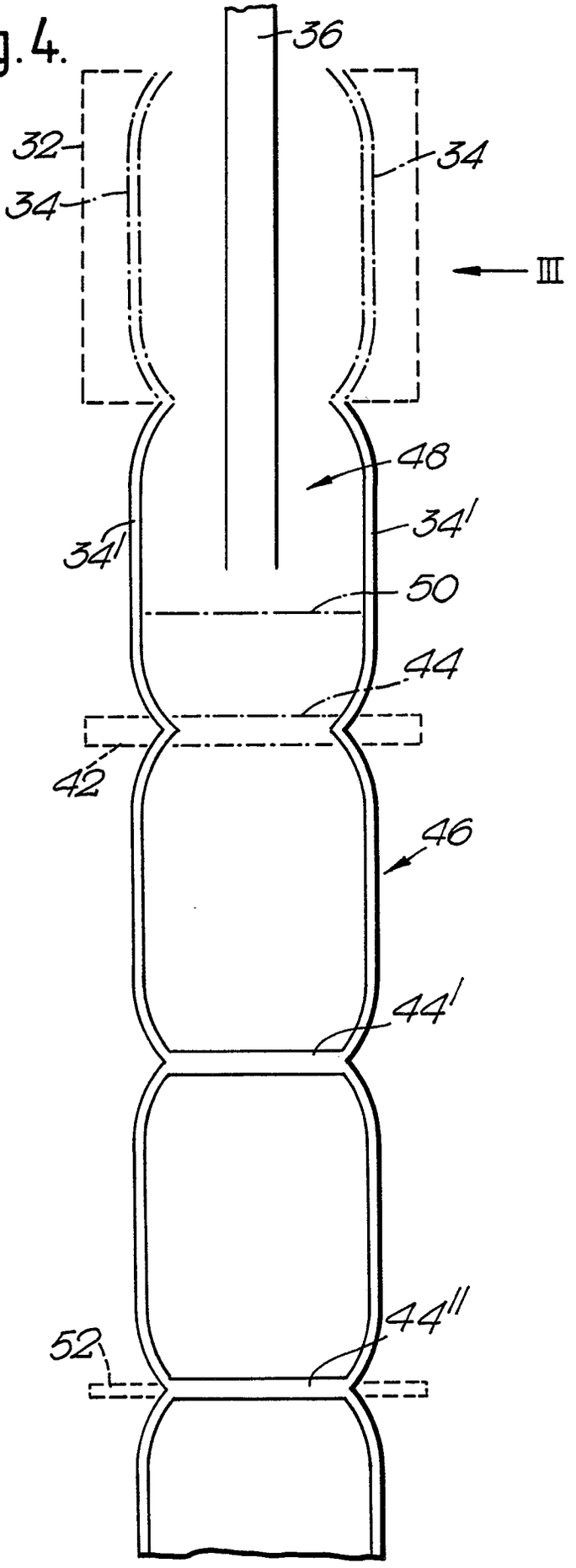



Fig.4.



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# EUROPEAN SEARCH REPORT

Application Number

EP 88 31 1768

## 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.4) |
|---|---|---|---|
| X<br><br>Y | DE-B-1 149 846 (P. SCHMITT)<br>* Column 5, line 47 - column 6, line 20; figure 14 *<br>--- | 1,3,4,7,12,13<br><br>2,6,8-11 | B 65 B 3/04<br>C 11 D 13/16<br>B 65 B 9/02 |
| Y | FR-A-1 064 427 (BODIN et al.)<br>* Whole document *<br>--- | 2,6 | |
| Y | US-A-3 245 197 (S.A. VAN MIL, Jr., et al.)<br>* Column 3, lines 7-10; figures 5,6 *<br>--- | 11 | |
| Y | FR-A-2 332 906 (ROBERT BOSCH GmbH)<br>* Page 3, lines 36-39; figure *<br>--- | 8 | |
| Y | FR-A-1 597 253 (J. FORESTIER)<br>* Page 2, lines 27-32; figure 1 *<br>--- | 9 | |
| Y | US-A-4 090 342 (J.P. RISHEL)<br>* Abstract; figure 1 *<br>--- | 10 | TECHNICAL FIELDS SEARCHED (Int. Cl.4) |
| X | EP-A-0 244 084 (A.C. BALL)<br>* Column 3, lines 47-54; column 7, lines 42-47; claim 2; figure 2 *<br>----- | 1 | B 65 B<br>C 11 D<br>B 65 D |

**The present search report has been drawn up for all claims**

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 13-03-1989 | SCHELLE,J. |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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