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

(11) Publication number: **0 000 824**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **78300222.3**

(22) Date of filing: **01.08.78**

(51) Int. Cl.²: **B 65 D 57/00**, B 65 D 85/34

(30) Priority: **15.08.77 GB 34149/77**

(43) Date of publication of application:
21.02.79 Bulletin 79/4

(84) Designated contracting states:
BE DE FR NL

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(54) Light-weight packages comprising a skeletal container.

(57) A light-weight package (2) comprising a skeletal container (1) formed from a plurality of interconnected self-supporting ribs (3) to (8) and having a sheet material (12) stretched around the container (1), the ends of the sheet material being positively secured to a rib of the container so as to maintain a tension in the sheet material. The tension causes a compressive force to be exerted in the container which causes the container to become more rigid.

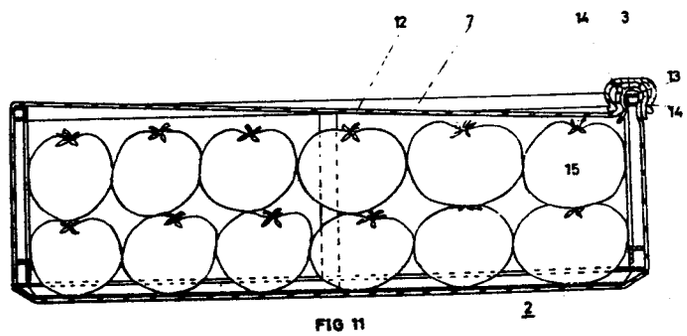

FIG 11

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LIGHT-WEIGHT PACKAGES COMPRISING A SKELETAL CONTAINER

This invention relates to light-weight packages comprising skeletal containers.

It is known to make crates from thermoplastics materials, but such crates need to have thick walls and/or thick reinforcing ribs if they are to be rigid enough for use in transporting soft articles such as fruit and in particular tomatoes. Thick walls and ribs mean that a large volume of thermoplastics material is consumed in making the crate with the result that the crates are heavy and expensive and cannot compete with crates made from compressed paper or low quality wood which are conventionally used by fruit packers.

This invention provides a rigid light-weight package comprising:

a) a skeletal container form from a plurality of interconnected self-supporting thermoplastics ribs dimensioned such that the total volume of thermoplastics material used to make the ribs does not exceed 3% (preferably 1%) of the capacity of the container, and

b) a sheet material having two ends and an intervening portion wherein one end is positively secured to a rib of the container, the intervening portion is stretched around the container and maintained in tension so as to exert a compressive force on the container and the other end is also positively secured to a rib of the container so as to maintain the tension in the sheet material.

Preferably the containers have a capacity of from 500 to 100,000 cm^3 (especially 1000 to 14,000 cm^3).

The sheet material may be any material which is resilient and flexible enough to be stretched around the container and which is strong enough (preferably even when wet) to sustain a tension which exerts a compressive force

on the container. The sheet material may therefore be a woven cloth, a thermoplastics film (especially polyethylene or polyolefin films) or a net (especially a polyethylene or polypropylene net). Nets have the advantage of allowing easy circulation of air into and out of the package.

Positive means are provided to secure the ends of the sheet material to the ribs of the container. For example, the positive means may comprise a layer of adhesive (preferably impact adhesive) which bonds the end of the sheet material either directly onto a rib or indirectly, that is to say the end may be bonded onto a member which is itself fixed to the rib. Alternatively, the adhesive may be replaced by a clip, preferably a clip which makes a tight snap-action fit around the rib. A third possible positive means comprises a series of projections provided on the rib and preferably moulded integrally with the rib. The ends of the sheet material are impaled upon the projections (if the sheet material is continuous) or hooked over the projections (if the sheet material is a net). The projections may be barbed to hinder accidental removal of the sheet material or they may be swaged down onto the sheet material for example using the technique known as ultrasonic staking or by pressing with a hot tool. Barbed projections have the advantage of being simple to use and also being re-usable whereas projections provide a more permanent fastening which makes pilfering more difficult.

The containers and sheet materials are preferably made from aliphatic crystalline polyolefins such as low or high density polyethylene or homopolymers of propylene or copolymers of propylene with from 1 to 20% by weight of ethylene. The copolymers are preferably made by introducing ethylene into the final stages of an otherwise propylene homopolymerisation process. As an alternative

to the copolymers there may be used a homopolymer of propylene blended with up to 10% by weight of a rubber. Suitable rubbers include butyl rubbers, polyisoprenes and the rubbery copolymers of ethylene with 30 to 70% by weight (based on the ethylene) of propylene and optionally up to 8% by weight (based on the weight of the ethylene) of a non-conjugated diene.

The preferred aliphatic crystalline polyolefins preferably have a melt flow index of from 0.5 to 40 g/10 minutes when measured according to British Standard 2782:Part 1/105C/1970 using a 2.16 kg load and carried out at 230°C in the case of predominantly propylene polymers and at 190°C for all other polyolefins.

A preferred embodiment of the invention will now be described with reference to the drawings in which:

Figure 1 shows a side elevation of a container used to make a package according to this invention.

Figure 2 shows an end elevation of the container shown in Figure 1.

Figure 3 shows a plan view of the base of the container shown in Figures 1 and 2.

Figure 4 shows on a larger scale a section taken on the line A-A of Figure 1 or 2 or E-E of Figure 1.

Figure 5 shows a section taken on the line C-C of Figure 1.

Figure 6 shows a section taken on the line D-D of Figure 1.

Figure 7 shows a section taken on the line B-B of Figure 2.

Figures 8 to 10 show on an even larger scale modifications to the section taken on the line A-A of Figure 1 (as shown in Figure 4).

Figure 11 shows a package incorporating the container shown in Figures 1 to 3.

Figures 1, 2 and 3 show a light-weight container 1 suitable for use in a package 2 as shown in Figure 11. Container 1 comprises opposed longitudinal walls defined by horizontal longitudinal ribs 3 and 4 and uprights 5 and also end walls defined by uprights 5 and horizontal transverse ribs 7 and 8. Ribs 3 and 4 and ribs 7 and 8 are reinforced by braces 6. The base of container 1 is defined by longitudinal ribs 4 and transverse ribs 8 reinforced by cross-braces 9a and 9b. Feet 10 are provided at each corner of the base to assist in aligning the base of a stacked container with the top of the container beneath.

Ribs 3 and 7 and ribs 4 and 8 have sections as shown in Figures 4 and 5 respectively. Uprights 5 have horizontal sections as shown in Figure 6 and are provided with horizontal reinforcing flanges 11. Braces 6 have a horizontal section which is the same as the vertical section of ribs 3 as shown in Figure 4. Cross-braces 9a and 9b have vertical sections as shown in Figure 7.

Container 1 is used to form package 2 as shown in Figure 11. Package 2 consists of net 12 stretched around container 1. The ends 13 and 14 of net 10 are securely clipped onto longitudinal rib 3 by a snap-action clip 14. Net 12 is clipped onto rib 3 in such a way as to ensure net 12 is in tension so that it exerts a compressive force on container 1.

It has been found that provided net 12 exerts a compressive force on container 1, the package 2 has sufficient rigidity for it to be used in the transport of tomatoes 15 even though the total volume of thermoplastics material used in making the container is less than 3% of the capacity of the package.

Figure 8 shows an alternative method of securing net 12 to rib 3. Rib 3 is provided with an integral barbed projection 20 onto which net 12 is hooked.

Figures 9 and 10 show a further alternative method of securing net 12 onto rib 3. Rib 3 is provided with an integral projection 21 over which net 12 is hooked. Projection 21 is then swaged down onto net 12 using an ultrasonic or heat-staking technique so as to produce a mushroomed stake 22.

Clearly the sheet wrapping material should be long enough to wrap around the container and wide enough to enclose at least a major part (preferably at least 95%) of those faces of the container which are parallel to the axis of the wrapped-around sheet material. More preferably the sheet wrapping material should be wide enough to allow its longitudinal edges to be folded inwardly of the package to protect faces of the container which are not parallel to the axis of the wrapped-around sheet material.

CLAIMS

1. A rigid light-weight package comprising:

a) a skeletal container formed from a plurality of interconnected self-supporting thermoplastics ribs dimensioned such that the total volume of thermoplastics material used to make the ribs does not exceed 3% of the capacity of the container, and

b) a sheet material having two ends and an intervening portion characterised in that one end of the sheet is positively secured to a rib of the container, the intervening portion of the sheet is stretched around the container and maintained in tension so as to exert a compressive force on the container and the other end of the sheet is also positively secured to a rib of the container so as to maintain the tension in the sheet material.

2. A package according to claim 1 wherein the sheet material is positively secured to a rib by means of a clip.

3. A package according to claim 3 wherein the clip is a snap-action clip.

4. A package according to claim 1 wherein the sheet material is positively secured to a rib by being impaled onto a series of projections provided on the rib.

5. A package according to claim 4 wherein the ends of the projections are swaged down onto the impaled sheet material to provide a more permanent fastening.

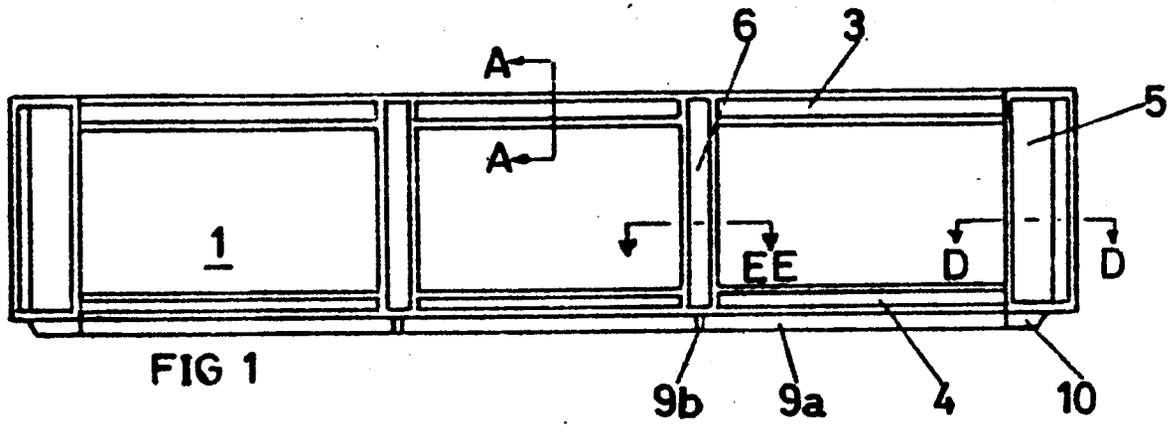

FIG 1

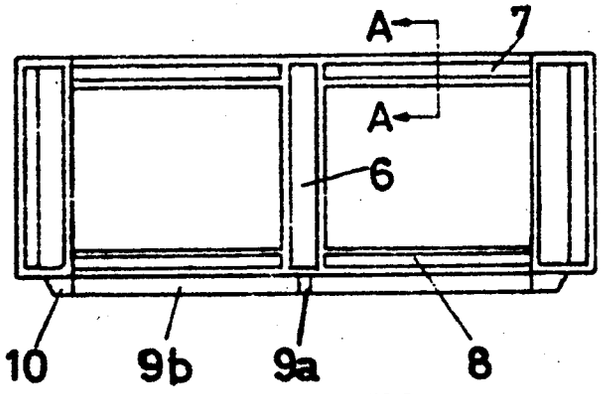

FIG 4

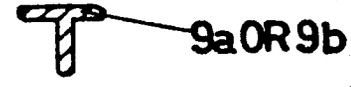

FIG 7

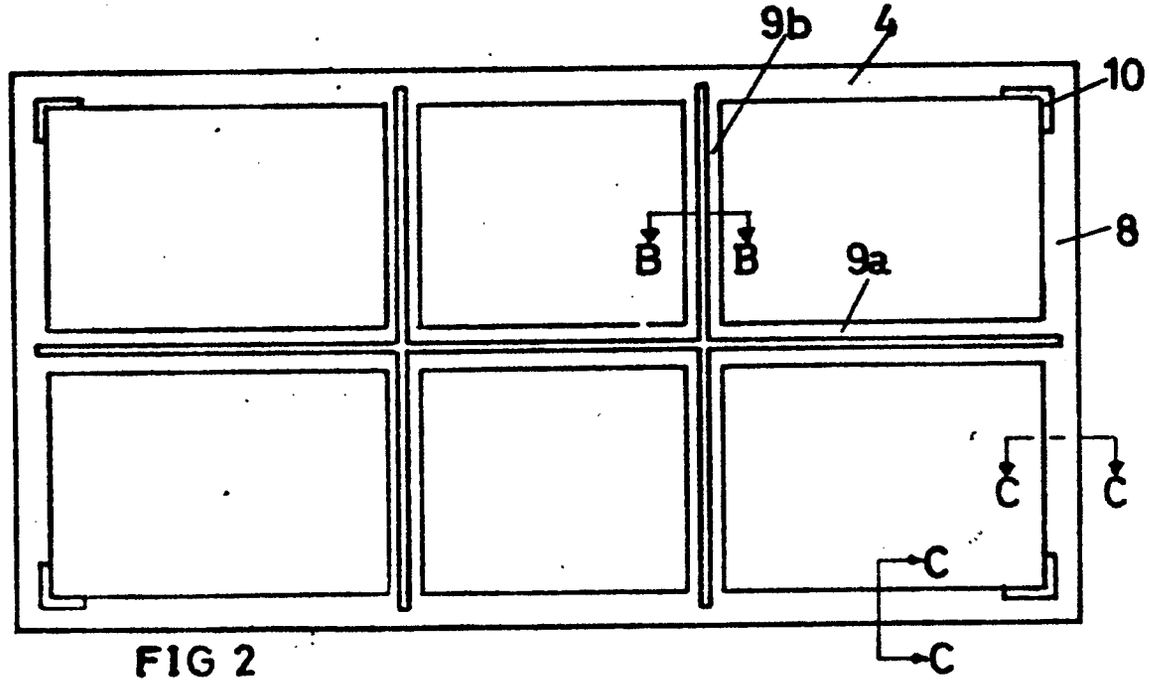

FIG 2

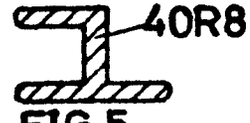

FIG 5

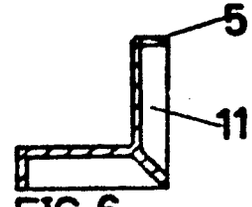

FIG 6

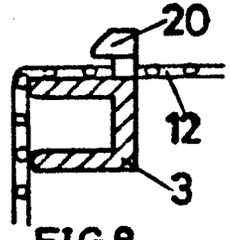

FIG 8

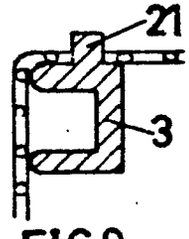

FIG 9

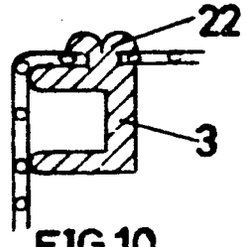

FIG 10

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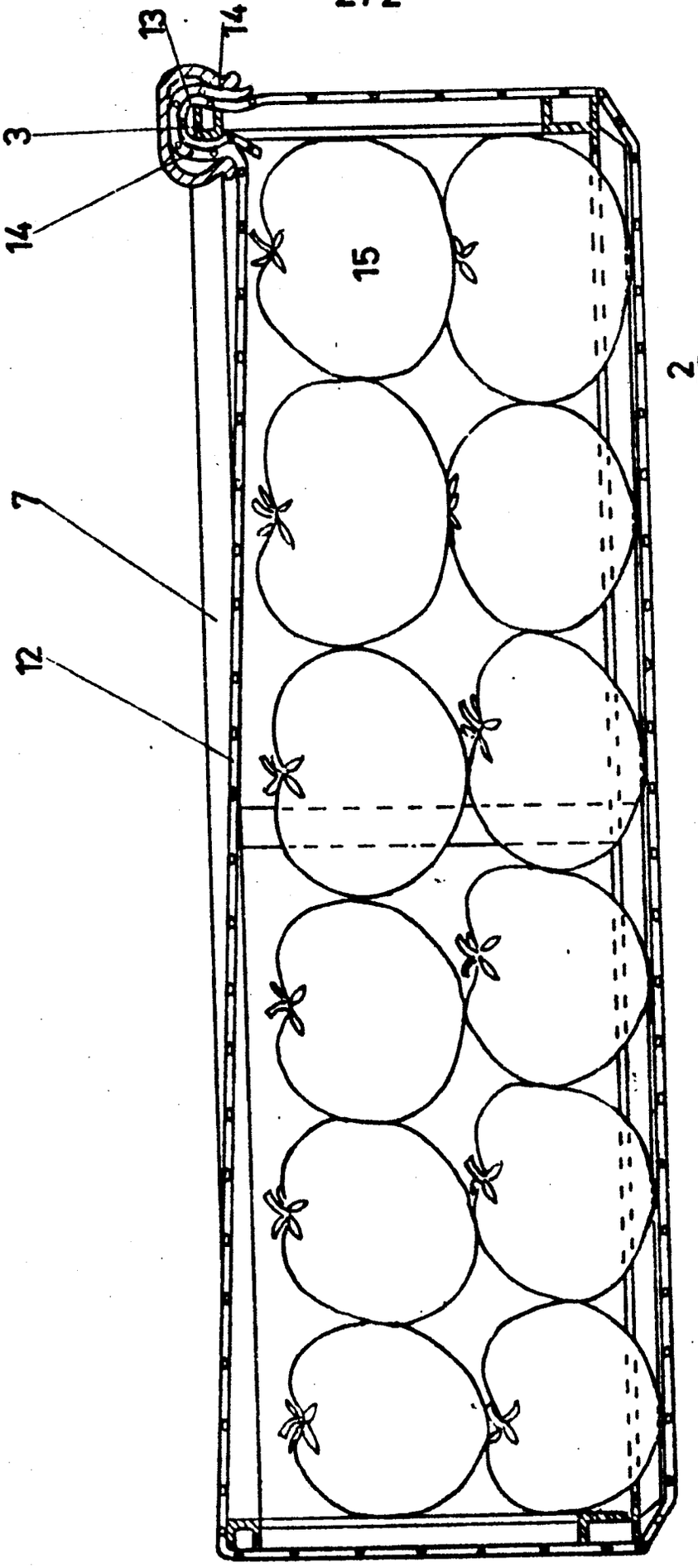

FIG 11

European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 78 30 0222

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	DE - C - 1171812 (CEFERINO POLO SARA) * Column 2, line 50 - column 3, line 23; column 3, line 56 - column 4, line 32; figures 1 and 2 *	1
	US - A - 2 106 425 (H.G. GRANT) * Page 1, right-hand column, line 13 - page 2, left-hand column, line 43; figures 1-4 *	1
	FR - A - 1 457 980 (S. HAMMER A/S PAPIRINDUSTRI) * Page 1, right-hand column, line 18 - page 2, left-hand column, line 54; figures 1-4 *	1
E	US - A - 4 047 550 (W.A. SCHOLTZ) * Column 3, line 27 - column 4, line 39; figures 1-4 *	1

CLASSIFICATION OF THE APPLICATION (Int. Cl.²)

B 65 D 57/00
B 65 D 85/34

TECHNICAL FIELDS SEARCHED (Int.Cl.²)

B 65 D 57/00
B 65 D 85/34
B 65 D 29/00
B 65 D 29/04
B 65 D 33/02
B 65 D 77/04

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	07-11-1978	MARTENS

EPO Form 1503.1 06.78