

12

EUROPEAN PATENT APPLICATION

21 Application number: 84300295.7

51 Int. Cl.³: **D 21 H 5/00**
//B65D65/00

22 Date of filing: 18.01.84

30 Priority: 26.01.83 GB 8302166

43 Date of publication of application:
22.08.84 Bulletin 84/34

84 Designated Contracting States:
AT BE CH DE FR GB IT LI NL

71 Applicant: **The Wiggins Teape Group Limited**
P.O. Box 88 Gateway House Basing View
Basingstoke Hampshire RG21 2EE(GB)

72 Inventor: **Inglis, Bruce Reynolds**
15 Moorlands West Hill
Ottery St. Mary Devonshire(GB)

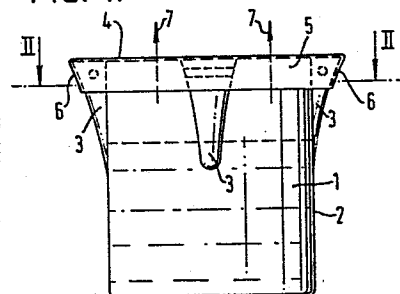
72 Inventor: **Drew, Quentin Miles**
14 Spurway Road
Tiverton Devon(GB)

74 Representative: **Bridge-Butler, Alan James et al,**
G.F. REDFERN & CO. High Holborn House 52/54 High
Holborn
London WC1V 6RL(GB)

54 Paperlike sheet materials.

57 A thermally formable paperlike sheet material comprising at least 25% synthetic thermoplastics material a substantial proportion of which is fibrillated, with at least a substantial portion of the balance 100% being of cellulosic fibres, said sheet having a thickness of less than 140 microns and being treated to exhibit a minimum tensile strength along a first axis of 12 Newtons, and along a second axis at right angles to the first axis of 8 Newtons, per 25 millimetres of width transverse to the respective axis, and a permeability to air of less than 100,000 cubic centimetres per minute through an area of 10 square centimetres and at a pressure of 10 centimetres water gauge. Such sheet material finds particular application for use as wrappers or in forming sealed closures (4) for containers (2) having convoluted surfaces (3) and which hold materials (1) like freshly ground coffee which are required to breathe (7) without being exposed to ambient conditions.

FIG. 1.



PAPERLIKE SHEET MATERIALS

This invention relates to paperlike sheet materials.

In particular, the invention is concerned with thin membranous sheet materials which can be formed into non-planar configurations under the influence of heat whilst maintaining a low but finite permeability to air. It is also sometimes desirable that such materials should also have paperlike matt surface characteristics facilitating adhesion when using conventional adhesives.

10 The invention is additionally concerned with such membranous sheet material, which when adhered to another surface, or perhaps to itself in overlapping relation, is required to not significantly affect the apparent smoothness of the surfaces at the zone of overlap.

15 Such sheet material finds particular application for use as wrappers or in forming sealed closures for containers having convoluted surfaces and which hold materials required to "breathe" without being generally exposed to ambient conditions. Freshly ground coffee, for example, exhibits this characteristic. The capacity of the sheet to accept thermal deformation assists in configuring the closure to the container or the wrapper whilst maintaining the desired permeability. At the same time, because the material has a paperlike matt surface, the adhesives conventionally used in the packaging industry can be used to secure the closure or wrapper. The material can also be used as a moisture resistant air filtration element which is odour free, in contradistinction to conventional elements made of cellulosic paper, which are necessarily impregnated with resins such as melamine or urea formaldehyde to achieve wet strength.

20

25

30

In one aspect therefore, the invention provides a thermally formable paperlike sheet material comprising at least 25% synthetic thermoplastic material, a substantial proportion of which is fibrillated, with at least a substantial proportion of the balance to 100% being of cellulosic fibres, said sheet having a thickness of less than 140 microns and being treated to exhibit a minimum tensile strength along a first axis of 12 Newtons, and along a second axis at right angles to the first axis of 8 Newtons, per 25 millimetres of width transverse to the respective axis, and a permeability to air of less than 100,000 cubic centimetres per minute through an area of 10 square centimetres and at a pressure of 10 centimetres water gauge.

The foregoing tensile strength may be achieved by heat and/or pressure consolidation or by coating with a binder or a film forming material such as polyvinyl alcohol or polyvinyl acetate, or by a combination of such consolidation and coating.

By limiting the thickness of the sheet material of the invention to 140 microns it can be adhered to another surface, or perhaps to itself, in overlapping relationship without substantially affecting the apparent smoothness at the zone of overlap.

Preferably, the content of synthetic thermoplastic material is at least 30%. Pigments or fillers may also be included if required.

In another aspect, the invention provides a method of making a paperlike sheet as above defined, using an aqueous dispersion of solid material comprising at least 25% synthetic thermoplastic material, a substantial proportion of which is fibrillated with at least a substantial proportion of the balance to 100% being of cellulosic fibres, which dispersion is formed into a web, pressed and dried and then

treated so as to confer thereon the thickness tensile strength and permeability as above defined. The heating of the web is preferably effected by infra-red heating. Such treatment may comprise consolidation by heat and/or pressure coating with a binder or a film forming material such as polyvinyl alcohol or polyvinyl acetate, or a combination of such consolidation and coating.

Preferably, the sheet material comprises from 50% to 95% synthetic thermoplastic material. Still more preferably the sheet material comprises 75% synthetic thermoplastic material, at least 80% of which is fibrillated. The synthetic thermoplastic material may, for example, be constituted by a polyolefin such as polyethylene or polypropylene. Synthetic thermoplastic particulate material may be included to supplement the fibrillated material.

The cellulosic fibres may for example be of bleached softwood sulphate or sulphite or cotton linters. Loadings of papermaking additives such as titanium dioxide or calcium carbonate may also be included.

Heat consolidation provides an effective method of reducing the permeability of the sheet material of the invention without significantly affecting its paper like character. With material containing fibrillated material of lower melting points, such as polyethylene, permeability can be reduced substantially to zero by heat consolidation alone.

For material containing fibres of higher melting points, such as polypropylene, such low levels of permeability are not always obtainable by heat consolidation alone without affecting the paper like characteristics. In such cases, after heat consolidation to achieve the required tensile strength, the permeability is further reduced as required by sizing with materials such as polyvinyl alcohol or polyvinyl acetate.

Alternatively, pressure consolidation may be used, pressure being applied for example by means of a paper machine calender, to achieve the same result.

5 The invention will now be further described in use with reference to the accompanying drawings and in the Examples which follow. In the drawings :

Figure 1 is a side elevation, partly in section of a container for material which is required to breathe, and

10 Figure 2 is a plan view on the line II-II of Figure 1.

Referring to the drawings a material 1 which slowly generates a gas as a by-product, is held in a container 2. The container 2 is formed with apertured lugs 3 which
15 facilitate handling, but which confer a convoluted outer configuration on the container.

The container 2 is sealed by a closure 4 of material according to the invention. The closure 4 is heat moulded so as to envelop the upper edge 5 of the container and the lugs
20 3 to provide an effective seal. Conventional adhesives such as polyvinyl acetate can be used to adhere the closure to the container at the peripheral portion 6 of the closure.

It will be seen that the closure is effective to seal the
25 contents 1 from exposure to ambient conditions whilst permitting the slow release of any gas generated as indicated by the arrows 7.

The examples are set out in the Tables which follow.

In Table I, each Example relates to a sheet material which has been made by dispersing the specified furnish in water, forming, pressing and drying a fibrous web derived from the furnish on a Fourdrinier paper machine and subjecting the dried web to infra-red heating to effect consolidation. In the case of Example 7, the sheet was additionally surface coated with polyvinyl acetate.

Other surface coatings which may be used for controlling the permeability are :

- 10 Poly(vinylalcohol)
- Poly(vinylacetate)
- Plasticised starch derivatives (e.g. starch ether/glycerol/antihumectant)
- Poly(vinylidenechloride)
- 15 Plasticised alginates/carboxymethyl cellulose
- Pigmented slurries bound by any of the above.

The sheet materials of Examples 1 to 12 were found to perform satisfactorily in the formation of container closures as described above with reference to Figures 1 and 2.

In Table II, each Example relates to a sheet material made in the same manner as the sheets of Examples 1 to 6, except for the heat consolidation step. In the case of the Examples of Table II consolidation was affected by passing the sheet twice through a paper machine calender.

TABLE I

EXAMPLES	FURNISH		POST CONSOLIDATION TENSILE STRENGTH (NEWTONS/25mm WIDTH)		POST CONSOLIDATION PERMEABILITY (cc/min/10cm ² at 10 cms W.G.)	GRAMMAGE (gms/m ²)	POST CONSOLIDATION THICKNESS (MICRONS)
	SYNTHETIC PULP %	CELLULOSIC PULP %	MACHINE DIRECTION	CROSS DIRECTION			
1	50% SOLVAY PULPEX E (POLY-ETHYLENE)	50% STORA 32	34	24	600	37	90
2	(((75% (SOLVAY (PULPEX E ((POLY- (ETHYLENE) (((	(((25% STORA 32 (((	34	19	30	36	90
3	((75% (SOLVAY (PULPEX E ((POLY- (ETHYLENE) (((	(((25% STORA 32 (((	28	17	500	30	75
4	((75% (SOLVAY (PULPEX E ((POLY- (ETHYLENE) (((	(((25% STORA 32 (((	29	18	250	37	82
5	((75% (SOLVAY (PULPEX E ((POLY- (ETHYLENE) (((	(((25% STORA 32 (((	36	22	160	38	85
6	((75% (SOLVAY (PULPEX E ((POLY- (ETHYLENE) (((	(((25% STORA 32 (((	37	17	100	45	99
7	75% SOLVAY PULPEX P (POLY-PROPYLENE)	25% STORA 32	15	9	780 (after sizing with polyvinyl acetate)	35	134
8	(75% SOLVAY (PULPEX PADC (+ YELLOW (IRON OXIDE (PIGMENT	25% STORA 32	9	7	4700	33	102

TABLE II

EXAMPLES	FURNISH		POST CONSOLIDATION TENSILE STRENGTH (NEWTONS/25MM WIDTH)		POST CONSOLIDATION PERMEABILITY (cc/min/10cm ² at 10 cms W.G.)	GRAMMAGE (gms/m ²)	POST CONSOLIDATION THICKNESS (MICRONS)
	SYNTHETIC PULP % (SOLVAY PULPEX PADC)	CELLULOSIC PULP % STORA 32	MACHINE DIRECTION	CROSS DIRECTION			
9	60	40	23	14	170	35	58
10	60	40	23	13	270	38	65
11	50	50	32	16	390	39	68
12	(60 (+ YELLOW (IRON OXIDE (PIGMENT	40	25	14	<20	33	63

CLAIMS

1. A thermally formable paperlike sheet material comprising at least 25% synthetic thermoplastics material a substantial proportion of which is fibrillated, with at least
5 a substantial portion of the balance to 100% being of cellulosic fibres, said sheet having a thickness of less than 140 microns and being treated to exhibit a minimum tensile strength along a first axis of 12 Newtons, and along a second axis at right angles to the first axis of 8
10 Newtons, per 25 millimetres of width transverse to the respective axis, and a permeability to air of less than 100,000 cubic centimetres per minute through an area of 10 square centimetres and at a pressure of 10 centimetres water gauge.
2. A thermally formable paperlike sheet material as
15 claimed in claim 1 in which the tensile strength is achieved by heat and/or pressure consolidation.
3. A thermally formable paperlike sheet material as claimed in claim 1 in which the tensile strength is achieved by coating with a binder or a film forming material.
- 20 4. A thermally formable paperlike sheet material as claimed in claim 3 in which the binder or film forming material is polyvinyl alcohol or polyvinyl acetate.
5. A thermally formable paperlike sheet material as
25 claimed in claim 3 or claim 4 in which the tensile strength is achieved by a binder or a film forming material in combination with heat and/or pressure consolidation.
6. A thermally formable paperlike sheet material as claimed in any one of the preceding claims in which the content of synthetic thermoplastics material is at least 30%.

7. A thermally formable paperlike sheet material as claimed in any one of the preceding claims in which pigments or fillers are included.
8. A thermally formable paperlike sheet material as
5 claimed in any one of the preceding claims comprising from 50% to 95% synthetic thermoplastic material.
9. A thermally formable paperlike sheet material as claimed in claim 8 comprising 75% synthetic plastics material, at least 80% of which is fibrillated.
- 10 10. A thermally formable paperlike sheet material as claimed in any one of the preceding claims in which the synthetic plastics material is constituted by a polyolefin.
11. A thermally formable paperlike sheet material as
15 claimed in claim 10 in which the polyolefin is polyethylene or polypropylene.
12. A thermally formable paperlike sheet material as claimed in any one of the preceding claims in which synthetic thermoplastics particulate material is included to supplement the fibrillated material.
- 20 13. A thermally formable paperlike sheet material as claimed in any one of the preceding claims in which the cellulosic fibres are of bleached softwood sulphate or sulphite or cotton linters.
14. A thermally formable paperlike sheet material as
25 claimed in any one of the preceding claims including loadings of papermaking additives.
15. A thermally formable paperlike sheet material as claimed in claim 14 in which the additives are titanium dioxide or calcium carbonate.

16. A thermally formable paperlike sheet material having the characteristics set forth in accompanying Examples 1 to 12.

17. A thermally formable paperlike sheet material substantially as described herein.

18. A method of making a thermally formable paperlike sheet material as set forth in any one of the preceding claims 1 to 17 which includes using an aqueous dispersion of solid material comprising at least 25% synthetic thermoplastics material, a substantial proportion of which is fibrillated with at least a substantial proportion of the balance to 100% being cellulosic fibres, which dispersion is formed into a web, pressed and dried and then treated so as to confer thereon the thickness, tensile strength and permeability as defined in claim 1.

19. A method as claimed in claim 18 in which the said treatment includes consolidation by heat and/or pressure, coating with a binder or a film forming material, or a combination of such consolidation and coating.

20. A method as claimed in claim 19 in which the binder or film forming material is polyvinyl alcohol or polyvinyl acetate.

21. A method of making a thermally formable paperlike sheet material substantially as described herein.

1/1

FIG. 1.

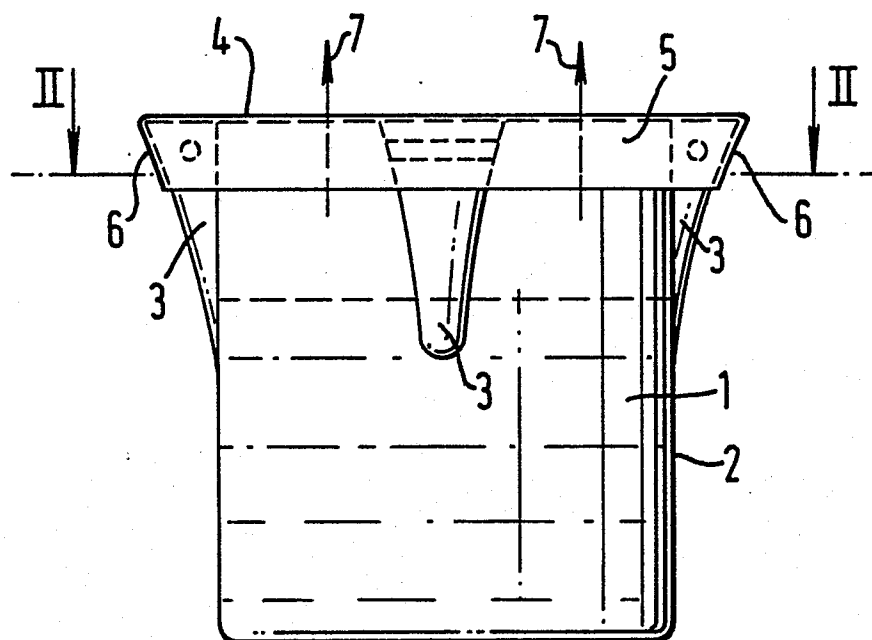
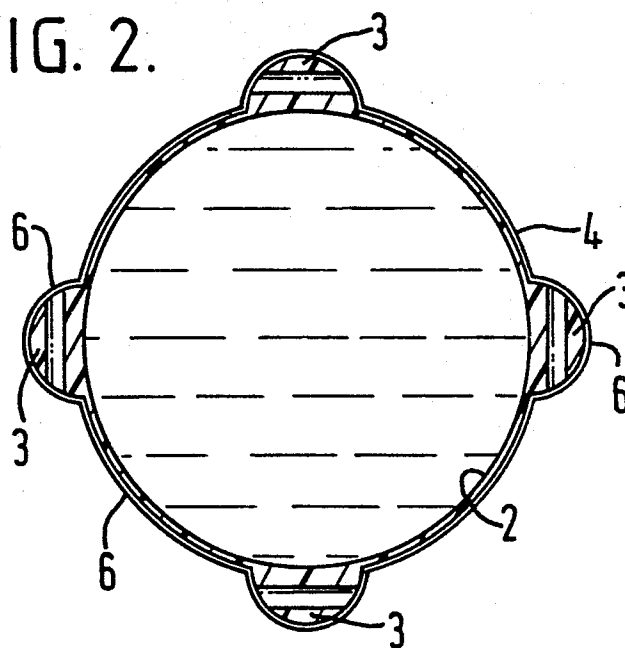


FIG. 2.





European Patent
Office

EUROPEAN SEARCH REPORT

0116414

Application number

EP 84 30 0295

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. 3)
A	DE-A-2 344 367 (F. SCHOELLER JUN.) * Pages 3-5; page 6, first paragraph *	1-3, 5, 6, 10-14, 18, 19, 21	D 21 H 5/00 B 65 D 65/00 //
A	DE-A-2 358 506 (MITSUBISHI PAPER MILLS) * Claims 1-3; pages 4-12 *	1-3, 5, 6, 8-14, 18, 19, 21	
A	GB-A-1 491 937 (MONTEDISON) * Whole document *	1, 2, 6, 12, 14, 15, 18, 19, 21	
A	GB-A-1 453 503 (SOLVAY) * Whole document *	1, 2, 6, 7, 10-15, 18, 19, 21	B 65 D D 21 H
A	FR-A-2 169 197 (CROWN ZELLERBACH) * Claims 1-11, 14-17; pages 1, 11; example *	1, 2, 6, 8-11, 18, 19, 21	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26-04-1984	Examiner NESTBY K.
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	



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. 3)
A	GB-A-1 189 269 (ETHYLENE-PLASTIQUE) * Page 1, lines 8-58 *	1,3,18 ,19,21	
A	GB-A-1 155 823 (ZELLSTOFFFABRIK WALDHOF) * Page 1; page 2, lines 26-35,80-90 *	1,3,4 18-21	
A	US-A-3 298 855 (A.F. HELIN et al.) * Whole document *	1,3,4 18-21	
A	US-A-3 029 940 (S. LAGERGREN) * Column 2, lines 3-72; column 5, lines 7-24 *	1,3,4 18-21	
A	V. STANNETT et al.: "Permeability of plastic films and coated paper to gases and vapors", Tappi Monograph Series no. 23, 1962, Technical Association of the Pulp and Paper Industry, New York, US * Pages 39-48 (Part IV. Effect of a Paper Substrate)	1,3,18 ,19,21	
A	EP-A-0 011 488 (WIGGINS TEAPE)		TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26-04-1984	Examiner NESTBY K.
CATEGORY OF CITED DOCUMENTS		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	
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			



DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	CH-A- 99 775 (MEISTER, THOMI & BÜHLER) -----	
		CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
		TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
The present search report has been drawn up for all claims		
Place of search THE HAGUE	Date of completion of the search 26-04-1984	Examiner NESTBY K.
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		