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B5A AB14 ANA ANC A1R314C1C A2E12B A2E7A
A2E8 A2L A20T1 A20T14 A20T16(56) Documents cited
GB 2138734 A GB 2087784 A GB 1315482 A
GB 1197727 A GB 1193681 A GB 1140368 A
GB 0642913 A GB 0482913 A EP 0412493 A
EP 0164822 A EP 0094268 A(58) Field of search
UK CL (Edition K) B5A AB14 AB19 AB2 ANA ANC
AT14E AT14P
INT CL⁵ B29C

(54) Moulding against a shape or surface imparting film liner

(57) A film-like layer (216) is held between the mould parts (10, 12) and plastics material is injected thermoformed, or compressed in the mould against the film, causing the film to be urged against an adjacent surface 19 of the mould which is of different shape or surface texture to that of the film, to impart to the moulded plastics material a surface of the form of the film which differs from that which would be otherwise imparted by the adjacent mould surface (219). The film may be removed from, or remain as part of the moulded article, and may be a smooth surface, or may be pre-painted if remaining on the article.

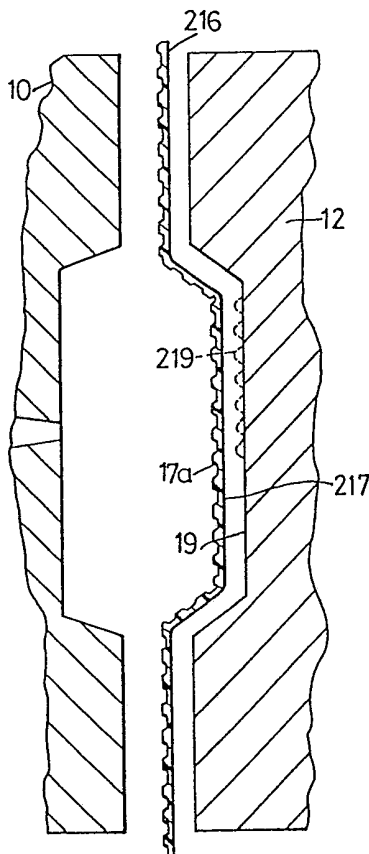


Fig. 5

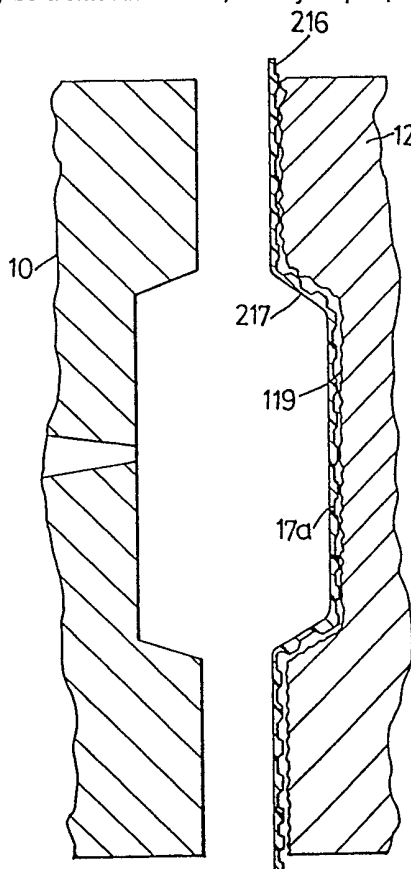


Fig. 6

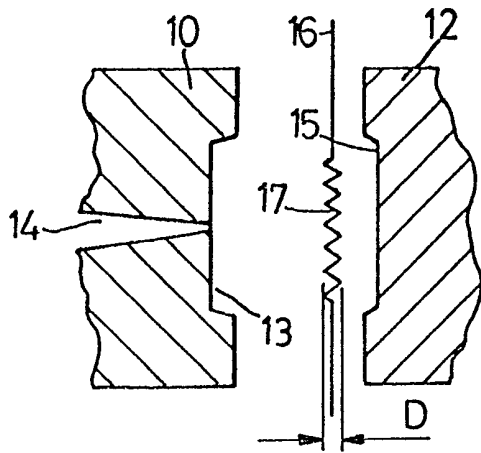


Fig. 1

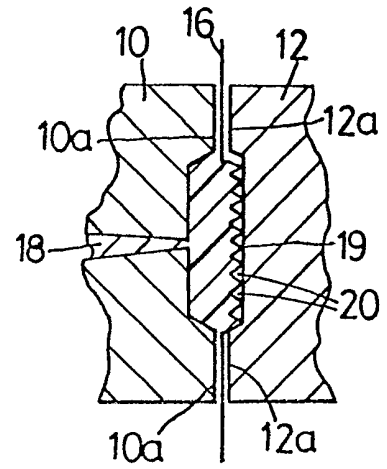


Fig. 2

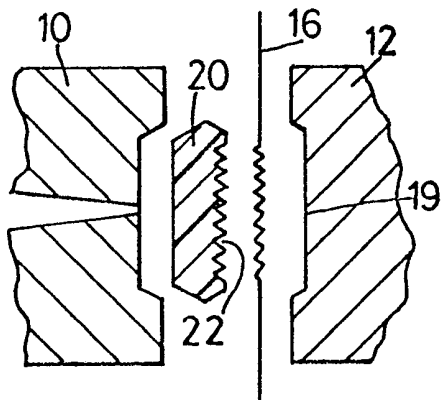


Fig. 3

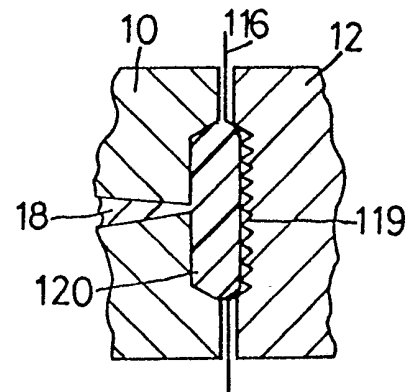


Fig. 4

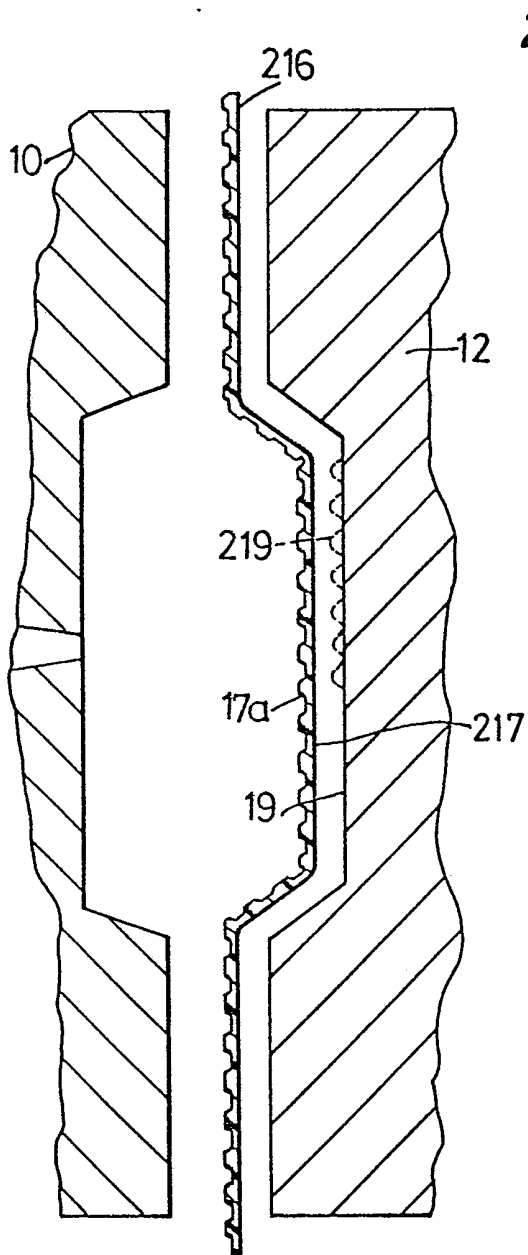


Fig. 5

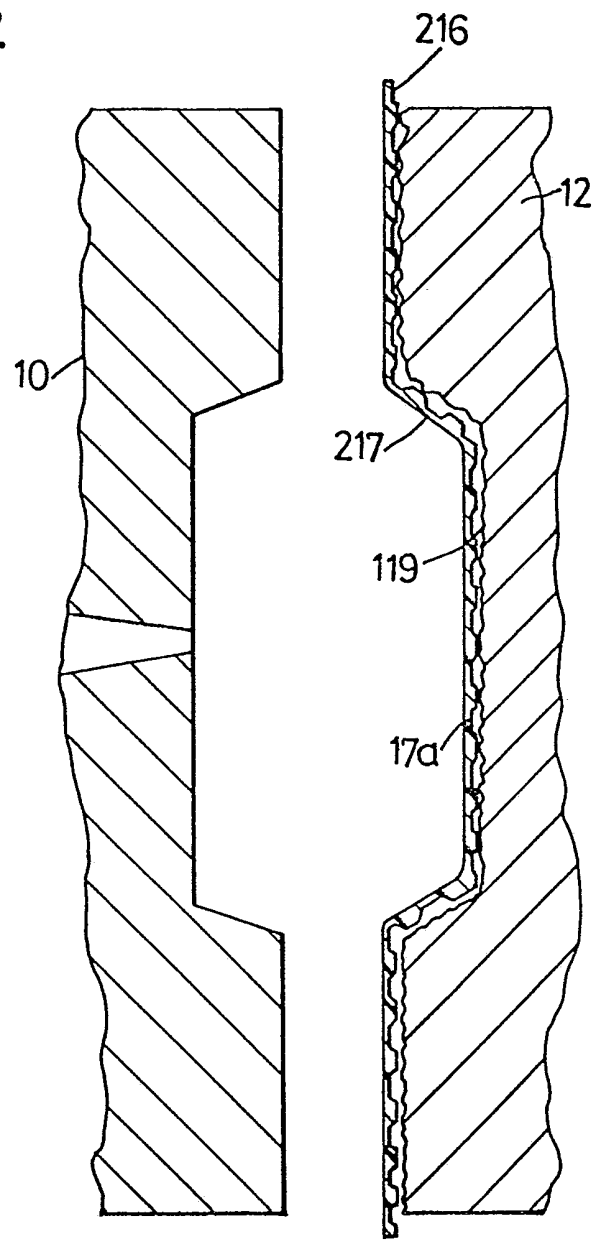


Fig. 6

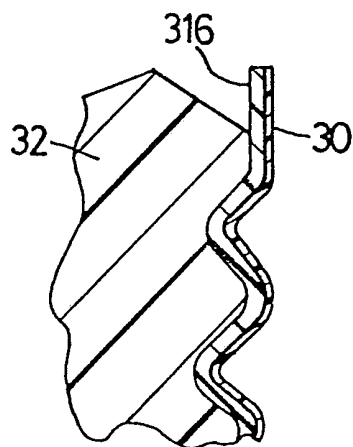


Fig. 7

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A METHOD OF MOULDING, A MOULD FOR USE IN
SUCH A METHOD AND A COMPONENT MADE BY SUCH A METHOD

The invention relates to a method of moulding to a
mould for use in such a method and to a component
made by such a method. The invention is
particularly, but not exclusively, concerned with
5 injection moulding.

Injection moulding of thermoplastics components is
well known and components formed in that way can have
an excellent surface finish. The surface finish
itself is dictated by the mould surface against which
10 the thermoplastics material is moulded. Where, for
example, a fine surface pattern comprising closely
spaced surface irregularities is required, it is
necessary for the appropriate surface of the mould to
be engraved in order to impart the necessary texture
15 to the surface of the component and such engraving is
expensive. Clearly, where many different types of
surface texture are required, production of
respective moulds can be extremely expensive.

One object of the present invention is to provide a
20 method of moulding which can improve the versatility
of a mould and, in particular, which will enable a
single mould to be used to provide a plurality of
different surface finishes. Another object of the
present invention is to provide a mould for use in

such a method.

According to one aspect of the invention there is provided a method of moulding comprising providing a mould, inserting into the mould a film-like layer of material and introducing mouldable material under pressure into the mould against the film-like layer so as to urge the film-like layer against an adjacent surface of the mould, the surface of the film-like layer against which the mouldable material is moulded and the adjacent surface of the mould being of different surface form whereby the film-like layer imparts to the material a surface shape which is different from that which would otherwise be imparted by the said adjacent surface of the mould.

By using such a method, a single mould can be used to provide a minimum of two different surface textures to the moulded material, the first being provided by the mould itself and the second being provided by the mould with the film-like layer positioned therein.

If desired, the film-like layer may have an embossed surface formation which will be substantially imparted to the surface of the moulded material. By providing a number of film-like layers having various types of embossed surface patterning, a single mould can be used to produce a large number of components

having different surface patterning simply by using the appropriate film-like layer in the mould.

Where an embossed surface formation is provided on the film-like layer, the invention may include
5 providing a mould where the said adjacent surface is substantially smooth.

In another example, the said adjacent surface of the mould may be formed to define a given surface pattern and the method may include inserting into the mould a
10 said film-like layer of material which will impart a substantially smooth surface finish to the mouldable material and not the given surface pattern which would otherwise be imparted by the said adjacent surface of the mould.

15 In a further example the said adjacent surface of the mould may be formed to define a given surface pattern and the method may include inserting into the mould a film-like layer of material which will impart a surface pattern to the mouldable material which is
20 different from the surface pattern of said adjacent surface.

The method may include injecting the mouldable material into the mould and, in such a case, the mouldable material may conveniently comprise a

thermoplastics type. However other moulding methods and appropriate mouldable materials may be used.

The mould may comprise at least two parts and the method may then include introducing the film-like layer into the mould with the two parts separated and closing the two parts together with the film-like layer in place prior to introducing the mouldable material.

The film-like layer may comprise a suitable nylon material.

After moulding the material, a component formed by the mouldable material will be removed from the mould and the method may include leaving the film-like layer in the mould for a subsequent moulding operation or removing the film-like layer from the component taken out of the mould. In the latter case, the removed film-like layer of material can be discarded or inserted into the mould again for a subsequent moulding operation.

Alternatively, the method may include removing from the mould a component formed by the mouldable material and leaving the film-like layer in position on the component to provide a desired finish. In that way the component can be formed with both a

desired surface shape and finish, e.g. colour or colours, by the film. The film may have a surface coating which provides the finish, e.g. a paint. The surface finish may be on the outside surface of the film on the component.

According to another aspect of the invention there is provided a mould for use in a method according to the first aspect of the present invention or any of the consistory clauses relating thereto, the mould having said film-like layer of material therein for imparting to the mouldable material a surface form which is different from that which would otherwise be imparted by the said adjacent surface of the mould.

According to a further aspect of the invention, there is provided a component made by a method according to the first aspect of the invention or any of the consistory clauses relating thereto.

A method of moulding, a mould for use in such a method and a component made therewith in accordance with the invention will now be described by way of example with reference to the accompanying drawings in which:-

Fig.1 is a diagrammatic cross section through one form of mould in accordance with the invention shown

with two parts of the mould separated,

Fig.2 is a diagrammatic cross section of the mould
shown in Fig.1 with the mould parts brought together
and plastics material injected into a cavity defined
5 by the mould,

Fig.3 is a view similar to Fig.1 after moulding has
taken place,

Fig.4 is a view similar to Fig.2 but showing a
modified mould and different type of film-like layer,

10 Fig.5 is a view similar to Fig.1 drawn to a larger
scale showing a different type of film-like layer in
a mould having a flat adjacent surface,

Fig.6 is a view similar to Fig.5 showing a film of
the Fig.5 type reversed and positioned in a mould
15 having an adjacent surface formed with a surface
pattern and

Fig.7 is a cross section through part of a moulded
component drawn to a larger scale and having a coated
film-like layer thereon.

20 In Fig.1, a mould comprises first and second parts
10, 12. In the embodiment illustrated, the first

part 10 is movable towards the second part 12.

The first mould part 10 defines a recess 13 and an injection port 14. The mould part 12 defines a recess 15.

5 A layer of film-like material 16, such as nylon film, e.g. of around 0.5mm thickness, is embossed to define a surface pattern 17. The embossing may take the cross-sectional dimension D across the film to around one and a half times the film thickness so as to
10 leave the depth of the embossing around one half of the film thickness. In Figs.1 to 3 dimension D and embossing depth are shown exaggerated for clarity. The pattern preferably comprises closely spaced surface irregularities and the zig-zag pattern 17
15 shown is merely for illustrative purposes. If desired the pattern 17 could be of other form and could even be formed so as to mould a trade mark, logo, picture or written matter.

The method of moulding includes placing the film 16
20 between the mould parts 10, 12 as shown in Fig.1, closing the mould as shown in Fig.2 and then injecting a mouldable thermoplastics material 18 into the mould so as to fill the cavity defined by the recesses 13, 15. When the mould is closed, the film
25 16 is positioned between surfaces 10a, 12a of the

mould parts 10, 12 to hold the film in place. The injection of the thermoplastics material urges the embossed section 17 against the bottom of the recess 15 which has a flat surface 19. The embossed section 5 17 traps pockets of air between itself and the surface 19 which prevents the embossed section from flattening against the surface 19 during injection of the thermoplastics material 18. Therefore, the moulded material conforms substantially to the 10 embossed section 17 and when the mould parts are separated as shown in Fig.3, a component 20 formed by the moulding step can be removed from the mould with the desired surface texture 22 formed thereon. When the mould parts 10, 12 are opened, the film 16 may 15 remain in position in the mould for a subsequent moulding step or may be peeled away from the component 20 and discarded or placed in the mould again for subsequent use. For ease of separation of the film 16 from the component 20, the film will be 20 of different material from the material 18 and/or a may be treated with a release agent.

In Fig.4, mould part 10 is identical to that shown in Figs.1 and 2 but mould part 12 has its recess 15 formed with an engraved bottom surface 119 in place 25 of the flat surface 19. Such a surface would normally produce a component somewhat similar to the component 20 shown in Fig.3. However, by placing a

non-embossed film 116 in the mould, air pockets will be trapped during the mould step between the film 116 and the engraved surface 119 and the resulting component 120 will either have a substantially flat right hand surface or will at least be smoother than the surface 119. In this case the film may be thicker than that used in Figs.1 to 3 as embossing is not required. If desired the film may have a surface which is formed so as to impart a surface pattern to the component different from that of the engraved surface 119.

In Figs.1 to 3 or Fig.4, the film 16 can be pre-formed, eg. by vacuum, to fit into a mould of particular shape. That will help to avoid creasing of the film particularly in moulds of complex shape. Where the film 16 is embossed as in Figs.1 to 3, the vacuum forming step can also be used to produce the pattern 17. Where the film 16 is used in the Fig.4 mould, the vacuum forming of the film leaves the surface of the film to be positioned adjacent mould surface 119 in a flat form.

Therefore, by using a film 16 or 116 in a mould, the mould can be used to produce a variety of components having different textured surfaces. Such surfaces may be of a type which will reproduce a wood-grain, leather-grain or other fine surface texture which, if

applied to the surface of an injection moulding tool, would involve engraving.

In Fig.5 a film 216 is formed, e.g., by pressing so as to define a flat surface 217 on one side and an embossed surface 17a on the other side. In that case, the film 216 will normally be thicker than the film 16 in Figs.1 to 4 and may be semi-rigid in nature. The film 216 is vacuum formed so as to be of complementary shape to the mould part 12 which has its bottom surface 19 flat as in Figs.1 to 3. With the film 216 in position in the mould, thermoplastics material can be injected into the mould as described with respect to Figs.1 to 3 to form the component. After moulding, the component is removed from the mould and separated from the film 216. Instead of utilising a mould part 12 with a flat surface 19 it could have a surface formation 219 different from that of the embossed surface 17a against which the flat surface 217 will lie and remain substantially flat during the moulding step.

In Fig.6 the film 216 is inverted so that moulding takes place against the flat surface 217. Such an arrangement is useful where the mould part 12 has an engraved surface 119 as in Fig.4. The film 216 produces a substantially flat adjacent surface on the moulded component.

In Fig.7, a film 316 has a coating 30 of paint e.g. thermoplastic paint, on the surface which faces the bottom of the adjacent mould part. The film 316 is made of a material which will bond to the mouldable material during the moulding step so that a finished component 32 will carry the film which provides a desired surface finish. For example, both the injected thermoplastics material 18 and the film 316 may be polypropylene. The film 316 shown in Fig.7 is embossed as in Figs.1 to 3 and is used in a mould of the kind shown in those Figures or in Fig.5 with the flat mould surface 19. Alternatively, the film 316 could be flat and used in a mould as shown in Fig.4. It is envisaged that instead of providing the coating 30 on the outer surface of the film 216 as shown, it could be provided on the inner surface and would bond to the mouldable material. The coating 30 could provide any required form of decorative surface and could include a trade mark, logo, picture or written matter. Again the film can be pre-formed, eg. by vacuum, to fit into the mould to avoid creasing of the film. Where the film is to bond to the component it is desirable to use a thin film to improve bonding and reduce distortion of the component on cooling.

Whilst specific reference has been made to injecting the mouldable material into the mould, it will be understood that the mouldable material could be

introduced in other ways, e.g. by thermoforming, cold press moulding or compression moulding.

The terms "bond" and "bonding" as used herein embrace cases where the bonded materials are joined

5 homogeneously, e.g. as by welding.

CLAIMS

1. A method of moulding comprising providing a
mould, inserting into the mould a film-like layer of
material, and introducing mouldable material under
5 pressure into the mould against the film-like layer
so as to urge the film-like layer against an adjacent
surface of the mould, the surface of the film-like
layer against which the mouldable material is moulded
and the adjacent surface being of different surface
10 shape whereby the film imparts to the mouldable
material a surface shape which is different from that
which would otherwise be imparted by the said
adjacent surface of the mould.
2. A method according to Claim 1 including
15 providing the film-like layer with an embossed
surface formation which is substantially imparted to
the mouldable material.
3. A method according to Claim 2 including
providing said embossed surface formation as closely
20 spaced surface irregularities.
4. A method according to Claim 1, 2 or 3
including providing the adjacent surface of the mould
as a substantially smooth surface.

5. A method according to Claim 1 including forming said adjacent surface of the mould so as to define a given surface shape and inserting into the mould a film-like layer of material which will impart a substantially smooth surface finish to the mouldable material and not the given surface shape which would otherwise be imparted by the said adjacent surface of the mould.
6. A method of moulding according to Claim 1, 2 or 3 including forming said adjacent surface of the mould to define a given surface pattern and inserting into the mould a said film-like layer of material which will impart a surface pattern to the mouldable material which is different from the surface pattern of said adjacent surface.
7. A method according to any preceding Claim including introducing the mouldable material by injection into the mould.
8. A method according to any preceding Claim in which the mould comprises at least two parts and the method includes introducing the film-like layer into the mould with the two parts separated and closing the two parts together to hold the film-like layer in position prior to introducing the mouldable material.

9. A method according to any preceding Claim in which the mouldable material is plastics.
10. A method according to any preceding Claim in which the film-like layer is of a polyamide material.
- 5 11. A method according to any preceding Claim including removing from the mould a component formed by the mouldable material and leaving the film-like layer in the mould for a subsequent moulding operation.
- 10 12. A method according to any of Claims 1 to 10 including removing from the mould a component formed by the mouldable material with the film-like layer thereon and removing the film-like layer from the component.
- 15 13. A method according to any of Claims 1 to 10 including removing from the mould a component formed by the mouldable material and leaving the film-like layer in position on the component to provide a desired finish.
- 20 14. A method according to Claim 13 including providing the film-like layer with a surface coating which provides the desired finish.

15. A method according to Claim 14 in which the surface coating is provided on the outer surface of the film.

16. A method according to Claim 15 in which the
5 coating is formed by paint.

17. A method according to any preceding claim including pre-forming the film-like layer so as to conform substantially to the shape of at least part of the mould.

10 18. A method of moulding substantially as described herein with reference to Figures 1 to 3, Fig.4, Fig.5, Fig.6 or Fig.7 of the accompanying drawings.

15 19. A mould for use in a method according to any preceding Claim, the mould having said film-like layer of material therein for imparting to the moulded material a surface form which is different from that which would otherwise be imparted by the said adjacent surface of the mould.

20 20. A mould constructed and arranged substantially as described herein with reference to Figs.1 to 3, Fig.4, Fig.5 or Fig.6 of the accompanying drawings.

21. A moulded component made by a method according to any of Claims 1 to 18.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

9120609.4

Relevant Technical fields

(i) UK CI (Edition K) B5A: ANA; ANC; AB14; AB19;
AB2; AT14P; AT14E

(ii) Int CI (Edition 5) B29C

Search Examiner

A J M TAJASQUE

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

15 NOVEMBER 1991

Documents considered relevant following a search in respect of claims

1-21

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB A 2138734 (DOW) page 1 lines 87-98; page 3, lines 46-60	Claim 1 at least
X	GB A 2087784 (REDIFON) page 1 lines 106-111	" "
X	GB A 1315482 (B I P) page 1 lines 50-68; page 3, lines 4-25	" "
X	GB A 1197727 (B U S M) page 2, lines 18-38, and lines 88-94	" "
X	GB A 1193681 (F M C) page 1, lines 19-61	" "
X	GB A 1140368 (BARNETTE) page 1, lines 35-51; figures 10, 11 for example	" "
X	GB A 0642913 (SMITH) page 1, lines 19-23, and lines 56-70	" "
X	GB A 0482913 (ROEMELCH) page 2, lines 64-107	" "



Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number

9120609.4

Relevant Technical fields

(i) UK Cl (Edition) Contd. from page 1

(ii) Int Cl (Edition)

Search Examiner

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

Documents considered relevant following a search in respect of claims

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	EP A 0164822 (EX-CELL-O CORPORATION) page 1, line 22 - page 2 line 11; page 6, lines 1-41	" "
X	EP 0094268 (SO-GE-MA-P) See Derwent Abstract	" "
X	EP 0412493 (L KURZ) See Derwent Abstract	" "



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