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**D E C I S I O N**  
**of 19 January 2000**

**Case Number:** T 1028/96 - 3.2.1  
**Application Number:** 86106603.3  
**Publication Number:** 0203469  
**IPC:** B68G 1/00, D04H 1/00

**Language of the proceedings:** EN

**Title of invention:**  
Improved polyester fiberfill and process

**Patentee:**  
E.I. DU PONT DE NEMOURS AND COMPANY

**Opponent:**  
Fabromont AG

**Headword:**  
-

**Relevant legal provisions:**  
EPC Art. 56, 100(b)

**Keyword:**  
"Sufficiency of disclosure (yes)"  
"Undue burden for selecting a missing parameter (no)"  
"Inventive step (yes)"

**Decisions cited:**  
-

**Catchword:**  
-



Case Number: T 1028/96 - 3.2.1

**D E C I S I O N**  
**of the Technical Board of Appeal 3.2.1**  
**of 19 January 2000**

**Appellant:** E.I DU PONT DE NEMOURS AND COMPANY  
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**Representative:** Abitz, Walter, Dr.-Ing.  
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**Respondent:** Fabromont AG  
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**Representative:** Lesser, Karl-Bolko, Dipl.-Ing.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 28 October 1996  
revoking European patent No. 0 203 469 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** F. Pröls  
**Members:** M. Ceyte  
J. van Moer

## Summary of Facts and Submissions

- I. The appellant is proprietor of European patent No. 0 203 469 (application No. 86 106 603.3).

Independent claims 1 and 7 of the patent as granted read as follows:

"1. Refluffable fibreballs consisting essentially of entangled polyester fibrefill characterized in that the fibrefill is spirally crimped, and coated with a slickener and has a cut length of about 10 mm to about 60 mm, and is entangled randomly within the fibreballs, which have an average dimension of 1 to 15 mm with at least 50% by weight of the balls having a cross-section such that its maximum dimension is not more than twice its minimum dimension, the fibreballs having a cohesion measurement, as defined in the description under the corresponding heading, of less than 6 Newtons (N).

7. Process for shaping polyester fibrefill into fibreballs that are suitable for transportation by air-blowing, involving separating the fibrefill into a plurality of discrete tufts that are tumbled on the interior cylindrical wall of a stationary cylindrical vessel with blades that rotate about an axial bladed shaft that is mounted horizontally, characterized in that the polyester fibrefill has a spiral crimp, has a cut length of about 10 to about 60 mm and has been slickened, and that the tufts are tumbled by air, that is stirred by the blades, whereby the tufts are repeatedly turned and impacted by the air against the interior cylindrical wall so as to entangle the fibres and so as to condense and reshape the tufts into fibreballs of randomly entangled fibres having an

average dimension of 1 to 15 mm, at least 50% by weight of the balls having a cross-section such that its maximum dimension is not more than twice its minimum dimension, and the fibreballs having a cohesion measurement, as defined in the description under the corresponding heading, of less than 6 Newtons (N)."

II. The patent was opposed by the respondent (former opponent 02) on the ground of lack of patentability and insufficiency of disclosure.

The following state of the art was *inter alia* cited:

D1: US-A-4 477 515

D5: EP-A-0 013 427

The appellant (patent proprietor) relied upon

E1: Report by Mr K. Floyd (enclosures to letter of 4 November 1988) for substantiation of the appellant's submission that the cohesion measurement as referred to in the patent specification could be carried out by the skilled person.

E1\*: Investigation report and exhibits by Mr K. Floyd (filed by the appellant with its letter dated 14 March 1995). This report shows the cohesion measurement instrument built by Mr K. Floyd in accordance with the instructions of the patent in suit.

G1: "Gutachten Nr. E-885-Z-95", dated 22 February 1996, established by Dipl.-Ing. E. Kleinhansl of

the Denkendorf Institute ("Institut für Textil und Verfahrenstechnik").

G2: Declaration dated 12 March 1996 of Prof.Dr. J. Knott of the "Centre de recherche et de contrôle textile, chimie et environnement" (CELABOR).

In support of the ground of insufficiency of disclosure, the respondent submitted that the patent in suit did not provide the skilled person with sufficient information as to how cohesion measurements are performed essentially because the distance of the lower most pairs of horizontal rods with respect to the bottom of the cylinder for the fibrefill was not mentioned in the specification of the patent.

III. By its decision posted on 28 October 1996, the Opposition Division revoked the European patent arguing that the claimed subject-matter was not inventive over the opposed prior art documents D1 and D6 (JP-A-57 000 948).

IV. The appellant lodged an appeal against this decision on 21 November 1996 and paid the prescribed fee at the same time.

The statement of grounds of appeal was filed on 28 February 1997.

V. By an interlocutory decision T 1028/96 of 15 September 1999, the appeal was assigned to the present Board.

On appeal, the respondent further relied upon the following evidence:

B12: Expert report of "Forschungsinstitut Hohenstein"  
dated 3 October 1994

G3: Expert report of "Deutsches  
Wollforschungsinstitut" (DWI) dated 30 November  
1994.

On appeal the appellant presented *inter alia* the  
following evidence:

E3: First declaration by John Clark of 25 February  
1997.

E4: Investigation report by Mr Kenneth Floyd of  
26 February 1997.

E11: Second declaration by John Clark of 20 January  
1999.

In the course of the appeal proceedings the following  
evidence was also presented:

E6: Expert report dated 21 August 1996 from  
Prof. Dr. H. Höcker.

E7: Sworn statement dated 19 January 1999 from  
Dipl.Ing. D. Schreiner.

E8: Expert report dated 12 November 1998 from  
Prof. Dr. H. Höcker.

VI. Oral proceedings were held on 19 January 2000.

The appellant requested that the decision under appeal  
be set aside and the patent be maintained as granted.

In support of its request it essentially made the following submissions:

- (i) As to the sufficiency of disclosure (Article 83 EPC): It is true that the distance of the lowermost pair of horizontal rods with respect to the bottom of the cylinder is not expressly indicated in the patent in suit. However, any skilled person is able to establish by simple trial and error experiments that such spacing should be about 20 mm: In the course of the proceedings for grant appellant contracted an independent research institute (Shirley Institute) to perform cohesion measurements on a number of fibreball samples provided by it, the institute being given no other information than that contained in the patent application i.e. without the spacing in question. In its report E1\* the institute selected the same distance as the applicant, that is 20 mm, and the measurements made correlated with the measurements made by the applicant. The Denkendorf Institut ("Institut für Textil- und Verfahrenstechnik") selected about the same distance (report G1) and the expert Prof. Dr. J. Knott confirmed this (G2).

If for any reason an expert did select a distance which is much higher than 20 mm, then he will certainly find higher cohesion (expert report E6). This would mean however that when he reworks the examples disclosed in the patent he would not get the right results and would thus be led to correct the distance accordingly.

- (ii) As to the issue of patentability, the fibreballs

in accordance with claim 1 of the patent in suit differ from that known from document D1 at least in that

- (i) at least 50% of the fibreballs have a cross section such that its maximum dimension is no more than twice its minimum dimension and
- (ii) the cohesion value is less than 6 Newtons.

As it is apparent from the declaration by John Clark (E3) and the investigation report by Kenneth Floyd (E4), the cohesion value of the fibreballs disclosed in document D1 are much higher than 6 Newtons. Furthermore an essential step in the manufacturing of the fibreballs in the patent in suit is the selection of the starting material (spirally crimped fibrefill coated with a slikener and having a cut length from 10 to 60 mm), as well as the selection of the method used for the rounding of the fibreballs, which combination leads to the claimed low level of cohesion between the fibreballs. Document D1 does not suggest using the claimed method and thus the skilled person following the teaching of this citation would not be able to arrive at fibreballs having excellent refluffability, whose cohesion value lies under 6 Newtons.

Document D5 does not disclose more than what is already disclosed by document D1. In particular this citation does not teach using spirally crimped fibrefill, which is an essential feature necessary to obtain the desired effect. In any case this document does not lead to special



considerations of the cohesion or its importance for improving the refluffability.

VII. The respondent requested that the appeal be dismissed. It rejected the arguments brought forward by the appellant as to (i) the insufficiency of disclosure (Article 83 EPC) and (ii) the patentability of the claimed invention:

(i) Contrary to the appellant's submissions, the skilled person is unable to establish that the spacing of the lowermost pair of horizontal rods with respect to the bottom of the cylinder should be 20 mm. In the EP-A-0 524 240 filed by the appellant subsequently to the patent in suit, such distance is said to be 30 mm. In the expert report G3 ("Deutsches Wollforschungsinstitut"), this distance is said to be 25 mm and according to the expert report B12 ("Forschungsinstitut Hohenstein") the distance in question should be 50 mm. This means that this distance is clearly indefinite. It is also not contested that the selection of this spacing greatly influences the measured values of the cohesion. By selecting an appropriate spacing, it is quite possible to obtain for any fibreball sample a cohesion value which is less than 6 Newtons.

Expressed differently, the skilled person is unable to distinguish unambiguously fibreballs having a cohesion value of less than 6 Newtons from those having a higher cohesion value, because the results obtained for the cohesion depend on the selection of the distance in question. Thus, the claimed value of less than 6 Newton does not

constitute a limitation or a distinguishing feature of the claimed refluffable fibreballs and as a consequence has not to be taken into consideration when assessing the inventive step of the alleged invention.

As already stated the description of the patent is not sufficiently complete to enable those skilled in the art to implement the invention claimed in claim 1. The same applies to method claim 7 which contains all the features claimed in claim 1 and in particular the cohesion value of less than 6 Newtons.

- (ii) Document D5 discloses all the features of the claimed fibreballs save the use of a slickener and the cohesion value of less than 6 Newtons. As has been already explained the cohesion value is not a distinguishing feature and thus has nothing to do with the issue of inventive step. Furthermore, it would be obvious for a skilled person wanting to reduce the cohesion between the fibre balls and thus to improve the refluffability properties, to coat the fibreball material with a well known slickener. It follows that the subject-matter of claim 1 is obvious in view of prior art document D5.

### **Reasons for the Decision**

1. The appeal is allowable.
2. *Insufficiency of disclosure*

2.1 According to Articles 102(1) and 100(b) EPC, a patent is to be revoked if the specification of the patent "does not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a skilled person in the art".

The respondent alleges that the specification of the patent did not disclose the invention clearly enough and completely enough for it to be performed by a skilled person in the art in that

- (i) such a person is unable to determine the distance of the lowermost pair of horizontal metal rods with respect to the bottom of the apparatus for measuring the cohesion value, and as a consequence
- (ii) such a person cannot reconstruct the instrument described in the specification for measuring the cohesion value, and thus
- (iii) determine whether the claimed cohesion measurement is less than 6 Newtons.

It is not in dispute that the selection of the distance in question has a major effect on the measured cohesion value.

The instrument for measuring the cohesion value is described in the paragraph "Cohesion Measurement" of the patent specification bridging pages 9 and 10. In the opposition proceedings before the Board, the parties both agreed that the sole parameter of the instrument which is not expressly indicated is the distance of the lowermost pair of retention rods from

the lowest transverse rod of the rectangle to be pulled through. The lowest transverse rod of the rectangle is said to be suspended about 3 mm above the bottom of the cylinder for the fibre-fill (page 9 lines 57, 58 of the specification).

The specification of the patent in suit discloses the invention with reference to four examples I to IV.

In example I a sample of the invention is compared with four commercially available products as to the measured cohesion performed by the instrument described and the refluffability of these samples.

The sample of the invention is clearly defined in this example:

"A tow of asymmetrically-jet-quenched drawn slickened poly(ethylene terephthalate) filaments of 4.7 dtex is prepared conventionally without mechanical crimping, using a draw ratio of 2.8X, a commercial polysiloxane slickener in amount 0,35% Si, and a relaxation temperature of 175°C thus curing the silicon slickener on the filaments in the tow. The filaments were cut to 35 mm and relaxed again in staple form at 175°C. The staple was compressed to a density of 200 kg/m<sup>3</sup>. This fibre-fill was opened by using a "Rotopic" opener (available from Rieter, Switzerland) and a batch was conveyed by a stream into the modified machine described and illustrated and processed at 250 rpm for 1 minute first, to break the mass of fibres into small discrete tufts and then for 3 minutes at 400 rpm, to convert those tufts into balls and then to consolidate these balls i.e. to produce fibreballs, according to the invention, which were sprayed with 0.5% of a low

temperature-curing silicone (Ultratex ESU) diluted with 4 parts of water to each part of silicone, to further reduce the cohesion of the fibreballs."

From the foregoing it is apparent that the starting material, the steps and conditions necessary for preparing the sample of the invention according to Example I are well defined. This means that the skilled person knowing the starting material and following the definite operating conditions given in example I would be able to arrive at the sample (1) of the invention whose cohesion value according to Table I shall be 3.0 Newtons.

Furthermore four commercially available products (samples 2 to 5) are clearly identified at page 6; for example, sample (4) which is said to be "Esterolla" loose competitive product sold by Toyobo (1.6 dtex, 40 mm cut length, no spiral-crimp)". Table I indicates both the cohesion value 3.0 Newton of the sample (1) of the invention and the cohesion values 7.2, 15.3, 20 and 19.3 Newtons of the four commercially available fibrefills (samples 2 to 5).

There is thus no doubt that the skilled person could acquire or purchase these four commercially available fibre fills and could also prepare the described sample of the invention. The Board can see no reason why the skilled person by carrying out cohesion measurements on these samples with a test apparatus as described in the patent specification would not be able to determine the distance between the lowermost pair of rods with respect to the lowermost transverse rod of the rectangle. As already stated, the skilled person is able to prepare or to obtain the samples of Examples I

and he knows from Table I the values of the cohesion which are to be obtained. Thus by simple trial and error experiments he can find out the afore-mentioned distance leading to the defined cohesion values and having a size of about 20 mm.

It should be stressed that no practical difficulties have to be overcome in reconstructing the instrument for measuring the cohesion and in performing the measurements of the cohesion, given that the sole parameter which is not expressly quoted is said distance; and since the skilled person is guided by the values to be obtained such experiments do not appear to be undue and to require inventive skill.

2.2 In this respect it is observed that a relatively limited number of experiments might need to be made in the present case, on account of the following clear definition of the cohesion to be measured (at page 9 lines 53 to 55 of the specification):

"In essence, the cohesion is the force needed to pull a vertical rectangle of metal rods up through the fibrefill which is retained by 6 stationary metal rods closely spaced in pairs on either side of the plane of the rectangle."

This sentence clearly means that the cohesion to be measured is not defined by the force which is needed to simply pull the lowest rod of the rectangle through the part of the column of fibrefill which is below the 6 metal rods but that the distance in question should be low enough so that the force needed to pull the rectangle through the whole column of fibreballs retained by the 6 metal rods spaced in pairs can be

measured.

Moreover considering the functioning of the measuring instrument and in particular the vertical pulling movement of the lowest rod of the rectangle to pass three successive pairs of rods positioned at equal vertical distance that is 20 mm, the first distance to be travelled by said lowest rod should obviously be in the same range i.e. about 20 mm as the vertical distance between two pairs of rods themselves. Reference is made in this respect to the expert reports G1 (Denkendorf Institute) and G2 (CELABOR Institute). As can be derived from exhibit 17 in Mr Floyd's report E1, the apparatus for measuring the cohesion is constructed in this manner.

- 2.3 Thus, owing to the definition of the cohesion force to be measured and theoretical considerations, the skilled person would be encouraged to select a spacing of about 20 mm when reworking the examples of the patent in suit, so that the number of experiments which would be required is limited.
- 2.4 According to Mr Floyd's report E1 filed during the proceedings for grant an independent research institute (the "Shirley Institute") was contracted by the appellant to perform cohesion measurements on a number of fibreball samples provided by it, the institute being given no other information than was contained in the patent application. The institute duly built a test rig and performed the measurements, the results of which correlate with the results obtained by the appellant. The Institute came also to the conclusion that the distance should be about 20 mm.

According to the expert report G1, a further independent institute (the "Denkendorf Institute") had likewise selected approximately such spacing. It is true that the two institutes above were contracted by the appellant. However, also the CELABOR Institute ("Centre de recherche et de contrôle textile, chimie et environnement") was contracted by one of the former opponents (which are no more a party in the appeal proceedings) and confirmed in the expert report G2 that (i) the distance should be 20 mm and (ii) if such spacing is adhered to fibre material produced according to the invention "has a cohesion value of about 3" that is to say less than 6 Newtons".

As to the evidence submitted by the respondent during the hearing before the Board, B12 is an expert comment of the "Forschungsinstitut Hohenstein" in which it is stated that distance in question has an influence on the cohesion measurement and that this distance should be about 50 mm. However the expert involved neither built a test rig nor performed cohesion measurements, so that it is in principle not possible to give a relevant expert comment thereon.

In the further expert report G3 dated 30 November 1994 the "Deutsches Wollforschungsinstitut(DWI)" was also contracted by the above-mentioned former opponent and selected a distance with respect to the bottom of the test cylinder of 25 mm. Thus the spacing with respect to the lowest rod of the rectangle amounts to 22 mm, a value which comes very close to 20 mm.

- 2.5 Document EP-B-0 524 240 as mentioned by the respondent represents a patent application filed by the appellant several years after the priority date of the patent in



suit. Thus, the rod distance of 30 mm as defined in EP-B-0 524 240 cannot be used as an evidence for estimating the teaching of the patent in suit.

- 2.6 It follows from the above considerations that the information contained in the patent in suit is sufficiently clear and complete to enable the skilled person to determine the distance of the lowermost pair of horizontal rods with respect to the lower transverse rod of the rectangle and thus to reconstruct the instrument for measuring the cohesion value and to perform such measurements. Accordingly the Board concludes that also for this reason the claimed invention meets the requirements of Articles 100(b) or 83 EPC.

3. *Inventive step*

- 3.1 As it is apparent from the introductory part of the description, the problem underlying the patent in suit is to provide a polyester fibrefill as a washable down-like substitute for filling pillows and the like that particularly in terms of "refluffability" i.e. its ability to be returned quickly to its original soft fluffy condition simply by shaking and patting is comparable to down but is much cheaper than down.

In view of the commercial significance of providing such product considerable research has been made in this field, numerous developments being mentioned and evaluated in the introductory part of the description of the patent in suit.

The problem above is in essence solved by the refluffable fibreballs as defined in claim 1.

The refluffable fibreballs can also be produced by a process for shaping polyester fibrefill into fibreballs as defined in claim 7.

In the Board's view the essence of the invention resides in the selection, on the one hand, of the starting material, that is spirally crimped fibrefill coated with a slickener and having a cut length from 10 to about 60 mm and, on the other hand, of the method defined in claim 7 for rounding the balls having an average dimension of 1 to 15 mm, which combination leads to the defined measurement of cohesion values of less than 6 Newtons, and thus to fibreballs having good refluffability properties which are significantly improved over those of the cited prior art. The essence of the invention resides also in the recognition that a low level of cohesion between the fibreballs is the main contributing factor to their good refluffability, which approaches that of natural down.

- 3.2 Although the respondent in the course of the hearing based its submissions as to the lack of inventive step exclusively on document D5, it is necessary to consider briefly document D1 which was regarded as the most relevant prior art publication during the opposition proceedings.

In the Board's view fibreballs in accordance with claim 1 of the patent in suit differ from that known from document D1 in that

- (i) the average dimension of the fibreballs is of 1 to 15 mm
- (ii) the cohesion measurement is less than 6 Newtons

Claim 12 of document D1 says that the fibreballs are "substantially globular". This also means that the fibreballs disclosed there are predominately spherical in shape. Furthermore the range of diameter of these fibreballs (10 to 50 mm) overlaps that specified in the claim (1 to 15 mm). Thus the main distinction of the fibreballs claimed over this prior art is the low level of cohesion between the fibreballs (less than 6 Newtons).

The appellant filed documents E3 and E11 (1st and 2nd declaration by John Clark) as proof that the fibreballs produced in document D1 did not have the claimed low level of cohesion. Reports E7 (D. Schreiner) and E8 (H. Höcker) were presented in order to show that the fibreballs produced in document D1 had also had a low level of cohesion. However, in the Board's view the reports E7 and E8 are not relevant, given in particular that the apparatus "clean master" used for rounding the balls according to Report E8 is neither disclosed nor suggested by the teaching of document D1. All that document D1 indicates (see column 6, lines 52 to 54) is that, "if necessary, the separated fibres are wrinkled by mechanical, wind or manual force to round the fibrous masses".

In contrast, in the claimed method the plurality of discrete tufts into which the fibrefill is separated are tumbled on the interior cylindrical wall of a stationary cylindrical vessel with blades that rotate about an axial bladed shaft mounted horizontally. As stated on page 5, lines 36 to 41 of the patent in suit "the most important function of the stirrer blades is believed to be to stir the air, to create turbulence, and to turn the balls of fibres repeatedly so that they

continually present different faces to the wall of the vessel and thus produce rounded balls, rather than rolled cylinders (tails). Once a tail is formed during high speed operation it is unlikely to be converted into a ball, but will present its cylindrical surface to the wall each time, and thus merely become a denser tail; this will raise the cohesion of the product, and so adversely affect refluffability."

From the foregoing it is apparent that starting from prior art document D1 the essential steps in the manufacturing of the fibreballs in the patent in suit is the selection of the method used for the rounding of the fibreballs and of the average dimension of the fibreballs within the range of 1 to 15 mm, which combination leads to cohesion values under 6 Newtons.

3.3 In the decision under appeal the Opposition Division considered the low level of cohesion as being not essential or subsidiary. However as has been already explained, it must be concluded that the low level of cohesion is an essential feature of the claimed refluffable fibreballs. There is no suggestion either in document D1 or in the other prior art publications present in the proceedings that the cohesion aspect of fibreballs had previously received any attention, so that there was nothing to encourage the skilled person to consider ways of meeting the requirement of claim 1 in this respect.

3.4 Turning now to the sole prior art document D5 considered by the respondent, the following is to be observed:

The present invention is directed to refluffable

fibreballs which are made by the use of spirally crimped polyester fibrefill. The provision of a low level of cohesion between the fibreballs renders the fibreballs refluffable. This citation nowhere discloses these two essential elements and is directed to a different objective, namely a needle-processed textile covering as defined in claim 1 and shown in the figures.

The "fibre aggregates" described by this citation can be prepared by extremely simple means. Thus, it is said at page 9 second paragraph of this citation that the ball-shaped yarns may also be fabricated, for example, by intermingling or rolling up of fibres between fingers of a hand, so as to form the fibres into balls, or into longitudinal shapes and that it is thus possible, for example, to devise web-like structures. Reference is made further to known processes for preparing the fibre aggregates, thus, e.g., to the process described in DE-A-28 11 004.

It is obvious that such a simple method did not lead to the fibreballs of the invention with a low level of cohesion which have to be prepared in a process which is more complex in comparison.

Parallel or crimped fibres or fibres helically spun into each other are used in this citation for preparing fibre aggregates. All of those forms are equivalent for solving the problem there and have nothing do with spirally crimped fibres of the invention. It is noted that fibres spun helically into each other are not comparable with spirally crimped fibres. If two fibres are helically spun into each other, they are far from having a crimp. Consequently, one of the essential

features of the starting material to be used according to the invention i.e to be spirally crimped, is neither disclosed nor suggested by this citation. Having regard to the fact that the preparation method is also quite different, it is clear that the materials proposed in document D5 did under no circumstances lead to the fibreball material according to the invention, and in particular to a low level of cohesion between the fibreballs. And, as has been already explained, it is this low level of cohesion which is the main contributing factor to their good refluffability.

- 3.5 Therefore the Board comes to the conclusion that the subject-matter of claim 1 involves an inventive step (Article 56 EPC).

The same applies to the subject-matter of claim 13 of the patent in suit concerning a "pillow filled with fibreballs of claim 1".

- 3.6 With regard to method claim 7, it is observed that such claim contains all the features of the refluffable fibreballs as claimed in claim 1 that is i.a. the spirally crimped fibrefill and the low level of cohesion which are essential.

Accordingly, for the same reasons given herein above the method according to claim 7 involves an inventive step (Article 56 EPC).

4. Dependent claims 2 to 6 and 8 to 12 concern particular embodiments of the invention claimed in claims 1 and 7 respectively, and are likewise allowable.

5. The opposition grounds thus do not prejudice the

maintenance of the patent as granted.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The patent is maintained as granted.

The Registrar:

The Chairman:

S. Fabiani

F. Pröls