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**D E C I S I O N**  
**of 13 May 2004**

**Case Number:** T 0901/01 - 3.2.6

**Application Number:** 95201986.7

**Publication Number:** 0694639

**IPC:** D04B 9/12

**Language of the proceedings:** EN

**Title of invention:**

Sinker arrangement in a knitting machine and knitwork formation methods using said arrangement

**Patentee:**

SANTONI S.p.A.

**Opponent:**

Mayer & Cie. GmbH & Co.

**Headword:**

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**Relevant legal provisions:**

EPC Art. 123(2), 83, 56

**Keyword:**

"Amendments - inclusion of features contained in the drawings"  
"Sufficiency of disclosure - (yes)"  
"Inventive step - (yes)"

**Decisions cited:**

T 0169/83, T 0218/94, T 0539/98, T 0606/89

**Catchword:**

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Case Number: T 0901/01 - 3.2.6

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.6  
of 13 May 2004

**Appellant:** SANTONI S.p.A.  
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**Representative:** Freiherr von Schorlemer,  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 31 May 2001  
revoking European patent No. 0694639 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** P. Alting van Geusau  
**Members:** G. Pricolo  
R. T. Menapace

## Summary of Facts and Submissions

- I. The appeal is from the decision of the Opposition Division posted on 31 May 2001 to revoke European patent No. 0 694 639, granted in respect of European patent application No. 95201986.7.
- II. In the decision under appeal the Opposition Division, while accepting that the amendments made by the patentee were allowable under Article 123 EPC, considered that the patent in suit did not disclose the invention defined in method claims 5 and 7 of the main request in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. Furthermore, the Opposition Division rejected the patentee's first auxiliary request for lack of inventive step of the independent method claim 5, corresponding to claim 8 of the main request, having regard to the disclosure of document
- E6: US-A-2 925 724.
- III. The appellant (patentee) lodged an appeal, received at the EPO on 3 August 2001, against this decision and simultaneously paid the appeal fee. The statement setting out the grounds of appeal was received at the EPO on 9 October 2001.
- IV. In a communication accompanying the summons for oral proceedings pursuant to Article 11(1) Rules of Procedure of the boards of appeal the Board expressed the preliminary opinion that for the question of sufficiency of disclosure it was necessary to establish whether the skilled person could find without undue

burden a manner of operating the knitting machine in order to obtain the stationary configuration referred to in the method claims. Considering the issue of inventive step document

E1: GB-A-2 038 376,

rather than E6, would appear to represent the closest prior art because it showed a sinker arrangement suitable for producing terry knitwork.

- V. Oral proceedings, at the end of which the decision of the Board was announced, took place on 13 May 2004.

The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of claims 1 to 10 and columns 1 to 5 of the description as filed during the oral proceedings, and Figures A, B and 1 to 6 as granted. In support of its arguments, the appellant filed document:

D1: pages 52 to 55 of the book "Knitting Technology", by D.J. Spencer, Pergamon Press, 1989

The respondent (opponent) requested that the appeal be dismissed.

- VI. Claims 1, 5 and 7 filed during oral proceedings read as follows:

"1. A knitting machine comprising a sinker arrangement (20) located between adjacent needles (9), comprising a terry sinker (2) and a stitch sinker (3) characterised in that said terry sinker (2) is operationally interposed between two stitch sinkers (3, 21), in which:

- the terry sinker (2) comprises a terry hook (4) which generates a terry surface (5) and a working surface;
- each of the stitch sinkers (3, 21) comprises a stitch hook (7) adjacent to the knocking-over surface (8)."

"5. A method for producing terry knitwork using at least one first yarn (12) and at least one second yarn (13) to be interlocked by needles (9) positioned laterally to and spaced by the sinker arrangement (20) of the knitting machine in accordance with one or more of the preceding claims, characterised in that, when said needles (9) are below the level of the working surface of the sinkers, said yarns extend relative to the sinkers (2, 3, 21) of said arrangement (20) in the following manner:

- the first yarn (12) originating from a first package and kept by the head (10) of one of needles (9) passes under the stitch hook (7) while resting on the knocking-over surface (8) of the first stitch sinker (3), then passes over the terry hook (4) while resting on the terry surface (5) of the terry sinker (2), then passes under the stitch hook (7) while resting on the knocking-over surface (8) of the second stitch sinker (21), and then passes into the head (10) of the knitting machine adjacent needle (9) to terminate within the stitch under production;
- the second yarn (13) originating from a first package and kept by the head (10) of one of the needles (9) passes under the stitch hook (7), while resting on the knocking-over surface (8) of the first stitch sinker (3), passes under the terry hook (4), while resting on the working surface (6) of the terry sinker (2), passes under the stitch hook (7) while resting on the knocking-over surface (8) of the second stitch sinker

(21), and finally passes into the head (10) of the knitting machine adjacent needle (9) to terminate within the stitch under production."

"7. A method for producing wide-mesh knitwork using at least one first yarn (12) and at least one second yarn (13) to be interlocked by needles (9) positioned laterally to and spaced by the sinker arrangement (20) of the knitting machine in accordance with one or more of claims 1 to 4, characterised in that, when said needles (9) are below the level of the working surface of the sinkers, said yarns (12,13) extend relative to the sinkers (2, 3, 21) of said arrangement (20) in the following manner: both the first yarn (12) and the second yarn (13), originating respectively from a first and a second package, are kept by the head (10) of one of the needles (9) and pass under the stitch hook (7) while resting on the knocking-over surface (8) of the first stitch sinker (3), then pass over the terry hook (4) while resting on the terry surface (5) of the terry sinker (2), then pass under the stitch hook (7) while resting on the knocking-over surface (8) of the second stitch sinker (21), and finally pass into the head (10) of the knitting machine adjacent needle (9), to terminate within the stitch under production."

VII. In support of its requests the appellant relied essentially on the following submissions:

It was clear from the drawings of the application as filed that the manner in which the yarns extended relative to the sinkers referred to in claims 5 and 7 was obtained when the needles were below the working

surface of the sinkers. Therefore, the amendments complied with the requirements of Article 123(2) EPC.

The sinker arrangement of the claimed invention differed from the conventional sinker arrangement consisting of a stitch sinker and a terry sinker, as known for instance from E1, in that it comprised a second identical stitch sinker disposed symmetrically with respect to the terry sinker. Considering that finding appropriate movements of the sinkers of the conventional sinker arrangement was a routine task for the skilled person, there could be no difficulty in finding out how to move the second stitch sinker since the latter, being identical to it, had to be moved in the same manner as, the first stitch sinker. Moreover, it was well known that during the knitting process the yarns were taken at a certain height above the sinkers and subsequently progressively lowered by a needle below the sinkers. In order to obtain the instantaneous configuration of claim 5 in which both yarns first passed under the stitch hook of the first sinker, then one yarn passed over the terry hook, and finally both yarns passed under the stitch hook of the second stitch sinker, the skilled person would recognise that it was merely necessary to provide an appropriate timing for the forward movement of the sinkers, whereby the stitch sinkers should be moved when the distance between the two yarns was sufficiently small so that both yarns could be taken by the stitch hooks. Such small distance was reached when the needle was in a sufficiently low position. Analogous considerations applied with respect to the instantaneous configuration of claim 7.

Document E1 relating to a sinker arrangement suitable for making terry knitwork represented the closest prior art, and not E6 which disclosed a knitting machine using a single yarn and having only stitch sinkers and no terry sinkers. The provision of a further stitch sinker in accordance with the claimed knitting machine allowed to determine the knitwork density independently from the state of the previous (old) loop, to easily unload the stitch made, and to avoid needle breakage in case one yarn broke. Since there were no indications in the prior art of how to solve these problems, and document E6 disclosed the provision of a stationary spacer interposed between two identical stitch sinkers for solving a different technical problem, the claimed subject-matter involved an inventive step.

VIII. In its written submission the respondent argued that the application as filed did not disclose the features that the sinker arrangement was provided between adjacent needles and that the yarns were kept by the heads of one of the needles. During oral proceedings it only submitted that the inclusion in claims 5 and 7 of the feature according to which the needles were below the working surface of the sinkers was contrary to the requirements of Article 123(2) EPC, because this feature, although shown in the drawings, was never presented as an essential feature of the invention.

The respondent further argued essentially as follows: The method claims defined instantaneous configurations of the sinker arrangement but not the sequence of method steps necessary for obtaining them. Even the remaining parts of the patent in suit failed to disclose these steps. The drawings showed the



instantaneous configurations but did not give any indication concerning the timing of the movement of the sinkers and their radial position relative to the knitting machine. There was no disclosure of how to obtain the dispositions of yarns relative to the sinkers defined in the method claims, when the knitting machine was in use. The only manner for obtaining these dispositions consisted in keeping the knitting machine stationary and inserting the yarns manually, but this could not be regarded as a knitting process. In fact, in all the prior art documents there was not one single example of a yarn passing under the stitch hook and then over the terry hook, but only of a first yarn passing above the stitch hook and the terry hook and a second yarn passing under both of them as in E1.

The alleged advantages of the knitting machine of claim 1 were obtained only when the knitting method of claim 5 or claim 7 was carried out. The knitting machine of claim 1 was however to be considered independently from any specific methods in which it could be utilized. Thus, when formulating the technical problem solved by the knitting machine of claim 1, the technical effects obtained by performing said methods were not to be taken into consideration. Although the closest prior art E6 disclosed a knitting machine using a single yarn, the use of a second yarn was a matter of common general knowledge and therefore the skilled person would consider to use the knitting machine according to E6 for knitting with two yarns. Since a generally known fabric knitted with two yarns was a terry fabric, the skilled person would consider the use of the knitting machine of E6 for producing a terry fabric. In such case, he would immediately recognize

that the spacer member interposed between two identical stitch sinkers in the knitting machine according to E6 could be used as a terry sinker for making terry loops in the known manner, as described e.g. in E1. Moreover, nothing hindered the skilled person from using said spacer member as a terry sinker. The problems underlying the patent in suit were also solved by the knitting machine according to E6 since it was provided with two identical stitch sinkers. Therefore, the subject-matter of claim 1 did not involve an inventive step. The same conclusion was reached when starting from E1 as the closest prior art. Indeed E6 taught that the provision of a further stitch sinker provided specific advantages and therefore the skilled person would consider the provision of a further stitch sinker in the knitting machine of E1 and would thereby directly arrive at the subject-matter of claim 1.

The respondent submitted during the oral proceedings that there were no objections based on lack of inventive step against the subject-matter of claims 5 and 7.

## **Reasons for the Decision**

1. The appeal is admissible.
2. *Amendments*
  - 2.1 Claim 1 claims "a knitting machine comprising a sinker arrangement" rather than "a sinker arrangement in a knitting machine" as claim 1 as filed. It further defines, when compared to claim 1 as filed, that the

sinker arrangement is located between adjacent needles. This feature can be directly and unambiguously derived from the disclosure of Figures 2, 4 and 6 of the application as filed.

Corresponding amendments are introduced in the method of claims 5 and 7 ("the sinker arrangement **of the knitting machine** in accordance with one or more of the preceding claims"; "needles [...] **spaced** by a sinker arrangement"; "**adjacent** needle"), which are equally based upon the application as filed.

Claims 5 and 7 are further amended by way of inclusion of the additional feature that the manner in which the yarns extend relative to the sinkers referred to in the characterizing portion is obtained "when said needles are below the working surface of the sinkers" and the additional feature that the yarns are kept by the head of one of the needles. These additional features can also be directly and unambiguously derived from the disclosure of Figures 2, 4 and 6 of the application as filed.

- 2.2 The respondent objected to the inclusion in the claims of features taken from the drawings and which were not disclosed as being essential for achieving the objects of the invention.

However, according to established case law of the boards of appeal the EPC does not prohibit the amendment of claims to include features from drawings, provided the structure and the function of such features are clearly, unmistakably and fully derivable from the drawings in terms of structure and function by

a person skilled in the art and so relatable by him to the content of the description as a whole as to be manifestly part of the invention (see T 169/83, OJ 1985, 193). These conditions are fulfilled in the present case, because the features in question are shown in the figures of the application as filed and are also present in conventional knitting machines and methods so that the skilled person would consider that they manifestly make part of the invention. Indeed, the provision of a plurality of needles in a knitting machine having sinkers is necessary for obtaining a knitted fabric. Furthermore, it is generally known that there is a step of the knitting cycle during which the needles are in a position below the working surface of the sinkers whilst they keep the yarns in their head. Since the position of the yarns during knitting is defined by both the sinkers and the needles, the amendment introduces a required function of interaction of the sinkers and needles as further set out in paragraph 3 below.

- 2.3 Basis for the subject-matter of claims 2 to 4, 6, and 8 to 10 is found in claims 2 to 4, 6 and 9 to 11 of the application as filed.
- 2.4 The description of the patent in suit as adapted is consistent with the claims as amended.
- 2.5 Since the claims are amended by way of inclusion of further limiting features, the amendments result in a restriction of the extent of protection conferred by the European patent.

2.6 Therefore the amendments do not give rise to objections under Article 123(2) and (3) EPC.

3. *Sufficiency of disclosure (Article 83 EPC)*

3.1 *Claim 5*

3.1.1 The knitting cycle of knitting machines comprising a stitch sinker and a terry sinker is explained in column 1 of the patent in suit with reference to Figures A and B. A detailed explanation of the movements of the needles and of the sinkers is given in document E1, which is cited in the patent in suit (column 1, line 8). In accordance with the disclosure of E1, and also in accordance with common general knowledge as depicted in Figure 7.5 of document D1, the knitting cycle comprises a phase during which the stitch sinker is withdrawn in order to allow the feeder to present the yarn to the needle (which is in a raised position, see Figure 5 of E1 and 7.5(c) of D1) and also to free the old loop, and a phase during which the stitch sinker is in a forward position in order to hold down the new loop when the needle rises from its lowest position which is located below the working surface of the sinkers (see Figures 6 and 7 of E1 and 7.5(e) of D1). When producing a terry fabric, the terry sinker must be advanced before the stitch sinker (see Figure 6 and page 2, lines 77 to 81, of E1) in order to allow its hook to penetrate between the two yarns so that a terry loop can be formed. Thus, the instantaneous configuration of a knitting machine in the process of fabricating a terry fabric, in which the needles are below the level of the working surface of the sinkers, one yarn passes under the stitch hook of the stitch

sinker and then under the terry hook, and the other yarn passes over the terry hook, is one which is obtained in the conventional knitting machine of E1 in a known manner (see also Figure A of the patent in suit). The instantaneous configuration referred to in claim 5 of the patent in suit is one which differs from the above-mentioned conventional configuration in that a further stitch sinker is provided and in that both yarns pass under the hooks of the stitch sinkers. However, considering that the function of said further stitch sinker is implicit in its designation and can only be the same as that of a conventional stitch sinker, and indeed the patent in suit discloses that the further stitch sinker can be identical with the first one (see column 3, lines 30,31), it is clear for a skilled person that the further stitch sinker should be moved in a timed relationship with respect to the needle and the terry sinker which essentially corresponds to the - conventional - timed relationship with which the first stitch sinker is moved. This means that the further stitch sinker must be in a withdrawn position when the feeder presents the yarn to the needle and in a forward position when the needle rises. Furthermore, since both yarns must pass under the stitch hook, the stitch sinkers must be advanced at a time at which the distance between the two yarns is sufficiently small so that the yarns can both be taken by the hooks of the stitch sinkers, for instance at a time at which the needle is at such a low position that the two yarns are sufficiently close to each other. In so far also the claim is now in conformity with the description in that it comprises the feature according to which the yarn configuration defined in the claim is

related to a position in which the needles are below the level of the working surfaces of the sinkers.

- 3.1.2 The Opposition Division (see in particular point 13.(iv) of the decision under appeal) and the respondent argued that guidance for the skilled person was necessary to establish the claimed yarn path since no piece of information published before the relevant date was available which was suitable to supplement the disclosure of the patent in this respect.

According to the established case law of the boards of appeal (see e.g. T 218/94, points 3.1 and 3.2 of the reasons), an alleged invention is sufficiently disclosed if it is capable of being performed by the skilled person, without the exercise of an inventive effort, on the basis of the information disclosed in the patent specification, taken together with common general knowledge. In the present case, as explained above, the disclosure of the patent in suit needs only to be supplemented by an adaptation of the steps of the knitting cycle which does not expose the skilled person to an undue burden but belongs to his normal capacities (cf. also T 539/98, point 3.3.3 of the reasons) since the determination of the laws of movement of sinkers, needles and yarn feeding device of knitting machines for obtaining a specific result (in terms of interaction between the moving parts aimed at the production of a specific knitted fabric) is part of his routine activities.

3.2 Claim 7

The method of claim 7 differs from the method of claim 5 essentially in that, in the instantaneous configuration referred to in claim 7, both the first and the second yarns pass over the terry hook. In fact, in the instantaneous configuration defined in claim 7, the two yarns follow the same path. This means that, compared to the method of claim 5, in the method of claim 7 the terry sinker must be advanced in such a manner as to allow its hook to pass under both yarns rather than to penetrate between the two yarns. Finding the appropriate timing of movement of the terry sinker for obtaining such result lies well within the realm of the normal ability of the skilled person.

3.3 Since the methods of amended claims 5 and 7 can be put into practice by the skilled person without any inventive effort or undue burden and the Board is satisfied that the same applies for the subject-matter of the other claims, which were not objected to by the respondent for insufficient disclosure, the patent in suit meets the requirements of Article 83 EPC.

4. *Novelty*

Since none of the cited documents discloses a sinker arrangement comprising two stitch sinkers and a terry sinker operationally interposed between them, the subject-matter of claim 1, and of method claims 5 and 7 which require to utilize the features of such a sinker arrangement, is found to be novel.

Novelty was in fact not in dispute.



5. *Inventive step*

5.1 The problem underlying the patent in suit is to overcome the following drawbacks of a knitting machine having a stitch sinker and a terry sinker (see column 2, lines 10 to 30):

- (i) the knitwork density obtainable depends on the state of the previous (old) loops and in particular on their tension;
- (ii) unloading the stitch can be difficult because the loop to be withdrawn and removed from the needle tends to drag the old loops with it;
- (iii) if the first yarn breaks, the stitch is not formed and the yarn accumulates into the head of the needle until the latter breaks.

5.2 Document E1 represents the closest prior art in respect of the subject-matter of claim 1, because it relates to a knitting machine conceived for the same general purpose of being used for producing terry knitwork and has the most relevant technical features in common therewith.

Using the wording of claim 1 of the patent in suit, E1 discloses (see Figures 1 and 8) a knitting machine comprising a sinker arrangement located between adjacent needles (19), comprising a terry sinker (2) and a stitch sinker (1), the terry sinker (2) comprising a terry hook (6) which generates a terry surface (7) and a working surface (9), the stitch

sinkers (1) comprising a stitch hook (12) adjacent to the knocking-over surface (13).

The subject-matter of claim 1 is distinguished from the knitting machine of E1 in that a further stitch sinker comprising a stitch hook adjacent to the knocking-over surface is provided, the terry sinker being operationally interposed between the two stitch sinkers.

5.3 Compared to the prior art E1, where the yarns pass from the **terry sinker** of a sinker arrangement to the **adjacent needle head** and then one of them passes to the **stitch sinker** of the next sinker arrangement (see Figure 8 of E1), the distinguishing features allow a disposition of the yarns in which they pass from a (further) **stitch sinker** of a sinker arrangement to the **adjacent needle head** and then - again - to a **stitch sinker**. Thus, the knitwork density can effectively be determined by means of the position of the further stitch sinker. It follows that at least the technical problem consisting in overcoming drawback (i) mentioned above is solved by the claimed knitting machine.

5.4 E6 relates to a sinker structure for circular knitting machines. The main objective underlying E6 is to avoid that the loops are carried along with the sinkers as they are advanced or retracted thereby causing an uneven loop formation (see column 1, lines 44 to 55). In order to achieve this object, E6 teaches (see column 2, lines 61 to 71) to provide sinkers in the form of individual side members (32) which are separated by a spacer or shedder element (35), a pair of side members and a shedder element being mounted in each slot between adjacent needles. The pairs of side

members (32) of the sinkers are identical in structure and are advanced and retracted simultaneously to function as a single sinker (see column 3, lines 1 to 4), whilst the shedder element (35) is not movable (see column 3, lines 11, 12). The shedder element (35) has an inclined surface (45) which acts to hold the yarn from moving with the side members (32) of the sinker as they are retracted or withdrawn so that the needle will always draw a uniform length of yarn to form the desired length loop (see column 3, lines 45 to 50). Since the shedder element (35) is fixed, it cannot take part actively to the formation of the loop in the manner of a terry sinker. In fact, a terry sinker must be able to be moved forward to meet the yarn in order to form a loop which is longer than that obtained when the stitch sinker meets the yarn. Therefore, since the shedder element of the sinker arrangement of E6 is not a terry sinker and considering that the need to overcome the above-mentioned drawback (i) (see point 5.1 above) arises in the knitting machine of E1 because a terry sinker is present which actively participates in the formation of the loop, there would have been no reason for the skilled person to even consider applying the teaching of E6 to the knitting machine of E1. Furthermore, E6 discloses that instead of two side members separated by a shedder element the sinker arrangement could consist of a single side element and a shedder element if desired (column 2, last line and column 3, first line). Thus, according to E6 the presence of a further stitch sinker does not per se provide particular advantages, and therefore there is no reason for the skilled person to isolate and extract from the context of E6 the feature relating to

a further stitch sinker in the expectation of any advantages when applied to the knitting machine of E1.

Finally, E6 does not contain any indications suggesting how to overcome the above-mentioned technical drawbacks (ii) and (iii).

5.5 Contrary to the respondent's opinion, the knitting machine of E6 cannot be regarded as the closest prior art because it is not conceived for the same purpose and does not aim at the same objective as the knitting machine in accordance with the patent in suit (see e.g. T 606/89). Indeed, the knitting machine of E6 does not comprise a terry sinker and it is designed for knitting a single yarn rather than a first and a second yarn. Even assuming that the skilled person would consider to adapt the machine of E6 for producing terry knitwork, there is no reason why he would replace the shedder element (35), which must be fixed in order to perform its function of holding the yarn from moving with the sinker as the latter is withdrawn, with a movable terry sinker. In fact, the straight-forward solution arrived at when combining the teachings of E6 and E1 would consist in providing a terry sinker on one side of the sinker (20) consisting of side members (32) and shedder element (35), thereby maintaining essentially an arrangement corresponding to that shown in E1.

The respondent further argued that the alleged advantages of the knitting machine were obtained only when it was used for carrying out the method of claims 5 and 7 and that the knitting machine of claim 1 was to be considered independently from any specific uses thereof.

However, any use of the knitting machine in which the features defined in claim 1 are utilized, which might be different from the use referred to in claims 5 and 7, provides the technical effect that the knitwork density can effectively be determined by means of the position of the further stitch sinker (see point 5.3 above). Therefore, at least this technical effect is to be taken into consideration when assessing inventive step.

5.6 Since the remaining available prior art neither discloses nor suggests the provision of a second stitch sinker in a sinker arrangement comprising a stitch sinker and a terry sinker, the subject-matter of claim 1 is found to involve an inventive step (Article 56 EPC).

5.7 The methods of claims 5 and 7 require the utilization of the features of the knitting machine of claim 1. Therefore, also the subject-matter of these claims involves an inventive step.

The subject-matter of dependent claims 2 to 4, 6 and 8 to 10 relating to particular embodiments of the claimed knitting machine and methods likewise involves an inventive step.

6. Therefore, claims 1 to 10 together with the description as filed during oral proceedings of 13 May 2004, and the drawings of the patent as granted, form a suitable basis for maintenance of the patent in amended form.

**Order**

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

1. The decision under appeal is set aside.
  
2. The case is remitted to the first instance with the order to maintain the patent on the basis of the following documents:

**claims:** 1 to 10 filed during the oral proceedings of 13 May 2004;

**description:** columns 1 to 5 filed during the oral proceedings of 13 May 2004;

**drawings:** Figures A, B and 1 to 6 of the patent as granted.

The Registrar:

The Chairman:

M. Patin

P. Alting van Geusau