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**Datasheet for the decision
of 19 April 2010**

Case Number: T 2015/07 - 3.2.06

Application Number: 01660027.2

Publication Number: 1123759

IPC: B21D 13/04

Language of the proceedings: EN

Title of invention:

Method for corrugating a metal foil and metal foil obtained by such a method

Patentee:

ECOCAT OY

Opponent:

Emitec Gesellschaft für Emissionstechnologie mbH

Headword:

-

Relevant legal provisions:

RPBA Art. 12(2)(4), 13(1)

Relevant legal provisions (EPC 1973):

EPC Art. 54, 56

Keyword:

"Main request - novelty (no)"

"Auxiliary request - inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 2015/07 - 3.2.06

D E C I S I O N
of the Technical Board of Appeal 3.2.06
of 19 April 2010

Appellant: Emitec Gesellschaft für Emissionstechnologie
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 30 October 2007
rejecting the opposition filed against European
patent No. 1123759 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: P. Alting van Geusau
Members: M. Harrison
W. Sekretaruk

Summary of Facts and Submissions

I. The appellant (opponent) filed an appeal against the opposition division's decision rejecting the opposition against European patent number 1 123 759, and requested revocation of the patent.

In its decision, the opposition division found *inter alia* that the subject matter of claim 1 was novel with respect to

E5: JP-A-09 174 180 A (Japanese patent abstract and English computer translation of the full document).

II. In its appeal grounds, the appellant relied on E5 to support an objection of lack of inventive step with respect to the subject matter of claim 1. A general reference was also made in item (B) of the appeal grounds to the submission of 19 January 2006 (i.e. the notice of opposition).

III. The respondent (proprietor) requested as a main request that the appeal be dismissed, or that the patent be maintained on the basis of the claims of one of its three auxiliary requests filed with the appeal grounds.

IV. With its letter dated 2 November 2009, the appellant filed a further submission, including arguments against claim 1 based on E5.

V. The Board issued a summons to oral proceedings together with a communication under Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA), in which the Board stated that although the appellant had not

attacked novelty of the subject matter of claim 1 with its grounds of appeal, the Board intended to use its discretion to allow the appellant to change its case (with reference e.g. to Article 13(1) RPBA) in accordance with its submissions in the letter dated 2 November 2009 concerning E5, since the subject matter of independent claim 1 appeared *prima facie* to lack novelty. The Board also opined that the subject matter of independent claim 5 appeared to lack novelty.

VI. With its letter of 19 March 2010, the respondent maintained its main request and filed a series of further auxiliary requests, the first auxiliary request of which corresponded to that filed with its response to the grounds of appeal.

VII. During the oral proceedings held before the Board on 19 April 2010, the appellant maintained its request for revocation of the patent. The respondent maintained its main request that the appeal be dismissed and replaced all its auxiliary requests with a sole auxiliary request for maintenance of the patent in an amended form, including claims 1 to 4 and description columns 1 to 4 as filed during the oral proceedings, together with Figures 1 to 6 as granted.

VIII. Claims 1 and 5 of the main request (patent as granted) read as follows:

"1. A method of corrugating a metal foil, in which an originally flat metal foil (40) is rolled in at least two steps between fluted rollers (42, 43) disposed in pairs, characterized in that, in a first step, the roller grooves (41) have a radius at their top which

accounts for 10% or more of the distance between the groove tops, and in that in a final step, the roller grooves (44) have a radius at their top which is smaller than the radius in the first step."

"5. A corrugated metal foil (11) intended to form together with a flat metal foil (12) a package pervious to gas or liquid, characterised in that the radius of the fold bottom and top is in the range from 1 to 10% of the fold distance."

IX. Claim 1 of the auxiliary request differed from claim 1 of the main request in that the terminology "fluted rollers (42, 43)" was replaced by "axially fluted rollers (42, 43)".

X. The arguments of the appellant may be summarised as follows:

Main request

The novelty objection in regard to claim 1 was not a change of case, as the same objection had already been made before the opposition division and a reference to the entire notice of opposition had been made in the appeal grounds.

The subject matter of claim 1 lacked novelty over E5, in view of paragraph [0030] in combination with the drawings, which disclosed consecutive roller stations in which the height of the corrugations became progressively larger and the pitch progressively smaller, with decreased foil width. The radius at the top of the flutes in the first station S_1 was far greater than 10% of the fold distance due to the

corrugation height-to-pitch ratio dimensions disclosed. The general form of the rollers was shown in drawing 2 and this matched the approximately sinusoidal curve resulting in the foil which was depicted in drawing 3. The reduction in radius of the roller groove tips from station S_1 to station S_4 was implicit in view of the dimensions quoted for pitch and height at those stations and the smooth wave form.

The subject matter of independent claim 5 also lacked novelty with respect to e.g.

E6: JP 57 007 221 (Japanese patent abstract in English and Japanese language document),

which was also in accordance with the provisional opinion of the Board.

Auxiliary request

Although the addition of the term "axially" in claim 1 rendered its subject matter novel it did not involve an inventive step, since it was known in the prior art to use either radially or axially fluted rollers for producing corrugations, rolling in two steps using axially fluted rollers being known from e.g.

E2: US 5 819 575 A, and

E3: US 5 983 692 A.

Taking E5 as the closest prior art, the problem to be solved was to find an alternative way of producing the corrugated foil. It was then obvious to solve this problem by using two consecutive roller pairs of E2

shown in Fig. 1, or the two consecutive roller pairs 2a, 2a and 3a, 3b in E3.

In the appellant's submission of 2 November 2009, item 8, with regard to claim 1 of the (then) first auxiliary request,

E4: US 5 085 268 A, and

E11: EP 0 484 364 B

were cited as disclosing the successive formation of the corrugated foil by using axially fluted rollers.

XI. The arguments of the respondent may be summarised as follows:

Main request

The objection to novelty of claim 1 with regard to E5 was not part of the appellant's appeal grounds, but could only be deduced from its submission of 2 November 2009. Anyway, the subject matter of claim 1 was novel because the radius of curvature of the roller groove tops at each station could not be deduced in E5. The features of the characterizing part of the claim were thus not known from E5. Although dimensions were disclosed at each station in E5, the foil was 50 μm thick, so that whilst drawing 3 showed a decreasing radius of the curves of the foil at each station and a somewhat sinusoidal corrugation curve, this was merely schematic whereby no dimensions of radius could be deduced therefrom. It was possible that roller pairs with the same groove tip radius were used at each station S_1 to S_4 because the height of the corrugations was very similar to the foil thickness, and merely a

successive increased indentation with the same groove tip radius at each station could produce the final foil shape.

The subject matter of claim 5 was also novel with respect to all cited prior art.

Auxiliary request

The amendment of claim 1 was taken from paragraph [0006] of the published version of the filed application and the subject matter of this amended claim 1 involved an inventive step when starting from E5. E5 disclosed the production of a foil with corrugations running in the longitudinal direction of feed. A skilled person had no incentive to use axially fluted roller pairs at all, since the corrugations would then be perpendicular to those in E5 and thus entirely incompatible therewith. E2 and E3 also did not teach successive reduction of the groove top radius; in E2 the first roller pair made a corrugation but the second roller pair merely performed a feeding operation. In E3, the upstream roller pair 2a/2a, performed corrugation in a different direction to the roller pair 3a/3b, and the downstream roller pairs did not make corrugations at all. Neither of E2 or E3 combined with E5 would lead to the subject matter of claim 1 unless an inventive step were involved.

Reasons for the Decision

1. *Main request*

1.1 The appellant did not make an explicit novelty objection against claim 1 with regard to E5 when filing its grounds of appeal, even though such an objection was made and decided upon during the opposition proceedings. Although the appellant made a general reference to submissions given e.g. in its notice of opposition, such a general reference is not in accordance with Article 12(2) RPBA which requires that a party should "specify expressly all the facts, arguments and evidence relied on."

However, since E5 had already been used in the grounds of appeal to support an inventive step objection against claim 1, and since the decision under appeal also dealt with novelty of the subject matter of claim 1 with respect to E5, the Board used its discretion (see Article 13(1) RPBA) to allow the appellant to change its case in this regard, in view of the submission of 2 November 2009.

1.2 The subject matter of claim 1 of the main request (i.e. claim 1 as granted) lacks novelty with respect to E5, as explained below.

1.2.1 Using the wording of claim 1 and references to E5 in parentheses, E5 (see in particular all the drawings and paragraphs [0029] and [0030]) discloses a method of corrugating a metal foil, in which an originally flat metal foil (see reference numeral 1 in drawing 1) is rolled in at least two steps (stations S_1 to S_n) between

fluted rollers (A_1/A_1 to A_n/A_n) disposed in pairs (see e.g. drawings 2 and 3), wherein, in a first step (station S_1), the roller grooves (see e.g. the grooves on the rollers in drawing 2, which produce foil corrugations as in drawing 3 at station S_1), have a radius at their tops which accounts for 10% or more of the distance between the groove tops (here it is to be noted that the height of the produced corrugations in E5 is $h_1/2 = 0.04$ mm, and the pitch P_1 between corrugations is 1.07 mm, which, due to the curve of the corrugations being continuous and essentially sinusoidally varying in accordance with the form of the rollers shown in drawing 2, results in a radius of the corresponding roller groove top of vastly greater than 10% of the corrugation pitch P_1 , whereby "pitch" in E5 is essentially the same as the "distance between the groove tops" in claim 1), and in that in a final step (e.g. the step at station S_4), the roller grooves have a radius at their top which is smaller than the radius in the first step (this is implicit from the fact that the height of the corrugations increases from 0.04 mm in station S_1 to $h_4/2 = 0.1$ mm with a corresponding reduction in pitch to 1 mm in station S_4 , the corrugated surface remains smooth and substantially sinusoidal and the width W of the foil decreases accordingly).

- 1.2.2 In regard to the foregoing, it should be noted that claim 1 defines a radius which is in a first step "10% or more of the distance between the groove tops" and in a final step merely a radius which is "smaller than the first step". Since the width of the foil in E5 is reduced at each station together with the pitch, and the curvature of the rollers is depicted as being essentially smoothly varying, it is implicit to a

skilled person that the radius of the groove tops of the rollers would decrease between station S_1 and station S_4 . Whilst it might be theoretically possible that the groove tops could be made to have an equal radius in all stations and the method could be carried out in some way such that the corrugation height still increased between each station while producing a reduced pitch, this is not what would be understood by a skilled person on a normal reading of E5 where successive processing by forcing a sheet into the nip between two rollers would logically be carried out by successively reducing the pitch and radius of curvature of the roller grooves between at least some, if not all, of the stations so as to match the reduced curvature of the foil corrugations as the pitch decreases. If smooth curvature were not used, it would appear that only with special measures of some undisclosed type would it be possible to arrive at the pitch and heights disclosed in paragraph [0030] in drawing 3 for each and every station S_1 to S_4 . Such a theoretical and indeed highly unlikely possibility is thus not within the disclosure of E5 when read by a skilled person.

- 1.2.3 In respect of the respondent's argument that the form of the corrugation curve shown at each station in drawing 3 is only schematic, it should be noted that whilst it is accepted *per se* by the Board that no precise measurements may be made on the corrugation curves depicted in drawing 3 due to that schematic representation, the disclosure in drawing 3 that the curve smoothly varies as a continuous wave is entirely in line with the general shape of the rollers depicted in drawing 2. There is thus no logical reason to assume that drawing 3 is a misleading representation of the

generally obtained corrugation curve, nor that the roller groove top radius would for some reason be arranged to be the same between each and every station.

1.2.4 The fact that a thin foil of 50 μm is used as the starting material in E5 and that the corrugations with a total height difference in step S_1 of 80 μm and in step S_4 of 200 μm , does not change the foregoing conclusions. If anything, with a thin foil of that type, the necessary precision in arriving at the uniform height and pitch as quoted in E5 would be expected to result from arranging the rollers with groove radii adapted to the natural change of foil radius due to contraction of the foil width W between station S_1 to S_4 .

1.3 The subject matter of claim 1 thus lacks novelty over E5, and the requirements of Article 54 EPC 1973 are consequently not fulfilled. The respondent's main request is therefore not allowable.

1.4 As a consequence of the foregoing, it is not necessary for the purposes of this decision to give reasons as to why the Board concluded, as also stated during the oral proceedings, that the subject matter of claim 5 of the main request also lacked novelty.

2. *Auxiliary request*

2.1 The claims of the auxiliary request correspond to claims 1 to 4 of the set of claims 1 to 6 filed with the first auxiliary request in the respondent's reply to the grounds of appeal.

Although the auxiliary request represents a change of case with respect to the respondent's complete case (see Article 12(2), 12(4) and 13(1) RPBA), the Board exercised its discretion and admitted the request into proceedings, in particular since filing the request was procedurally efficient in view of the fact that all product claims were deleted and the subject matter of the method claims had already been discussed.

- 2.2 The introduction of the terminology "axially" to define the orientation of the flutes on the rollers is based on the disclosure in paragraph [0006] of the published version of the filed application, where the terminology "axially fluted rolls" is used. Although this terminology is disclosed in relation to conventional methods, it is apparent from paragraph [0009] that the conventional method is also disclosed as being used at least to form the first step of the two step corrugation process, and that the corrugation is made deeper in a second step. The apparatus shown in Figure 4, with respect to which the method is described (see paragraphs [0009] and [0010]) shows this first and second step being formed on axially fluted rollers. It is thus unambiguously disclosed for a skilled person that first and second step are each carried out on axially fluted rollers. The requirements of Article 123(2) EPC are thus met.

Also, no objections were raised by the appellant in regard to Article 123(3) EPC or Article 84 EPC 1973, and the Board finds no reason to raise any objections of its own in this regard.

2.3 By introducing the term "axially" to define the direction of the flutes on the rollers used in the method of claim 1, the subject matter of claim 1 is novel with respect to E5, since in E5 the grooves of the rollers run circumferentially and thus no axial fluting is present.

The appellant also made no objection to the novelty of the subject matter of claim 1 with regard to E5 or any other cited document.

2.4 The appellant argued that the subject matter of claim 1 lacked an inventive step when starting from E5 as the closest prior art and combining this with the teaching of E2 or E3 to solve a problem of providing an alternative way of forming the foil of E5.

2.5 The Board accepts that the objective problem to be solved when starting from E5 can indeed be regarded as providing an alternative way of forming the foil of E5.

2.6 The respondent argued that a skilled person would not resort to E2 and E3 at all, because the process of E5 formed corrugations running longitudinally in the feed direction whereas E2 and E3 formed corrugations perpendicular to this and would thus be incompatible with E5. However this argument is found unconvincing by the Board, since the objective problem to be solved over E5 is the production of a foil of E5 in an alternative manner, not the production of a foil with corrugations running longitudinally in the feed direction.

2.7 Nevertheless, the appellant has failed to convince the Board concludes that a skilled person would combine the teaching of either E2 or E3 with E5 in order to solve the objective problem unless inventive skill were used.

2.7.1 E5 discloses a process of producing a foil in which the foil is continuously corrugated in successive stations with the height of the corrugations gradually increasing and the pitch of the corrugations gradually decreasing as the foil passes through successive stations S_1 to S_4 .

2.7.2 Although E2 discloses the manufacture of a corrugated foil in which two successive pairs of rollers with corrugations are present (roller pairs 3a and 5a), only the first set of rollers 3a are however corrugation forming rollers (see e.g. column 3, lines 33 to 55), whereby the second set of rollers 5a merely perform the function of feeding the corrugated sheet. The feeding rollers 5a notably also have substantially the same pitch as the first set of rollers. In between these sets of rollers 3a and 5a, the foil is also cut. Thus, a skilled person searching for an alternative way of manufacturing a corrugated foil of the type in E5, would note that E2 only teaches a single step corrugation which would not therefore lead the skilled person without using inventive skill to the subject matter of claim 1, since the entire purpose of E5 is to use a multi-step method so as to gradually alter the corrugation profile at each corrugation station in order to arrive at the required profile.

2.7.3 E3 discloses (see e.g. Fig. 2) four consecutive roller pairs 2a/2a, 3a/3b, 4a/4b and 5a/5b. However

corrugations produced between rollers 2a/2a run longitudinally along the foil (see column 4, line 61 to column 5, line 2) and would thus involve fluting circumferentially. Roller pairs 4a/4b and 5a/5b are smoothing rollers. Thus the only roller pair producing corrugations using axial flutes is the single roller pair 3a/3b. For the same reasons as apply to the combination of E2 with E5, the skilled person would not, without using inventive skill, apply the teaching of a single axially fluted roller pair from E3 to the corrugation method from E5 to thereby arrive at the subject matter of claim 1.

- 2.8 Although no arguments were made during oral proceedings when presenting arguments on inventive step with regard to E4 and E11, the appellant had mentioned E4 and E11 in its written submissions as being relevant to claim 1 of the auxiliary request when seen in combination with E5. E4 and E11 were cited as examples of two-step procedures with axially fluted rollers. However, the two-step procedure disclosed in column 3, lines 31 to 55 of E4 is not equivalent to any of the two steps of the procedure in E5 where a gradual modification of the same corrugations takes place on each successive step. Instead, in E4 a first corrugation is produced between the first pair of rollers and then a second smaller corrugation (protrusions/indents 34) of unknown radius is produced in the corrugated sheet by a second pair of rollers 26, 28. Rather than being a gradual changing of the same corrugations as in E5, the method of E4 involves instead the production of second corrugations superposed on the main corrugations.

Similarly in E11, secondary smaller corrugations are produced between or within certain sections of the main corrugations (see e.g. Figures), which is a different concept to that in E5 where the successive rollers pairs are used for gradual alteration of the same corrugation.

2.9 Thus, in view of the prior art documents cited by the appellant and the appellant's arguments made with regard thereto, the Board finds that the subject matter of claim 1 involves an inventive step. The requirements of Article 56 EPC 1973 are therefore fulfilled.

2.10 The Board also concludes that the amendments made to the description have removed inconsistencies between the claims and the description. The appellant also raised no objections to the description amendments.

2.11 The Board therefore finds that the auxiliary request is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the European patent on the basis of the following documents:

claims 1 - 4 and description columns 1 - 4 of 19 April 2010;

Figures 1 - 6 as granted.

The Registrar:

The Chairman:

M. Patin

P. Alting van Geusau