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D E C I S I O N
of 18 May 2004

Case Number: T 0573/02 - 3.2.1

Application Number: 95111841.3

Publication Number: 0697554

IPC: F16L 33/02

Language of the proceedings: EN

Title of invention:
Tolerance-compensating hose clamp

Patentee:
Hans Oetiker AG Maschinen- und Apparatefabrik

Opponent:
ETABLISSEMENTS CAILLAU Société Anonyme à Directoire et Conseil de Surveillance

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
"Admissibility of the amendments (yes)"
"Reformatio in pejus (no)"
"Novelty (yes)"
"Inventive step (yes)"

Decisions cited:
G 0001/99

Catchword:
-

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Case Number: T 0573/02 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 18 May 2004

Appellant: (Opponent)	ETABLISSEMENTS CAILLAU Société Anonyme à Directoire et Conseil de Surveillance 28, rue Ernest Renan F-92130 ISSY-LES-MOULINEAUX (FR)
Representative:	Intès, Didier Gérard André Cabinet Beau de Loménie, 158, rue de l'Université F-75340 Paris Cedex 07 (FR)
Respondent: (Proprietor of the patent)	Hans Oetiker AG Maschinen- und Apparatefabrik Oberdorfstrasse 21 CH-8812 Horgen (CH)
Representative:	Strehl, Schübel-Hopf & Partner Maximilianstrasse 54 D-80538 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted 29 April 2002 concerning maintenance of European patent No. 0697554 in amended form.**

Composition of the Board:

Chairman: S. Crane
Members: Y. A. F. Lemblé
S. U. Hoffmann

Summary of Facts and Submissions

I. The opponent's appeal is directed against the interlocutory decision of the Opposition Division posted 29 April 2002 according to which, account being taken of the amendments made by the patent proprietor during the opposition proceedings, European patent No. 0 697 554 and the invention to which it related were found to meet the requirements of the EPC.

II. The following prior art was cited by the appellant in the statement of grounds of appeal:

D1: US-A-4 919 682

D6: US-A-3 475 793

D17: DE-C-40 38 529

D21: US-A-3 402 436

III. During oral proceedings held on 18 May 2004 the appellant (opponent) requested that the decision to maintain the patent in amended form be set aside and that the patent be revoked in its entirety.
The respondent (patentee) requested that the patent be maintained on the basis of the claims 1 to 13 filed during the oral proceedings.

IV. Claim 1 reads as follows:

"1. A clamp structure for fastening a hose of hard material comprising
a clamping band (11),

means in said clamping band to enable installing of the clamp structure on the hose to be fastened thereby, including tightening means (16) located near one end of said band (11) for tightening the clamp structure about said hose as well as providing both a clamping force and a tolerance-compensation, and
further tolerance-compensating means(30) separate from said tightening means (16) and located intermediate said tightening means (16) and the other end of said clamping band (11), said further tolerance-compensating means (30) including an undulation in said clamping band (11) to increase the return spring action of the clamp structure, and an opening (38) provided in said undulation (30),
characterised in that said opening (38) is circular and located in the top portion of the undulation (30)."

V. The appellant's submissions made in writing and at the oral proceedings, insofar as they are relevant to the present decision, can be summarised as follows:

Amended claim 1 was not novel with respect to D6. This document mentioned in column 4, lines 65 to 72 that the described clamp structure comprised, in addition to the elastically effective tension spring elements 2, ear-shaped lugs or folds 22 that could be contracted in a known manner by means of pincers of the like. These additional ears could be, for example, of the so-called "Oetiker"-type which provided both the clamping force and the tolerance compensation. They corresponded to the tightening means of claim 1. The elastically effective tension spring elements 2 included an undulation in the clamping band and, thus, corresponded to the further separate tolerance-compensating means of

claim 1. The further consideration of the passage of column 8, lines 7 to 13, which expressly mentioned the "notching or recessing" of the center portion 19 of the undulation, led to the conclusion that, except for the feature that the opening made in the undulation was of circular form, all the other features of claim 1 were explicitly disclosed in D6. A photocopy of figure 18 of D6 made on an enlarged scale and joined to the notice of appeal showed that the opening 19 was nearly circular. Even if it was assumed that the opening of figure 18 of D6 had a slight ovality, this would take away the novelty of claim 1. In this type of clamp, the opening 19 was obtained by punching a hole out of the band in flat condition, the latter being thereafter bent and drawn to form the undulation. Because of the deformation linked to the formation of the undulation, it was impossible for an opening which had been circular before the bending process to remain perfectly circular after the formation of the undulation. In fact, the initially circular opening took a slightly oval shape after formation of the undulation. Therefore, the adjective "circular" had to be interpreted in the claim as having such a broad meaning as to include such slightly oval openings.
Although D6 specified that the notches or recesses 19 had the effect of reinforcing the centre portion of the undulation, this did not preclude the making of the notch as a tiny circular hole which would have a reinforcing function achieved by a strain hardening effect on the contour of the hole.

The subject-matter of claim 1 lacked inventive step. Should the Board consider that the clamp structure of D6 did not disclose a circular opening located in the

top portion of the undulation, that feature was obvious to the person skilled in the art on the basis of his general knowledge. Starting from the general teaching of D6, the idea of adapting the elastic characteristics of the compensating undulation to the particular material of the hose did not represent an inventive contribution to the prior art. That this adaptation could be achieved by weakening the elasticity of the undulation and that weakening could be obtained by cutting one or more openings of any shape in the top of the undulation was an obvious alternative to the proposal of reinforcing that top portion and disclosed in D6. The passage of column 8, lines 20 to 28 already hinted at the possibility of increasing the elasticity of the undulation by means of a notch. The fact that there was no unexpected or particular effect connected to the circular form when compared to an oblong opening, known per se from D1, or a drop-shaped opening (see the two graphs dated 6 March 2002 and annexed to the minutes of the oral proceedings before the Opposition Division), spoke for a lack of inventive step.

The clamp structure as defined in claim 1 was also obvious to the skilled person on the basis of a combined consideration of D6 with D17. Document D17 disclosed that openings having for example an hourglass shape and made in a clamping band, fulfilled the function of elastic tolerance compensating means. D17 also proposed to replace the hourglass shaped openings 24 of figure 1 by circular openings 124 (figure 6), when the required amount of elastic deformations was to be reduced (column 6, lines 41 to 51). The same teaching was applicable to the openings 19 made in the undulation of D6.

The subject-matter of claim 1 was also rendered obvious by the content of D1 which was taken as a basis for the delimitation of claim 1 in the two-part form. In D1, the further separate tolerance compensating means took the form of two undulations 8 traversed by a longitudinally extending central slit 9. D1 mentioned that the undulations, which were particularly elastic because of the slit 9, were stretched substantially flat when a hose of hard material was to be fastened by the clamp (column 2, lines 35 to 52). On the basis of considerations similar to those made above with respect to D17, a skilled person who wanted to reduce the elasticity of such an undulation would have contemplated a strengthening of the undulation by choosing an opening which did not have the high longitudinal extend of the slit of D1. In so doing, he would come to a circular opening located in the top portion of the undulation, as claimed.

VI. The respondent countered essentially as follows:

There was no disclosure of an opening in the sense of through-hole in the centre of the undulation of the clamping band of D6 but only of a reinforcement which might take the various forms mentioned in column 8 of D6. There was also no suggestion of an opening in the form of an aperture obtained by removal of material from the top of the undulation. Moreover, when the claim defined the opening as being circular, it referred to the clamp structure as a finished part. The documents D1, D6 and D21 showed various ways of adapting the elastic characteristics of an elastic fold. None of them led to the concept of providing a circular

hole in the top of an undulation. The document D17 represented no solution to that problem because it disclosed a band which was flat from the beginning.

The band structure of the invention was very advantageous in that the removal of a minimal amount of material in the top of the undulation had a maximal effect on the elasticity of the undulation. Additionally, the circular form of the cut provided for an optimal stress distribution and prevented stress peaks in that area. The concept of cutting an opening in the top of the undulation represented therefore an ingenious way of adapting the elastic characteristics of an elastic undulation to the harder material of the hose.

Reasons for the Decision

1. Admissibility of the amendments (Articles 123(2) and (3) EPC); Clarity (Article 84 EPC); "Reformatio in pejus"

1.1 Compared to claim 1 as granted, claim 1 is now limited to a specific embodiment of the clamp structure (figure 7 of the patent) which is particularly adapted for fastening a hose of hard material. Accordingly, the further separate tolerance compensating means are now defined as including an undulation having a single circular opening located in the top portion of the undulation. These limitations have a clear basis in the application as originally filed (page 5, lines 19 to 22; claim 8) and were not objected to by the appellant as representing an extension of the subject-matter.

1.2 The appellant questioned the clarity of the relative term "hard". Owing to the fact that the patent distinguishes hoses made of softer material, like rubber, from those made of harder material, like plastic materials, the Board considers that the term "hard" is not unclear within this context.

1.3 The appellant objected to the deletion of the limitation "of such a shape as to take into consideration the hardness of the hose material" which was introduced by the respondent during the opposition proceedings and emphasized the adaptive character of the shape of the opening. The Board notes in this respect that the deleted expression did not impart any teaching as to how the shape of the opening and the hardness of the material are linked. The expression in question was vague and deprived of any clear technical teaching. The deleted expression has been replaced by the more specific teaching of providing the undulation with a circular opening when the clamp is intended to be used in conjunction with harder hose materials. A teaching which was disclosed right from the beginning.

1.4 The amendments made in the independent claim 1 in replacement of the wording held allowable by the Opposition Division introduce originally disclosed features which further limit the scope of the patent as maintained by the Opposition Division. Hence, the amended claims do not put the appellant (opponent) in a worse situation than if it had not appealed and the principle of avoiding "Reformation in pejus" mentioned in the decision G 1/99 of the Enlarged Board of Appeal (OJ EPO 2001, 381) has been duly observed.

2. *Novelty*

The Board agrees with the appellant that the passage of column 8, lines 7 to 13 of D6 proposes the "grooving, indenting, depressing, notching or recessing" in the centre portion of the elastic fold 2 in the same manner as it was already proposed with the centre portion 19 of the deformable lug or fold 22 depicted in figure 18 of D6. Thus, such an elastic fold corresponds to the further separate tolerance compensating means of claim 1.

The contention of the appellant that especially the term "notch" included a circular opening, is, however, not correct. As mentioned in column 7, line 44 to column 8, line 6 of D6, the part depicted with the reference numeral 19 in the central part of the fold is systematically described as being a "reinforcement" and its purpose is clearly to prevent that a sharp bending, i.e. buckling or collapse, takes place in the centre of the fold of the band during the clamping operation (see figure 16 of D6). Such a reinforcement can take various forms and the terms "notch" and "recess" are indeed cited. In D21, which is assigned to the same applicant and has the same filing date and makes use of the same terminology as D6, the same "reinforcement" is disclosed in the same context and for the same purpose. The terms "notch" and "recess" are also mentioned as forms taken by the reinforcement (column 6, lines 39 to 40). Except for the reference numeral of the reinforcement (40 instead of 19), the figures 12 to 14 of D21 are identical with the figures 16 to 18 of D6. Figures 18 to 21 of D21 illustrate different forms of realisation of the reinforcements at an enlarged scale. As mentioned in column 6, lines 34 to 42 of D21, all of

them are realised by a radial deformation of the central part of the fold along a direction which extends in a circumferential direction of the clamp. This deformation stiffens the fold against bending. Within this context, the word "notch", which was expressly selected by the appellant in support of his argumentation, also entails the notion of extending along that particular direction.
There is no disclosure or suggestion of the reinforcement taking the form of a circular opening. Although it is conceivable that some cutting may be used to form the described reinforcement, there is no suggestion of cutting an aperture of circular form in the top of the fold. This operation would undoubtedly weaken the resistance of the fold against bending.
Nor is there any disclosure of a tiny through-hole made in the top of the fold and having a reinforcing effect by strain hardening, as contended by the appellant. The mention of such a tiny hole is pure speculation and biased by the *ex-post facto* knowledge of the invention.

3. *Inventive step*

3.1 The argument that the skilled person who wanted to reduce the elasticity of an undulation would have contemplated a weakening by punching the top portion of the undulation as an obvious alternative to the proposal of reinforcing that top portion, known per se from D6 or D21, does not find any support in D6. This document only and consistently mentions the reinforcing effect. The Board understands the passage of column 8, lines 20 to 28 cited by the appellant as meaning that the purpose of the notches, grooves, indentations and depressions is still to reinforce, in this instance to

increase the elasticity of the fold 2 in case the band is made of a soft steel material which does not exhibit a sufficient spring action, thus obviating the need for annealing the material in the area of the deformable folds or lugs 22 (see D6: column 5, lines 1 to 3). Another object to be achieved by the reinforcements in connection with the elastic folds 2 mentioned in D6 is to allow an increase of the clamping force, thus permitting the use of thinner and more flexible material for the band (column 8, lines 11 to 13). There is nothing in D6 about weakening an elastic undulation and, all the less, about weakening that could be obtained by cutting one or more openings of any shape in the top of an undulation

3.2 Starting from the metal clamp of D1 having the "m"-shaped clamp undulation traversed by a longitudinally extending central slit, the contention of the appellant that the skilled person would seek to strengthen the elastic undulation of D1 because it was considered to be too weak for harder hose materials is not backed by the cited passage of D1 (column 2, lines 35 to 52). There is nothing in this passage which suggests that the "m"-shaped clamp undulation was not adequate for harder hose material. The fact that the undulations were stretched substantially flat when a hose of hard material was to be fastened by the clamp is mentioned as having the advantage of preventing a useless squeezing of the deformable pipe by exerting a uniform pressure at every point, which is an essential condition for preventing detachment.
The longitudinal slot 9 which extends along the two adjacent undulations 8 of the clamp structure of D1 cannot be considered as constituting an opening located

in the top portion of the undulation and having a circular shape. The argument that it would have been obvious to a skilled person to reduce the size of the slit 9, if the elasticity of the undulation was considered to be too weak for harder hose materials, does not lead to a circular opening in the top portion of the undulation. In the Board's opinion, the skilled person would rather have considered a reduction of the width of the slit 9.

A circular opening only in the top portion of the undulation has the effect of weakening the part of the undulation which is subjected to the highest efforts. There is no example in the prior art of such a localised weakening. This might be explained by the danger of failure linked to the abrupt change of section at that highly stressed location.

3.3 The Board cannot recognise in D17 any contribution to the problem of adapting the elastic characteristics of an elastic fold. Document D17 discloses elastic tolerance compensating means in the form of hourglass shaped openings 24 (figure 1) or circular openings 124 (figure 6) made in the flat part of a clamping band. This type of elastic tolerance compensating means can be used as an alternative to, or in addition to, the undulation mentioned in the claim. There is no other obvious way of combining the teaching of D17 with a clamp structure having undulations of the type shown in D1 or D6.

3.4 Therefore, in the Board's judgment, the concept of cutting a single circular opening in the top portion of an undulation in order to achieve elastic characteristics of that undulation which, when used as

a separate tolerance compensation means in a clamping band including tightening means for fastening a hose, are particularly adapted for harder hose materials, is not disclosed or suggested by the prior art cited by the appellant.

4. The Board concludes from the above that the subject-matter of claim 1 is novel (Article 54 EPC) and involves an inventive step (Article 56 EPC).

Dependent claims 2 to 13 relate to further developments of the inventive concept disclosed in claim 1 and contain all of the features of claim 1. The above conclusions regarding novelty and inventive step apply equally to these claims which likewise meet the requirements of the EPC.

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 13 submitted during the oral proceedings;

   - description pages 2 to 12, 12a, 12b, 12c and 13 submitted during the oral proceedings

   - drawings as granted.

The Registrar: The Chairman:

A. Vottner S. Crane