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D E C I S I O N
of 14 July 1999

Case Number: T 0621/97 - 3.5.2

Application Number: 90309189.0

Publication Number: 0414514

IPC: H02G 1/08

Language of the proceedings: EN

Title of invention:
Cable ducting and method for installing cables through ducts

Patentee:
Arnco Corporation

Opponent:
Dipl.-Ing. Dr. Ernst Vogelsang GmbH & Co. KG

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - no"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0621/97 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 14 July 1999

Appellant: (Opponent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 15 April 1997 rejecting the opposition filed against European patent No. 0 414 514 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: W. J. L. Wheeler
Members: R. G. O'Connell

J. H. P. Willems

Summary of Facts and Submissions

I. This appeal is against the rejection of the opposition to European patent No. 414 514.

II. In the notice of opposition the opponent (now appellant) had requested revocation of the patent in its entirety on the grounds that the subject-matter of the claims of the patent did not involve an inventive step (Article 100(a) EPC in conjunction with Articles 52(1) and 56 EPC) having regard in particular to the following prior art documents:

D1: DE-A-3 529 541

D2: DE-U-8 901 210.

III. In its response to the statement of grounds of appeal the respondent (proprietor) appellant cited three new documents:

V1: US-A-5 154 869

V2: EP-B-0 458 012

V3: English translation of V2, both V1 and V2 emanating from the appellant (opponent) and being published after the filing date of the opposed patent.

IV. With a subsequent letter dated May 1998 the appellant cited a new prior art document:

D3: AU-B-12 616/88

as evidence of common general knowledge in the art relevant to the interpretation of D1 and D2.

V. In a communication accompanying a summons to oral proceedings the board indicated that it was not persuaded of the relevance of the postpublished documents V1 to V3. As regards the prior art citation D3 it pointed out that the disclosure in a single patent document was not normally regarded as common general knowledge in the art.

VI. Claim 1 as granted (main request) reads as follows:

"1. A duct for transmission and other cable, the duct comprising polymeric tubing having spiral ribs (58) with peaks (54) and valleys (56) along the inner wall (50), the peaks forming a surface over which cable may travel, to reduce the friction of travel of the cable through the duct, characterised in that the spiral ribs (58) along the inner wall of the duct turn in one direction and then in the other direction."

Claims 1 of auxiliary requests I to VI add the following features respectively to the end of claim 1 of the main request:

"and the duct has an inside diameter from 12.5 mm to 152.4 mm." (auxiliary request I);

"the duct having an inside diameter from 12.5 mm to 152.4 mm (1/2 inch to 6 inches) and a wall thickness from SIDR 5 to 21." (auxiliary request II);

"there being a plurality of changes of direction for said ribs." (auxiliary request III);

"in a periodic manner." (auxiliary request IV);

"there being a plurality of changes of direction for said ribs, wherein each rib changes direction in alternating fashion after about 0.305 m to 1.829 m (one to six linear feet)." (auxiliary request V);

"there being a plurality of changes of direction for said ribs, with each rib making about one revolution for about 0.305 m to 1.829 m (one to six linear feet) in one direction and then in the other direction in an alternating fashion." (auxiliary request VI).

VII. Oral proceedings were held before the board on 14 July 1999.

VIII. The appellant argued essentially as follows:

(i) The documents V1 to V3 were published after the filing date of the opposed patent and had no bearing on the assessment of inventive step in the instant appeal.

(ii) The claimed duct resulted from an obvious combination of the teachings of D1 and D2, in particular the application to the spiral ribs on the **inner** wall of the duct shown in Figure 3 of D1 of the idea of alternating the winding sense of the spiral which was taught in D2 Figure 4 for the **outer** surface of a cable to facilitate the pulling of the latter into a duct.

(iii) For the person skilled in the art ribs on a cable outer surface and ribs on the inner wall of a duct were straightforward mechanical equivalents; it was obvious that the function of reducing the area of contact - and hence friction - between the relatively slidable surfaces of cable and duct inner wall respectively would be achieved in either configuration. Indeed this equivalence is acknowledged in the opposed patent itself at page 4, lines 53 to 55 in relation to the duct embodiments shown in Figures 5 and 6, which have external as well as internal ribs:

"Alternatively, longitudinal ribs 60, as shown in Figure 6, may be used along the outer wall 52 to aid in inserting the duct through an outer duct. The use of the ribbing reduces friction in this regard, as does the internal spiral ribbing 58."

(iv) The skilled person starting from the duct construction of D1 Figure 3 and addressing the problem of cable twisting which inevitably arose when a cable was pulled through this duct would consider D2, which solved this problem for the mechanically equivalent configuration of a (outer) ribbed cable sliding in a smooth-(inner)walled duct and would appreciate immediately that the solution taught in D2 of alternating the winding sense of the spiral would solve the same problem if applied to the D1 structure. In this way he would arrive at the subject-matter of claim 1 by routine workshop considerations not involving an inventive step.

(v) As regards the auxiliary requests they related only to routine design selection of particular dimensions not involving an inventive step.

IX. The respondent argued essentially as follows:

(i) D3 related solely to ducts having annular corrugations, ie transverse ribs, of the kind acknowledged as prior art in the opposed patent at page 2, line 17 and not to ducts having spiral (in the sense of 'helical' as in 'spiral staircase') ribs of the kind featuring in the invention to which the opposed patent related. It was less relevant than D1 or D2.

(ii) The purpose of citing the postpublished documents V1 to V3 was to show that at the time of filing of these patent applications the appellant regarded the idea of providing a duct wall with an alternating spiral rib as inventive.

(iii) To categorise the relocation of the alternating spiral ribs of D2 Figure 4 on the inner wall of a duct, as claimed in the characterising portion of claim 1 of the opposed patent, as a mechanical equivalent which the person skilled in the art would routinely adopt was an argument based on hindsight. It failed to take into account the manufacturing difficulties involved - such as rotating die parts - in providing the alternation on the inner wall of the duct as opposed to the cable outer wall as taught in D2. These difficulties alone would be enough to prevent the person skilled in the art seriously contemplating

the idea of transferring the alternating spiral ribs of D2 to the inner wall of the duct.

(iv) An additional reason why the person skilled in the art would not have seriously contemplated adopting the construction claimed in the opposed patent is that he would not have realised that it had non-obvious advantages which outweighed its obvious manufacturing disadvantages. As a result of the alternation in the winding sense of the spiral ribs on the inside of the duct wall the cable, as it was drawn through the duct, had a tendency to follow the ribs so that there was some lateral, ie side to side, oscillating movement as the cable moved longitudinally through the duct. This lateral oscillation minimised twist and reduced any sidewall loading, so that frictional forces between the cable and ribs were minimised. Further, this lateral oscillating movement of the cable caused it to touch different parts of the alternating spiral ribs, thereby reducing the build-up of heat and reducing the likelihood of damage to the cable, with fresh lubricant, when lubricant was used, being collected from pools of lubricant between adjacent ribs, as the cable moved axially, and from side to side relative to the duct.

(v) Turning to the auxiliary requests, the respondent contended that auxiliary request I and auxiliary request II were directed to particularly advantageous selected values. Auxiliary request III emphasised the inventive distinction over D2 Figure 4 which showed only one change of

direction. Auxiliary request IV was directed to the particularly advantageous periodic alternation of the spiral direction while auxiliary requests V and VI related to particularly advantageous frequencies for this periodicity.

X. The appellant requested that the decision under appeal be set aside and that the patent be revoked.

XI. The respondent requested that the appeal be dismissed and that the patent be maintained as granted (main request) or in accordance with auxiliary requests I to IV filed 14 June 1999 or auxiliary requests V and VI submitted at the oral proceedings on 14 July 1999.

Reasons for the Decision

1. The appeal is admissible.

2. *Evidence filed on appeal*

2.1 V1 to V3

These postpublished documents are alleged by the respondent to show that the appellant argued differently in relation to inventive step of subject-matter essentially similar to that of claim 1 of the opposed patent in his own patent applications. The appellant denies that the subject-matter is the same. But even if it were, the alleged contentions would have little or no probative value in relation to the issue of inventive step which is to be assessed objectively.

Hence these documents will be disregarded by the board.

2.2 D3

The board agrees with the respondent that this late-filed document relates solely to corrugated ducts of the kind acknowledged as prior art in the opposed patent. Since it does not relate even to spiral ribs, let alone alternating sense spiral ribs, it is less relevant than D1 or D2 and will therefore be disregarded by the board pursuant to Article 114 (2) EPC.

3. Although the opposed patent contains five independent claims, only claim 1 of the main request and of each auxiliary request needs detailed consideration since the other independent claims undisputedly stand or fall with the substance of the respective claim 1.

4. *Novelty*

4.1 The appellant sought in the oral proceedings held before the board to introduce a new ground for opposition of lack of novelty based on the appellant's (disputed) interpretation of D3. Such a new ground may be considered in appeal proceedings only with the proprietor's consent (Opinion G 10/91 OJ EPO 1993, 420, point 3 of the formal binding opinion), and this consent was not forthcoming, so, apart from the finding that D3 is to be disregarded, the board has no jurisdiction to consider this ground further.

5. *Inventive step (main request)*

5.1 Accordingly the main issue to be decided in this appeal in relation to the main request is whether the subject-matter of claim 1 involves an inventive step having regard to documents D1 and D2 and common general knowledge in the art.

5.2 It is common ground that claim 1 is correctly delimited with respect to the closest prior art D1, ie that the difference between the claimed duct and D1 is represented by the feature specified in the characterising portion of the claim, viz that the spiral ribs along the inner wall of the duct turn in one direction and then in the other direction. The board accepts the respondent's interpretation of this feature as meaning that the winding sense of the spiral (which should strictly speaking be referred to as a helix) alternates along the longitudinal axis of the duct and, as pointed out by the appellant, includes the case of a single reversal of direction.

5.3 The description of the opposed patent states at page 4, lines 55 to 56: "The benefit of alternating the direction of the spiral rib 58 is that a cable passed through the duct will not have a tendency to rotate with the spiral." In the judgment of the board this suffices to determine the objective technical problem relative to D1 as preventing rotation (or twisting) of the cable with the spiral ribs. This accords with the submission of the respondent in his letter of 10 June 1999 (bottom of page 4).

5.4 The board agrees with the appellant that the person skilled in the art would appreciate that this rotation would tend to occur in an internally spirally ribbed

duct such as D1 Figure 3. It is a problem which tends to occur willy-nilly in use. This view of the common general knowledge in the art is consistent with the use of the word "although" in the original application referring to the duct originally claimed which - like the D1 Figure 3 duct - did not have an alternating spiral: "Moreover, although the ribbing is spiral, there was no tendency to twist the transmission cable." (EP-A-414 514, page 4, lines 10 and 11). This statement itself is qualified on the same page in the passage at lines 35 and 36 corresponding to the citation from the patent at point 4.3 above where the benefit of alternation is mentioned.

5.5 By the same token the board considers that, although it is not mentioned in D2, the person skilled in the art would appreciate that the alternating spiral rib on the surface of the cable in D2 Figure 4 is provided to counter the twisting action which would occur with the spirally ribbed cable of D2 Figure 2. The board disagrees here with the finding of the opposition division at point 9 of the decision under appeal that the person skilled in the art would not have found any relevant teaching in D2 because of the lack of analysis of the detailed functioning of the various rib patterns in that document. The board's view is that the addressee of D2 - a person skilled in the cable art - would, from his specialist knowledge and experience in that field, be sensitized to the effects on cables of spiral structures in general - eg in stranded cables - and of spiral guiding ribs in particular and would accordingly understand why D2 Figure 4 had an alternating spiral and was referred to at page 6 as having that structure ("mit wechselnder Schlagrichtung

wendelförmig verlaufen zu lassen").

5.6 The question to be answered in this appeal therefore boils down to this: would the person skilled in the art, starting from D1 Figure 3 and addressing the known problem of cable twisting in an internally spirally ribbed duct, adopt and adapt the solution taught in D2 Figure 4 for the analogous problem of twisting of an externally spirally ribbed cable? The argument adduced by the respondent for answering this question in the negative was that the person skilled in the art would not appreciate that the balance of advantage between the manufacturing difficulty of providing alternation on the internal duct wall instead of on the cable outer sheath on the one hand and the enhanced pulling performance thereby achieved on the other was sufficiently positive.

5.7 The opposition division was not persuaded that the manufacturing difficulties involved in producing alternating spiral ribs on the inner wall of a duct were as great as the respondent alleged; cf decision under appeal at point 5. This is also the judgement of the board. The board notes that the description of the opposed patent assumes that the skilled reader will be able to implement this feature without undue burden.

5.8 The board is not, however, persuaded by the further reasoning of the opposition division and the similar argumentation of the respondent. As indicated above, the board judges it to be more realistic to impute awareness of the twisting effect of spiral ribs to the person skilled in the art and a consequent ability on his part to appreciate the problem solved by the D2

Figure 4 embodiment. In addition the board identifies the technical problem relative to the duct of D1 Figure 3 as to prevent, or at least reduce, the cable twisting effect which occurs in that duct under some pulling conditions. Given that the ribbing was provided in the duct inner wall in D1 Figure 3 for good reasons, viz pulling smooth cables, the skilled person would naturally seek to solve the twisting problem in the context of the internally ribbed duct configuration; changing to a ribbed cable would not solve his problem. He would therefore, in the judgement of the board, adopt the alternation concept of D2 Figure 4, and adapt it to the inverted geometry of the spirally ribbed duct in the obvious way thus arriving directly at the subject-matter of claim 1. It may be that the further advantageous effects of lateral oscillation etc would then manifest themselves by way of bonus. If so, they would only convince the person skilled in the art that the path he had chosen was better even than he thought or needed; it was already obvious for him to take this path.

5.9 Hence, having regard to D1 and D2 and common general knowledge in the art, the subject-matter of claim 1 of the main request does not involve an inventive step within the meaning of Article 56 EPC.

6. *Auxiliary requests*

6.1 Auxiliary requests I and II

The board is not persuaded that the particular ranges of dimensions of duct inside diameter and wall thickness specified in auxiliary requests I and II do

not include values which would be arrived at by routine design activity, given the dimensions of commonly used cables and the mechanical properties of commonly used polymeric tubing. They represent such a large part of the possible range as to be implausible as an inventive selection.

6.2 Auxiliary request III

The board agrees with the appellant’s interpretation of D2 Figure 4 that only a short section of cable is shown; the person skilled in the art would appreciate that the whole cable would include a plurality of alternations of winding sense.

6.3 Auxiliary request IV

A periodic alternation is the easiest and hence most natural alternation to provide from the manufacturing point of view. Again the board is not persuaded that an inventive step is involved in such a choice in adapting the teaching of D2 Figure 4.

6.4 Auxiliary requests V and VI

Neither is the board persuaded that the values specified for the alternation frequency represent anything other than the result of routine optimisation of a single parameter.

6.5 In the judgement of the board, therefore, having regard to the prior art documents D1 and D2 and common general knowledge in the art, the subject-matter of claim 1 of each of the auxiliary requests does not involve an

inventive step within the meaning of Article 56 EPC.

7. *Conclusion*

Since the patent as granted or as amended in accordance with the claims of the auxiliary requests fails to meet the requirements of the EPC there is no allowable request before the board.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

M. Kiehl W. J. L. Wheeler