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Bezeichnung der Erfindung: Anchor shank
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : B63B 21/24

ENTSCHEIDUNG / DECISION

vom / of / du 30 August 1990

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent / Titulaire du brevet : BRUPAT LIMITED

Einsprechender / Opponent / Opposant : R. van den Haak

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Articles 52(1) and 56

Schlagwort / Keyword / Mot clé : "Inventive step (yes, after amendment)"

Leitsatz / Headnote / Sommaire

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Case Number : T 258/87 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 30 August 1990

Appellant : (Proprietor of the patent)
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Decision under appeal :
Decision of the Opposition Division of the European Patent Office dated 27 March 1987 revoking European patent No. 0 020 152 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : F. Gumbel
Members : S. Crane
F. Benussi

Summary of Facts and Submissions

I. European patent No. 0 020 152 was granted on 16 May 1984 on the basis of European patent application No. 80 301 793.8 filed on 30 May 1980, priority being claimed from United Kingdom application No. 7 919 169, dated 1 June 1979.

II. The patent was opposed by the Respondent on the grounds of lack of inventive step (Article 100(a) EPC) and inadmissible extension of subject-matter (Article 100(c) EPC). In support of his case, the Respondent referred to the following prior art documents:

(D1) NL-A-7 608 728
(D1') GB-A-1 584 196 (late published equivalent of document D1)
(D2) NL-A-7 115 016
(D3) FR-A-2 082 722
(D4) FR-A-2 366 987

A third party introduced under Article 115 EPC a further document

(D5) US-A-3 749 044

into the proceedings, which the Respondent then incorporated into his argumentation.

III. The patent was revoked by the Opposition Division in a decision dated 27 March 1987.

According to the decision, the subject-matter of Claim 1 of the patent lacked inventive step having regard to the document D5 and the documents

(D6) GB-A-1 356 259
(D7) GB-A-694 976

which are referred to in the introductory part of the description of the contested patent.

IV. The Appellants (Proprietors of the patent) lodged an appeal against this decision on 27 May 1987, the appeal fee having been paid one day earlier. The Statement of Grounds, accompanied by new claims, was received on 4 August 1987.

V. In his counterstatement, received 16 December 1987, the Respondent referred to a new document

(D8) US-A-2 368 942

which in his view destroyed the novelty of the new main claim. He also attacked the allowability of the amendments to the claims on formal grounds.

VI. In a communication dated 6 June 1990 pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, in preparation of the oral proceedings requested by both parties, the Board indicated various formal deficiencies in the claims and outlined the steps necessary to arrive at the subject-matter of the patent from the closest prior art disclosed in document D5.

VII. At the oral proceedings on 30 August 1990 the Appellants, after preliminary discussion between the parties and the Board, submitted a new set of Claims 1 to 9, whereupon the Respondent withdrew all formal objections to the claims.

The Appellants also submitted a revised description adapted to these new claims. The Appellants accordingly requested maintenance of the patent in amended form on the basis of these documents together with the drawings as published.

VIII. Independent Claim 1 is worded as follows:

"An anchor including a fluke (3) and a shank (1) adapted at one end (13) to be attached to an anchor line and at the other end to be attached to the fluke (3), the shank (1) comprising at least two transversely spaced elongate plate members (4, 5) which extend generally in the fore and aft direction, said elongate plate members (4, 5) including leading and trailing edges and being connected by at least one transverse plate member (6, 7, 8) located between said shank ends and being inclined to present a positive angle of attack to the sea bed soil, a plurality of rearwardly directed open-ended passages (60) being provided between the elongate plate members (4, 5) said open-ended passages (60) being substantially non-convergent with the cross-sectional area of their outlets (62) being substantially equal to or greater than the cross-sectional areas of their inlets (61) to permit substantially unobstructed soil flow through said passages (60), characterised in that the elongate plate members (4, 5) are bent at an elbow (10) so that said shank (1) is of cranked form having a longer leg (11) adapted for attachment to the anchor line and a shorter leg (9) attached to the anchor fluke (3) with the elbow (10) located vertically above the fluke (3) when the anchor is orientated with said one shank end (13) and the rear of the fluke (3) lying in a common horizontal plane, the attachment of the shorter leg to the fluke being the only connection between the shank and the fluke, and in that one of said open ended passages (60) is defined by

the fluke (3), a said transverse plate member located adjacent or below the elbow and the elongate plate members of the shorter shank leg (9) to permit escape of a rearward flow of soil between the trailing edges of the shorter leg (9)".

In the above wording, the Board has, by virtue of Rule 88 EPC, corrected a linguistic error by the insertion of a comma and "and" between the words "fluke" and "in" in the seventh to last line.

Dependent Claims 2 to 9 relate to preferred embodiments of the anchor according to Claim 1.

IX. In support of their request, the Appellants, in the course of the written and oral proceedings, put forward the following arguments:

The aim of the invention is to provide an anchor with a shaft that is strong but nevertheless offers low soil penetration resistance and is capable of contributing to the burial forces developed by the anchor.

The closest prior art is the twin shank Delta anchor shown in Figures 4 and 5 of document D5. Here the longitudinal shank members are straight and attached to the rear of the fluke. To provide a stable construction a support 15 connects the front of the fluke to a transverse plate member 14 disposed between the shank members. Although not mentioned in document D5, it is accepted that the transverse plate member 14 contributes to the burial forces and that accordingly document D5 shows all the features of the preamble of Claim 1. However, the support 15 is an essential part of the construction of document D5 and cannot be dispensed with, whereas it is an essential feature of Claim 1 that no such support is present. This

support 15 can be detrimental to flow of soil over the fluke and through the passage in the shaft and also provides additional soil penetration resistance.

Moreover, Claim 1 requires that the shank members be cranked. The cranked form delays the onset of burial resistance afforded by the shank. Although this principle was known, cranked shanks and twin shanks had existed side-by-side for many years without anyone coming upon the idea of combining them. This was witnessed by

(D9) US Reissue 21841

to the same inventor as that named in document D8.

Thus, although this inventor was clearly a man well versed in the anchor art and aware of both cranked shanks (document D9) and twin shanks (document D8), he had not thought of combining the two forms. The argument of the Respondent that document D8 in fact showed twin cranked shanks was not well founded. The articulated arms 3, 7 shown there did not constitute a cranked shank within the normal definition of the term incorporated into Claim 1.

The known advantage of a cranked shank was balanced by the disadvantage that it had to be designed to withstand high bending moments and was, therefore, heavy. Preceding the application date of the present patent, there had accordingly been a trend towards straight shanks, such as shown for example in document D5, the lighter weight of these shanks enabling a heavier fluke to be used to counteract the burial resistance of the shank. The Appellants had recognised that by providing transverse plate members between longitudinal cranked shank members a structure with high resistance to bending but low resistance to soil penetration could be achieved.

X. The Respondent is of the opinion that the appeal should be dismissed as inadmissible, since it does not deal with reasons given by the Opposition Division in its revocation decision. The Opposition Division had not started from document D5 as closest prior art but from document D6.

The arguments of the Appellants on the substantive issue of inventive step have been contested by the Respondent. His counter-arguments presented in the written and oral proceedings, insofar as these are still relevant to the new claims, can be summarised as follows:

Since cranked shafts are well known per se it would be obvious for the skilled man to adopt this form in the anchor according to Figures 4 and 5 of document D5. The transverse plate member 14 would then as a matter of course be located in a position to define a passage through the shorter leg of the shank. With a cranked shaft form the support 15 would become superfluous and could be dispensed with. A combination of these obvious steps leads directly to the subject-matter of Claim 1 without any surprising result.

Furthermore, it was not clear that the transverse plate member contributed significantly to the burying force as claimed by the Appellants. This could be demonstrated by a video showing a model of the anchor according to the patent in action. Since, however, the Appellants had formal objections to the admissibility of this video as evidence, the Respondent would not insist on showing it.

The assertion by the Appellants that cranked shafts and twin shanks had had a parallel existence and not previously been combined was not tenable in the light of document D8, which showed twin cranked shanks. In fact,

Claim 1 was distinguished from this prior art solely by the position of the elbow of the cranked shank as defined in the claim. This form of cranked shank was, however, well known, as shown for example in document D9, and nothing prevented the skilled man from adapting it with the twin cranked shank shown in document D8. This path also led, therefore, in obvious manner, to the claimed anchor.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC; it is, therefore, admissible.

The objections of the Respondent in this respect are not well founded. It is plain from the appealed decision when read as a whole that there document D5 is also considered as constituting the closest prior art. The one sentence taken in isolation by the Respondent to demonstrate the opposite is clearly the result of a minor semantic infelicity. Furthermore, the new Claim 1 filed with the Statement of Grounds of Appeal had been revised so as to place the features known from document D5 in its preamble. In these circumstances, the Appellants were clearly entitled to base their argumentation on this document as constituting the most relevant prior art.

Amendments

2. The Board is satisfied that the valid claims meet the requirements of Articles 84, 123(2) and 123(3) EPC.

In particular, although the features in Claim 1 concerning the relative areas of the inlets and outlets of the passages in the shank, the position of the elbow in the

shank with respect to the fluke, the connection of the shank to the fluke and the position of the transverse plate member in the shank have no strict verbal counterpart in the original disclosure they are unambiguously derivable from this disclosure when proper account is taken of the drawings. Since the presently valid claims have met the approval of the Respondent in these respects, further detailed explanations would be superfluous.

Furthermore, the features concerning the connection of the shank and the positions of the elbow and of the transverse plate member represent a clear limitation of the scope of protection in comparison with the granted Claim 1.

State of the art

3. The closest state of the art is without doubt the anchor shown in Figures 4 and 5 of document D5. Here the shank is essentially in the shape of an "A" with two longitudinal members being connected together at one end to form an attachment point for an anchor line and connected at their other ends to the fluke. The bar of the "A" is constituted by a transverse plate member 14 which extends parallel to the fluke. The elongate members and the transverse plate member thereby effectively define two open-ended passages through the shank, which by virtue of the geometry involved widen in the rearward direction of the fluke and which allow substantially unobstructed soil flow therethrough. The transverse plate member 14 is connected by a support 15 to the front of the fluke. Although no other purpose apart from structurally stabilising the shank is ascribed in document D5 to the transverse plate member 14, it is common ground between the parties that in use this plate member will in fact contribute to the burial forces developed by the anchor.

This prior art anchor accordingly corresponds with that defined in the preamble of Claim 1.

3.1 Document D3, on which the preamble of granted Claim 1 was based, relates to an anchor for use in sea beds of very soft mud which comprises a fluke resembling a bulldozer shovel blade. The shank comprises two elongate members jointed by transverse plate members which define passages through the shank. The shank is not cranked and by virtue of reinforcing plates along the rear of the shank the outlets of the passages in the shank are smaller than the inlets.

3.2 Document D8 discloses a lightweight anchor of the swinging fluke type wherein the shank comprises two substantially parallel longitudinal members 2, 3 joined together at one end and connected by hinge pins at their other ends to respective fluke arms 7. Between their ends remote from the hinge pins the fluke arms carry a fluke and between their ends adjacent the hinge pins, on the opposite side thereof with respect to the fluke, they carry a transverse plate member which acts as a stock to prevent rotation of the anchor and has a sharpened leading edge to assist in soil penetration.

3.3 The documents D1 and D2 show anchors with twin shanks that are not cranked and which are not equipped with a transverse plate member. The documents D4, D6, D7 and D9 all relate to anchors with a single cranked shank of a variety of forms.

The numerous other documents which have been introduced into the proceedings by the Appellants in support of various points in their argumentation and which are not itemised in the decision are of no greater relevance than the documents mentioned above.

Novelty

4. As is apparent from the above, the subject-matter of Claim 1 is distinguished from the closest prior art disclosed in document D5 by the features of its characterising clause. These features can be summarised essentially as follows:

(a) The shank is of cranked form.

(b) The fluke is connected to the shank solely by virtue of an attachment at the end of the shorter leg of the shank.

(c) A transverse plate member is located adjacent or below the elbow in the shank.

The subject-matter of Claim 1 is, therefore, novel. Since this is no longer disputed by the Respondent, further detailed consideration is unnecessary.

Problem and solution

5. In comparison with the closest state of the art shown in document D5, the technical problem to be solved is to be seen in the provision of an anchor in which the shank construction offers a low soil penetration resistance whilst at the same time contributing to the burial forces developed by the anchor when in use.

The Board is satisfied that the distinguishing features (a) to (c) identified in point 4. above contribute to the solution of this problem. Thus, the

cranked form of the shank results in the resistance offered by the shank to soil penetration being delayed; the fact that as a result of feature (b) there is no support strut or the like in front of the shorter leg of the shank avoids the additional soil penetration resistance of this strut and the possibility of the strut disturbing the flow of soil through the passages in the shank; finally, the location of the transverse plate member according to feature (c) ensures that this can make a useful contribution to the burial forces generated by the anchor.

Inventive step

6. Starting from the anchor of Figures 4 and 5 of document D5 it is apparent that a number of steps would be necessary to arrive at an anchor as claimed in Claim 1. The Respondent argues that once the skilled man has decided to replace the straight longitudinal shank members of this prior art anchor by longitudinal members of cranked form then the other steps, i.e. the removal of the support strut 15 and the choice of a location for the transverse plate member 14 adjacent or below the elbow of the shank would follow automatically.

6.1 However, the Board is of the opinion that the cited state of the art as a whole does not provide a clear incentive for the skilled man to take this first step. It is indeed true that cranked shanks are well known, as is their beneficial property of delaying the onset of soil penetration resistance by the shank. On the other hand, this beneficial property is balanced by the problem of the need to design a cranked shank to withstand higher bending moments, a problem which would be accentuated when twin shank members of narrow section were involved.

The Appellants have not provided any concrete evidence of a technical prejudice existing against twin cranked shanks. However, the fact that twin shanks and cranked shanks have existed alongside each other for many years without any apparent attempt to combine these forms does tend to point in this direction. The only document relied upon by the Respondent as showing twin cranked shanks is document D8. However, the Board takes the view that the shank of the anchor according to document D8 is constituted by the straight longitudinal members 2, 3 and does not comprise the fluke arms 7 that are hinged to these longitudinal members. It is, therefore, not possible to consider the combination of members 2, 3 and arms 7 as constituting a twin shanked crank for the fluke carried by the fluke arms.

6.2 However, even if the skilled man took the step of replacing the straight shank members according to document D5 by cranked shank members, the other steps necessary to arrive at the anchor claimed in Claim 1 do not, as argued by the Respondent, follow automatically. Thus, the support strut 15 is described as an essential component of the prior art anchor and the adoption of a cranked form for the shank provides no reason to dispense with it. Moreover, if it were dispensed with, it would seem logical to dispense with the transverse plate member 14, since as described this has as its main function transferring load to the strut. Again, in the event of the transverse plate member 14 being retained in the absence of the strut 15, there would be no technical incentive for the skilled man to locate this plate member adjacent or below the elbow in the shank.

6.3 As indicated in point 6.1 above, the Board does not share the view of the Respondent that document D8 shows twin cranked shanks. His argument that the anchor according to

Claim 1 can be derived merely by replacing the "cranked shank members" shown in document D8, which are in fact a combination of straight shank members and fluke arms hinged thereto, whereby the "elbow", i.e. in reality the hinge point, lies in the plane of the fluke, by conventional cranked shank members such as shown in document D9 where the elbow lies vertically above the fluke, is, therefore, unfounded. It must also be noted here that the fluke and the "transverse plate member", i.e. stock, of the anchor according to document D8, lie in the same plane and do not define between them a passage for the flow of soil as required by Claim 1 of the contested patent.

6.4 Summing up, the Board comes to the conclusion that the subject-matter of Claim 1 cannot be derived in an obvious manner from the cited prior art and accordingly involves an inventive step, Article 56 EPC. It is, therefore, patentable and the patent may be maintained on the basis of this Claim 1 and dependent Claims 2 to 9 which relate to preferred features of the anchor according to Claim 1.

Order

For the above 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 claims and the description as submitted at the oral proceedings and the drawings as granted.

The Registrar: The Chairman:

S. Fabiani F. Gumbel