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D E C I S I O N
of 20 February 1997

Case Number: T 0703/95 - 3.2.1

Application Number: 89904584.3

Publication Number: 0425497

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Language of the proceedings: EN

Title of invention:
Marine Anchor

Patentee:
Simpson-Lawrence Limited

Opponent:
Brupat Limited

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - yes"

Decisions cited:
-

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-

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Case Number: T 0703/95 - 3.2.1

D E C I S I O N
of the Technical Board of Appeal 3.2.1
of 20 February 1997

Appellant: (Proprietor of the patent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 21 June 1995 revoking European patent No. 0 425 497 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: F. Gumbel
Members: S. Crane
G. Davies

Summary of Facts and Submissions

I. European patent No. 0 425 497 was granted on 27 January 1993 on the basis of European patent application No. 89 904 584.3.

II. The patent was opposed by the present respondents on the grounds that its subject-matter lacked novelty and/or inventive step (Article 100(a) EPC) and that the invention was insufficiently disclosed (Article 100(b) EPC).

In support of their arguments on novelty and inventive step the respondents cited *inter alia* the following prior art documents:

D1: GB-A-1 590 085
D2: GB-A-415 176
D3: GB-A-2 171 970
D4: US-A-1 983 481
D5: GB-A-1 513 453
D6: GB-A-574 326
D7: DE-A-3 639 023.

III. With its decision posted on 21 June 1995 the Opposition Division revoked the patent. The reason given for the decision was that the subject-matter of the independent claims lacked inventive step with respect to the documents D2 and D7.

IV. An appeal against this decision was filed on 16 August 1995, and the fee for appeal paid at the same time.

The statement of grounds of appeal was filed on 26 October 1995.

V. Oral proceedings before the Board were held on 20 February 1997.

At the oral proceedings the appellants (proprietors of the patent) submitted a new set of claims 1 to 13 according to a main request and a revised description on the basis of which, together with the drawings as granted, they requested that the patent be maintained in amended form.

Claim 1 of the main request reads as follows:

"A one-piece free-fall dropping anchor (1) of the burying-type comprising a shank (12, 42) having a leading end (8) adapted to be connected to a main anchor cable, a fluke (14) rigidly fixed to the shank (12), said fluke generally being in the shape of a double-bladed ploughshare with the blades (16, 30, 60) being disposed symmetrically about the median plane (X-X) of the shank (12), the leading ends of the blades terminating in a single apex (18; 58), the trailing ends of each blade (16; 30; 60) diverging outwardly from said median plane (X-X), and each blade having a generally inwardly dished shape (20), said shank (12) and fluke (14) being arranged to define a buoyant centre of gravity (C) disposed between the shank (12) and the fluke (14) forwardly of the join of the shank and the fluke so that the anchor, in use, tends to land on the seabed with a three-point contact, said three-point contact being provided by the leading end (8) of the shank (12), said common apex (18; 58) and the trailing end (21) of one of the blades (16)."

Dependent claims 2 to 12 relate to preferred embodiments of the anchor according to claim 1.

Independent claim 13 reads as follows:

"A burying type anchor (10), comprising a substantially rigid shank (12), and rigidly connected thereto, a fluke (14) in the general form of a double-bladed ploughshare with a pointed forward end (18; 58) and substantially symmetrical about a longitudinal median plane (X-X), the generally inwardly dished outer surface (20) of each blade (16) of the fluke (14) extending either side of a central ridge (17) formed by the junction between said outer surfaces (20), and being generally parallel to said central ridge (17) at the forward end portion (21) of the fluke (14) and diverging in the direction towards a rear end portion of the fluke at which said fluke (14) is connected to the shank (12) so that said fluke blade surface (20) extends substantially obliquely with respect to said central ridge (17) at said rear portion at least in an outer side portion (21) laterally spaced from the central ridge (17) so that the fluke presents a substantial surface area facing generally in the direction of the pull on the anchor in use thereof when said anchor has penetrated the mooring bed and orientated itself with respect to the direction of the pull, said shank (12) and fluke (14) being arranged to define a buoyant centre of gravity (c) disposed between the shank and the fluke forwardly of the join of the shank and the fluke so that the anchor, in use, tends to land on the seabed with a three-point contact, said three-point contact being provided by the leading end (8) of the shank (12), said pointed forward end (18; 58) of the fluke and a trailing end (21) of one of the blades (16)."

The respondents requested that the appeal be dismissed. They also requested an apportionment of costs.

VI. The arguments put forward by the appellants can be summarised as follows:

Document D2, which constituted the closest state of the art, related to an anchor which under the name "CQR" had been in wide use for more than 50 years, and indeed was still on sale today. An essential feature of that anchor was that the shank comprised two parts which were hinged together in a particular way. The purpose of this was to ensure that the fluke would come to lie in an appropriate orientation on the mooring bed to ensure that the fluke would bury itself when a pull was applied to the anchor cable. It was however known that a continued pull on the anchor cable could cause the anchor to "roll out" until the fluke emerged from the mooring bed with substantial loss of all anchoring resistance.

It was to the solution of this problem that the invention was essentially addressed. The appellants had departed from the teachings of document D2 and found that a one-piece rigid shank coupled with a modified form of the blades of the fluke enabled a significantly higher resistance to "roll-out" to be achieved. This modified form of the blades was adequately defined by the wording of claim 1 of the main request and clearly distinguished from the form of the blades taught by document D2. In comparison with those known blades the blades according to the invention provided a greater transverse surface area facing the direction of pull on the anchor cable. The form of the shank and the blades was also such as to give a position of the buoyant centre of gravity of the anchor which in use would tend to ensure that the anchor landed on the mooring bed in an appropriate three-point contact orientation to

initiate self-burying when a pull was applied to the anchor cable. In this respect it had to be noted that the position of the buoyant centre of gravity given in dependent claim 2 was merely a preferred one and not absolutely necessary to achieve the desired effect.

The use of a one-piece rigid shank also brought other advantages compared with the known "CQR" anchor. In particular, the hinge of that anchor could become jammed by stones or other debris and made lifting and stowing of the anchor difficult.

Document D7 had been seen by the Opposition Division to constitute the closest state of the art. However, the only things which this anchor had in common with that defined in claim 1 was that it had a rigid one-piece shank and that it was supposed to adopt a three-point contact after falling onto the mooring bed. That three-point contact was however intended to be achieved by a semicircular bar or hollow tube fixed to the top back end of the fluke. The fluke was a flat, substantially triangular, blade which would provide very little resistance to "roll-out".

It was therefore apparent that the way documents D7 and D2 had been combined by the Opposition Division purportedly to arrive at the claimed invention ignored what the essential teachings of these documents were, was wholly arbitrary and based solely on hindsight knowledge of the invention. In any case, the Opposition Division had overlooked that the form of the blades specified in claim 1 was also distinguished from that disclosed in document D2.

The commercial embodiment of the invention being sold as the "Delta" anchor had enjoyed considerable commercial success. Having regard to the fact that the buyers were generally very discriminating and knowledgeable, this was a convincing indicator for the technical advance which had been made over the state of the art, and accordingly inventive step. Another indicator was imitation by numerous competitors.

VII. In reply the respondents argued substantially as follows:

There was nothing in the wording of claim 1 of the main request which could serve to distinguish the form of the blades of the anchor claimed from the disclosure of document D2. In this respect the appellants had sought to rely on the fact that the claim required the blades to be "dished" and had indicated that this meant being curved in two orthogonal directions, whereas the blades of document D2 were only curved in one direction. However, this special meaning of "dished" was not to be found in the patent specification where the term was used synonymously for "concave". There could be no doubt that the blades shown in document D2 were also concave.

It was therefore clear that the only distinction between the anchor defined in claim 1 and that known from document D2 was that it was a one-piece anchor with the shank rigidly fixed to the fluke. Document D2 already proposed an arrangement wherein the hinge between the two parts of the shank was arranged near the free end of the shank rather than above the fluke. The person skilled in the art seeking to put this teaching into effect would clearly recognise that a hinge in this position would be superfluous since its function could be taken over by the shackle between the anchor cable and the end of the shank. As had been

demonstrated with the exhibits B3, B5 and BE5 it could be seen that a known "CQR" anchor with the hinged shank replaced by a simple one-piece shank would still show the required tendency to adopt a three-point contact with the mooring bed when a pull was applied to the anchor cable. Having regard to all of this it was obvious for the person skilled in the art to use a one-piece shank since there were clear incentives to do so. In particular, there would no longer be any danger of the hinge jamming and the one-piece shank was self-evidently cheaper to manufacture. As could be seen from documents D5 and D7 the modern trend in self-burying anchor design was in fact to provide a rigid shank. All that the appellants had done was to transfer this idea to the "CQR" anchor. They had effectively admitted this in their statement in the brochure for the "Delta" anchor (exhibit BE6) that they had integrated known design features to produce the "perfect anchor". As far as the alleged commercial success of the "Delta" anchor was concerned, it was in any case not clear that the anchor actually being sold, which did not correspond to any of the illustrated embodiments in the patent specification, fell within its claims, particularly having regard to the emphasis the appellants now placed on the term "dished". Accordingly, no reliance should be placed on commercial success when evaluating inventive step.

Despite their objections to claim 1 the respondents were satisfied that the subject-matter of claim 13 was patentable. Provided that this claim were put into the proper two-part form to make the differences to the state of the art according to document D2 clear, and also the essential feature for achieving the desired three-point contact as stated in claim 2 was added, the respondents would have no objection to the maintenance of the patent in amended form with such a claim as the sole independent claim. In view of this offer, which

had been made in writing in the course of the proceedings, it would be equitable to make an award of costs for the oral proceedings in the event that the Board held the subject-matter of claim 1 not to be patentable.

Reasons for the Decision

1. The appeal complies with the requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. It is therefore admissible.

2. *Formal admissibility of the amended documents (main request)*

2.1 Claim 1 of the main request consists in essence of a combination of the features of granted claims 1 and 3. It has also been specified that the claimed anchor is a "free-fall dropping anchor of the burying-type". That the patent specification indeed relates to anchors of this type is abundantly clear from its description of the properties and use of the anchors disclosed.

Independent claim 13 consists of a combination of granted independent claim 14 and claim 3.

Dependent claims 2 to 12 correspond to granted claims 2 and 4 to 13 respectively.

There are accordingly no objections to the amended set of claims under Articles 123(2) and (3) EPC.

2.2 Neither of independent claims 1 and 13 is in the two-part form required by Rule 29(1) EPC "wherever appropriate". Although the Board is satisfied, as explained more fully below, that document D2 represents

the closest state of the art it does not seem appropriate to take this document as the basis for the preamble of a two-part claim. The reason for this is that document D2 specifically requires the presence of a feature (the hinge in the shank) with which the present invention specifically dispenses. A delimitation of the claim against this state of the art would therefore be artificial and show no constructive purpose, as would a delimitation against a more remote state of the art. The Board, unlike the respondents, therefore sees no objection to the one-part form of independent claims 1 and 13 in the present case.

2.3 Another objection of the respondents against the terms of independent claims 1 and 13 is that in their opinion the requirement stated in claim 2 that the buoyant centre of gravity be disposed on the fluke side of a line drawn between the leading end of the shank and a line of maximum blade width is essential to the achievement of the effect stated in the independent claims that the anchor will adopt three-point contact when landing on the seabed, so that the feature of claim 2 should be incorporated into the independent claims.

Here, however, the Board can accept the argument of the appellants that the position of the buoyant centre of gravity as stated in claim 2 is the preferred one which brings optimal results. The position stated in claims 1 and 13 on the other hand, namely that the buoyant centre of gravity is disposed between the shank and the fluke forwardly of the join of the shank and fluke is sufficient in normal circumstances to ensure that the anchor "tends", which is all that these claims require, to land on the seabed with a three-point contact.

2.4 Apart from an adaptation of the wording of the description to that of the amended claims the only significant amendment made to it has been the introduction of a satisfactory definition of what is meant by "buoyant centre of gravity" of the anchor, namely that it is the apparent centre of gravity when the anchor is submerged in water. (The apparent centre of gravity of an object submerged in a liquid is different from its true centre of gravity if the object is not solid and of a uniform density.) It was the absence, in their view, of a clear meaning of this term which formed the basis of the respondent's original objection in the opposition proceedings, which was not pursued on appeal, that the invention had been insufficiently disclosed.

3. *State of the art*

3.1 Document D1 relates to an anchor for positioning floating structures which is in use disposed to lie flat on the mooring bed by an auxiliary vessel. The anchor comprises a fluke and a one-piece shank rigidly attached to the fluke. The fluke has a dihedral shape with planar side walls extending downwardly from the medium plane of the anchor and defining therebetween an upper corner edge and longitudinal edges lying in a common plane perpendicular to the median plane of the anchor. The corner edge extends downwardly towards the common plane from the region where the shank is fixed to the fluke. The side walls are preferable extended outwardly by wings which lie in the common place.

3.2 Document D2 discloses a self-burying, free-fall dropping anchor which comprises a fluke in the general form of a double-bladed ploughshare and a shank formed of two rigid portions. One of these portions is fixed to the fluke and extends outwardly from the central ridge formed by the junction of the two blades and the

other of the portions is pivotally attached to the fixed portion for relative swinging movement about an axis which intersects the central ridge in the region of the apex defined by the two blades. In use, the anchor comes to lie on the seabed with the hinged portion of the shank extending flat along the ground with the hinge, the point of the fluke and the rear end of one of the blades providing a three point contact with the ground.

The centre of gravity of the unit comprising the fluke and the fixed portion of the shank lies forwardly of a line between the hinge and the rear end of either blade. This ensures the initial digging-in of the point of the fluke when drag is applied to the anchor cable. As burying of the anchor continues the provision of the hinge ensures the automatic righting action of the fluke and maintenance of substantially stable conditions during continuance of drag (see page 4, lines 113 to 117). The outer surface of each blade preferably conforms to a section of a cylindrical surface formed by generators parallel to the central ridge (page 3, lines 42 to 46).

In a passage extending from page 4, line 118 to page 5, line 11 possible modifications of the disclosed preferred embodiment are discussed. In particular, it is suggested that the fixed portion of the shank can be extended in the forwardly direction and the hinge formed at a position in advance of the point of the fluke. Furthermore, although this was not preferred, a one-piece shank could be directly hinged to the fluke.

3.3 Document D3 is principally concerned with the fluke shape of a mooring or bower anchor in which the rigid shank is rigidly attached to the fluke. The fluke is made up from flat plates and essentially comprises two forward plates extending downwardly at an angle from

the medial plane and widening rearwardly from a single apex, a central plate extending between the inner surfaces of the forward plates and a respective rear terrafin plate extending downwardly from the rear edge of each forward plate. The terrafin plates have a number of purposes, in particular to tilt the fluke into the right angle of attack when the fluke is at rest on the mooring bed and to act as stabilisers against roll during burial of the anchor. When used as a bower angle, ie one which is laid by the anchor cable, two destabilising bars, one lying in the medial plane and one transverse thereto, are provided on the shank to ensure that the anchor will roll into a fluke-down position when a pull is applied to the anchor cable.

3.4 Document D4 relates to an anchor which is provided with means defining a hollow buoyant chamber which ensures that the anchor will descend to the seabed in an orientation suitable for embedding the fluke.

3.5 Document D5 is concerned with the shape of the fluke of a one-piece self-burying anchor. The fluke has curved side arm portions giving the fluke overall an upwards facing concave working surface. The centres of curvature of respective half-side of the fluke are designed to lie at positions which are spaced laterally from the shank. This arrangement gives roll stability while avoiding soil compression immediately adjacent the shank.

3.6 The anchor of document D6 comprises a self-burying fluke with an inverted T- or Y- shaped cross-section, which broadens from a forward point to the rearward end, and which is hinged to a shank about an axis lying in the medial plane of the anchor. The shank includes a buoyant chamber intended to raise the hinge from the ground when the anchor lies on its side, in order to facilitate initial digging-in.

3.7 Document D7 discloses an anchor with a flat, substantially triangular, fluke rigidly attached to a straight shank extending from the fluke at an acute angle thereto. The side edges of the fluke are preferably concave. At the rear end of the fluke there is provided a substantially semicircular member, preferably in the form of a hollow tube, the purpose of which is to ensure that on landing on the seabed the anchor will roll into a position with the point of the fluke, one of its rear side edges and the free end of the shank in three-point contact with the ground, so that the point of the fluke will dig into the ground when a pull is applied to the anchor cable.

4. *Novelty (Claim 1 of main request)*

4.1 Although the question of what features distinguish the subject-matter of claim 1 from the anchor known from document D2 is still highly contentious between the parties, and will be dealt with fully below when considering inventive step, there is no longer any dispute that this subject-matter is novel with respect to this state of the art, since document D2 does not disclose a one-piece anchor with the fluke rigidly fixed to the shank as required by the claim.

4.2 As can be seen from the above analysis of the remaining cited documents D1 and D3 to D7, it is apparent that the subject-matter of claim 1 is also novel with respect to this state of the art. In particular, of these cited documents only D1 and D3 disclose one-piece anchors wherein the fluke can be considered to be in the form of a "double-bladed ploughshare" in the widest sense of this term. However, the anchor of document D1 is not of the free-fall dropping type and in the anchor of D3 the blades of the ploughshare are effectively concave on their underside and not "inwardly dished" as required by the claim whatsoever way that term might be interpreted (see below). Since the novelty of the subject-matter of claim 1 with respect to the documents D1 and D3 to D7 is no longer in dispute further elucidations are unnecessary.

5. *Inventive step (Claim 1 of main request)*

5.1 In the opinion of the respondents the anchor of claim 1 is effectively distinguished form the state of the art according to document D2 only by the fact that its shank is rigidly fixed to its fluke. In particular, they argue that there is nothing in the definition of the shape of the blades of the ploughshare which could differentiate this shape from that of the blades disclosed in document D2. Each of those blades had a "generally inwardly dished shape" and a trailing end which "diverged outwardly from the median plane". Furthermore, they had shown by means of their exhibits B3, B5 and BE5 that if the hinged shank of document D2 was replaced by a rigidly fixed one-piece shank then the centre of gravity of the anchor would lie in a position which would also tend to ensure that the anchor took up the required three-point contact on landing.

With respect to the term "dished" they argued that this would normally be understood as meaning capable of holding a volume of liquid. In the course of the appeal proceedings the appellants had argued that the term implied concave curvature in two orthogonal directions, which in effect amounted to the same thing. However, particularly with regard to the embodiment of Figures 1 to 3 of the patent specification there was nothing which pointed to these requirements of a dished shape being met and the blades were merely referred to as being concave, as was clearly the case with the blades of document D2. In principle, the respondents had no objection to the appellants relying on the restricted meaning of "dished" which they had introduced into the proceedings, provided that it was made unambiguously clear that this was how the term was to be interpreted in the claim and the embodiment of Figures 1 to 3 was deleted.

5.2 As a preliminary remark in this context, the Board notes that an accurate representation of three dimensional surfaces in schematical drawings and any attempt at defining such surfaces in language suitable for a patent claim is notoriously difficult. The words appearing in present claim 1 in this respect are substantially identical to those used in claim 1 as originally filed and were chosen by the appellants in full knowledge of the anchor according to document D2, which is referred to at some length in the description of the original application.

At page 6, lines 25 to 28 of the application (column 3, lines 53 to 57 of the patent specification) it is stated that the concave outer surface of each blade presents a substantial surface area (best seen in Figure 3) extending transversely outwards with respect to the direction along which drag force is applied. In the first paragraph of page 8 of the application

(column 4, lines 23 to 42 of the patent specification) it is explained how the shape of the blades influences resistance to roll-out and provides self-steering. In the light of this the Board is satisfied that the requirement of claim 1 that the trailing end of each blade "diverge outwardly" from the median plane must be understood as meaning that the consequence of this divergence is to increase the surface area of the blade when seen in the direction of pull. To adopt the approach of the respondents and to understand it merely as meaning that the trailing end of the blade, like the forward end of the blade, extends downwardly ("diverges") from the median plane would not be commensurate with the totality of the disclosure and, given that this type of divergence of the blades is inherent to a double-bladed ploughshare in the first place, would serve to make the feature redundant in its context, which cannot have been intended.

Summing up, the Board is therefore of the opinion that the significant difference between the shape of the blades defined by present claim 1 and that disclosed in document D2, namely part of a cylindrical surface, is not in some special or particular meaning of the term "dished" but in the requirement that the trailing end of the blade diverges outwardly from the median plane, interpreted as explained above. In this respect it is noted that this interpretation corresponds to a large extent with the way the relevant part of the blade surface is defined in claim 13, namely that the fluke blade surface "extends substantially obliquely with respect to the central ridge at said rear portion at least in an outer side portion laterally spaced from the central ridge so that the fluke presents a substantial surface area facing generally in the direction of pull".

5.3 As for the position of the centre of gravity required by claim 1 it is evident that since document D2 does not disclose an anchor with a fluke rigidly fixed to a one-piece shank it cannot actually disclose where the centre of gravity of such an anchor is positioned. Thus, wherever the position of the centre of gravity of the anchor fabricated by the respondents and comprising a fluke as shown in document D2 rigidly fixed to a shank might be, this information cannot be assimilated to the state of the art.

5.4 The Board is satisfied, on the basis of the information contained in the patent specification and the explanations given by the appellants in the course of the proceedings, that the combination of blades of the shape defined in claim 1 with a one-piece shaft rigidly fixed to the fluke, with the fluke and the shank being arranged to define a buoyant centre of gravity as stated in the claim, gives an anchor which will quickly penetrate the mooring bed as it is dragged and will provide a high resistance to "roll-out" on continued drag through the mooring bed, this latter aspect being the main technical problem which the invention set out to solve.

5.5 It is made clear in document D2 that the hinge between the portions of the shank (or in a less preferable alternative a hinge between a one-piece shank and the fluke) is essential to the functioning of the anchor disclosed there. In view of this, the arguments of the respondent that the person skilled in the art would be encouraged by the reference in document D2 to the possibility of the hinge being forward of the point of the fluke to reduce the length of the hinged portion of the shank to such an extent that he would then recognise it to be reduntant and would dispense with it, can only be seen as being coloured by hindsight. Nevertheless, even if it were assumed that the person

skilled in the art, animated perhaps by the desire to eliminate the hinge in the shank for reasons of manufacturing economy or safety, were to investigate the possibility of doing so, there is nothing in the state of the art which at the same time could have encouraged him to have modified the shape of the blades of the ploughshare disclosed in document D2 in such a way as to give them "trailing ends diverging outwardly from the median plane" as this term is properly to be understood. Since the respondents have not in fact argued that this would be the case, relying instead on their assertion that there was no difference between the shape of the blades defined in claim 1 and those disclosed in document D2, further detailed explanations on this point are unnecessary.

5.6 For the above reasons the Board has come to the conclusion that the subject-matter of claim 1 involves an inventive step (Article 56 EPC).

6. *Claim 13*

The Board endorses the view expressed by the respondents themselves that the subject-matter of independent claim 13 is patentable. They have made only formal objections to the wording of the claim, which have been dealt with in points 2.2 and 2.3 above.

7. *Costs*

The request of the respondents for apportionment of costs was conditional on the Board finding that the subject-matter of claim 1 was not patentable and as a consequence maintaining the patent on the basis of claim 13, of which the respondents had already indicated their acceptance.

If that had been the case, the respondents felt that the oral proceedings would have been shown to be unnecessary; as it was not, their request need not be considered further.

Order

For these reasons it is decided that:

1. The contested decision is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of claims 1 to 13 and the description submitted during oral proceedings, with the drawings as granted.

3. The request of the respondents for apportionment of costs is rejected.

The Registrar:

S. Fabiani

The Chairman:

F. Gumbel