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Datasheet for the decision of 30 March 2021

Case Number: T 1907/17 - 3.2.06

Application Number: 01999218.9

Publication Number: 1347930

IPC: B66B7/06

Language of the proceedings: EN

Title of invention:
ELEVATOR HOIST ROPE THIN HIGH-STRENGTH WIRES

Patent Proprietor:
Kone Corporation

Opponents:
ORONA E.I.C S. Coop.
Inventio AG
Otis Elevator Company

Headword:

Relevant legal provisions:
EPC Art. 56, 84, 100(a), 123(2)

Keyword:

Inventive step - main request (no), auxiliary request 1 (no)
Amendments - added subject-matter - auxiliary request 2 (yes)
Claims - clarity - auxiliary requests 3 to 5 (no)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
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Beschwerdekammern

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Case Number: T 1907/17 - 3.2.06

D E C I S I O N
of Technical Board of Appeal 3.2.06
of 30 March 2021

Appellant: (Opponent 1)	ORONA E.I.C S. Coop. Poligono Lastaola, s/n E-20120 HERNANI (Guipùzcoa) (ES)
Representative:	Carpintero Lopez, Francisco Herrero & Asociados, S.L. Cedaceros 1 28014 Madrid (ES)
Appellant: (Opponent 3)	Otis Elevator Company Ten Farm Springs Road Farmington, CT 06032-2568 (US)
Representative:	Schmitt-Nilson Schraud Waibel Wohlfrom Patentanwälte Partnerschaft mbB Pelkovenstraße 143 80992 München (DE)
Respondent: (Patent Proprietor)	Kone Corporation Kartanontie 1 00330 Helsinki (FI)
Representative:	K & H Bonapat Patentanwälte Koch · von Behren & Partner mbB Donnersbergerstraße 22A 80634 München (DE)
Party as of right: (Opponent 2)	Inventio AG Seestrasse 55 6052 Hergiswil (CH)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 29 June 2017 rejecting the opposition filed against European**

patent No. 1347930 pursuant to Article 101(2) EPC.

Composition of the Board:

Chairman	M. Harrison
Members:	M. Hannam
	E. Kossonakou

Summary of Facts and Submissions

I. In T0875/11, a first appeal resulting from the opposition to the present patent, the Board in a different composition found the grounds for opposition under Articles 100(b) and (c) EPC not to prejudice maintenance of the patent as granted. The case was remitted to the opposition division for further prosecution.

II. The opposition division rejected the oppositions to European patent No. 1 347 930.

III. Appeals were filed by each of the appellant/opponent I and the appellant/opponent III against this decision of the opposition division. They each requested that the decision under appeal be set aside and the patent be revoked. Auxiliarily, oral proceedings were requested.

IV. In its letter of response, the respondent (patent proprietor) requested that the appeals be dismissed or, in the alternative, that the patent be maintained in amended form according to one of auxiliary requests 1 to 5. Oral proceedings were not requested.

V. The following documents are relevant to the present decision:

D1 EP-A-0 631 967
D4 Drahtseile - Bemessung, Betrieb, Sicherheit by Klaus Feyrer, Springer Verlag 1994
D24 DIN 2078, Stahldrähte für Drahtseile, May 1990

VI. The Board issued a summons to oral proceedings and a subsequent communication containing its provisional

opinion, in which it indicated *inter alia* that the subject-matter of claim 1 of the main request and auxiliary request 1 lacked an inventive step, that the subject-matter of claim 1 of auxiliary request 2 did not meet the requirement of Article 123(2) EPC, that claim 1 of auxiliary request 3 lacked clarity and that auxiliary requests 4 and 5 failed to overcome at least one of the objections to the foregoing auxiliary requests. It furthermore indicated that a decision could be taken without holding oral proceedings as these had not been requested by the respondent.

VII. With letter of 10 March 2021 the respondent indicated that it would make no further substantive submissions and that a decision could be taken based on the written submissions on file.

VIII. The scheduled oral proceedings were subsequently cancelled.

IX. Claim 1 of the main request (claim 1 as granted) reads as follows (with paragraph annotation included as used by the opposition division in its decision):

"Elevator, preferably an elevator without machine room, in which elevator
(a) a hoisting machine (6) engages a set of hoisting ropes (3) via a traction sheave,
(b) said set of hoisting ropes consists of hoisting ropes of substantially circular cross-section,
(c) said ropes having a load-bearing part twisted from steel wires of circular and/or non-circular cross-section,
(d) and in which elevator the hoisting ropes support a counterweight (2) and an elevator car (1) moving on tracks,

characterized in that
(e) the cross-sectional area of the steel wires of the hoisting ropes is larger than 0.015 mm^2 and smaller than about 0.2 mm^2, and that
(f) the steel wires of the hoisting ropes (3) have a strength exceeding 2000 N/mm^2."

Claim 1 of auxiliary request 1 reads as for claim 1 of the main request except that the expression "characterized in that" is substituted by "wherein" and that feature (f) reads as follows:

"the steel wires of the hoisting ropes (3) have a strength greater than 2300 N/mm^2 and less than 2700 N/mm^2 ".

Claim 1 of auxiliary request 1 reads as for claim 1 of auxiliary request 1 with the following feature appended:

"wherein multiple rope passages are used".

Claim 1 of auxiliary request 3 reads as follows:

"Elevator for a nominal load below 1000 kg and a speed below 2 m/s, preferably an elevator without machine room, in which elevator
(a) a hoisting machine engages a set of hoisting ropes (3) via a traction sheave,
(b) said set of hoisting ropes consists of hoisting ropes of substantially circular cross-section,
(c) said ropes having a load-bearing part twisted from steel wires of circular and/or non-circular cross-section,
(d) and in which elevator the hoisting ropes support a counterweight (2) and an elevator car (1) moving on

tracks,
wherein
(e) the cross-sectional area of the steel wires of the hoisting ropes is larger than 0.015 mm^2 and smaller than about 0.2 mm^2, and that
(f) the steel wires of the hoisting ropes (3) have a strength exceeding 2000 N/mm^2 forming therewith ropes having a diameter of the order of 3-5mm".

Claim 1 of auxiliary request 4 reads as for claim 1 of auxiliary request 3 except for feature (f) which reads as follows:

"the steel wires of the hoisting ropes (3) have a strength exceeding 2000 N/mm^2 forming therewith ropes having a diameter of 3-5mm".

Claim 1 of auxiliary request 5 reads as for claim 1 of auxiliary request 3 except for feature (f) which reads as follows:

"the steel wires of the hoisting ropes (3) have a strength greater than 2300 N/mm^2 and less than 2700 N/mm^2 wherein multiple rope passages are used for ropes having a diameter of the order of 3-5mm".

X. The arguments of appellant/opponent I relevant to the present decision may be summarised as follows:

The subject-matter of claim 1 of the main request did not involve an inventive step when starting from D1 and combining this with the technical teaching of D24. The skilled person would adopt steel wires of diameter 0.2 mm from D24 since this allowed the greatest reduction in size of the driving gear. They would also select wires exceeding 2000 N/mm^2 in strength since

this enabled the strength / wire diameter benefits to be optimised. The same arguments also held for claim 1 of auxiliary request 1.

Claim 1 of auxiliary requests 3 and 5 respectively lacked clarity due to the diameter of the ropes being defined to be 'of the order of' 3-5 mm, this expression being vague and leaving the scope of the claims ill-defined.

XI. Opponent II (a party as of right under Article 107 EPC) made no submissions in the present appeal procedure.

XII. The arguments of appellant/opponent III relevant to the present decision may be summarised as follows:

The subject-matter of claim 1 of the main request lacked an inventive step. Starting from D1, even if features (e) and (f) were not explicitly known from D1, these were implicitly disclosed as a result of D24, a German industrial standard. Table 3 of D24 disclosed a wire diameter of 0.2 to 0.5 mm and a nominal wire strength of 1960 + 390 N/mm^2 such that the claimed parameters for the steel wires were simply those defining a standard strength class and diameter.

If features (e) and (f) were to differentiate claim 1 from D1, the objective technical problem to be solved could be seen as to provide an alternative hoisting rope for the elevator of D1. D24 disclosed both the claimed wire cross-sectional areas (albeit as wire diameters) and the claimed wire strengths such that the claimed parameter values were simply a matter of ordinary choice for the skilled person, not requiring the exercise of an inventive step.

The subject-matter of claim 1 of auxiliary request 1 lacked an inventive step for essentially similar reasons to those forwarded with respect to the main request.

The subject-matter of claim 1 of auxiliary request 2 failed to meet the requirement of Article 123(2) EPC. The context in which the adopted feature of 'multiple rope passages' was originally disclosed on page 20, line 29 had not been included in claim 1, such that this lacked a direct and unambiguous basis.

As regards claim 1 of auxiliary requests 3 and 5, the limits allowed by the expression 'of the order of' 3-5 mm were not clear, such that the scope of protection conferred could not be determined.

As regards auxiliary request 4, defining the elevator as being 'for ... a speed below 2 m/s' also lacked clarity.

XIII. The respondent's arguments relevant to the present decision may be summarised as follows:

The subject-matter of claim 1 of the main request involved an inventive step. D1 failed to disclose features (e) and (f) of claim 1. The objective technical problem of 'an improved hoisting rope' was not meaningful since many different factors (e.g. low cost, long life, low elongation) could influence what was seen as an 'improvement'. The skilled person would not consider D4 for modifying the hoisting rope known from D1 since D4 related to wire ropes in general, not specifically to hoisting ropes. The skilled person would not consider using wire strengths exceeding 2000N/mm^2 because, at the priority date of the patent,

the relevant standard for lifts was EN81-1 which stipulated a maximum wire strength of 1770N/mm^2. The same arguments were relevant for the subject-matter of claim 1 of auxiliary request 1, with the amended wire strength range additionally defining a new wire strength class, which indicated its technical relevance and thus justified the recognition of the presence of an inventive step.

The basis for the amendment made to claim 1 of auxiliary request 2 was page 20, line 29 of the application as filed.

Page 5, lines 1 to 4 of the application as filed provided basis for the amendment in claim 1 of each of auxiliary requests 3 to 5 for the ropes having a diameter of 3-5 mm.

Reasons for the Decision

1. Main request

1.1 *Inventive step*

The ground for opposition under Article 100(a) EPC in combination with Article 56 EPC is prejudicial to maintenance of the patent as granted.

1.1.1 D1 discloses the following features of claim 1 (the reference signs in parentheses referring to D1):

Elevator (see Figs. 1 and 2) in which
(a) a hoisting machine (6) engages a set of hoisting ropes (3) via a traction sheave (7),
(b) said set of hoisting ropes (3) consists of hoisting

ropes of substantially circular cross-section (see Fig. 2 and col. 4, lines 41 to 43),
(c) said ropes having a load-bearing part twisted from steel wires of circular and/or non-circular cross-section (this is implicit and also not contested by the respondent),
(d) and in which elevator the hoisting ropes support a counterweight (2) and an elevator car (1) moving on tracks.

1.1.2 D1 fails to disclose the following features of claim 1:

(e) the cross-sectional area of the steel wires of the hoisting ropes is larger than 0.015 mm^2 and smaller than about 0.2 mm^2, and
(f) the steel wires of the hoisting ropes have a strength exceeding 2000 N/mm^2.

1.1.3 The argument of appellant/opponent III that the above features (e) and (f) were implicitly known from D1 on the basis of the disclosure in industrial standard D24 is not accepted. Table 3 of D24 discloses four strength classes for steel wires, the maximum being 1960 N/mm^2. Even with the maximum +390 N/mm^2 tolerance added to this strength, this solely discloses a maximum permitted strength for this nominal strength class (1960 + 390 = 2350 N/mm^2) but does not disclose all wires of the class having a wire strength exceeding 2000 N/mm^2. D24 thus fails to allow the conclusion to be drawn that the steel wires in D1 must implicitly have a strength exceeding 2000 N/mm^2.

1.1.4 Based on features (e) and (f) differentiating claim 1 from D1, the objective technical problem to be solved can be seen as 'how to provide an improved hoisting rope'. The respondent's argument that 'an improved

hoisting rope' was not meaningful since many different factors (e.g. low cost, long life, low elongation) could influence what was seen as an 'improvement', is not accepted. Whilst these factors may very well influence an improved hoisting rope design, such features are not included in claim 1. The features (e) and (f), differentiating claim 1 over D1, however also provide an 'improved hoisting rope' at least since the high wire strengths allow greater flexibility in how the elevator system using them can be designed; e.g. smaller diameter hoisting ropes can be used, which provide at least weight saving advantages for the elevator hoisting machine, resulting e.g. in lower power usage and reduced capital cost.

1.1.5 The claimed solution to the objective technical problem is obvious to one skilled in the art of hoisting ropes.

1.1.6 D4 is a handbook of wire ropes dated 1994 and as such can be used to demonstrate common general knowledge at the priority date of the patent. On page 4 of D4, wire strengths up to 4000N/mm^2 are disclosed, particularly with wire diameters less than 0.8mm. Page 4 of D4 further discloses wire drawing as a typical way in which such high strength wires are manufactured, the smaller the wire diameter the larger strengths which are achievable; wire diameters under 0.8mm (the claimed cross-sectional area of the steel wires fall into this size, corresponding to the wire diameter range of approximately 0.14mm to 0.5mm) are disclosed as being necessary to achieve the highest wire strengths of 4000N/mm^2. With the skilled person always seeking improvements to known constructions of hoisting rope, they would appreciate that higher strength / smaller diameter ropes at least make the ropes lighter with the associated advantages in total hoisting system mass and

power consumption. This would guide the skilled person to the claimed wire strengths and cross-sectional areas when trying to solve the objective technical problem posed, without their having to exercise an inventive step.

1.1.7 The respondent's argument that D4 relates only to wire ropes in general, not specifically to hoisting ropes, is not accepted as being a reason for why the skilled person would not consider D4 to modify the hoisting rope known from D1. With the claimed hoisting ropes comprising steel wires, the disclosure in D4 is directly applicable to wire ropes when used for applications such as elevator hoisting ropes. The skilled person searching for a solution for improving prior art ropes would thus take D4 into account. It is also noted that nothing has been altered in the claimed wires of the ropes to make them somehow 'suitable' for elevator applications compared to the wires in D4.

1.1.8 The respondent's contention that, at the priority date of the patent, the relevant standard for lifts stipulating a maximum wire strength of 1770N/mm^2 would have dissuaded the skilled person from considering wire strengths beyond this, is not accepted. The relevant standard indicates only what is legally permissible in elevators in service in the period for which the standard is valid. It does not limit what developments for future elevators are permitted, a patent, in fact, typically being a vehicle for detailing such future plans.

1.1.9 It thus follows that, starting from D1 and wishing to solve the objective technical problem, the skilled person would modify the hoisting rope known from D1 using their common general knowledge as evidenced by

D4, thereby reaching the claimed subject-matter without exercise of an inventive step.

1.1.10 The ground for opposition under Article 100(a) EPC in combination with Article 56 EPC thus prejudices maintenance of the patent as granted. The main request is therefore not allowable.

2. *Auxiliary request 1*

2.1 *Inventive step*

The subject-matter of claim 1 fails to meet the requirements of Article 56 EPC.

2.1.1 Claim 1 has been amended to recite a wire strength between 2300N/mm^2 and 2700N/mm^2. The features differentiating claim 1 over D1 are therefore:

(e) the cross-sectional area of the steel wires of the hoisting ropes is larger than 0.015 mm^2 and smaller than about 0.2 mm^2, and
(f) the steel wires of the hoisting ropes have a strength greater than 2300 N/mm^2 and less than 2700 N/mm^2.

2.1.2 As was the case for claim 1 of the main request, the objective technical problem to be solved can still be seen as 'how to provide an improved hoisting rope'.

2.1.3 As found in point 1.1.6 above, the skilled person knows that reducing wire diameter and increasing wire strength offers advantages with respect to the size and weight of the hoisting rope for any given elevator system, such that choosing an appropriate wire diameter and increasing the wire strength to fall within the

claimed range cannot be credited with involving an inventive step. In this regard, page 4 of D4 discloses wire diameters less than 0.8mm as being appropriate for strengths up to 4000 N/mm^2 and page 6 discloses steel wires of strength 2450N/mm^2 to be commercially available. It thus follows that selecting a wire diameter and strength in the claimed range would be an obvious solution to the posed technical problem.

2.1.4 The respondent argued that a particular advantage of the claimed invention could be recognised because a new strength class was achieved by the claimed wire strength range. Whether a new strength class is defined or not by the claimed wire strength range from 2300 N/mm^2 to 2700 N/mm^2 is however irrelevant for purposes of acknowledging the presence of an inventive step. Rather, of importance is whether the claimed strength range is obvious to the skilled person when starting from the closest prior art and wishing to solve the posed objective technical problem. As indicated in point 2.1.3, the claimed solution is obvious to the skilled person.

2.1.5 The Board thus confirms its finding in point 6.2 of its preliminary opinion, that the subject-matter of claim 1 fails to meet the requirement of Article 56 EPC. Auxiliary request 1 is therefore also not allowable.

3. *Auxiliary request 2*

3.1 *Article 123(2) EPC*

The subject-matter of claim 1 fails to meet the requirement of Article 123(2) EPC.

3.1.1 Relative to auxiliary request 1, claim 1 has been further limited to recite the feature 'wherein multiple rope passages are used'. The respondent argues this feature is disclosed on page 20, line 29 of the application as filed.

3.1.2 This feature has however been extracted in isolation from the context in which it is disclosed on page 20. Lines 30 to 32, immediately following the disclosure of 'using multiple rope passages', further define that 'the ropes go to the elevator car at most as many times as to the counterweight'. As indicated in point 6.3.2 of the preliminary opinion, this omitted feature is directly and structurally related to the use of multiple rope passages such that its omission results in the subject-matter of claim 1 extending beyond the content of the application as filed, contrary to the requirement of Article 123(2) EPC.

3.1.3 Auxiliary request 2 is thus not allowable.

4. *Auxiliary request 3*

4.1 *Article 84 EPC*

Claim 1 is not clear, contrary to the clarity requirement of Article 84 EPC.

4.1.1 The amendments made to claim 1 result in it lacking clarity. Firstly, the added recitation 'forming therewith ropes having a diameter of the order of 3 to 5 mm' is unclear. The 'forming therewith' expression is language directed to a method of manufacture in a claim directed to a device, so that it is unclear what structural limitations this places upon the claimed elevator. Additionally, the expression 'of the order of

3-5 mm' is unclear since the limits of the claimed range are undefined e.g. would a hoisting rope of 2.5 mm diameter fall within the claimed range? This ambiguity would leave the skilled person in a quandary as to how the expression 'of the order of 3-5 mm' was to be understood. Finally, specifying the elevator to be 'for ... a speed below 2 m/s' also introduces a lack of clarity as it is not clear what limiting structural feature has been introduced thereby.

4.1.2 As indicated in point 6.4 of the preliminary opinion, claim 1 thus contravenes Article 84 EPC. Auxiliary request 3 is therefore not allowable.

5. *Auxiliary request 4*

5.1 *Article 84 EPC*

5.1.1 The amendments made to claim 1 with respect to claim 1 of auxiliary request 3 fail to address the following objections already found to result in a lack of clarity:

- claim language directed to a method of manufacture (forming therewith) in a claim to a device (elevator); and
- the elevator being 'for ... a speed below 2 m/s' which fails to define what limiting structural feature has been introduced thereby.

5.1.2 As a consequence, for the same reasons as for claim 1 of auxiliary request 3, the present claim 1 lacks clarity. Auxiliary request 4 is thus also not allowable.

6. *Auxiliary request 5*

6.1 *Article 84 EPC*

6.1.1 Claim 1 of this request also recites that the claimed elevator is 'for ... a speed below 2 m/s' and the rope diameter is claimed to be 'of the order of' 3-5 mm. As found in point 4.1.1 above and applying equally here, both of these expressions introduce a lack of clarity into claim 1.

6.1.2 Claim 1 thus fails to meet the clarity requirement of Article 84 EPC. Auxiliary request 5 is therefore similarly not allowable.

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:

D. Grundner M. Harrison

Decision electronically authenticated