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Datasheet for the decision of 23 January 2018

Case Number: T 2074/14 - 3.2.06

Application Number: 03743075.8

Publication Number: 1479640

IPC: B66B23/14

Language of the proceedings: EN

Title of invention:
CONVEYOR DEVICE

Patent Proprietor:
Toshiba Elevator Kabushiki Kaisha

Opponent:
Otis Elevator Company

Headword:

Relevant legal provisions:
EPC 1973 Art. 83, 100(b)

Keyword:
Sufficiency of disclosure - main request (no) auxiliary requests (no)

Decisions cited:
T 0171/84

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2074/14 - 3.2.06

D E C I S I O N
of Technical Board of Appeal 3.2.06
of 23 January 2018

Appellant: (Opponent)	Otis Elevator Company Ten Farm Springs Road Farmington CT Connecticut 06032 (US)
Representative:	Schmitt-Nilson Schraud Waibel Wohlfrom Patentanwälte Partnerschaft mbB Destouchesstraße 68 80796 München (DE)
Respondent: (Patent Proprietor)	Toshiba Elevator Kabushiki Kaisha 5-27, Kitashinagawa 6-chome Shinagawa-ku, Tokyo 141-0001 (JP)
Representative:	Kramer Barske Schmidtchen Patentanwälte PartG mbB European Patent Attorneys Landsberger Strasse 300 80687 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 18 August 2014 rejecting the opposition filed against European patent No. 1479640 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	M. Harrison
Members:	M. Hannam
	J. Hoppe

Summary of Facts and Submissions

I. An appeal was filed by the appellant (opponent) against the decision of the opposition division rejecting the opposition to European patent No. 1 479 640. It requested that the decision be set aside and the patent be revoked.

II. In its letter of response, the respondent (patent proprietor) requested that the appeal be dismissed or, in the alternative, that the patent be maintained according to one of its auxiliary requests I, II or III.

III. The following documents, referred to by the appellant in its grounds of appeal, are relevant to the present decision:

D6 US-A-4 498 890;
OT8 "Kompensation des Polygoneffekts eines mit konstanter Winkelegeschwindigkeit umlaufenden Ritzels durch die Auslenkung der Kette entlang einer Korrekturbahn", a mathematical model developed by the appellant/opponent.

IV. The Board issued a summons to oral proceedings and a subsequent communication containing its provisional opinion, in which it indicated *inter alia* that the patent appeared not to provide guidance as to how the reference positions could be calculated, measured or simulated such that Article 100(b) EPC could prejudice maintenance of the patent as granted.

V. With letter of 8 January 2018 the respondent filed additional auxiliary requests A, B, IA, IB, IIA, IIB, IIIA and IIIB.

VI. Oral proceedings were held before the Board on 23 January 2018, during which the respondent filed a new document:

M10078 "Vibration of roller chain drives at low, medium and high operating speeds", W Choi, G E Johnson, Mechanical Engineering and Applied Mechanics, The University of Michigan.

The final requests of the parties were as follows:

The appellant requested that the decision under appeal be set aside and that the European patent No. 1 479 640 be revoked.

The respondent requested that the appeal be dismissed or auxiliarily that the patent be maintained based on one of its auxiliary requests in the given order:

- auxiliary request A, filed with letter of 8 January 2018;
- auxiliary request B, filed with letter of 8 January 2018;
- auxiliary request I, filed with letter dated 12 May 2015;
- auxiliary request IA, filed with letter of 8 January 2018;
- auxiliary request IB, filed with letter of 8 January 2018;
- auxiliary request II, filed with letter dated 12 May 2015;
- auxiliary request IIA, filed with letter of 8 January 2018;
- auxiliary request IIB, filed with letter of 8 January 2018;

- auxiliary request III, filed with letter dated 12 May 2015;
- auxiliary request IIIA, filed with letter of 8 January 2018; or
- auxiliary request IIIB, filed with letter of 8 January 2018.

VII. Claim 1 of the main request, auxiliary request A and auxiliary request B reads as follows:

"A conveyer apparatus comprising:
a footstep guide rail (3);
a plurality of footsteps having footstep rollers (5) moving along the footstep guide rail (3);
a footstep chain (7) for connecting the footstep rollers (5) of the footsteps with each other at predetermined pitches;
a rotation driving device (8) for generating a driving force to move the footsteps in a designated direction; and
a drive sprocket (9) that rotates due to the driving force of the rotation driving device (8) and further transmits the driving force of the rotation driving device (8) to the footstep chain (7),
wherein the footstep guide rail (3) is provided, in a part thereof in the vicinity of the drive sprocket (9), with a mountainous or valley-shaped curved part (13) characterized in that
a velocity of a pitch circle of the drive sprocket (9) is represented by Vt;
an average velocity of the footstep rollers (5) moving while being connected to the footstep chain (7) is represented by Vo; and
a position at which the moving velocity of the footstep rollers (5) comes to Vo as a result of reducing from Vt is represented by a reference position,

wherein there exist a plurality of reference positions along the footstep guide rail (3), and
the curved part (13) is arranged in a part of the footstep guide rail (3), which is positioned between one reference position in the vicinity of the drive sprocket (9) and another reference position adjoining the one reference position."

Claim 1 of auxiliary request I, auxiliary request IA and auxiliary request IB reads as for claim 1 of the main request with the following feature appended:

"wherein the vicinity of the drive sprocket is covered with a comb plate where a comb is attached to a leading end of the comb plate and the footsteps are adapted so as to pass under the comb plate."

Claim 1 of auxiliary request II, auxiliary request IIA and auxiliary request IIB reads as for claim 1 of the main request with the following features appended:

"wherein, for three adjacent footstep rollers (5a, 5b, 5c), when the leading footstep roller (5a) approaches the drove sprocket (9) to climb over the above-mentioned reference position, the moving velocity of the leading footstep roller (5a) becomes smaller than Vo;
when the second footstep roller (5b) arrives at the curved part (13) of the footstep guide rail (3) in the vicinity of the drive sprocket (9), the second footstep roller (5b) moves along the curved part (13) while changing its level; and
since the pitch of the respective footstep rollers (5) is constant, the change in the level of the second footstep roller (5b) causes the third footstep roller (5c) to approach the leading footstep roller (5a) by an

amount of change in the level of the second footstep roller (5b), so that the third footstep roller (5c) is accelerated; thereby, a descent in the moving velocity of the leading footstep roller (5a) being cancelled by an increase in the moving velocity of the third footstep roller (5c), so that the moving velocity of the third footstep roller (5c) is maintained at Vo; and, when the leading footstep roller (5a) advances furthermore, its moving velocity becomes faster than Vo conversely; and, at this time, since the second footstep roller (5b) has just passed through a peak of the curved part (13) of the footstep guide rail (3) in the vicinity of the drive sprocket (9), the level of the second footstep roller (5b) returns and the third footstep roller (5c) departs from the leading footstep roller (5a), so that the third footstep roller (5c) is decelerated;
thereby, the increase in the moving velocity of the leading footstep roller (5a) being cancelled by a slowing-down in the moving velocity of the third footstep roller (5c), so that the moving velocity of the third footstep roller (5c) is maintained at Vo."

Claim 1 of auxiliary request III, auxiliary request IIIA and auxiliary request IIIB reads as for claim 1 of the main request with the following features appended:

"wherein a footstep roller (5) positioned between the curved part (13) and the drive sprocket (9) and having an unevenness in velocity is established as a velocity unevenness roller;
another footstep roller (5) which is the second one from the velocity unevenness roller along the footstep guide rail (3) via the curved part (13) and which is expected to have a constant velocity, is established as a constant-velocity roller; and

a trace of an intersecting point between two circles during respective moving of the velocity unevenness roller and the constant-velocity roller by one pitch each, one circle being described by a center of the velocity unevenness roller as the center of the circle and a link length of the footstep chain as the radius of the circle and another circle being described by a center of the constant-velocity roller as the center of the other circle and the link length of the footstep chain (7) as the radius of the other circle, is established as a roller center trace, and wherein the curved part (13) is formed so as to follow the roller center trace."

VIII. The appellant's arguments as regards sufficiency of disclosure may be summarised as follows:

As regards the main request, the skilled person was unable to establish the location of the reference positions such that Article 100(b) EPC prejudiced maintenance of the patent. Measuring the reference position location was impossible since inertial and tolerance effects made the whole system permanently dynamic, such that e.g. system vibrations were inevitable and this led to an extremely complex system from which to take the required accurate measurements. If some means of calculation were to be used, there was no information in the patent which taught the skilled person how to calculate the reference positions. Being a patent document, D6 did not represent common general knowledge of the skilled person (see T171/84), nor had text books been cited to prove that the calculation of reference positions was widely accepted or even understood. M10078 did not help in this regard as this gave no information at all as to how reference positions might be calculated.

The same objections, albeit under Article 83 EPC, applied to each of the auxiliary requests.

IX. The respondent's arguments as regards sufficiency of disclosure may be summarised as follows:

Regarding the main request, Article 100(b) EPC did not prejudice maintenance of the patent. The reference positions could be established by simulation, measurement or calculation. Regarding the measurement of the reference positions, high speed imaging would enable the locations of where the footstep rollers reached the average footstep chain velocity to be ascertained. The reference positions were an intrinsic property of any sprocket driven chain drive and the skilled person would thus know how to establish their locations. The chain would experience a repeating mechanical interaction with the drive sprocket resulting in a stationary system not subject to significant movement instabilities.
Alternatively, the locations of the reference positions could be established by calculation. Paragraphs [0048] and [0049] of the patent disclosed a formula involving the average velocity of the footstep rollers which would enable the skilled person to calculate the reference positions. OT8 also showed that the location of the reference positions could be calculated by the skilled person. Additionally, D6 provided evidence of the common general knowledge of the skilled person, particularly since the polygonal effect was a well documented phenomenon occurring in a well understood mechanical system with the skilled person consequently being aware of the teaching in patent documents relating to this limited technical area. The similarity between the compensation curves in Figs. 3 and 4 of the patent and Fig. 4 of D6 further underlined that the

skilled person would be aware of the teaching of D6. The exact location of the reference positions was also not of such importance due to the asymptotic shape of the compensation curve at its start and finish. The bibliography of M10078 also underlined the polygon effect, and thus the calculation of reference points, as being common general knowledge.

As regards the auxiliary requests, the same arguments as those forwarded in support of the main request applied equally.

Reasons for the Decision

Main request

1. *Article 100(b) EPC 1973*

The ground for opposition under Article 100(b) EPC 1973 is prejudicial to the maintenance of the patent as granted.

1.1 Claim 1 as granted includes the feature:

'a position at which the moving velocity of the footstep rollers (5) comes to Vo as a result of reducing from Vt is represented by a reference positions (sic)'.

The patent as a whole however provides no teaching as to how the reference position(s) can be determined, be this by simulation, measurement or calculation. Similarly, such teaching is not available to the skilled person from common general knowledge. Such

reference positions are fundamental for the invention to be carried out since the curved part (13) of the footstep guide rail (3) 'is positioned between one reference position in the vicinity of the drive sprocket (9) and another reference position adjoining the one reference position.' Thus, without being able to determine the reference positions, the invention cannot be carried out by a person skilled in the art.

1.2 It is noted first that the reference positions themselves are physical positions of the footstep chain in the conveyer apparatus, these positions however being defined as those where the footstep roller velocity reaches Vo (the average footstep roller velocity) having reduced from Vt (the velocity of the footstep roller at the pitch circle of the drive sprocket). It is also not a matter of dispute between the parties that every footstep conveyer apparatus driven by a chain interacting with a drive sprocket will be subject to the polygonal effect, and that the footstep roller velocity will thus fluctuate between maximum and minimum values. As a consequence, therefore, the footstep rollers will reach the average velocity Vo on reducing from Vt at several positions along the chain path on every such conveyer apparatus which has not been altered by a compensation means. Nonetheless, how to establish the location of the claimed reference positions in the claimed conveyer apparatus is not taught in the patent.

1.3 As regards the respondent's contention that the location of the reference positions could be simulated, no indication of how such a simulation could be performed is to be found either in the patent or in the written submissions of the respondent. In response to the preliminary opinion of the Board which addressed

the lack of any information as to how e.g. a simulation could be performed, the respondent offered no further argument either in writing or at the oral proceedings. The Board thus sees no reason to diverge from its preliminary opinion in this regard and the Board thus confirms its preliminary opinion that the patent fails to disclose how the reference positions can be established through simulation.

1.4 The respondent's argument that the reference positions could be established by measurement during the design phase of the apparatus is not convincing. In order to empirically determine the reference positions, the instantaneous velocity of the footstep rollers would need to be measurable so that the positions in which this velocity reduced to the average velocity could be identified.

1.4.1 Such a physical measurement of the exact positions at which the average velocity is reached would not be readily possible on an operating conveyer apparatus according to claim 1. Such an apparatus would not behave in an easily predictable, static manner as might be suggested when relying on purely theoretical considerations. Rather, mechanical imperfections in the apparatus (tolerances in the chain-links; the mass and inertia of the footsteps; irregularities in the drive sprocket etc.) would result in the footstep chain's movement diverging from the theoretical behaviour with obvious delays in the theoretical acceleration and deceleration of the chain. These delays would occur through *inter alia* the inertia of the overall conveying system retarding movement, and/or any play in the chain links causing a hiatus in the movement being immediately transferred from link to link in the chain. As a consequence, even if the instantaneous velocity of

the footstep rollers could be ascertained by way of high speed imaging, the precise locations of the reference positions would not be fixed positions in time along the footstep chain due at least to the above identified mechanical imperfections. Which aspects should be taken into account to establish the specific moment at which the velocity should be measured is not a simple matter and no information on this has been disclosed.

1.4.2 The respondent's contention that the chain links interacting with the drive sprocket was a repeating mechanical interaction which would thus produce a stationary system of reference positions is not convincing. It can be accepted in a theoretical, perfect system, with no inertial effects or tolerances in linkages, that a stationary conveyer system would result in which it could be possible to identify and accurately locate the reference positions. However, with it being argued that the reference positions could be empirically determined on an actual conveyer apparatus, this would be subject to inertial and tolerance effects which would necessarily cause the footstep chain movement to diverge from the theoretical, thus making a repeatable determination of the reference positions by measurement impossible.

1.4.3 The respondent's argument that it could surely not be required to have to explicitly provide a way of measuring an intrinsically present feature is also not accepted. The intrinsic presence of reference positions along the footstep chain is not questioned; such reference positions doubtlessly exist for the claimed apparatus. What is not possible is for the skilled person on the basis of the teaching of the patent as a whole, by measurement from an actual conveyer apparatus

with all its mechanical imperfections causing motion diverging from the theoretical, to determine the locations of the claimed reference positions.

1.4.4 In summary therefore, the skilled person would be unable to identify the reference positions by measurement.

1.5 The respondent's argument that the skilled person could establish the reference positions by calculation is not accepted.

1.5.1 The respondent's reference to paragraphs [0048] and [0049] of the patent in order to enable Vo to be calculated is not convincing. The formula in this paragraph identifies small velocity unevenness of the footstep rollers being defined by $(Vo-r\omega\sin(\omega t+\varphi))$, yet the patent fails to identify what physical quantity 'φ' represents. The respondent indicated this to be a constant 'phase shift', yet this knowledge provides no resultant ability to calculate the value of Vo. As such, this formula for velocity unevenness does not guide the skilled person to determining the average footstep roller velocity Vo which would be required for calculating the claimed reference positions. A reference by the respondent to 'excel sheets' used by the proprietor in order to calculate the reference positions is also not helpful, since the sole calculation disclosed in the patent in this regard is that for the velocity unevenness cited above, which fails to provide the skilled person with a method of calculating the average velocity Vo and thus also the reference positions.

1.5.2 The respondent's reference to OT8 as proving that the skilled person's general knowledge included calculation

of compensation curves and thus the claimed reference positions is not accepted. OT8 is a document prepared by the appellant and, according to it, based on the kinematic model of D6, describing a quantitative mathematical model for calculating the position and shape of the compensation curve for the claimed apparatus in the opposed patent. The Board finds that, as also argued by the appellant, based on the information given in the patent and the skilled person's common general knowledge, significant efforts would still be required to derive the reference positions by calculation (see pages 1 to 8 of OT8). Lacking any guidance whatsoever in the patent, the considerable derivative effort through calculation required, as evidenced by OT8, is seen to constitute an undue burden to the skilled person when trying to carry out the invention.

1.5.3 As regards D6, which also disclosed how reference positions might be calculated, it has to be noted that this document is not mentioned in the description of the patent in suit. The respondent's argument that D6 could be seen as evidence of the skilled person's common general knowledge is not accepted. Indeed, contrary also to the finding of the opposition division in its decision, patent documents cannot normally be considered as evidence of the skilled person's common general knowledge and thus contribute to the sufficiency of disclosure of the patent in suit (see e.g. T171/84 Reasons 5; T 580/88, Reasons 2.3), rather common general knowledge is represented by basic handbooks and textbooks on the subject in question. Information that has to be found through a search does not belong to common general knowledge. In the present case, therefore, the respondent's reliance on D6 as an indication of how the skilled person would be able to

calculate the claimed reference positions is not persuasive. It is also noted that D6 was published in 1985 yet the respondent had failed, despite reference to the lack by the appellant, to cite a text book which could unequivocally prove the calculation of the reference positions to be common general knowledge.

1.5.4 The respondent's contention that the polygonal effect was a very specific phenomenon thus understood by everyone working in the field also fails to persuade that D6 should thus be seen as disclosing the common general knowledge of the skilled person. As found above, patent documents are not normally considered to evidence the common general knowledge of the skilled person, this rather being the content of textbooks which, even in this limited field relating specifically to the polygonal effect, have notably not been cited in support of the respondent's case.

1.5.5 The respondent's argument that the similarity between Figs. 3 and 4 of the patent in suit and Fig. 4 of D6 would have led the skilled person to the content of D6 is also not convincing. Even given the similarity in the compensation curves depicted in D6 and the patent, the skilled person is not considered to have the content of D6 as its common general knowledge, and would not expect to have to carry out a search of patent documents in the field in order to be able to carry out the invention insufficiently disclosed in the patent in suit.

1.5.6 The respondent's further argument that the exact location of the reference positions was not essential due to the asymptotic nature of the compensation curve in its extremities also fails to convince the Board to alter its conclusion. Such an argument addresses the

clarity of precisely where a reference position is to be defined. Yet the issue in question is whether the reference positions can be calculated at all by the skilled person based on the disclosure of the patent in suit in combination with common general knowledge, the answer to which is negative as detailed in the foregoing.

1.5.7 The respondent's reference to the extensive bibliography of M10078 with the argument that the polygon effect and its mitigation was thus common general knowledge is not accepted. While it cannot be questioned that numerous references in the bibliography included polygonal action in their title, this solely provides evidence that the polygonal effect is well known. This is not contested. No argument was however presented by the respondent that these references would provide the skilled person with guidance as to how to calculate the location of the claimed reference positions, nor indeed can any such guidance be ascertained without the filing of a specific document detailing such calculation.

1.5.8 In summary therefore, based on the information before it, the Board can only conclude that the skilled person would be unable to identify the reference positions by calculation.

1.6 With the skilled person being unable to establish the location of the reference positions by simulation, measurement or calculation, it follows that the ground for opposition under Article 100(b) EPC 1973 prejudices maintenance of the patent as granted.

Auxiliary requests

2. *Article 83 EPC 1973*

2.1 Claim 1 of each of the auxiliary requests includes the feature objected to in the main request that:

'a position at which the moving velocity of the footstep rollers (5) comes to Vo as a result of reducing from Vt is represented by a reference position'.

None of the features added to the respective claim 1 of any of the requests is found to change the conclusion on insufficiency of the main request. The respondent also did not contest that the same finding would apply to each of the auxiliary requests and opted to provide no further arguments in defence of these requests. The Board thus concludes, for the same reasons as those for the main request, that the amended form of the patent according to each of the auxiliary requests fails to disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

2.2 Each auxiliary request thus fails to meet the requirements of Article 83 EPC 1973. The auxiliary requests are therefore 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:

M. H. A. Patin M. Harrison

Decision electronically authenticated