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Datasheet for the decision of 23 November 2021

Case Number: T 1920/17 - 3.2.06

Application Number: 12169035.8

Publication Number: 2527281

IPC: B66B5/06, B66B5/00

Language of the proceedings: EN

Title of invention:
Elevator

Patent Proprietor:
Hitachi, Ltd.

Opponent:
KONE Corporation

Headword:

Relevant legal provisions:
EPC Art. 56, 123(2)
RPBA 2020 Art. 13(1), 13(2)

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Keyword:
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Amendment to appeal case - auxiliary requests 1 to 6 - admitted (no)
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Catchword:

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Case Number: T 1920/17 - 3.2.06

D E C I S I O N
of Technical Board of Appeal 3.2.06
of 23 November 2021

Appellant: (Opponent)	KONE Corporation Kartanontie 1 00330 Helsinki (FI)
Representative:	Glück Kritzenberger Patentanwälte PartGmbB Hermann-Köhl-Strasse 2a 93049 Regensburg (DE)
Respondent: (Patent Proprietor)	Hitachi, Ltd. 6-6, Marunouchi 1-chome Chiyoda-ku Tokyo 100-8280 (JP)
Representative:	MERH-IP Matias Erny Reichl Hoffmann Patentanwälte PartG mbB Paul-Heyse-Strasse 29 80336 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 3 July 2017 rejecting the opposition filed against European patent No. 2527281 pursuant to Article 101(2) EPC.**

Composition of the Board:

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

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. 2 527 281. It requested that the decision under appeal be set aside and the patent be revoked.

II. In its letter of reply, the respondent (patent proprietor) requested that the appeal be dismissed, alternatively that the patent be maintained according to one of auxiliary requests 1 to 4.

III. With letter of 22 May 2019, the respondent filed a replacement auxiliary request 4.

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

D1 US-B2-7 954 607
D2 US-A-4 880 082

V. The Board issued a summons to oral proceedings and a subsequent communication containing its provisional opinion, in which it indicated *inter alia* that Article 100(a) EPC in combination with Article 56 EPC appeared to be prejudicial to maintenance of the patent as granted (main request). It also indicated that auxiliary requests 1 to 4 each appeared to meet with objections under Article 123(2) EPC.

VI. With letter of 6 September 2021, the respondent filed replacement auxiliary requests 1 to 4 and new auxiliary

requests 5 and 6.

VII. To the Board's communication of 7 September 2021 stating that it intended to hold the oral proceedings by videoconference, the respondent requested that these be held in person as 'The Covid pandemic is not relevant anymore for vaccinated persons'.

VIII. In its communication of 10 November 2021, the Board indicated that it disagreed with the respondent's view with respect to the pandemic and indeed intended to hold the oral proceedings by videoconference.

IX. Oral proceedings were held by videoconference before the Board on 23 November 2021, during which the respondent filed auxiliary request 7. The parties' final requests were as follows:

The appellant requested that the decision under appeal be set aside and the European patent No. 2527281 be revoked.

The respondent requested that the appeal be dismissed and, subsidiarily, that the patent be maintained on the basis of one of auxiliary requests 1 to 6, filed with letter of 6 September 2021, or on the basis of auxiliary request 7 filed at oral proceedings.

X. Claim 1 of the main request (claim 1 as granted) reads as follows:

"An elevator comprising an arithmetic device (32, 37) that receives signals (28, 29, 30, 31) from a plurality of sensors for detecting operating states of a car (1) to determine an abnormality and control the car by an abnormality determination signal (33, 36, 38, 41),

wherein
an acceleration sensor (24) is provided on the car, and the arithmetic device includes a computing unit (43) that receives signals (28, 31) from the acceleration sensor and a speed detection unit (21) different from the acceleration sensor to respectively calculate car speeds (V1, V2)
and a comparing unit (46) that compares two calculated car speeds (V1, V2) in the arithmetic device to output the abnormality determination signal in accordance with a compared result,
characterized in that
the arithmetic device (32, 37) includes a correction unit (60) that resets the car speed (V2) calculated in accordance with the signal (31) from the acceleration sensor at every time of stopping the car."

XI. The respective claim 1 of each of the auxiliary requests 1 to 7 is appended to the present decision, whereby the respective claim 1 of auxiliary requests 1 to 6 is the 'marked-up' version.

XII. The appellant's arguments, relevant to the present decision, may be summarised as follows:

Main request

The subject-matter of claim 1 did not involve an inventive step when starting from D1 and combining this with the teaching of D2 and common general knowledge. A sensor was a device which read or in some way measured a physical quantity and produced a signal which could be interpreted. Functional block 7 of D1 carried out just such a function and so could be considered a sensor. As regards feature f), the arithmetic unit could reasonably be understood to be the safety

apparatus 10 in combination with the portions of the acceleration sensor 4 and the determination 7 of D1, the computing unit thus being within the claimed arithmetic unit. The operating states of the elevator car were directly related to the rotational speed of the electric motor 3. D1 thus failed to disclose solely feature h) of claim 1.

Should feature f) also be considered not disclosed, the partial objective technical problem to be addressed for feature f) was simply to provide a suitable place for the car speeds to be calculated. As regards feature h), this was to provide a safer database for the speed signal derived from the acceleration sensor.

As regards the solution to the first problem, choosing between two possible places for locating the computing unit was obvious to the skilled person and thus could not be credited with involving an inventive step. As regards the second problem, D2 disclosed resetting the elevator's speed when it came to rest (see col. 2, line 67 to col. 3, line 6). Both the analogue signal exiting the integrator 8 and the digital signal exiting the A/D converter 6 were reset (see also Fig. 2). This would thus guide the skilled person to the required modification of D1 in order to arrive at feature h), thus depriving the subject-matter of claim 1 of an inventive step.

Auxiliary requests 1 to 6

The subject-matter of claim 1 of each of these requests failed to meet the requirement of Article 123(2) EPC due to the application as filed not disclosing more than two arithmetic devices in the elevator system.

Auxiliary request 7

This should not be taken into account due to it being completely new subject-matter which could not be dealt with at such a late stage of the proceedings.

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

The respondent had not consented to the oral proceedings being held by videoconference.

Main request

The subject-matter of claim 1 involved an inventive step when starting from D1 when considering the technical teaching of D2. D1 failed to disclose features b), c) and d) of claim 1 in addition to features f), g) and h).

Regarding feature b), D1 failed to disclose an arithmetic device as defined in claim 1, due to the safety apparatus 10 failing to receive signals from a plurality of sensors and due to it not including a computing unit as required by feature f). The safety apparatus 10 was simply a 'black box' with regard to its functionality and thus could not anticipate the claimed arithmetic device. This had as a consequence that the claimed comparing unit in feature g) was also not known from D1.

As regards the claimed plurality of sensors in feature c), the first embodiment of D1 disclosed a single sensor i.e. the acceleration sensor 4. The 'determination of the motion information, 7' of D1 could not be considered a sensor since this represented

motion information rather than being a physical entity. Even if it could be seen as an entity, a sensor required measurement or detection of a physical quantity in order to produce a signal which could be interpreted; box 7 did not measure a quantity, rather it simply used an available electrical signal feeding the synchronous motor and represented this as a speed. Furthermore, this electrical signal did not reflect the operating states of a car, as required by feature c). The indication in col. 5, lines 55 to 59 that the electrical parameters of the motor were determined, from which the motion information of the elevator was determined, also did not unambiguously suggest the measurement or detection of a physical quantity by a sensor.

Feature f) was also not known from D1, as the safety apparatus 10 did not include the claimed computing unit. It was technically reasonable for the signals from the acceleration sensor and the determination 7 to already be car speeds, such that no 'computing' was necessary in the safety apparatus 10. Nor was there a speed detection 'unit'.

Based on features f) and h) differentiating claim 1 from D1, the objective technical problem to be solved, with particular reference to paragraphs [0009], [0019], [0045], [0046] and [0048] of the patent, was 'to provide a less complex elevator structure with increased safety'. The computing unit for calculating car speeds and the correction unit that reset the car speed derived from the acceleration sensor were both located in the arithmetic unit and had a synergistic effect justifying the formulation of a single technical problem to be solved.

The skilled person would not look in D2 for correcting car speed since this solely corrected counting errors (see sentence bridging cols. 1 and 2; sentence bridging cols 2 and 3) and was anyway not concerned with safety. D2 thus disclosed correction in an analogue system whereas D1 was a digital arrangement incompatible with D2. Even if the teaching of D2 were applied to D1, this would not result in a speed error being zeroed since D2 addressed the accumulation of pulse counting errors related to floor selection i.e. a positional correction rather than a speed correction. D2 also failed to calculate the speed of the elevator car, rather solely a voltage representing the speed of the elevator was output by the integrator 8. In addition, the safety apparatus 10 of D1 had two brake outputs which would require additional modification for the incorporation of the speed resetting from D2. D2 further failed to guide the skilled person to include the computing unit in the arithmetic device; indeed the appellant had also previously argued that the speed calculation could be carried out in the sensors 4 and 7 rather than in the safety apparatus 10.

Auxiliary requests 1 to 6 should be admitted. These were a direct response to the preliminary opinion which introduced a new objection under Article 123(2) EPC. The amendment made to claim 1 of auxiliary request 1 directly addressed point 3.1 of the Board's preliminary opinion and introduced the suggested amendment from paragraph [0059] of the application as filed. The application as filed consistently disclosed two arithmetic devices such that this was the intended, and supported, reading of claim 1. Conversely, the description reasonably defined multiple pairs of duplicated devices such that, with no clear limitation to just two, the claimed subject-matter was also

originally disclosed.
The same arguments additionally applied to the respective claim 1 of each of auxiliary requests 2 to 6.

Auxiliary request 7 should be taken into account by the Board. Claim 1 was a simple combination of the features of claims 1 and 5 as filed. The exceptional circumstances why this request should be taken into account were to be found in the fact that the discussion at oral proceedings had clarified the Board's objection in point 3.1 of its preliminary opinion. Claim 5 had always been part of the defended subject-matter (see e.g. page 21 of the respondent's reply to the grounds of appeal) such that it could not be seen as surprising and was also *prima facie* allowable. This was also the last chance for the proprietor which was hindered through the application of the new Rules of Procedure of the Boards of Appeal which had not been in force until after the first two submissions of the respondent had been filed.

Reasons for the Decision

1. *Oral proceedings by videoconference*

1.1 With letter of 8 October 2021 the respondent requested that the oral proceedings be held in person. The Board responded that, in accordance with the headnote of G1/21, it seemed that a state of general emergency was still in existence and that, in the interest of the health of all parties, in-person oral proceedings were to be avoided where possible and that it therefore intended to hold the oral proceedings by videoconference. It also invited the respondent to

provide further arguments in support of its request for the oral proceedings to be held in person.

1.2 To this communication, the respondent submitted no further arguments so that the Board exercised its discretion to hold the oral proceedings by videoconference.

2. *Main request*

2.1 *Article 100(a) EPC - Inventive step*

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

2.2 Starting from D1 as the closest prior art, this is found to disclose the following features of claim 1, the reference signs in parentheses referring to D1:

a) An elevator (1)
b) comprising an arithmetic device (10)
c) that receives signals from a plurality of sensors (4, 7) for detecting operating states of a car (2)
d) to determine an abnormality and control the car by an abnormality determination signal (col. 6, lines 11 to 30), wherein
e) an acceleration sensor (4) is provided on the car (2), and the arithmetic device (10) includes
g) a comparing unit that compares two calculated car speeds in the arithmetic device (10) to output the abnormality determination signal in accordance with a compared result (col. 6, lines 11 to 16).

2.2.1 The respondent's argument that the 'determination of the motion information, 7' of D1 could not be

considered a sensor, as this represented motion information rather than a physical entity, is not accepted.

First, in this regard, col. 6, lines 14 to 16 of D1 indicates that 'the motion information of the elevator car [is] determined from the electrical parameters of the synchronous motor'. For the electrical parameters of the synchronous motor to be converted into a motion information signal, an entity of some type must be present in order to perform such conversion. Without such an entity, the electrical parameters of the synchronous motor would remain just that and would not be changed in any manner, which would be contrary to what D1 requires. Hereafter the implicitly present device will be referred to as 'functional group 7'.

Further according to the respondent, even if 'functional group 7' could be seen as an entity, this was not a sensor since this required measurement or detection of a physical quantity in order to produce a signal which could be interpreted. This is also not persuasive. Even if the description in D1 fails to use the words 'measure' or 'detect' in the explanation of the conversion performed by functional group 7, col. 5, lines 55 to 59 indicates that there is 'a determination of' the electrical parameters of the synchronous motor 3 on the basis of which a determination of the motion information of the elevator is carried out. The expression 'determination' indicates an active interaction of some sort, in the present context thus inferring a processing of the electrical parameters of the motor in order to produce the motion information, not simply a passive receiving and passing-on of a signal as alleged by the respondent. This reflects nothing but the function of a sensor. It is further

noted that feature f) of claim 1 defines the second sensor (i.e. not the acceleration sensor) as a 'speed detection unit' which in fact suggests mere detection of speed rather than detection (or measurement) and production of a signal to indicate the detected value. In contrast, the determination carried out by the functional group 7 in col. 5, lines 55 to 59 of D1, implies the active receipt of a signal and processing this, thus disclosing nothing less than a sensor.

2.2.2 The respondent's related argument that functional unit 7 did not measure a quantity, rather it simply took an available electrical signal feeding the synchronous motor and represented this as a speed is not accepted. As outlined in the preceding point, the determination of the electrical parameters of the synchronous motor by functional unit 7, and the further determination of the motion information from this, indeed does reflect an active detection of an amount, processing and output of signals which satisfies the functions of a sensor, these functions notably meeting the definition of a sensor referred to by the appellant.

2.2.3 The respondent's further argument that the claimed sensor must comprise a transducer to convert the signal of the synchronous motor into a speed signal is also not accepted. Feature c) of claim 1 simply requires the sensor to detect operating states of a car, rather than a specific speed signal. The signal of the synchronous motor clearly is reflective of an operating state of a car, no further specification of this specifically being a speed signal being defined in feature c).

2.2.4 The respondent's argument that the electrical parameters of the synchronous motor in D1 did not reflect the operating states of a car either, as

required by feature c), is rejected. With the synchronous motor driving and thus producing the motion of the elevator car, the electrical signals controlling the motion of the synchronous motor will be directly related to this motion. Even if further drive components (such as a gearbox or a clutch arrangement) separated the motor from the car, the operating states of the car would be directly related to the electrical signals of the synchronous motor.

2.2.5 In summary, therefore, D1 discloses a sensor (functional unit 7) detecting the operating states of a car (i.e. the speed of the elevator car) such that feature c) is known from D1.

2.2.6 The respondent's contention in respect of feature b) that D1 failed to disclose an arithmetic device as defined in claim 1, due to the safety apparatus 10 failing to receive signals from a plurality of sensors, is not accepted. From Fig. 1 of D1, connections between both the acceleration sensor and the functional group 7 (via the frequency converter 11; lower arrow head of the double arrow from the frequency converter 11 to the safety apparatus 10) with the safety apparatus 10 is depicted and this is indeed described in col. 6, lines 11 to 16. A further corroboration of this interpretation is given in lines 21 to 30 where a comparison of the signals from the 'motion information 7' and the acceleration sensor is made which results in an emergency stop being executed if a deviation more than a set limit value between the signals is detected. The 'safety apparatus 10' is evidently that which is responsible for initiating the emergency stop, as the safety nature of an 'emergency' also makes clear. Still further, lines 30 to 32 of col. 6 continue to describe the emergency stop condition initiating an interruption

of the power supply to the synchronous motor 3, this interruption signal being depicted by the arrow from the safety apparatus 10 to the frequency converter 11 in Fig. 1. From all of the above, it follows that the only technically reasonable interpretation of the safety apparatus 10 of D1 is that it receives signals from both the acceleration sensor 4 and the sensor 7, detecting the speed of the car.

2.2.7 The respondent's further contention that the safety apparatus 10 was simply a 'black box' with regard to its functionality, and thus could not anticipate the claimed arithmetic device, is also not accepted. As already found above in point 2.2.6, the safety apparatus has a clearly defined function of comparing the two speed related signals (from the acceleration sensor and from the functional unit 7). The safety apparatus is however also responsible for instigating an emergency stop by controlling the machinery brake 13 and the wedge brake 14 (see col. 6, lines 21 to 30). Consequently, the safety apparatus has clearly defined functions which it carries out dependent upon the signal inputs to it, thus also justifying its anticipation of the claimed arithmetic device.

2.3 Regarding the respondent's argument that the safety apparatus 10 did not include a comparing unit, this is also not accepted. In view of the reasons given in point 2.2.6 above, the safety apparatus 10 receives two signals representative of speed. Col. 6, lines 11 to 16 describe how the two signals are compared, such a comparison indicating the presence in the safety apparatus of a unit performing a comparison. This comparison is used to instigate an emergency stop when a set limit value is exceeded, as described in lines 21 to 30 of col. 6. The respondent was indeed unable to

point to any contra-indication of where this comparing unit should be, apart from in safety apparatus 10, but argued that it was simply not stated in column 6, lines 11 to 16 where this comparison occurred, so that it could possibly occur in the functional unit 7. However, the fact that the acceleration signal information is sent to the safety apparatus 10 (see column 6, lines 11 to 16) and, in the same sentence, immediately following this, the motion is stated to be compared to the motion information (i.e. the information available from functional unit 7), and when having regard to the arrows drawn for the information/signal flows as well as for initiating an emergency stop, the sentence in question can only be understood in context to mean that the comparing occurs in the safety apparatus 10. Hence, the only logical conclusion is that the safety apparatus 10 does include the 'comparing unit'.

2.3.1 As regards the respondent's argument that feature g) required a comparison of two calculated car speeds, contrary to the respondent's view this indeed also occurs in D1. Col. 6, lines 16 to 21 indicates that the motion information determined from the synchronous motor and the signal from the acceleration sensor 'must be converted and scaled' prior to a comparison taking place. Such a converted and scaled signal comparison must thus result in a comparison of calculated car speeds being carried out.

2.3.2 The respondent's further argument that a car speed was typically measured in metres per second (m/s) and a mere signal could thus not be considered to be a speed is not accepted. Firstly in this regard it is noted that the calculated speeds defined in claim 1 of the patent in suit for comparison do not indicate these to be in m/s, rather these are merely signals

representative of car speeds which are compared. The motion information comparison in D1 (see col. 6, line 21) is thus no different to the signal comparison in the patent. Secondly, the speed being represented by a signal is not different to how the speed is represented according to the patent which, in paragraph [0048], discloses the acceleration signal being integrated in order to determine the car speed V2 which will thus be a signal representative of car speed, rather than necessarily car speed in m/s as suggested by the respondent.

2.3.3 Feature g) detailing the operation of the comparing unit is thus known from D1.

2.4 As regards feature f), contrary to the opinion of the appellant, a computing unit that calculates car speeds is not unambiguously present in the safety apparatus 10 of D1. It is not questioned whether such calculation of car speeds must occur in some physical location between the acceleration sensor 4 and the safety apparatus 10 and also between the sensor (functional unit) 7 and the safety apparatus 10, but rather that this calculation could be performed either in the sensors themselves (as the appellant itself had even stated was a possibility), or in the safety apparatus. Consequently D1 fails to unambiguously disclose that the claimed computing unit, which outputs the calculated car speeds, is actually present in the safety apparatus 10 itself.

2.4.1 The appellant's further argument, that the claimed arithmetic device could be anticipated by the safety apparatus 10 of D1 in combination with that part of each of the sensors which computes the car speed, is not seen as technically reasonable. This would require

the skilled person to interpret the extent of the arithmetic device in D1 as consisting of, in addition to the safety apparatus 10, an artificially divided-off portion of each sensor 4 and 7 so as to include the speed computing unit. Although it can be accepted that a combination of functional units might indeed make up a device (i.e. claim 1 is not limited to an arithmetic device being a single module or unit), this artificial separation of a portion of e.g. the sensor 4 (it being unknown how sensor 4 is actually constructed), is not a technically reasonable interpretation of how the skilled person would understand an arithmetic device, when sensors are also present supplying information to it.

2.4.2 Consequently, feature f) is not known from D1.

2.5 It thus follows that solely features f) and h) differentiate claim 1 from D1, i.e.

f) the arithmetic device includes a computing unit that receives signals from the acceleration sensor and a speed detection unit different from the acceleration sensor to respectively calculate car speeds; and
h) the arithmetic device includes a correction unit that resets the car speed calculated in accordance with the signal from the acceleration sensor at every time of stopping the car.

2.6 Based on these differentiating features, partial objective technical problems to be solved are seen to be appropriate, namely:
1. To provide a suitable location for the speed calculation to be carried out; and
2. How to improve the reliability of the elevator.

2.6.1 The respondent's suggestion that a single objective technical problem was appropriate, due to a synergistic effect existing in the function of the computing unit and the correction unit, is not persuasive. As to the computing unit being located in the arithmetic device, this is completely unrelated to the resetting of the car speed calculated from the acceleration sensor when the car stops. Even if both the computing unit and the correction unit are located 'in' the arithmetic device (noting however that claim 1 merely states that the arithmetic device 'includes' these), this does not prove a synergistic effect being demonstrated by the differentiating features of claim 1 over D1. Individual partial objective technical problems are thus appropriate for the skilled person, when considering inventive step using the problem-solution approach.

2.6.2 As to the objective technical problem suggested by the respondent and relating to increased safety of the elevator system, this is not objective. Even though paragraph [0009] of the patent suggests the disclosed invention to provide a safer elevator and paragraph [0048] indicates how this might be achieved, claim 1 fails to include a feature resulting in an increased safety of the elevator. Simply comparing speed signals from two separate sensors in order to generate an abnormality determination signal and thereby reset an offset car speed to zero does not, in itself, result in increased safety of the elevator. This would require a further action to be instigated, such as application of an emergency brake or interruption of the drive motor. Absent such a feature in claim 1, an increased safety is not demonstrated in claim 1 and so cannot appear in an objective technical problem. Instead, greater reliability is the result of the differing feature. Although the respondent had further pointed to

paragraph [0045] and particularly column 9, lines 36 to 38 of the patent in suit to support its viewpoint, this does not alter the Board's conclusion. In particular, paragraph [0045] relates to a preferred embodiment and criteria which relate to further actions of stopping the car (see e.g. paragraph [0044]) which are not part of claim 1.

2.7 In wishing to solve the partial objective technical problem of 'how to improve the reliability of the elevator', the skilled person would refer to D2 which discloses a method for determining the position of an elevator car, in which the signal from an acceleration sensor in the elevator car is integrated to obtain a voltage representing the speed of the car before being further converted into a pulse train proportional to the car speed allowing pulses over time to be counted and the car position to be calculated (see col. 1, lines 7 to 10; col. 2, lines 19 to 24 and lines 27 to 37). Even though D2 is primarily directed to determining the position of the elevator car, it achieves this by first using an integrated value of an acceleration sensor 5 to generate a speed signal. Col. 3, lines 2 to 6 includes a description of reducing errors in the elevator control by resetting this speed information when the elevator stops through a brake signal J resetting both the integrator 8 (which produces the speed voltage signal) and the A/D converter (which produces the pulse train). This therefore improves the reliability of the elevator through the movement of the elevator car ultimately being controlled. Thus, when wishing to solve the problem of improving the reliability of the elevator, the skilled person would see resetting the speed signal when the elevator stops, as disclosed in D2, as providing a teaching as to how to modify D1 and arrive

at feature h) in claim 1 without exercising an inventive step.

2.7.1 The respondent's argument that the opposition division had correctly seen D2 as not addressing any safety related improvements and thus could not solve the problem posed starting from D1 is not accepted. The opposition division had erroneously seen the objective technical problem when starting from D1 as being to provide a safer elevator (see point 2.2.1.7.3 of its decision) yet, as indicated in point 2.6.2 above, lacking any features in claim 1 to solve such a problem, the provision of a safer elevator system cannot be seen as an objective technical problem when starting from D1.

2.7.2 As regards the respondent's argument that the skilled person would not look in D2 for correcting car speed errors, since this solely corrected counting errors, this is not accepted. Col. 3, lines 2 to 4 of D2 clearly discloses the speed information being reset which is precisely that which is being sought by the skilled person in order to improve the reliability of the elevator in the context of stopping accurately in the desired location. Figure 2 of D2 also clearly indicates that the resetting via the brake signal J not only resets the A/D converter 6 and thus the pulse train it produces, but also resets the output of the integrator 11 i.e. its speed voltage signal.

2.7.3 The respondent's argument that D1 and D2 were incompatible due to D2 disclosing a correction in an analogue system whereas D1 was a digital arrangement, is also not accepted. The acceleration signal entering the integrator 11 indeed exits as an analogue signal representing speed but, after passing through the A/D

converter 6, the output will be a digital signal representing speed. There was thus no incompatibility to be seen between D1 and D2. Moreover, the skilled person was aware of analogue, digital and analogue/ digital circuits from their common general knowledge such that, even if an analogue signal and a digital signal were to require combining through the modification of D1 by way of D2, this would not hinder the skilled person from doing so. Consequently, this argument of the respondent does not hinder the adoption of the speed signal resetting from D2 into D1.

2.7.4 The respondent's further allegation that, even if the teaching of D2 were applied to D1, this would not result in a speed error being zeroed since D2 addressed the accumulation of pulse counting errors related to floor selection i.e. a positional correction rather than a speed correction, does not change the Board's view. It is not denied that D2 discusses the correction of accumulated pulse counting errors associated with floor selection (see the sentences bridging cols. 1 and 2 or cols. 2 and 3 of D2). However, as indicated in point 2.7.2 above, D2 unambiguously also resets the speed information when the elevator has stopped, which is the teaching that the skilled person would adopt into D1 in the light of the posed objective problem.

2.7.5 The respondent's argument that D2 failed to calculate the speed of the elevator car, rather solely a voltage representing the speed of the elevator was output by the integrator 8, is also not accepted. As indicated in its preliminary opinion, the Board sees a 'voltage representing the speed of the elevator' as, in all but name, the speed itself. The circuits manipulating the signals would be identical and would carry out the same process to reset a voltage representing a speed as it

would to reset a speed itself. As far as the circuit is concerned, the speed itself would also just be a voltage. The respondent's argument thus would not dissuade the skilled person from modifying D1 with the speed resetting teaching of D2.

2.7.6 The respondent also contended that the safety apparatus 10 of D1 had two brake outputs which would require additional modification for the incorporation of the speed resetting from D2. This would also not stop the skilled person from making the required modification without the exercise of an inventive step. The safety apparatus 10 of D1 already has the two brake outputs which are used to apply an emergency brake when the two speed signals produced by the sensors of D1 deviate by more than a set limit value 5. The incorporation of the speed resetting functionality from D2 into the safety apparatus 10 of D1 would thus not be significantly complicated, if at all, by the existence of two brake connections, nor was it argued by the respondent why this would be so.

2.7.7 The modification of D1 to incorporate feature h) is thus obvious to the skilled person in the light of the teaching of D2.

2.8 As regards the partial objective technical problem based on differentiating feature f) i.e. 'providing a suitable location for the speed calculation to be carried out', this is obvious to the skilled person in the light of D1 alone. As found in point 2.4 above, a computing unit that calculates car speeds must be present somewhere either in the respective sensors 4 and 7 or in the safety apparatus 10 of D1 so that the signals generated by the sensors can be compared in terms of speed (see col. 6, lines 16 to 21 of D1).

Choosing between two equally technically appropriate locations for the computing unit to be positioned cannot be credited with requiring the skilled person to exercise an inventive step.

2.8.1 The respondent's argument that the appellant was arguing contrarily on this point to how it had previously argued when discussing which features were known from D1 is not relevant. In point 2.4.1, the appellant is indicated to have argued that the claimed arithmetic device could be anticipated by the safety apparatus 10 of D1 in combination with that part of each of the sensors which computes the car speed i.e. that the computing unit could be located partly in the respective sensors. However, with the Board having found against the appellant on that point at oral proceedings, the Board does not see it to be unreasonable for it to have accepted the Board's findings and argue on this altered basis in subsequent discussions. This is all it was now doing, in suggesting that placing the computing unit in the safety apparatus 10 would be obvious for the skilled person. Indeed, the Board had not understood the appellant to have argued that the speeds were calculated in the sensors; the appellant had merely argued that they could be calculated there, and that, if that were the case, the arithmetic device should then be considered to extend to include parts of the sensors as well.

2.8.2 It thus follows that the modification of D1 to position the computing unit in the safety apparatus 10 is obvious for the skilled person in the light of their common general knowledge.

2.9 In summary, therefore, starting from D1 and wishing to solve the posed partial objective technical problems, the skilled person would arrive at the claimed subject-matter in consideration of the technical teaching of D2 and their common general knowledge without exercising an inventive activity.

2.10 The ground for opposition under Article 100(a) together Article 56 EPC consequently prejudices maintenance of the patent as granted. The main request is therefore not allowable.

3. *Auxiliary request 1*

Admittance

3.1 With this request having been filed with letter of 6 September 2021, it may be admitted only at the discretion of the Board, which discretion shall be exercised in view of *inter alia* the amendment resolving issues which were admissibly raised by another party in the appeal proceedings or which were raised by the Board (see Article 13(1) RPBA 2020).

3.2 In its preliminary opinion, the Board raised an objection under Article 123(2) EPC to the subject-matter of claim 1 of the (then) auxiliary request 1, the appellant having argued that the first auxiliary request contained an intermediate generalisation (page 5 of its letter of 21 August 2018). Although the Board considered that the specific features referred to by the appellant would not result in an intermediate generalisation, the Board nevertheless considered that the application as filed failed to disclose an arithmetic device which merely 'included' a first arithmetic device and second arithmetic device, rather

it simply disclosed a first and second arithmetic device (see item 3.1 of the Board's communication).

3.3 In claim 1 of the present auxiliary request 1, amended in reaction to the above objection, the elevator is defined as 'comprising a first and a second arithmetic device'. By introducing the word 'comprising' in the context of the first and second arithmetic devices, this is not limited to simply a first and second arithmetic device in the elevator, despite this being what the description as filed consistently discloses. Paragraph [0059] of the application as filed, referred to by the respondent as the alleged basis for the amendment, in fact further limits the first and second arithmetic devices 32, 37 to being duplicated arithmetic devices.

3.4 The respondent's argument that the application as filed consistently disclosed two arithmetic devices such that this was the intended, and supported, reading of the present claim 1 is not accepted. In this regard it is noted that the claims define the scope of an invention and the description simply supports the understanding of the claims. In the present case, the use of the term 'comprising' in claim 1 includes the possibility of more than simply two arithmetic devices being present in the elevator, which lacks a direct and unambiguous basis in the application as filed, this understanding of the claim not being changed by the specific disclosure of two arithmetic devices 32, 37 in paragraph [0059] of the description.

3.5 The respondent's further argument that the description could also reasonably be understood to describe multiple pairs of duplicated devices such that, with no clear limitation to just two, the claimed subject-

matter was originally disclosed, is not persuasive. In support of its argument, the respondent referred to paragraphs [0028], [0036] and [0059] of the application as filed. In each of these paragraphs solely 'arithmetic devices 32 and 37' are described with no indication of this intending to include the possibility of multiple pairs of duplicated arithmetic devices. The Board thus sees nothing to support the respondent's view that the description unambiguously discloses more than two arithmetic devices.

3.6 The respondent's argument that claim 1 as filed defined the elevator as 'comprising an arithmetic device' which thus allowed any number of arithmetic devices being included in the elevator is not persuasive in view of the present objection. The basis for amendment of present claim 1 is the description of the application as filed, which consistently discloses just two arithmetic devices rather than any number greater than one arithmetic device. The fact that claim 1 as filed defined the elevator as comprising an arithmetic device is thus not decisive for the allowability of the amendment to the present claim 1.

3.7 Consequently, the subject-matter of claim 1 extends beyond the content of the application as filed, contrary to the requirement of Article 123(2) EPC, such that auxiliary request 1 is *prima facie* not allowable. At least for this reason, the Board therefore exercised its discretion under Article 13(1) RPBA 2020 not to admit auxiliary request 1 into the proceedings.

4. *Auxiliary requests 2 to 6*

Admittance

4.1 These requests were also filed with letter of 6 September 2021, such that their admittance was also at the discretion of the Board under Article 13(1) RPBA 2020.

4.2 Claim 1 of each of these requests also includes the wording 'comprising a first and a second arithmetic device', found to extend the subject-matter of claim 1 of auxiliary request 1 beyond the content of the application as filed.

4.3 In support of these requests, the respondent offered no further arguments beyond those presented with respect to auxiliary request 1. At least for this reason, the Board thus finds that the subject-matter of claim 1 of each of auxiliary requests 2 to 6 *prima facie* also fails to meet the requirement of Article 123(2) EPC.

4.4 The Board therefore exercised its discretion under Article 13(1) RPBA 2020 not to admit auxiliary requests 2 to 6 into the proceedings.

5. *Auxiliary request* 7

5.1 After the Board had announced its discretionary decision regarding the foregoing requests, the respondent filed auxiliary request 7. Being filed after notification of the summons to oral proceedings, this amendment would not be taken into account unless there were exceptional circumstances, justified with cogent reasons, for it to be admitted (cf. Article 13(2) RPBA 2020).

5.2 As regards the existence of exceptional circumstances, the respondent's argument that it had only become clear through the discussion at oral proceedings what the

Board's objection regarding the first and second arithmetic devices entailed, is not seen as an exceptional circumstance. Point 3.1 of the Board's preliminary opinion stated '... it appears that the application as filed fails to disclose the claimed arithmetic device, i.e. one which 'includes' a first arithmetic device and second arithmetic device, rather simply a first and second arithmetic device are disclosed.' The objection cited here cannot be seen as ambiguous; solely a first and second arithmetic device are disclosed in the application as filed. The fact that the respondent, in its auxiliary requests 1 to 6 filed in reaction to the preliminary opinion, failed to limit the claimed elevator to just a first and second arithmetic device does not validate the suggestion that the objection was unclear. Rather, claim 1 of the respective auxiliary requests 1 to 6 simply failed to appropriately limit the subject-matter in order to overcome the objection.

5.3 The respondent's further argument in support of exceptional circumstances being present that auxiliary request 7 was the last chance for the respondent to defend its patent and this should not be hindered through the application of the revised Rules of Procedure of the Boards of Appeal, is not convincing either.

The Board notes firstly that the old Rules of Procedure would also have hindered such a last-minute filing. Secondly, the Revised Rules of Procedure entered into force on 1 January 2020 and their applicability in the present case constitutes no surprise or any other particular or indeed exceptional circumstance. This cannot therefore influence the Board's decision under Article 13(2) RPBA 2020 positively for the respondent.

Finally, the revised Rules of Procedure as in force since 1 January 2020 provided provision for the amendment of a party's appeal case under Article 13(1) RPBA 2020 within quite a strict framework reflecting established case law in the matter. The amendment at the present stage (i.e. the request being filed after issuance of the summons to oral proceedings) falls under the most restrictive, third level of the convergent approach for amendment of an appeal case under Article 13(2) RPBA 2020. This restricted possibility of amendment had been duly flagged for the parties in the Board's communication in preparation for the oral proceedings, so that its application was foreseeable.

5.4 In the absence of any exceptional circumstances justifying the amendment at this late stage of the proceedings, the Board exercised its discretion not to take account of auxiliary request 7 (Article 13(2) RPBA 2020).

5.5 For the sake of completeness, it is noted that, even if auxiliary request 7 had been taken into account due to the existence of (some unknown) exceptional circumstances, the Board would still have to exercise its discretion under Article 13(1) RPBA 2020. This is not simply an option; Article 25(2) stipulates that the new RPBA applies to all pending appeal cases apart from specific exceptions given in Article 25(2) and (3). Thus, Article 13(1) RPBA 2020 also applies, since the amendment by way of auxiliary request 7 is an amendment to the party's appeal case (see the title of Article 13 RPBA 2020).

Contrary to the respondent's contention, claim 1 of auxiliary request 7 had not always been a part of the defended subject-matter. Even though page 21 of the respondent's reply to the grounds of appeal indeed presented an argument as to why the subject-matter of dependent claim 5 was not obvious, a request containing an independent claim directed to the subject-matter of the present claim 1 (i.e. a combination of claims 1 and 5 as filed) was never filed, such that there was never a need for it to have been considered for compliance with the EPC previously. Auxiliary request 7 is thus an amendment to the respondent's appeal case. Auxiliary request 7 was furthermore not even convergent with the foregoing requests, diverging in a completely new direction for the appellant and the Board to have to consider and thus detrimental to procedural economy. The request notably comprised completely new subject-matter, such that it could not reasonably have been dealt with by the appellant without adjournment of the proceedings.

5.6 It follows that also under Article 13(1) RPBA 2020 auxiliary request 7 would not have been admitted into the proceedings. As to auxiliary request 7 being the last chance for the respondent to defend its patent and this being hindered through the application of the revised Rules of Procedure of the Boards of Appeal, this does not alter the Board's decision under Article 13(2) RPBA 2020, as it does not relate to an exceptional circumstance.

6. In the absence of an allowable request, the patent must be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The European patent is revoked.

The Registrar: The Chairman:

D. Grundner M. Harrison

Decision electronically authenticated

CLAIMS – AUX1

1. An elevator comprising ~~an~~ a first and a second arithmetic device (32, 37) that receive~~s~~ signals (28, 29, 30, 31) from a plurality of sensors for detecting operating states of a car (1) to determine an abnormality and control the car by an abnormality determination signal (33, 36, 38, 41), wherein

an acceleration sensor (24) is provided on the car, and

the first arithmetic device (32) and the second arithmetic device (37) which both include~~s~~ a computing unit (43) that receives signals (28, 31) from the acceleration sensor and a speed detection unit (21) different from the acceleration sensor to respectively calculate car speeds (V1, V2) and a comparing unit (46) that compares two calculated car speeds (V1, V2) in the arithmetic device to output the abnormality determination signal in accordance with a compared result,

characterized in that

the first and second~~the~~ arithmetic device~~s~~ (32, 37) include~~s~~ a correction unit (60) that resets the car speed (V2) calculated in accordance with the signal (31) from the acceleration sensor at every time of stopping the car.

CLAIMS – AUX 2

1. An elevator comprising a~~an~~ first and a second arithmetic device (32, 37) that receive~~s~~ signals (28, 29, 30, 31) from a plurality of sensors for detecting operating states of a car (1) to determine an abnormality and control the car by an abnormality determination signal (33, 36, 38, 41), wherein

an acceleration sensor (24) is provided on the car, and

the first arithmetic device (32) and the second arithmetic device (37) which both include~~s~~ a computing unit (43) that receives signals (28, 31) from the acceleration sensor and a speed detection unit (21), which is an encoder, different from the acceleration sensor to respectively calculate car speeds (V1, V2) and a comparing unit (46) that compares two calculated car speeds (V1, V2) in the arithmetic device to output the abnormality determination signal in accordance with a compared result,

characterized in that

the first and the second arithmetic devices (32, 37) output the abnormality determination signal for making the car stop when a difference of the two calculated car speeds becomes larger than a predetermined value in accordance with the compared result in the comparing unit, and

the first and second~~the~~ arithmetic device~~s~~ (32, 37) include~~s~~ a correction unit (60) that resets the car speed (V2) calculated in accordance with the signal (31) from the acceleration sensor at every time of stopping the car.

CLAIMS – AUX3

1. An elevator comprising ~~an~~ a first and a second arithmetic device~~s~~ (32, 37) that receive~~s~~ signals (28, 29, 30, 31) from a plurality of sensors for detecting operating states of a car (1) to determine an abnormality and control the car by an abnormality determination signal (33, 36, 38, 41), wherein

an acceleration sensor (24) is provided on the car, and

the first arithmetic device (32) and the second arithmetic device (37) which both include~~s~~ a computing unit (43) that receives signals (28, 31) from the acceleration sensor and a speed detection unit (21), which is an encoder, different from the acceleration sensor to respectively calculate car speeds (V1, V2) and a comparing unit (46) that compares two calculated car speeds (V1, V2) in the arithmetic device to output the abnormality determination signal in accordance with a compared result,

characterized in that

the first and the arithmetic devices (32, 37) output the abnormality determination signal for making the car stop when a difference of the two calculated car speeds becomes larger than a predetermined value in accordance with the compared result in the comparing unit, and

the first and second~~the~~ arithmetic device~~s~~ (32, 37) include~~s~~ a correction unit (60) that resets the car speed (V2) calculated in accordance with the signal (31) from the acceleration sensor at every time of stopping the car, and wherein

an offset measuring unit (63) is provided in the correction unit (60), for measuring an offset value ($\alpha 0$) of the acceleration sensor (24) at every time of stopping the car, and

the computing unit (43) includes a speed calculation unit (52) that calculates the car speed (V2) regarding the acceleration sensor by using the offset value output from the offset measuring unit.

CLAIMS – AUX4

1. An elevator comprising a first and a second arithmetic device (32, 37) that receives signals (28, 29, 30, 31) from a plurality of sensors for detecting operating states of a car (1) to determine an abnormality and control the car by an abnormality determination signal (33, 36, 38, 41), wherein

an acceleration sensor (24) is provided on the car, and

the first arithmetic device (32) and the second arithmetic device (37) which both includes a computing unit (43) that receives signals (28, 31) from the acceleration sensor and a speed detection unit (21), which is an encoder, different from the acceleration sensor to respectively calculate car speeds (V1, V2) and a comparing unit (46) that compares two calculated car speeds (V1, V2) in the arithmetic device to output the abnormality determination signal in accordance with a compared result,

characterized in that

the first and the arithmetic devices (32, 37) output the abnormality determination signal for making the car stop when a difference of the two calculated car speeds becomes larger than a predetermined value in accordance with the compared result in the comparing unit, and

the first and second arithmetic devices (32, 37) includes a correction unit (60) that resets the car speed (V2) calculated in accordance with the signal (31) from the acceleration sensor at every time of stopping the car, and wherein

an offset measuring unit (63) is provided in the correction unit (60), for measuring an offset value ($\alpha 0$) of the acceleration sensor (24) at every time of stopping the car, and

the computing unit (43) includes a speed calculation unit (52) that calculates the car speed (V2) regarding the acceleration sensor by using the offset value output from the offset measuring unit, and wherein

a third speed detection unit (70) is further provided in the elevator, different in the calculation for the two car speeds (V1, V2), and

the computing unit (43) includes a speed calculation unit (52) that corrects the car speed calculated in accordance with the signal (31) from the acceleration sensor on an operation of the car by using a car speed (V3) calculated in accordance with a signal from the third speed detection unit.

CLAIMS – AUX5

1. An elevator comprising ~~an~~ a first and a second arithmetic device (32, 37) that receive~~s~~ signals (28, 29, 30, 31) from a plurality of sensors for detecting operating states of a car (1) to determine an abnormality and control the car by an abnormality determination signal (33, 36, 38, 41), wherein

an acceleration sensor (24) is provided on the car, and

the first arithmetic device (32) and the second arithmetic device (37) which both include~~s~~ a computing unit (43) that receives signals (28, 31) from the acceleration sensor and a speed detection unit (21), which is an encoder, different from the acceleration sensor to respectively calculate car speeds (V1, V2) and a comparing unit (46) that compares two calculated car speeds (V1, V2) in the arithmetic device to output the abnormality determination signal in accordance with a compared result,

characterized in that

the first and the arithmetic devices (32, 37) output the abnormality determination signal for making the car stop when a difference of the two calculated car speeds becomes larger than a predetermined value in accordance with the compared result in the comparing unit, and

the first and second~~the~~ arithmetic device~~s~~ (32, 37) include~~s~~ a correction unit (60) that resets the car speed (V2) calculated in accordance with the signal (31) from the acceleration sensor at every time of stopping the car, and wherein

an offset measuring unit (63) is provided in the correction unit (60), for measuring an offset value (α0) of the acceleration sensor (24) at every time of stopping the car, and

the computing unit (43) includes a speed calculation unit (52) that calculates the car speed (V2) regarding the acceleration sensor by using the offset value output from the offset measuring unit, and wherein

a third speed detection unit (70) is further provided in the elevator, different in the calculation for the two car speeds (V1, V2), and

the computing unit (43) includes a speed calculation unit (52) that corrects the car speed calculated in accordance with the signal (31) from the acceleration sensor on an operation of the car by using a car speed (V3) calculated in accordance with a signal from the third speed detection unit (70), and

the third speed detection unit (70) is another encoder installed on a side of primary rope (10) of the elevator and, a rapid speed variation of the car speed (V3), calculated from the other encoder on the side of primary rope (10), is monitored to detect it as an occurrence of a slip (66) when detecting the rapid speed variation at a time t3 and the correction for the period during which the slip (66) occurs is not carried out.

CLAIMS- AUX 6

1. An elevator comprising ~~an~~ a first and a second arithmetic device (32, 37) that receive~~s~~ signals (28, 29, 30, 31) from a plurality of sensors for detecting operating states of a car (1) to determine an abnormality and control the car by an abnormality determination signal (33, 36, 38, 41), wherein

an acceleration sensor (24) is provided on the car, ~~and~~

the first arithmetic device (32) and the second arithmetic device (37) which both include~~s~~ a computing unit (43) that receives signals (28, 31) from the acceleration sensor and a speed detection unit (21), which is an encoder (21), different from the acceleration sensor to respectively calculate car speeds (V1, V2) and a comparing unit (46) that compares two calculated car speeds (V1, V2) in the arithmetic device to output the abnormality determination signal in accordance with a compared result, and

a controller (25),

characterized in that

the first and second arithmetic devices (32, 37) output the abnormality determination signal for making the car stop when a difference of the two calculated car speeds becomes larger than a predetermined value in accordance with the compared result in the comparing unit, and

the first and second~~the~~ arithmetic device~~s~~ (32, 37) include~~s~~ a correction unit (60) that resets the car speed (V2) calculated in accordance with the signal (31) from the acceleration sensor at every time of stopping the car, wherein

an output from the first arithmetic device (32) contains an abnormality determination signal (33) supplied to an AND circuit (42) of a safety controller (26) of the elevator, a switching signal (34) to a contactor in a power cutting-off circuit (6) of the elevator, a switching signal (35) to a brake driving circuit (4) of the elevator supplied to the power to a braking device (3) of the elevator and an emergency stop activating signal (36) to a gripping device (14) of the elevator; and an output from the second arithmetic device (37) contains a stop request signal (38) supplied to the AND circuit (42), a switching signal (39) to the contractor in the power cutting-off circuit (6), a switching signal (40) to the brake driving circuit (4) and an emergency stop activating signal (41) to the gripping device (14), wherein the eight output signals from the arithmetic devices (32, 37) are a stop output for activating a stopping system of the car (1), wherein

the abnormality determination signals (33, 38) are used for controlling and stopping the car (1) by the controller (25), wherein a signal level High means that the stop request is absent, and and a signal level Low means that the stop request is present, and these signals are output to the controller (25) via the AND circuit (42), and the controller (25) is configured to control an inverter (5) of the elevator by an inverter control signal (27) to stop the car (1) when either one of abnormality determination signals (33, 38) becomes Low.

AUX 7

- 1 -

CLAIMS – AUX7

1. An elevator comprising an arithmetic device (32, 37) that receives signals (28, 29, 30, 31) from a plurality of sensors for detecting operating states of a car (1) to determine an abnormality and control the car by an abnormality determination signal (33, 36, 38, 41), wherein

an acceleration sensor (24) is provided on the car, and

includes a computing unit (43) that receives signals (28, 31) from the acceleration sensor and a speed detection unit (21) different from the acceleration sensor to respectively calculate car speeds (V1, V2) and a comparing unit (46) that compares two calculated car speeds (V1, V2) in the arithmetic device to output the abnormality determination signal in accordance with a compared result,

characterized in that

the arithmetic device (32, 37) includes a correction unit (60) that resets the car speed (V2) calculated in accordance with the signal (31) from the acceleration sensor at every time of stopping the car, and

a third speed detection unit (70) is further provided in the elevator, different in the calculation for the two car speeds (V1, V2), and

the computing unit (43) includes a speed calculation unit (52) that corrects the car speed calculated in accordance with the signal (31) from the acceleration sensor on an operation of the car by using a car speed (V3) calculated in accordance with a signal from the third speed detection unit (70).