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(54) BRAKING DEVICE FOR AN ESCALATOR SYSTEM

(57) The invention relates to a braking device (100) for an escalator system (300), comprising: a first breaking element (4) configured to be in connection with a drive shaft (48), a second breaking element (5) configured to engage with the first breaking element (4) and a first actuating system (6) for moving the second breaking element (5) between a disengaged state and an engaged state, wherein the first actuating system (6) comprises: at least one sensor (15.1, 15.2) for detecting the rotational speed of the drive shaft (48), a first actuator (7) for actuating the second breaking element (5) and a control unit which is configured to activate the first actuator (7) in case of a certain rotational speed of the drive shaft (48) being detected by the at least one sensor (15.1, 15.2).

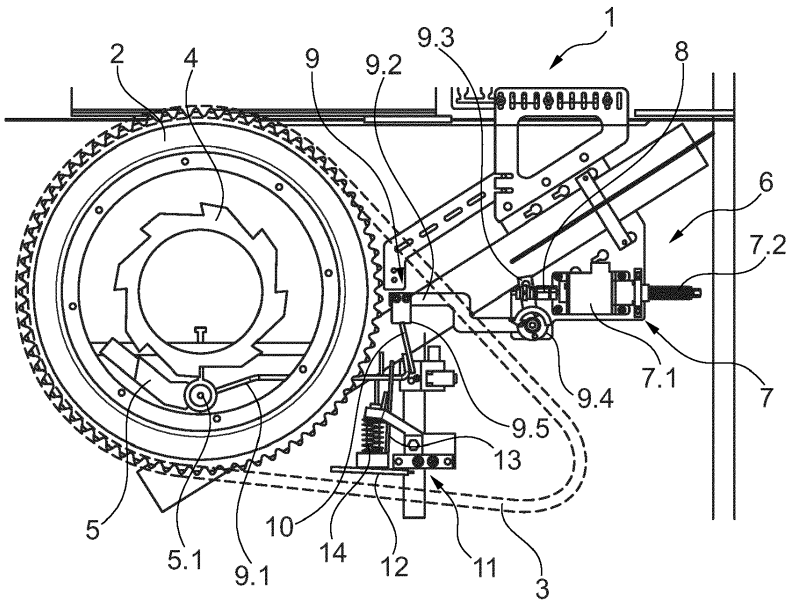

Fig. 1

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Description

Field of the invention

[0001] The present disclosure generally relates to escalator systems having a number of escalator steps being moveable along an escalator path. More particularly, the present invention is directed to a breaking device for breaking the escalator steps, in particular in an emergency situation. The invention is further directed to the escalator drive and the entire escalator system.

Background of the invention

[0002] Escalators for transporting people and goods are an integral part of modern residential and commercial buildings.

[0003] A typical escalator system includes a path which is usually formed by a frame and along which escalator steps can move. The steps may therefore be connected to travel rails or at least to each other and be deflected by two shafts at the ends of the path. At least one of the shafts may be a drive shaft or may be connected to a drive shaft. An escalator may have a path running horizontal and vertical or may also run only horizontal to form a moving walk, which may be included within the term escalator.

[0004] In escalator systems, two types of breaking devices are common located at the escalator drive. On the one hand, a breaking device for stopping or breaking the escalator system during normal operation, e.g. when the escalator is stopped for changing operation direction. On the other hand, auxiliary breaking devices are common, which hold fast the escalator steps in case of an emergency, e.g. breakage of a drive chain connecting the drive unit to a chain rim on the drive shaft, which would lead to an uncontrolled acceleration of the steps due to gravity.

[0005] It is further known that auxiliary breaking devices comprise means being connected to the drive shaft and means to engage with these means. For example, a ratchet wheel is connected to the drive shaft and a pawl is configured to engage with the ratchet wheel, holding fast the escalator steps in one rotational direction associated to gravity direction while allowing rotation in the other rotational direction.

[0006] Disadvantageously, with known auxiliary breaking devices, actuation is usually generated mechanically due to a certain type of failure, e.g. upon breakage of the drive chain. This kind of actuation, however, does not lead to actuation of the auxiliary breaking device due to different types of failure. E.g. when a connection between a drive device and a gearbox fails, this may lead to free-wheeling of the drive shaft although the drive chain is intact and therefore does not actuate the auxiliary breaking device.

Description of the invention

[0007] Thus, a need exists for an auxiliary breaking device that avoids above said disadvantages. It is therefore an object of the invention to provide a breaking device which is safely actuated in case of a failure within the escalator system.

[0008] This object is solved by the features of the independent claims. Advantageous embodiments are indicated in the dependent claims. Where technically possible, the features of the dependent claims may be combined as desired with the features of the independent claims and/or other dependent claims.

[0009] In particular, the object is solved by a braking device for escalator steps of an escalator system, the braking device comprising a first breaking element configured to be in connection with a drive shaft of the escalator system, a second breaking element configured to engage with the first breaking element for breaking the escalator steps and a first actuating system for moving the second breaking element between a disengaged state and an engaged state, wherein the first actuating system comprises: at least one sensor for detecting the rotational speed of the drive shaft of the escalator system, a first actuator for actuating the second breaking element and a control unit which is configured to activate the first actuator in case of a certain rotational speed of the drive shaft being detected by the at least one sensor.

[0010] As far as elements are designated with the aid of numbering, for example "first component", "second component" and "third component", this numbering is provided purely for differentiation in the designation and does not represent any dependence of the elements on one another or a compulsory sequence of the elements. This means in particular that, for example, a device or a method does not have to have a "first element" in order to have a "second element". The device can also comprise a "first element" and a "third element" without necessarily having a "second element". There may also be several units of an element of a single numbering, for example several "first elements".

[0011] The first breaking element is preferably fitted to the drive shaft in a torsionally rigid manner, e.g. due to form fit or frictional contact. The first breaking element may alternatively be formed as an integral part of the drive shaft, e.g. as a shoulder of the drive shaft. The second breaking element is preferably mounted next to the first breaking element, e.g. on a part of a housing or another stationary element of the escalator system and is moveable between a disengaged state and an engaged state, e.g. by being pivotably or linearly displaceable. Thus, in the engaged state, the first breaking element is hold fast to the stationary element of the escalator system via the second breaking element. Preferably, in the engaged state, a form fit is provided between the two breaking elements. When the first actuator is activated, it moves the second breaking element from the disengaged state to the engaged state.

[0012] The at least one sensor may be a sensor, which detects the rotational speed of the drive shaft exclusively for the first actuating system, which is particularly advantageous in a case, where the breaking device is retrofitted to an existing escalator system. The sensor may however also be a sensor of the escalator system, wherein the rotational speed information is used for further operation of the escalator system as well, e.g. via an escalator control unit. Accordingly, the control unit of the first actuating system may be a control unit exclusively for controlling the first actuator or the control unit may be an escalator control unit, which also controls further operation of the escalator system.

[0013] The described breaking device has the advantage, that it is actuated upon free-wheeling of the drive shaft no matter what the reason for the free-wheeling is, that is no matter of the actual failure that occurs. While the breakage of a drive chain is safely detected by the breaking device, also a disconnection between a drive unit and a gearbox or other failures can safely be detected. In particular, any difference between the rotational speed of the drive shaft and a rotational speed of a drive unit indicating any kind of failure, e.g. a disconnection between the drive unit and the drive shaft, may be detected. As the breaking device is further designed electromechanically, the actuation system may be of a simple and failsafe design. Further, the breaking device can be provided to existing escalator system via retrofitting to increase the safety of the operation of the existing system, in particular, if the system is built to an outdated standard. The rotational speed, upon which the first actuator is activated, may considered in relation to the rotational speed of a drive unit. Thus the first actuator is then activated upon a certain difference between the rotational speed of the drive shaft and the rotational speed of the drive unit. Alternatively or additionally, the rotational speed, upon which the first actuator is activated, is an absolute rotational speed, above which the escalator is considered to be overspeeding. This speed may also be called critical velocity. E.g. the critical velocity is defined due to regulations of what speed of the escalator steps a passenger may tolerate.

[0014] In a preferred embodiment, the first actuator comprises at least one solenoid for actuating the second breaking element, when electric current is passed through the solenoid. This is a simple and yet safe implementation of an electromechanical actuator, which can be controlled in accordance to the detected rotational speed via the control unit.

[0015] Preferred, the first actuator comprises at least one spring to keep the solenoid in an unactuated state, when no electric current is passed through the solenoid. Advantageously, the solenoid is thus associated to the disengaged state of the second breaking element in a currentless state and is therefore particularly energy-saving. Further, a spring may advantageously be designed to provide a sufficient holding force, to keep the actuator unactuated when no electric current is passed through the solenoid, while the force of the spring may also easily be exceeded by the force provided by the solenoid. Thus, the first actuator is safely hold in the unactuated state and at the same time fast to activate. Accordingly, in the embodiment described above, preferably, the control unit is configured to provide electric current passing through the solenoid for activating the first actuator to provide a simple, safe and low-cost actuating system.

[0016] In a further preferred embodiment, the at least one sensor is an inductive sensor. Such inductive sensors can safely and reliable detect the speed of an element associated with the drive shaft and are of low cost. Preferably, at least two sensors, in particular two inductive sensors, are provided within the first actuating system for redundancy.

[0017] In a further preferred embodiment, in particular with the at least one sensor being an inductive sensor, the at least one sensor is configured to detect the movement of teeth of a chain rim attached to the drive shaft of the escalator system. With an inductive sensor, this may simply be done by locating the sensors close to the outer circumference of the chain rim, while being oriented in a radial direction of the chain rim. The teeth then pass along the sensor alternately with the interspaced between the teeth, wherein periodic signals are detected by the inductive sensor.

[0018] In another preferred embodiment, the first breaking element is a ratchet wheel configured to be mounted on the drive shaft, wherein the second breaking element is a pawl configured to engage with the ratchet wheel, in particular a pivotable pawl. A ratchet wheel is preferably formed as a ring having an inner surface, e.g. a circular or non-circular inner surface, for abutting with an outer surface of the drive shaft and an outer surface with ratchet teeth along the circumferential direction for interaction with the pawl. A pawl preferably is a moveable lever and most preferably spring-loaded, wherein the spring force is directed to an engaged state of the pawl at the ratchet wheel. The ratchet wheel teeth preferably have a first surface on one side being steep, which interacts with a first surface of the pawl and cannot pass the pawl, so that the ratchet wheel is locked in a corresponding first rotational direction. The ratchet wheel teeth preferably further have a less steep second surface which, when moved against the pawl, is able to displace the pawl against the spring-load and ultimately pass the pawl, so that the tension wheel is unlocked in a corresponding second rotational direction. Due to this arrangement, an escalator steps may be hold in the direction, gravity acts on it and/or on a passenger standing on the steps. The pawl is preferably configured to be attached to any stationary element around the drive shaft, e.g. a housing, rack or frame, against which it holds the ratchet wheel. According to the before said, the ratchet wheel in the engaged state of the pawl may be locked in a first rotational direction and unlocked in a second rotational direction.

[0019] In another preferred embodiment, the breaking

device comprises a second actuating system for moving the second breaking element between the disengaged state and the engaged state, wherein the second actuating system comprises: a second actuator for actuating the second breaking element, wherein the second actuator is configured to be mechanically activated by a drive chain of the escalator system upon breakage of the drive chain. Due to this mechanically actuated actuating system, which is associated to the drive chain with drive chain breakage being the most common type of failure, a further safety aspect is added to the escalator system, in particular being partly redundant to the first actuating system. As being actuated mechanically only, the second actuating system is in particular reliable also in case of a power breakdown.

[0020] In a preferred embodiment, the breaking device further comprises a lever system, wherein the first actuator and/or the second actuator are configured for actuating the second breaking element via the lever system. With a lever system, the first actuating system and/or the second actuating system may be placed remotely from the breaking elements in favor of utilizing the available space in the proximity of the drive shaft. Further, with a lever system, in an embodiment with both, the first actuating system and the second actuating system, the actuating systems can both act on the same lever in connection with the second breaking element without affecting, e.g. hindering or blocking, each other.

[0021] The object is further solved by an actuator for a predescribed breaking device, comprising at least one solenoid for actuating the second breaking element, when electric current is passed through the solenoid and at least one spring to keep the solenoid in an unactuated state, when no electric current is passed through the solenoid. With the actuator, the advantages described for the breaking device are archived accordingly.

[0022] The object is further solved by an escalator drive for moving escalator steps along an escalator path, comprising at least one drive unit, at least one drive shaft for transmitting a drive torque from the drive unit to the escalator steps and at least one breaking device as described before-hand, wherein the first breaking element is in connection with the drive shaft. With the escalator drive, the advantages described for the breaking device are archived accordingly. In a preferred embodiment, the drive unit comprises a drive device which is an electric motor/generator.

[0023] In a preferred embodiment of the escalator drive, the drive unit comprises a drive device, at least one gearbox in connection with the drive device and at least one drive chain for transmitting the drive torque from the gearbox to a chain rim mounted on the drive shaft. In a preferred embodiment, the drive device is an electric motor/generator. With this embodiment, the advantages of the breaking device can be used to a particular extent, as within the gearbox, within the drive device and in-between the drive device and the gearbox, failure may occur which leads to free-wheeling of the drive shaft without being recognized by an auxiliary breaking device from the state of the art.

[0024] The object is even further solved by an escalator system comprising an escalator path, a number of escalator steps being moveable along the escalator path and an escalator drive as described before-hand. With the escalator system, the advantages described for the breaking device and the escalator drive are archived accordingly.

Brief description of the figures

[0025] In the following, the invention is explained in more detail with reference to the accompanying figures using preferred examples of embodiments. The formulation figure is abbreviated in the drawings as Fig.

Fig. 1 is a view of a breaking device according to a first preferred embodiment;

Fig. 2 is a perspective view of a detail of a breaking device according to a second preferred embodiment;

Fig. 3 is a schematic view of an escalator system.

Detailed description of the embodiments

[0026] The described embodiments are merely examples that can be modified and/or supplemented in a variety of ways within the scope of the claims. Any feature described for a particular embodiment example may be used independently or in combination with other features in any other embodiment example. Any feature described for an embodiment example of a particular claim category may also be used in a corresponding manner in an embodiment example of another claim category.

[0027] Figure 1 shows a view of a breaking device 100 and corresponding parts of an escalator drive 47 within an escalator system 300. Namely, the escalator drive 47 comprises a chain rim 2 mounted to a not shown drive shaft 48 and a drive chain 3 connecting the chain rim 2 with a drive unit not shown.

[0028] The breaking device 100 comprises a first breaking element 4 formed as a ratchet wheel, which is mounted to the same not shown drive shaft 48 the chain rim 2 is mounted to, and a second breaking element 5 formed as a pawl, which is pivotable around a pivot point 5.1 fixed to a stationary element of the escalator system 300. The breaking device 100 further comprises a first actuating system 6 having a first actuator 7 comprising a solenoid 7.1 and a spring 7.2. In an unactuated state, no electric current is passed through the solenoid 7.1 and it is kept in its position according to figure 1 by the spring 7.2. When the first actuator 7 is activated by an electric current passing through the solenoid 7.1, the solenoid 7.1 is moved to the left side against the spring 7.2 and actuates the second breaking element 5 as will be de-

scribed in the following.

[0029] The breaking device 100 further comprises a lever system 9, wherein a first lever 9.1 is in connection with the first breaking element 5 at the pivot point 5.1 and may therefore pivot the second breaking element 5 around the pivot point 5.1. The lever system 9 further comprises a second lever 9.2 which is in connection with a third lever 9.3 at a pivot point 9.4. When the first actuating system 6 is activated, the first solenoid 7.1 moves rightwards and pivots the third lever 9.3 around the pivot point 9.4 via a push rod 8. Accordingly, the second lever 9.2 is pivoted around the pivot point 9.4 as well and actuates the first lever 9.1 via a latch 9.5 and a push rod 10. Via the first lever 9.1, the second breaking element 5 is pivoted around the pivot point 5.1 and engages with the first breaking element 4.

[0030] The breaking device 100 further comprises a second actuating system 11, which has a second actuator 12 formed as a shoe in connection with a pull rod 13. The second actuator 12 is hold upwards by an intact drive chain 3, while it is pushed downwards by a spring 14 in case the drive chain 3 breaks and is not positioned below the second actuator 12 any longer. In this case, the pull rod 13 pulls down the first lever 9.1 and thereby actuates the second breaking element 5 to engage with the first breaking element 4. When the first actuating system 6 is activated, the first lever 9.1 moves without affecting the pull rod 13 and thus, the second actuating system 11 is not affected by an activation of the first actuating system 6. Vice versa, when the second actuating system 11 is activated, the push rod 10 moves downwards without affecting the latch 9.5 and thus, the first actuating system 6 is not affected by an activation of the second actuating system 11.

[0031] The first actuating system 6 is activated upon detection of a certain rotational speed of the drive shaft 48, in particular a relative rotational speed of the drive shaft 48 in comparison with a rotational speed of a drive unit of the escalator system 300, which may be detected by any sensor means of the escalator system 300. The detected rotational speed is processed by a control unit not shown in the figures, e.g. an escalator control unit, which controls the operation of the escalator system 300, or a control unit of the breaking device 100, which exclusively controls the first actuation system 6. For detecting the rotational speed of the drive shaft 48, the breaking device 100 may comprise at least one sensor 15.1, 15.2. Figure 2 shows a perspective view of a breaking device 100 which comprises the same elements as the breaking device 100 in figure 1, but further comprises a first sensor 15.1 and a second sensor 15.2 being redundant to each other. The sensors 15.1, 15.2 are inductive sensors and are placed adjacent to teeth 2.1 of the chain rim 2. Thus, the teeth 2.1 and intermediate spaces between the teeth 2.1 are passing along the sensors 15.1, 15.2 alternately, thereby giving a measure for the rotational speed of the drive shaft 48, which can be detected by the sensors 15.1, 15.2.

[0032] Figure 3 shows a schematic and simplified view of an escalator system 300 comprising travel rails 40, which form a path 41, along which steps 42 are pulled. Only a small number of steps 42 is shown in figure 4, yet steps 42 are attached to the travel rails 40 all along the path 41. The travel rails 40 are deflected on an upper end 43 by a shaft 44, wherein the travel rails 40 engage with gears 45, which are attached to the shaft 44. The travel rails 40 are further also deflected on an lower end 43 by a drive shaft 48, wherein the travel rails 40 engage with gears 46, which are attached to the drive shaft 48. The drive shaft 48 forms an escalator drive 47 together with a drive unit not shown. Further, a first breaking element 4 of a breaking device 100 analogous to figures 1 and 2 is mounted on the drive shaft 48 without the breaking device 100 being shown in further detail.

Reference list

[0033]

2	chain rim
2.1	teeth of the chain rim
3	drive chain
4	first breaking element
5	second breaking element
5.1	pivot point
6	first actuating system
7	first actuator
7.1	solenoid
7.2	spring
8	push rod
9	lever system
9.1	first lever
9.2	second lever
9.3	third lever
9.4	pivot point
9.5	latch
10	push rod
11	second actuating system
12	second actuator
13	pull rod
14	spring
15.1	first sensor
15.2	second sensor
40	travel rails
41	path
42	steps
43	upper end
44	shaft
45	gears
46	gears
47	escalator drive
48	drive shaft
100	breaking device
300	escalator system

Claims

1. A braking device (100) for escalator steps (42) of an escalator system (300), the braking device (100) comprising:

   a first breaking element (4) configured to be in connection with a drive shaft (48) of the escalator system (300);
   a second breaking element (5) configured to engage with the first breaking element (4) for breaking the escalator steps (42); and
   a first actuating system (6) for moving the second breaking element (5) between a disengaged state and an engaged state;
   wherein the first actuating system (6) comprises:

      at least one sensor (15.1, 15.2) for detecting the rotational speed of the drive shaft (48) of the escalator system (300);
      a first actuator (7) for actuating the second breaking element (5); and
      a control unit which is configured to activate the first actuator (7) in case of a certain rotational speed of the drive shaft (48) being detected by the at least one sensor (15.1, 15.2).

2. The breaking device (100) of claim 1, wherein the first actuator (7) comprises at least one solenoid (7.1) for actuating the second breaking element (5), when electric current is passed through the solenoid (7.1).

3. The breaking device (100) of claim 2, wherein the first actuator (7) comprises at least one spring (7.2) to keep the solenoid (7.1) in an unactuated state, when no electric current is passed through the solenoid (7.1).

4. The breaking device (100) of claim 2 or 3, wherein the control unit is configured to provide electric current passing through the solenoid (7.1) for activating the first actuator (7).

5. The breaking device (100) of any of the preceding claims, wherein the at least one sensor (15.1, 15.2) is an inductive sensor.

6. The breaking device (100) of any of the preceding claims, wherein the at least one sensor (15.1, 15.2) is configured to detect the movement of teeth (2.1) of a chain rim (2) attached to the drive shaft (48) of the escalator system (300).

7. The breaking device (100) of any of the preceding claims, wherein the first breaking element (4) is a ratchet wheel configured to be mounted on the drive shaft (48) and wherein the second breaking element (5) is a pawl configured to engage with the ratchet wheel, in particular a pivotable pawl.

8. The breaking device (100) of claim 7, wherein the ratchet wheel in the engaged state of the pawl is locked in a first rotational direction and unlocked in a second rotational direction.

9. The breaking device (100) of any of the preceding claims, comprising

   a second actuating system (11) for moving the second breaking element (5) between the disengaged state and the engaged state;
   wherein the second actuating system (11) comprises:

      a second actuator (12) for actuating the second breaking element (5);
      wherein the second actuator (12) is configured to be mechanically activated by a drive chain (3) of the escalator system (300) upon breakage of the drive chain (3).

10. The breaking device (100) of any of the preceding claims, further comprising a lever system (9), wherein the first actuator (7) and/or the second actuator (12) are configured for actuating the second breaking element (5) via the lever system (7).

11. Actuator (7) for a breaking device (100) of any one of claims 1 to 10, comprising

   at least one solenoid (7.1) for actuating the second breaking element (5), when electric current is passed through the solenoid (7.1); and
   at least one spring (7.2) to keep the solenoid (7.1) in an unactuated state, when no electric current is passed through the solenoid (7.1).

12. An escalator drive (47) for moving escalator steps (42) along an escalator path (41), comprising

   at least one drive unit;
   at least one drive shaft (48) for transmitting a drive torque from the drive unit to the escalator steps (42); and
   at least one breaking device (100) according to one of the claims 1 to 10, wherein the first breaking element (5) is in connection with the drive shaft (48).

13. The escalator drive (47) of claim 10, wherein the drive unit comprises

   a drive device;
   at least one gearbox in connection with the drive device; and

at least one drive chain (3) for transmitting the drive torque from the gearbox to a chain rim (2) mounted on the drive shaft (48).

14. An escalator system (300) comprising

an escalator path (41);
a number of escalator steps (42) being moveable along the escalator path (41); and an escalator drive (47) according to claim 12 or 13.

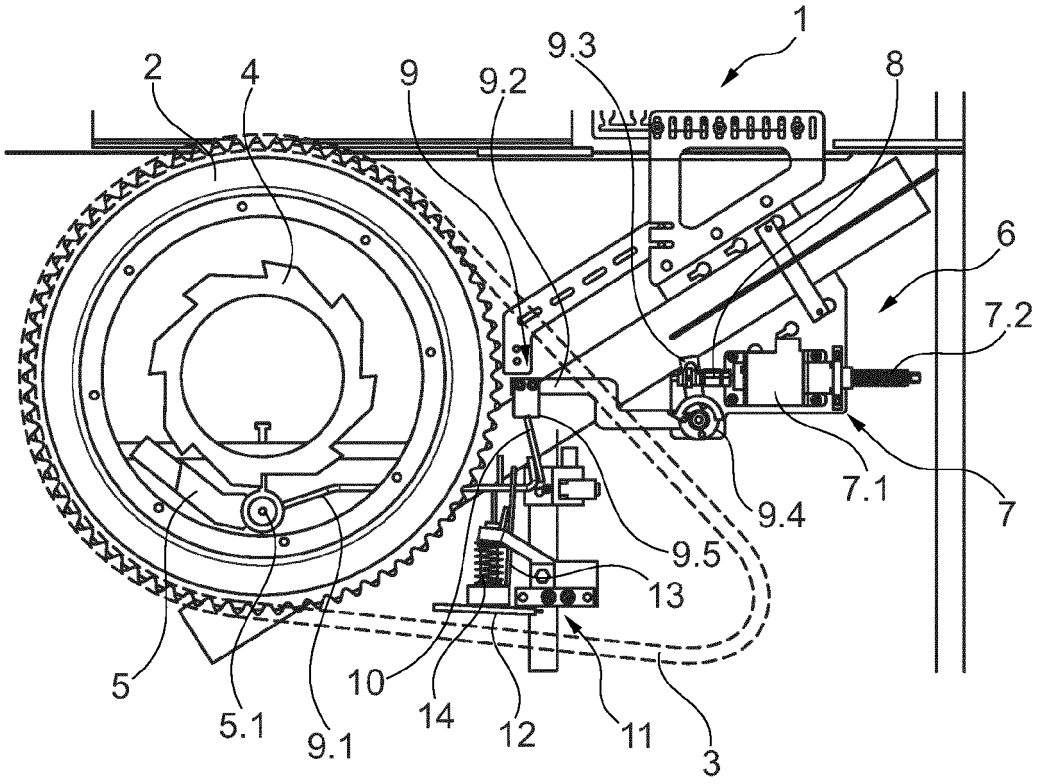
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Fig. 1

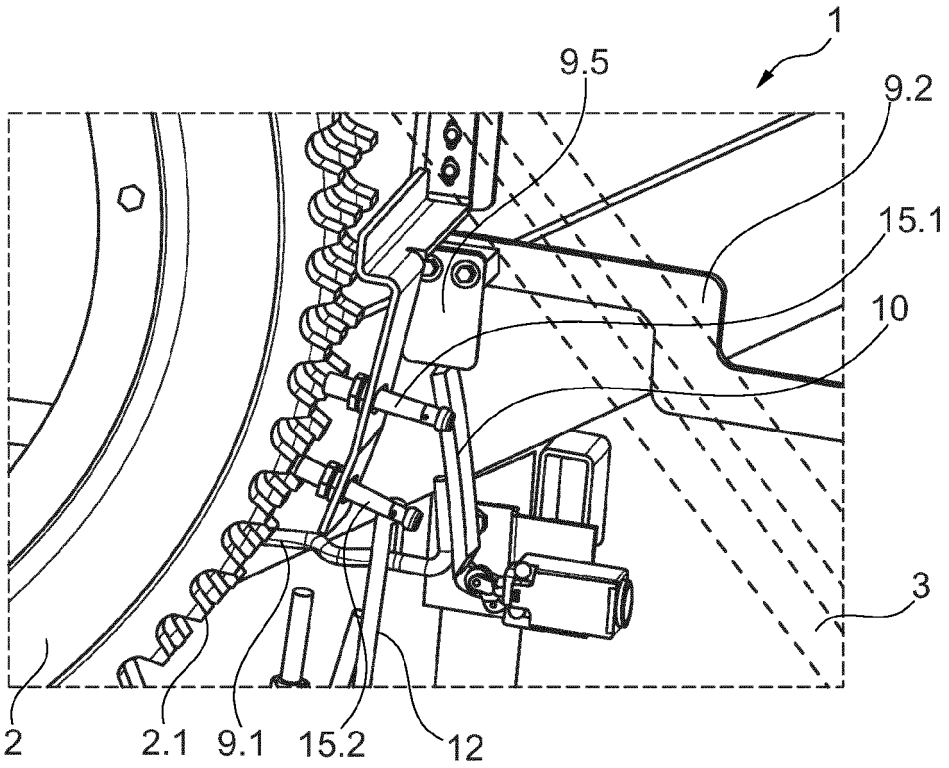
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Fig. 2

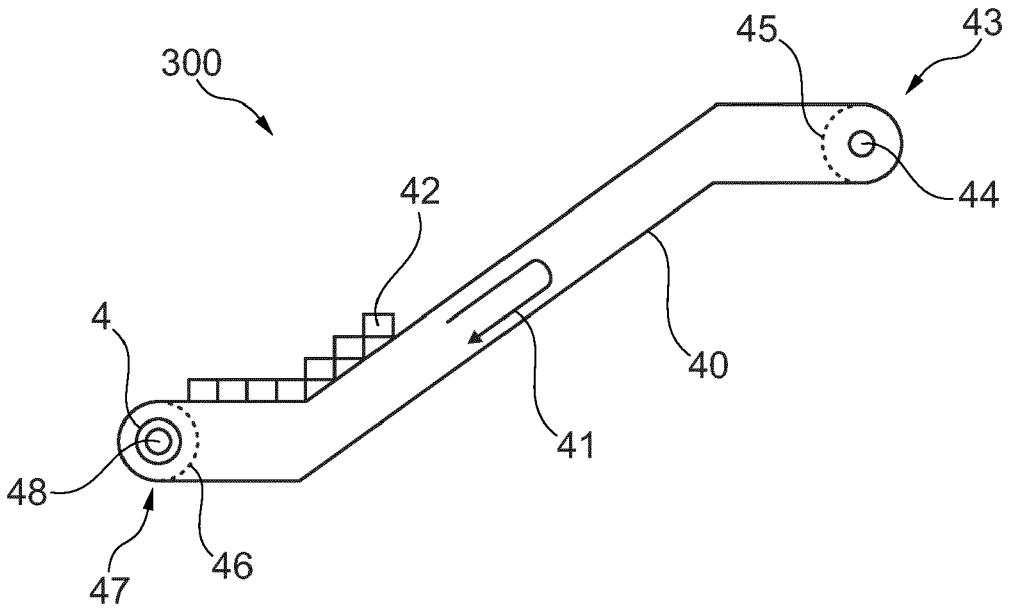

Fig. 3

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PARTIAL EUROPEAN SEARCH REPORT

under Rule 62a and/or 63 of the European Patent Convention. This report shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number
EP 23 38 2317

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	WO 2016/093582 A1 (MIJUHITEC CO LTD [KR]) 16 June 2016 (2016-06-16) * abstract * * paragraphs [0005], [0030] - [0044] * * figures 1-5 *	1-8, 12-14 10	INV. B66B29/00
X A	CN 1 117 939 A (HITACHI LTD [JP]) 6 March 1996 (1996-03-06) * abstract * * paragraphs [0016] - [0031] * * figures 1-5 *	1-4,7,8, 10,12-14 5,6	
X A	JP 2022 177367 A (MITSUBISHI ELECTRIC CORP) 1 December 2022 (2022-12-01) * abstract * * paragraphs [0009] - [0021], [0042] - [0046] * * figures 1-3 *	1-4,7,8, 12-14 5,6,10	
X A	EP 3 730 445 A1 (KONE CORP [FI]) 28 October 2020 (2020-10-28) * abstract * * paragraphs [0041] - [0069] * * figures 1-5 *	1-4, 12-14 5-8,10	TECHNICAL FIELDS SEARCHED (IPC) B66B

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INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

Place of search	Date of completion of the search	Examiner
The Hague	19 February 2024	Oosterom, Marcel

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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PARTIAL EUROPEAN SEARCH REPORT

Application Number
EP 23 38 2317

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	GB 2 211 809 A (HITACHI LTD [JP]) 12 July 1989 (1989-07-12)	1,2,4,9, 10,12,14
A	* abstract * * page 6, line 25 - page 10, line 9 * * figures 2-6 *	3,5-8,13
X	CN 108 584 661 A (YUNGTAY ELEVATOR EQUIPMENT CHINA CO LTD) 28 September 2018 (2018-09-28)	1,7-10, 12,14
A	* abstract * * paragraphs [0038] - [0059] * * figures 1-4 *	2-6,13
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A	* abstract * * paragraphs [0016] - [0041], [0043] * * figures 2-7 *	3,5,6, 10,13
X	JP 2012 153496 A (MITSUBISHI ELECTRIC CORP) 16 August 2012 (2012-08-16)	1,2,4, 7-9,12, 14
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CLASSIFICATION OF THE APPLICATION (IPC)

TECHNICAL FIELDS SEARCHED (IPC)

EPO FORM 1503 03.82 (P04C10) 2

Europäisches Patentamt
European Patent Office
Office européen des brevets

INCOMPLETE SEARCH
SHEET C

Application Number
EP 23 38 2317

Claim(s) completely searchable:
1-10, 12-14

Claim(s) not searched:
11

Reason for the limitation of the search:

The present application contains two independent claims of the same category, namely independent apparatus claim 1 and independent apparatus claim 11, which do not fall under one of the exceptions under Rule 43(2) EPC.

In response to the invitation under Rule 62a EPC, the applicant indicated that the search is to be carried out on the basis of independent apparatus claim 1.

Consequently, no opinion is established for unsearched claim 11.

Europäisches Patentamt
European Patent Office
Office européen des brevets

Application Number
EP 23 38 2317

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 23 38 2317

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-8, 10, 12-14

Braking device for escalator steps of an escalator system comprising an actuator comprising a solenoid.

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2. claims: 1, 9, 10, 12-14

Braking device for escalator steps of an escalator system comprising an actuator which is mechanically activated by a drive chain of the escalator system upon breakage of the drive chain.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 38 2317

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-02-2024

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82