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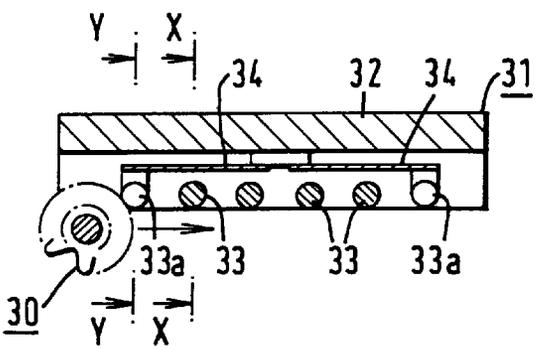
(54) Dual-purpose escalator for wheelchair

(57) A dual-purpose escalator for a wheelchair (4) including a plurality of steps (9) linked in an endless form and a main-frame (1) having a running path for the steps. The steps include a plurality of specialized steps (10, 11, 12) for loading a wheelchair (4). The escalator further includes an activating apparatus (31) provided on the running path for causing the specialized steps to alter a configuration thereof to a first state for a wheelchair loading operation mode or to restore the configuration to a second state for normal operation mode. Each of the specialized steps includes a toothed rotor (14, 30). The activating apparatus includes an engagement member (13a, 31) for engaging with the toothed rotor. Each of the toothed rotors is rotated by engaging with the engagement member for causing one of the specialized steps to alter the configuration to the first state when the steps are running in the running path in the wheelchair loading operation mode, respectively. The engagement member includes a base (32) and a plurality of pins (33) set in parallel on the base (32) at a specified pitch for engaging with the toothed rotor (30). The pin (33a) engaging firstly with the toothed rotor is set on the base (32) so as to be capable of relative displacement from the toothed rotor (30).

FIG. 1



EP 0 749 932 A2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to an escalator, and more particularly to a dual-purpose escalator for wheelchairs which is capable of transporting wheelchairs for physically handicapped persons as well as ordinary users.

Description of the Related Art

Usually, general escalators cannot safely transport wheelchairs for physically handicapped persons in the horizontal attitude because the depth dimensions of the steps are short. For this reason, recently, escalator systems have been considered in which specialized steps are included in part of the endlessly arranged multiple steps. These are expanded by mechanically altering their configuration when in the wheelchair loading operation mode. Thus, a deeper space for wheelchair loading can be ensured.

An escalator compatible with wheelchairs is disclosed in Japanese Patent Disclosure (Kokai) Shou 61-178391, and is described using Figures 15 to 20. In Figure 15, 1 is a main-frame (generally called a "truss") positioned at a slope between a landing 2 and a landing 3 on lower and upper floors. 4 is a wheelchair in which a physically handicapped person is seated and 5 is an attendant. 6 is an attendant call button provided close to landing 2. 7 are shift switches for the wheelchair loading operation mode provided in balustrade 1a of the escalator. 8 are also wheelchair operation buttons.

In Figure 15, 9 are the multiple steps which are arranged and run in an endless form on a path constructed in main-frame 1 using guiderails and the like. The design is that the treads of several steps 9 become of the same height as each other on the horizontal path sections at the lower and upper floors, and that the treads of each step 9 form stairs with levels differing from each other to run in the sloping section between.

Here, in multiple steps 9, 10 is a first specialized step, 11 is a second specialized step and 12 is a third specialized step. These steps are used for wheelchair loading. 13 is an activating apparatus which causes specialized steps 10, 11 and 12 to alter their configurations to a first state in which a wheelchair can be loaded when in the wheelchair operation mode, or to be restored to a second state for the normal operation mode.

When these first, second and third specialized steps 10, 11 and 12 become in the wheelchair operation mode through shift switch 7, the design is that first specialized step 10 is firstly activated by activating apparatus 13 and part of step 9 is caused to tilt. Then, second specialized step 11 is activated by activating apparatus 13, and a linking system 22 provided inside it is engaged with third specialized step 12. Third specialized step 12, which is linked by linking system 22, is supported by second specialized step 11 on the inclined part of escalator, so that a level space for loading wheelchairs of just 2 steps is ensured.

Specialized steps 10, 11 and 12 and activating apparatus 13 are further described using Figures 16 to 20. First, activating apparatus 13 is provided on main-frame 1 which is the running path for steps 9 to 12, and has rack 13b as an engagement member capable of up and down movement through elevator mechanism 13a.

Also, first to third specialized steps 10, 11 and 12 are provided with pinions 14a, 14b and 14c, respectively, which are toothed rotors for operating power input which rotate by engaging with rack 13b and are mounted on each of their inner lower sides. At the same time, they are provided with drivers 15a, 15b and 15c which drive mechanisms inside the steps linked with pinions 14a, 14b and 14c, respectively. The design is that, during normal operation mode running, these pinions 14a, 14b and 14c do not engage with rack 13b, which is withdrawn to the lower position of activating apparatus 13 as shown in Figure 16. During the wheelchair loading operation mode, the pinions 14a, 14b and 14c rotate by engaging with rack 13b, which is raised by elevator mechanism 13a of activating apparatus 13 as shown in Figure 17, while running in the horizontal path sections at the lower or upper floor. Thus, drivers 15a, 15b and 15c are operated in linked motion with pinions 14a, 14b and 14c, respectively.

First, specialized step 10 is provided with a tilting step section 16 capable of tilting partically and a surrounding fixed step section 17. As shown in Figure 16, in the normal operation mode, a bolt 18a projects from driver 15a mounted on tilting step section 16 and engages with a retainer 19a of fixed step section 17. Thus, tilting step section 16 and fixed step section 17 are incorporated as one horizontal surface. In the wheelchair loading operation mode, drive 15a withdraws bolt 18a by the rotation of pinion 14a which engages with rack 13b of activating apparatus 13 as described above, and disengages it from retainer 19a as shown in Figure 17. And when running on the sloping section, tilting step section 16 changes its configuration to a tilted state about a tilting rotation shaft 20, as shown in Figure 18.

Second specialized step 11 is provided with linking system 22 so that it links with and supports the tread of third specialized step 12 to form a deep tread of 2 step's depth when running on the sloping section.

This linking system 22 links with and supports, or releases the link with, a movable step section 23 of third specialized step 12 by thrusting forward or withdrawing a rack-toothed coupling rod (fork) 22a in linked motion via a gear 21 with the forward or reverse rotation of driver 15b.

Third specialized step 12 is provided with a movable step section 23 which is supported by linking system 22 of second specialized step 11, and a fixed step section 24 which guides and supports movable step section

23 so as to rise and fall via link 25 of a pantagraph. In the normal operation mode, as shown in Figure 16, a bolt 18c is projected by driver 15c mounted on fixed step section 24 and is engaged with a retainer 19c of movable step section 23. Thus, movable step section 23 and fixed step section 24 are incorporated as one. When in the wheelchair loading operation mode, as shown in Figure 17, driver 15c withdraws bolt 18c and disengages it from retainer 19c by the rotation of pinion 14c which engages with rack 13b of activating apparatus 13. At the same time, movable step section 23 is linked with and supported by coupling rod (fork) 22a of linking system 22 which thrusts forward from second specialized step 11. The design is that, as shown in Figure 18, movable step section 23 follows, even on the sloping section, at the same height as that of second specialized step 11 by means of the upward movement of link 25.

Also, wheel-stops 36 are provided in third specialized step 12 to prevent the falling of a wheelchair during the loading of wheel-chair 4. These wheel-stops 36 are projected from and retracted into the tread by driver 15c.

Figures 19 and 20 are drawings showing external appearances of first to third specialized steps 10, 11 and 12. Figure 19 shows the running state on the sloping section in the normal operation mode, and Figure 20 shows the running state on the sloping section in the wheelchair loading operation mode.

However, in the escalator constructed in the above way, when shifting from the normal operation mode to the wheelchair loading operation mode, as shown in Figure 17, elevator mechanism 13a of activating apparatus 13 operates and raises rack 13b, which is the engagement member, while running (in the horizontal path sections at the lower and upper floors). Pinions 14a, 14b and 14c, which are the toothed rotors for inputting the operating forces for first to third specialized steps 10, 11 and 12 which come running in succession, successively engage with rack 13b and rotate. Specialized steps 10, 11 and 12 operate through drivers 15a, 15b and 15c which are linked to the pinions 14a, 14b and 14c, respectively, and change their configuration to enable wheelchair loading. However, at this time, when each of pinion 14a, 14b and 14c starts to engage with rack 13b, the tips of the teeth will mutually interfere and excessive force will be generated if the phases of the two gears are not matched. When moving to the correctly engaged state by the pinion tooth tips sliding over the rack teeth, a shock will occur with a loud noise. This has an adverse effect on the protection of the mechanism and causes insecure feelings in the operators and the wheelchair users.

However, in the prior art dual-purpose escalator for wheelchairs as described above, when the specialized step configuration was being changed or the linking system did not operate, the design was to stop the escalator by operating a safety system. However, it was difficult to judge from the external appearance how the failure had occurred in each respective specialized step. Therefore, it was necessary to carry out an inspection by entering inside truss 1 of the escalator. This gave rise to problems of poor workability and accompanying danger.

The problem in the step construction mentioned above, which is the focal point of this invention, is the wheel-stop mechanism provided in the third specialized step.

As wheel-stop mechanisms proposed in prior art, there are Japanese Patent Publication No. Showa 63-17438 and Japanese Patent Publication No. Showa 63-51956.

Although not illustrated, these are both wheel-stops which are mechanically projected. In their methods the wheel-stops are projected to specified heights or retracted to their original positions when driving forces are applied by wheel-stop mechanisms.

However, these types of wheel-stop mechanisms have the following problems. That is to say, the case of a wheelchair or the like loaded directly above the wheel-stop mechanism for some reason or other can be considered. In such a case, with the wheel-stop mechanisms mentioned above, the following states may happen. That is, the wheel-stops may push the wheelchair upwards, or they may become in an overloaded state in which they cannot move because of the weight of the wheelchair, or the wheel-stop mechanism may be damaged. None of these states is acceptable.

Accordingly, this invention seeks to provide a dual-purpose escalator for wheelchairs which is designed to enable increased efficiency in the determination of the cause and in the work of investigation and inspection when an operational failure of the dual-purpose escalator occurs.

According to the invention, there is provided a dual-purpose escalator for a wheelchair, comprising:

a plurality of steps linked in an endless form;
a main-frame including a running path for said steps, said steps including at least two adjacent specialized steps for loading a wheelchair; and
activation means provided on said running path for causing said specialized steps to alter a configuration thereof to a first state for a wheelchair loading operation mode or to restore said configuration to a second state for normal operation mode;

characterised in that:

a first specialized step of said specialized steps includes linking means for linking with a second specialized step of said specialized steps;

said linking means in said first specialized step includes a coupling rod activated by said activation means for linking said first and second specialized steps to provide a space for loading said wheelchair when said steps are running in said running path in said wheelchair loading operation mode; and

said first specialized step includes a tread with an inspection port therein for checking the operation of

said coupling rod.

When using this invention, the operation of the coupling rods can be checked during wheelchair operation through the inspection ports provided in the tread of the specialized step which has the coupling rods. During maintenance inspections, whether or not there is smooth thrusting forward and retraction of the coupling rods can be checked.

A more complete appreciation of the invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

Figure 1 is a cross-section showing a possible first relationship between a toothed rotor and the engagement member in an escalator.
Figure 2(a) is a cross-section of Figure 1 on the line X - X;
Figure 2(b) is a cross-section of Figure 1 on the line Y - Y;
Figure 3 is a cross-section showing a possible second relationship between a toothed rotor and the engagement member in an escalator;
Figure 4 is a cross-section showing a possible third relationship between a toothed rotor and the engagement member in an escalator;
Figure 5 is a cross-section showing the structures of the specialized steps in the normal operation mode according to an embodiment of this invention;
Figure 6 is a cross-section showing the structures of the specialized steps in the wheelchair loading operation mode according to an embodiment of this invention;
Figure 7 is a cross-section showing the structures of the specialized steps in the wheelchair loading operation mode according to an embodiment of this invention;
Figure 8 is an oblique view showing the external structures of the specialized steps in the normal operation mode according to an embodiment of this invention;
Figure 9 is an oblique view showing the external structures of the specialized steps in the wheelchair loading operation mode according to an embodiment of this invention;
Figure 10 is a drawing showing the positions of the inspection ports according to an embodiment of this invention;
Figure 11(a) is a cross-section of a step which has a wheel-stop system;
Figure 11(b) is a cross-section showing the wheel-stop system of Figure 11(a) in more detail;
Figure 12 is a cross-section of a step which has the wheel-stop system in which the wheel-stop advances;
Figure 13 is a cross-section of a step which has the wheel-stop system in which a wheelchair is on the wheel-stop;
Figure 14 is a control circuit diagram for an escalator;
Figure 15 is a schematic drawing of a prior art dual-purpose escalator for wheelchairs;
Figure 16 is a structural drawing of the specialized steps and the activating apparatus of the prior art escalator in Figure 15 in the normal operation mode;
Figure 17 is a drawing showing the states of the specialized steps and the activating apparatus of the prior art escalator in Figure 15 when shifting to the wheelchair loading operation mode;
Figure 18 is a drawing showing the state of the specialized steps on the running path on the sloping section when in the wheelchair loading operation mode in the prior art escalator in Figure 15;
Figure 19 is a drawing showing the external appearance of the state of the specialized steps on the running path on the sloping section when in the normal operation mode in the prior art escalator in Figure 15; and
Figure 20 is a drawing showing the external appearance of the state of the specialized steps on the running path on the sloping section when in the wheelchair loading operation mode in the prior art escalator in Figure 15.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views, the embodiments of this invention will be described below.

The following is a description of a dual-purpose escalator for wheelchairs with reference to Figures 1 and 2. These show only a toothed rotor 30 provided in specialized steps 10, 11 and 12 for wheelchair loading for power input, and an engagement member 31 of the activating apparatus 13 positioned in the running path

Toothed rotors 30 are provided instead of pinions 14a, 14b and 14c and engagement member 31 is provided instead of rack 13b. The overall construction of the escalator apart from these is the same as in Figures 15 to 20 and has been omitted.

In Figures 1 and 2, engagement member 31 has a pin-rack structure composed of an oblong base 32 with a U-shaped cross-section and multiple pins 33 which are arranged parallel to each other with a specific pitch in the channel of base 32. Each of pins 33 is a roller pin. Pins 33 are all mounted so that they are free to rotate.

In order to fit this type of pin-rack engagement member 31 in which roller pins 33 are used instead of rack teeth, a sprocket is used as toothed rotor 30 in place of the pinions 14a, 14b and 14c in prior art.

When a pin-rack and a sprocket are used in place of the prior art rack and pinion, despite the composition being simple, the engagement is smooth and not liable

to break down, and there are the advantages of maintainability and proof against the environment being excellent. However, when sprocket 30 and the line of roller pins 33 in pin-rack eagagement member 31 start to engage, if the phases of the sprocket and the roller pins do not match, the tips of the sprocket teeth and the roller pins will interfere. Thus there is the defect that an excessive force will be produced in both the sprocket and the roller pins and, as the tips of the sprocket teeth slip over the roller pins in moving to a correctly engaged state, a shock will occur accompanied by a loud noise.

Here, as a preventive measure, out of the multiple roller pins 33 of pin-rack type engagement member 31, pin 33a which is the first to engage with toothed rotor (sprocket) 30 is supported by base 32 via a spring member 34, such as a plate spring, so that it is capable of displacement (escape) in a direction away from toothed rotor 30.

With this type of construction, in shifting to the wheelchair loading operation mode, when toothed rotor 30 on the specialized steps side starts to engage with roller pins 33 of the pin-rack 31 which is the engagement member of the activating apparatus 13 on the running path side, the teeth of rotor 30 may interfere with first pin 33a of engagement member 31. Should this happen, first pin 33a is supported by spring member 34 so that it is capable of displacement and can escape by the action of the spring. Therefore, quieter and smoother engagement can be achieved by keeping interference to the minimum. Thus, the occurrence of loud noises and shocks can be prevented, and an escalator which is compatible with wheelchair loading with quietness and with a high sense of security can be obtained.

Figure 3 shows a further arrangement. Here, toothed rotor (sprocket) 30 is guided and supported at the position of first contact with engagement member 31 so as to be capable of escape movement away from engagement member 31. That is to say, both toothed rotor (sprocket) 30 and a guide roller 35 are kept at a constant spacing A from each other on the vertical axis via a connecting member (not illustrated). The sprocket is mounted inside the specialized step so that it is capable of moving with a specified stroke in the transverse direction (the direction orthogonal to the forward direction). At the same time, recessed, surfaces 32b with slopes are formed at the front ans rear ends of the back surface 32a of base 32 of engagement member 31, which is the pin-rack.

In this way, when the teeth of rotor 30, which is the sprocket, interfere with first roller pin 33a of engagement member 31, the design is that first roller pin 33a escapes through spring action in the same way as in the first embodiment. At the same time, rotor 30 together with guide roller 35 move in the C direction escaping from roller pin 33a by space B between guide roller 35 and recessed surface 32b. By this means, interference is even further suppressed, and even quieter and smoother engagement can be achieved. At the same time, the design is that rotor 30 securely engages with the second and succeeding roller pins 33 by moving forward under the guidance of guide roller 35 rolling over rear surface 32a of base 32.

Figure 4 shows a yet further arrangement. Here, roller pin 33a, which is the first roller pin of pin-rack type engagement member 31 to engage with toothed rotor 30, is supported beforehand in a position which is withdrawn further than the other roller pins 33 from toothed rotor 30 by distance D, which is only small. By this means the chance of interference between first roller pin 33a and toothed rotor 30 is decreased and, at the same time, even if interference should occur, first pin 33a will escape by the spring action of spring member 34 in the same way as in the previous embodiments. Thus, interference is suppressed, and even quieter engagement can be achieved.

The following is a description of an embodiment of the invention this invention with reference to the drawings. Since the overall structure of the dual-purpose escalator for wheelchairs in this embodiment is the same as in Figure 15, the explanation has been omitted, but the practical structures of the specialized steps and their operation are described.

Figure 5 shows the case in normal operation when the specialized steps are not activated. Figure 6 shows the case in which the specialized steps are activated and operated for loading a wheelchair.

Indicator plates 26 are provided on the upper surfaces of coupling rods 22a. Each indicator plate 26 is composed of a white indicator plate 26a, a red indicator plate 26b and a blue indicator plate 26c in the logitudinal direction. Also, as shown in Figure 10, inspection ports 29 are provided in the grooves of cleats 28 of tread 27 above indicator plates 26 so that the differences of color on indicator plates 26 can be seen.

Figure 7 shows the state when specialized steps 10, 11 and 12 are activated and are running on the slope in a state capable of loading a wheelchair. Figures 8 and 9 are drawings showing external appearances of the specialized steps. Figure 8 is the normal running state, and Figure 9 is the state capable of loading a wheelchair.

An escalator capable of transporting wheelchairs is constructed as described above so that a space for wheelchair loading is ensured by linking specialized steps 10, 11 and 12.

In the normal operation state of Figure 8, mainly the blue color of blue indicator plates 26c can be seen through inspection ports 29. Thus, attendant 5 can confirm that coupling rods 22a are correctly retracted by checking this. As opposed to this, in the wheelchair operation mode shown in Figure 9, mainly the white color of white indicator plates 25a can be seen through inspection ports 29, so that the correct linking operation of coupling rods 22a can be confirmed. Also, the design is that in the case when the red color of red indicator plates 26b can be seen through inspection ports 29, coupling rods 22a have not correctly performed the link-

ing or retraction operation, and escalator stops through a safety system which is not illustrated. For this reason, the attendant can immediately judge the cause of the escalator stopping, and resetting operation for the breakdown can be performed within a short space of time. Also, during periodical inspection and maintenance periods, there is no requirement to go to the trouble of checking the operation of the internal mechanisms of the specialized steps from inside truss 1. This can be done merely by checking the operation of indicator plates 26 through inspection ports 29. Therefore, improvement of operational efficiency and safety can both be designed.

The following is a description of another dual-purpose escalator with reference to Figures 11 to 13. In these drawings, those items in which the constructions in Figures 15 to 20 are repeated have been given the same symbols and their descriptions have been simplified. Figure 11(a) shows a cross-section of a step which has the wheel-stop system, and Figure 11(b) shows the detailed construction of an overload absorption system. In Figure 11, 36 is wheel-stop, 37 is a wheel-stop guide roller, 38 is a pinion which engages with the wheel-stop 36, 39 is a spur gear which engages with the pinion 38, 40 is a shaft of spur gear 39, 41 is a bevel gear secured to the same shaft as spur gear 39 and 42 is a bevel gear which engages with bevel gear 41. 43 is an overload absorption system mounted on bevel gear shaft 44, and is composed of a hub 43a, friction plates 43b, a spring 43c, a keep plate 43d and a nut 43e. A gear wheel 45 is mounted sandwiched between friction plates 43b. 46 is a spur gear which engages with gear wheel 45.

Figure 12 shows the case where wheel-stop 36 advances and Figure 13 shows the case where a wheelchair is on wheel-stop 36.

In Figures 12 and 13, 36a is a detector arm which extends the lower part of wheel-stop 36 further than the underside of a riser 49. 48 is a limit switch provided on escalator truss 1 in the path of detector arm 36a.

Figure 14 shows the essential parts of the escalator control circuit. 50 is an escalator starting switch and 51 is a stopping switch. 52 is an escalator starting relay. 52a are normally-open contacts for self-holding. 53 is a wheelchair operation switch. 54 is a wheelchair operation ending switch. 55 is a wheelchair operation relay. 55a are normally-open contacts for the self-holding of relay 55. 55b are contacts which are normaly closed and only open for wheelchair operation. 48b are the normally-closed contacts of limit switch 48.

The following is a description of the operation of this embodiment.

In Figures 11 to 14, when no load is applied to wheel-stop 36, spur gears 45 and 46 are rotated by the drive input applied to pinion 14c. Hub 43a rotates under the frictional torque between spur gear 45 and friction plate 43b. This torque is sequentially transmitted to level gear 42, level gear 41, shaft 40, spur gear 39 and pinion 38 so that wheel-stop 36 advances. As shown in Figure 12, when wheel-stop 36 advances, detector arm 36a rises, and therefore, even if the escalator advances in this state, limit switch 48 will not operate.

When a wheelchair or the like is on wheel-stop 36, even if a driving force is supplied to pinion 14c, slip will occur between spur gear 45 and friction plates 43b and thus wheel-stop 36 will not project. At such a time, as shown in Figure 13, detector arm 36a of wheel-stop 36 is in the lowered position. Thus, when the escalator advances, detector arm 36a will operate limit switch 48.

The stopping operation for the escalator at this time is described with reference to Figure 14. The escalator is started by starting switch 50, and starting relay 52 is excited so that a self-holding circuit is formed by contacts 52a. When wheelchair operation switch 53 is closed in order to shift to wheelchair operation, wheelchair operation relay 55 is excited. By this means, normally-closed contacts 55b of circuit A will open so that wheelchair operation is commenced. At this time, when limit switch 48 operates as described above and its contacts 48b open, starting relay 52 is de-energized. Thus the escalator is stopped.

When the escalator is in normal operation, its state is as in Figure 13, which means that limit switch 48 is always operating. However, at this time, wheelchair operation relay 55 of circuit B is de-energized and normally-closed contacts 55b of circuit A remain in the closed state. Thus, even if contacts 48b opens, starting relay 52 will not be de-energized and the operation of the escalator can continue.

In this way, when an overload is applied to a wheel-stop, the design is that the wheel-stop is not forced by the overload absorption system to project. Also, the escalator can be made to operate so that it stops automatically at such times. Thus a dual-purpose escalator for wheelchairs with high safety can be provided.

With an escalator shown in Figures 1 to 4, shifting to the wheelchair loading operation mode can be commenced with smooth engagement between the toothed rotors on the specialized steps side and the engagement member of the activating apparatus on the running path side. Thus, the occurrence of loud noises and shocks can be prevented, and an escalator which is compatible with wheelchair loading with quietness and with a high sense of security can be obtained.

When using the invention according to Figures 5 to 10, an escalator can be provided with the following improvements: increased efficiency in determining the cause and investigation and inspection operations when the performance of the escalator is poor, and increased workability and safety during periodical inspection and maintenance.

Furthermore, in the case of a wheelchair being loaded above a wheel-stop, the wheelchair will not be pushed upward or overturned or will not become in an overload state, nor will the wheel-stop drive mechanism be damaged by the forced projection of the wheel-stop. Furthermore, the escalator can be stopped automatically when the wheel-stop projection operation does not occur. Therefore, the safety of wheelchair users and of

the escalator system can be increased.

Obviously, numerous modifications and variations of the present inventions are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.

Claims

1. A dual-purpose escalator for a wheelchair, comprising:

a plurality of steps (10, 11, 12) linked in an endless form;
a main-frame (1) including a running path for said steps, said steps (10, 11, 12) including at least two adjacent specialized steps for loading a wheelchair; and
activation means (13) provided on said running path for causing said specialized steps (10, 11, 12) to alter a configuration thereof to a first state for a wheelchair loading operation mode or to restore said configuration to a second state for normal operation mode;

characterised in that:

a first specialized step of said specialized steps includes linking means for linking with a second specialized step of said specialized steps;

said linking means (22) in said first specialized step includes a coupling rod (22a) activated by said activation means (13) for linking said first and second specialized steps to provide a space for loading said wheelchair when said steps are running in said running path in said wheelchair loading operation mode; and

said first specialized step includes a tread (27) with an inspection port (29) therein for checking the operation of said coupling rod (22a).

2. The dual-purpose escalator of claim 1, wherein:

said linking means (22) further includes an indicator plate (26) provided on the upper surface of said coupling rod (22a) which is capable of checking the operation of said coupling rod (22a) through said inspection port (29).

FIG. 1

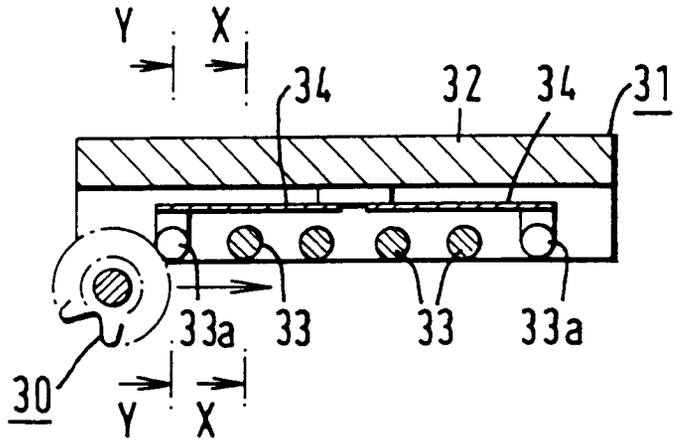


FIG. 2

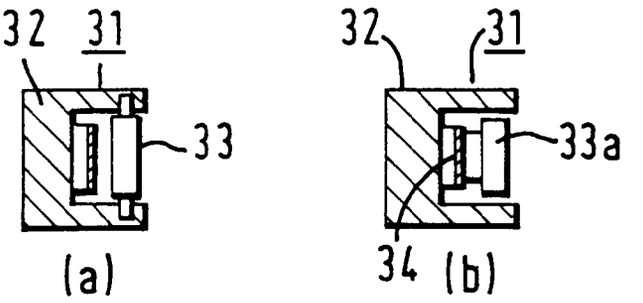


FIG. 3

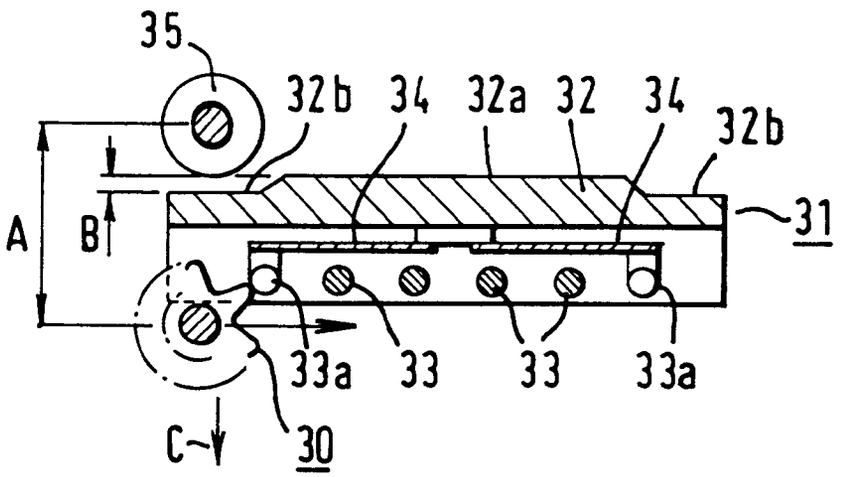
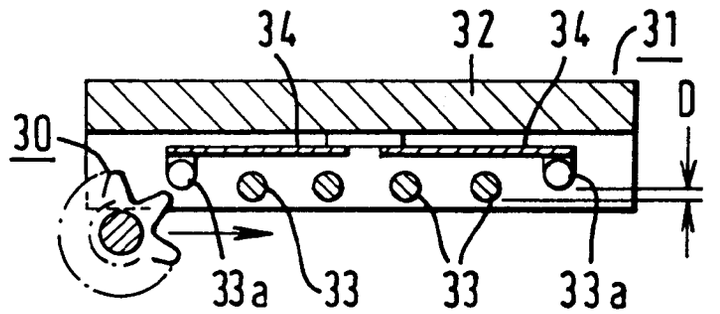


FIG. 4



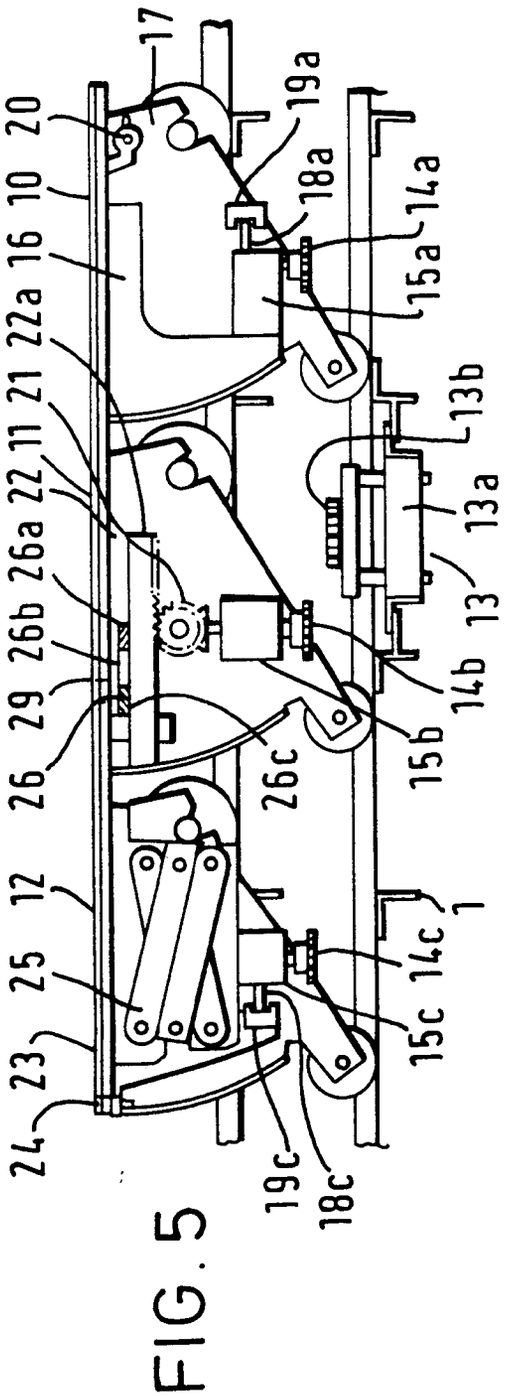

17
19a
18a
14a
15a
13b
13a
13
14b
15b
26c
14c
15c
1
20
10
16
22a
21
11
22
26a
26b
29
26
12
25
23
24
19c
18c

FIG. 5

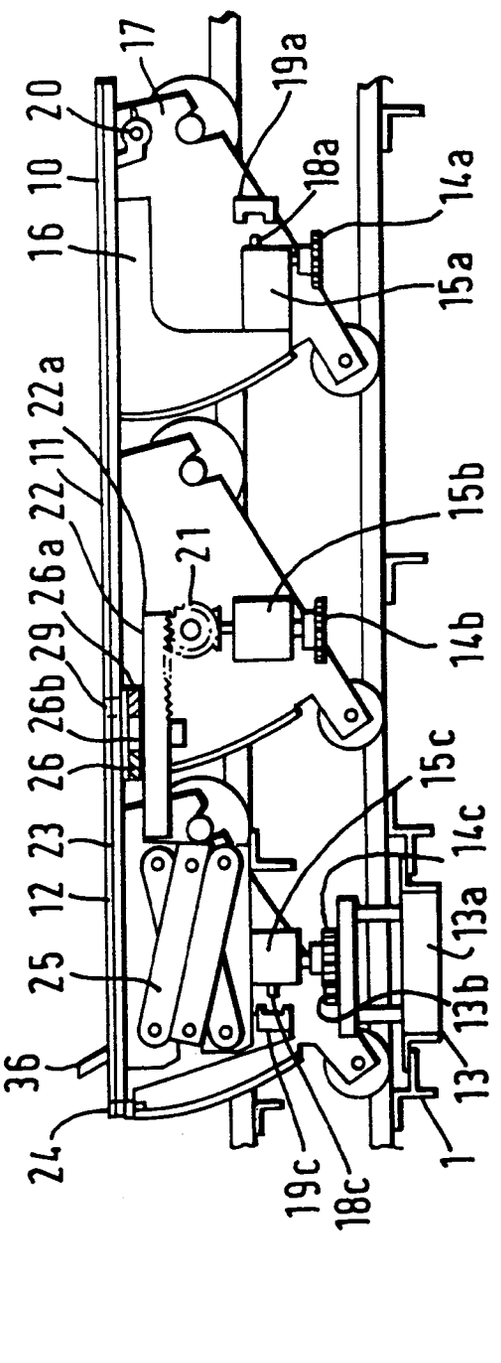

17
19a
18a
14a
15a
15b
14b
21
15c
14c
13a
13b
13
1
20
10
16
22a
11
22
26a
29
26b
26
12
23
25
36
24
19c
18c

FIG. 6

FIG. 7

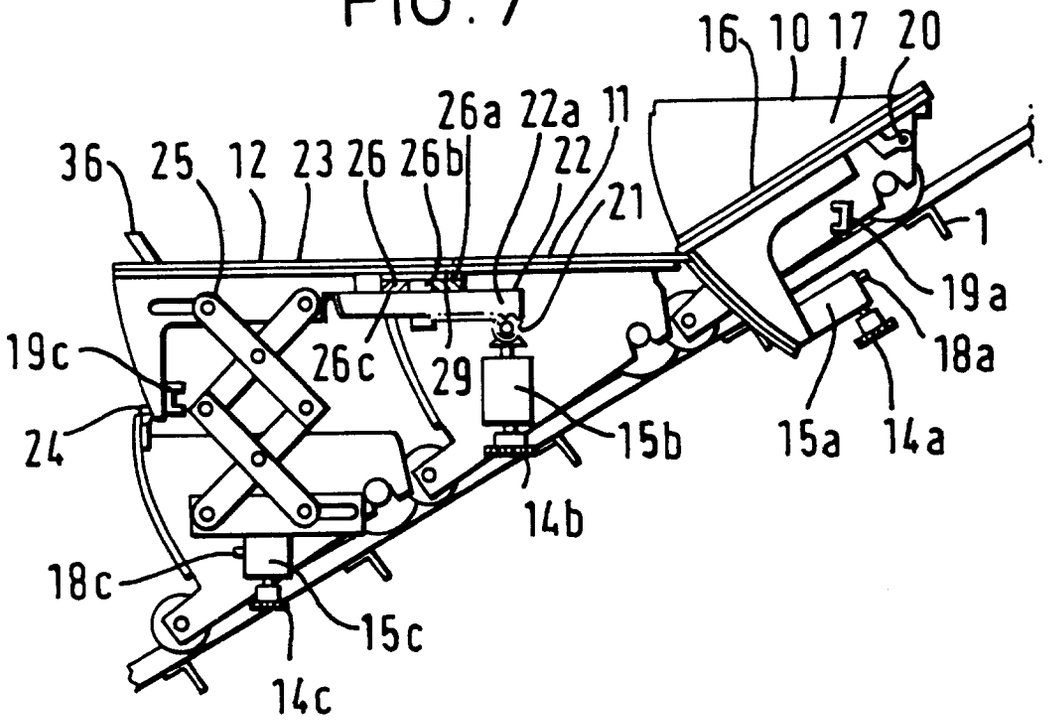

16
10
17
20
26a
22a
11
36
25
12
23
26
26b
22
21
1
19a
19c
26c
29
18a
24
15b
15a
14a
14b
18c
15c
14c

FIG. 8

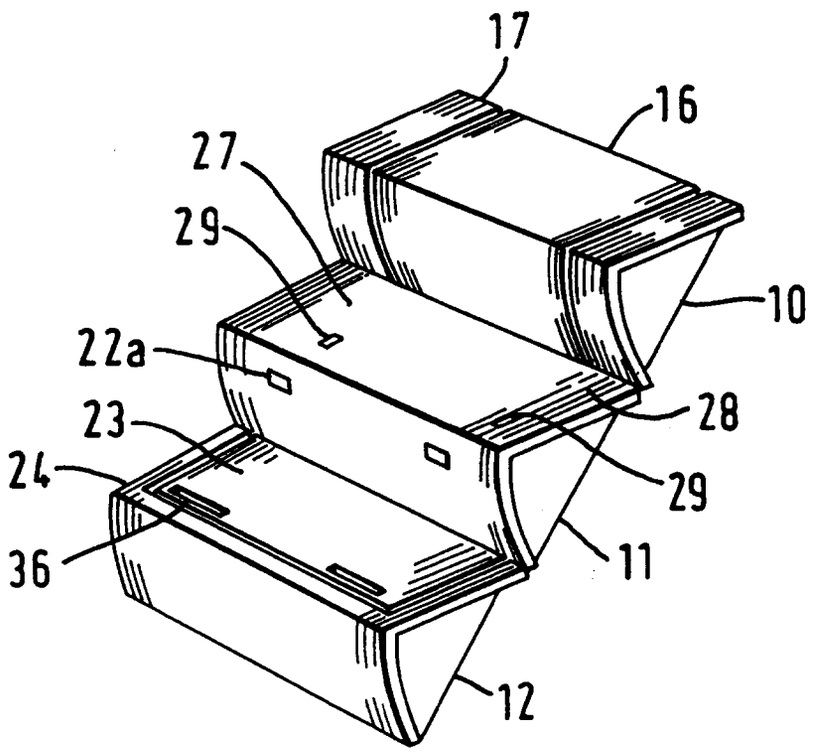

17
16
27
29
10
22a
28
23
24
29
36
11
12

FIG. 9

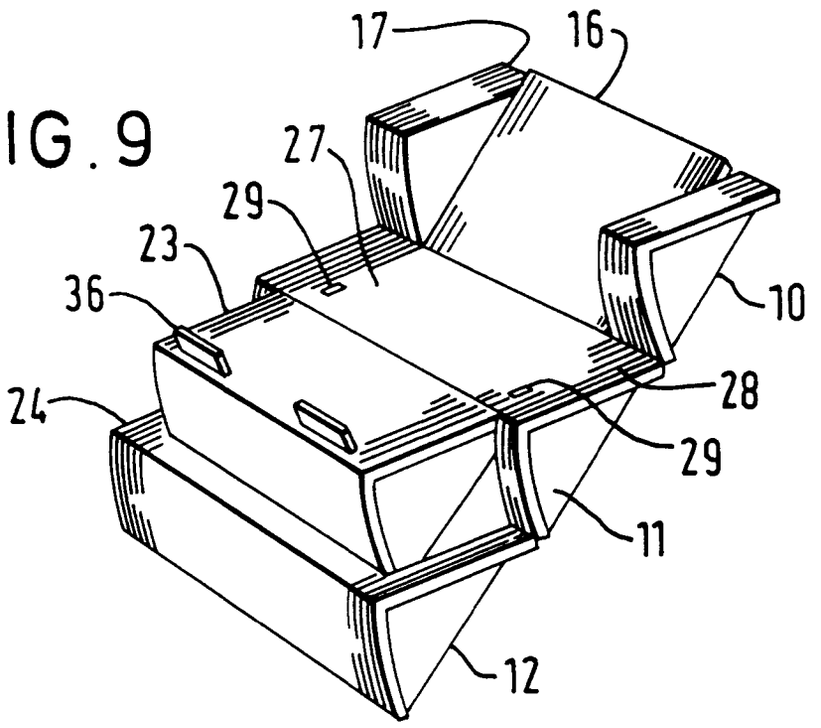


FIG. 10

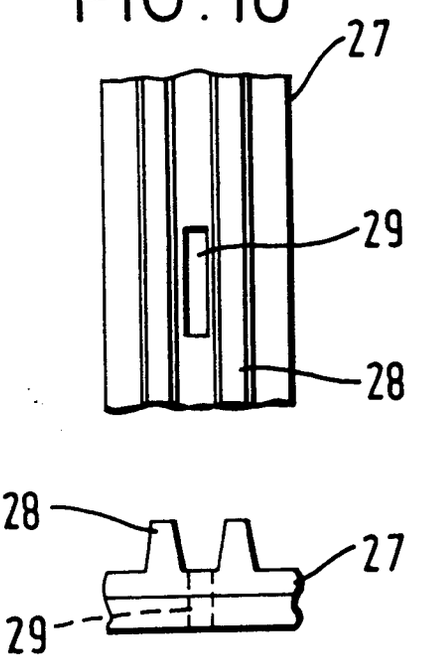
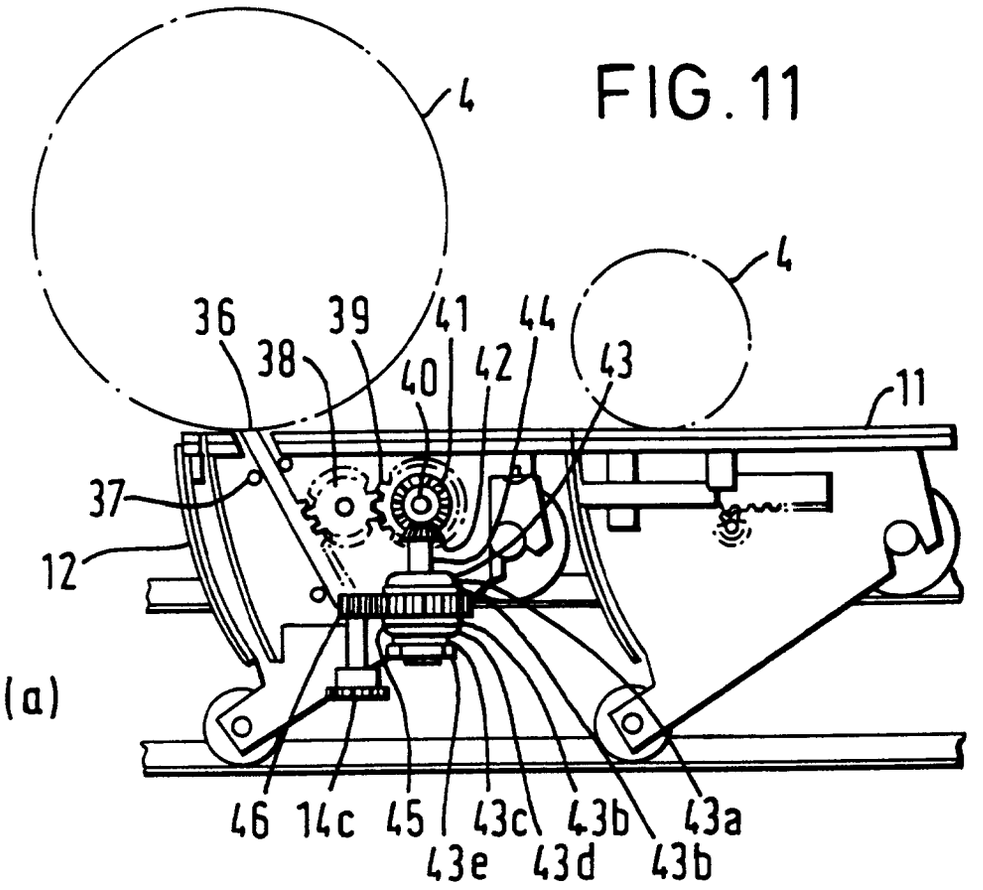


FIG. 11


4
4
36
39
41
44
38
40
42
43
11
37
12
(a)
46
14c
45
43c
43b
43a
43e
43d
43b

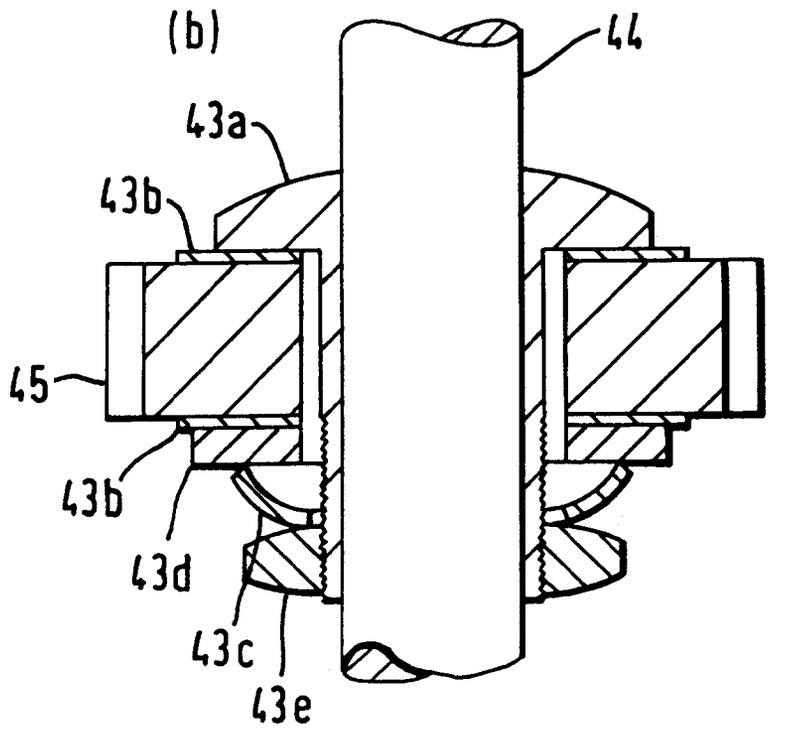

(b)
44
43a
43b
45
43b
43d
43c
43e

FIG. 12

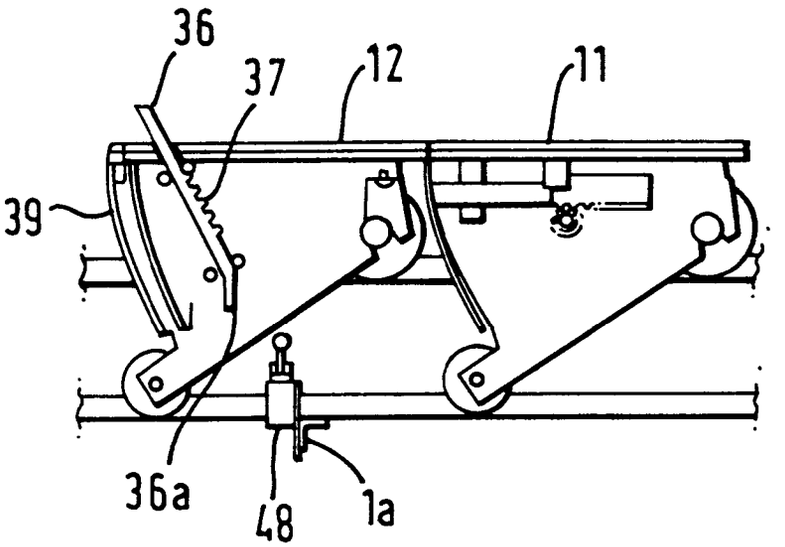


FIG. 13

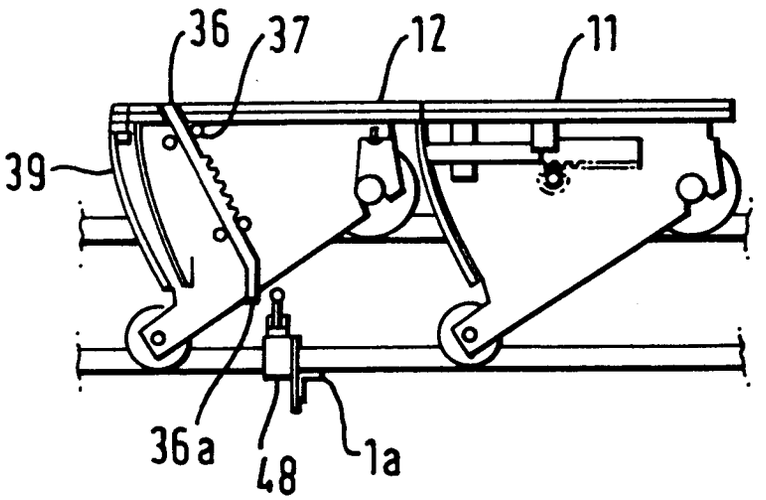


FIG. 14

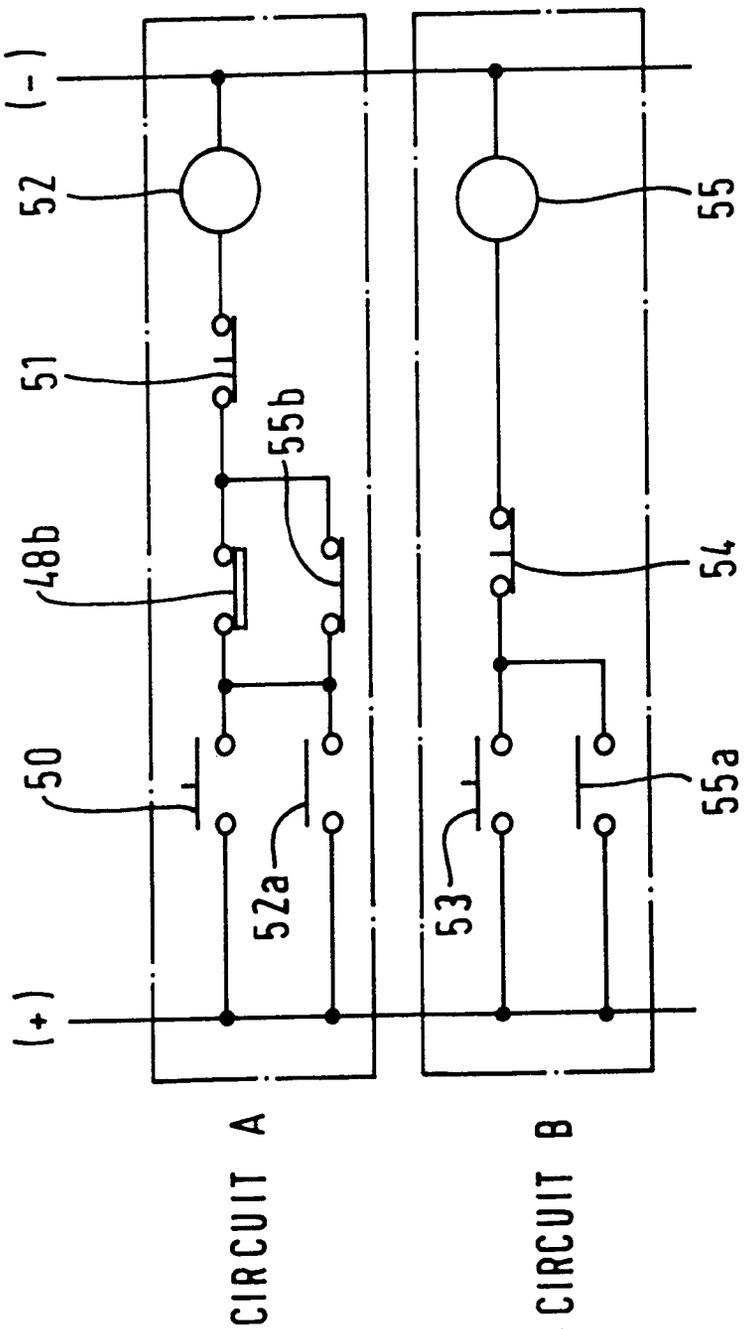


FIG. 15 (PRIOR ART)

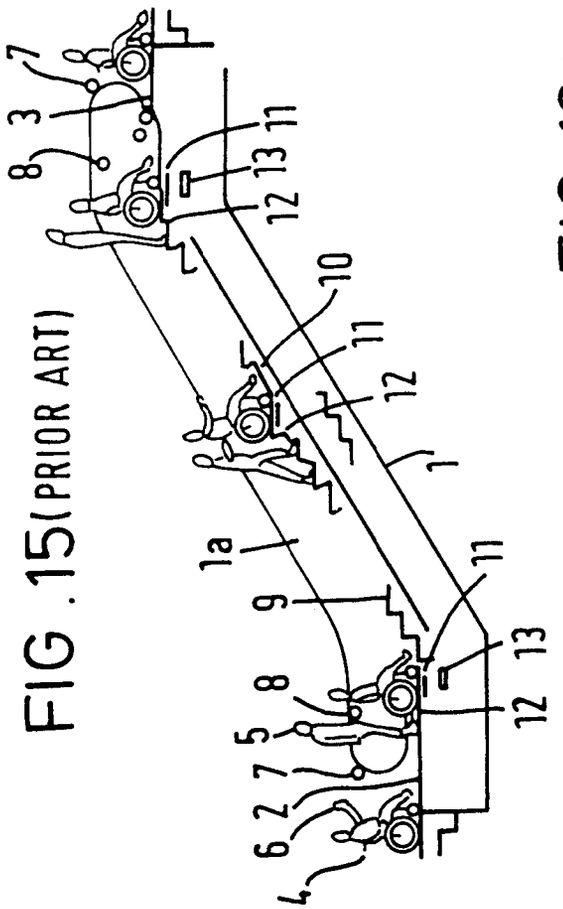
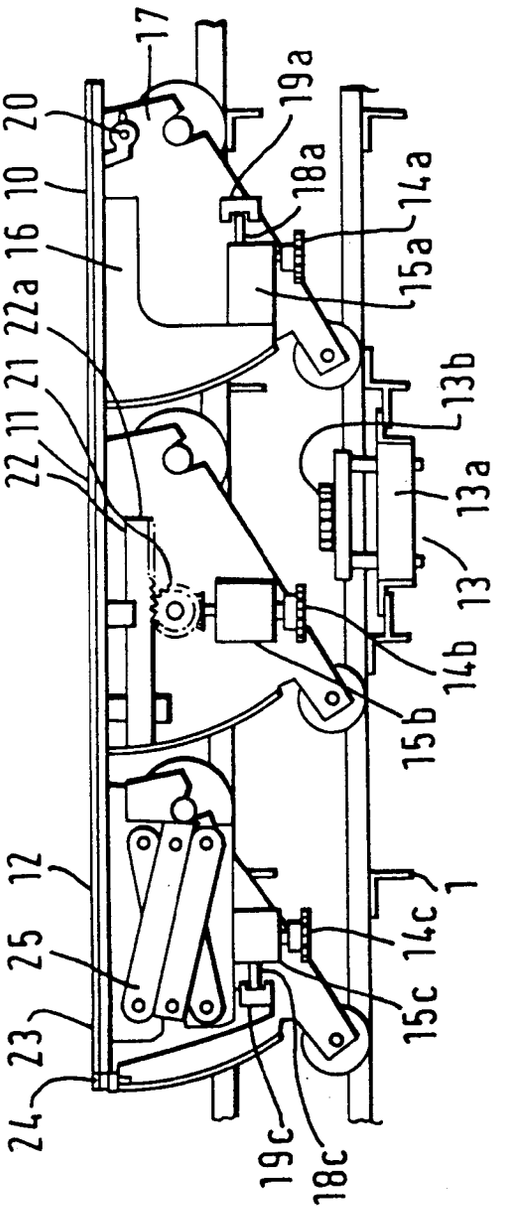


FIG. 16 (PRIOR ART)



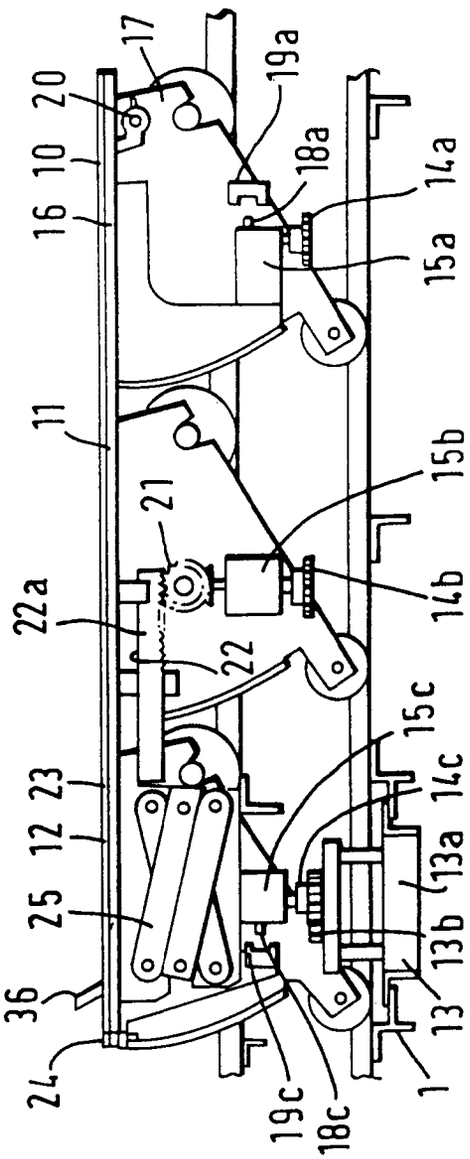


FIG. 17 (PRIOR ART)

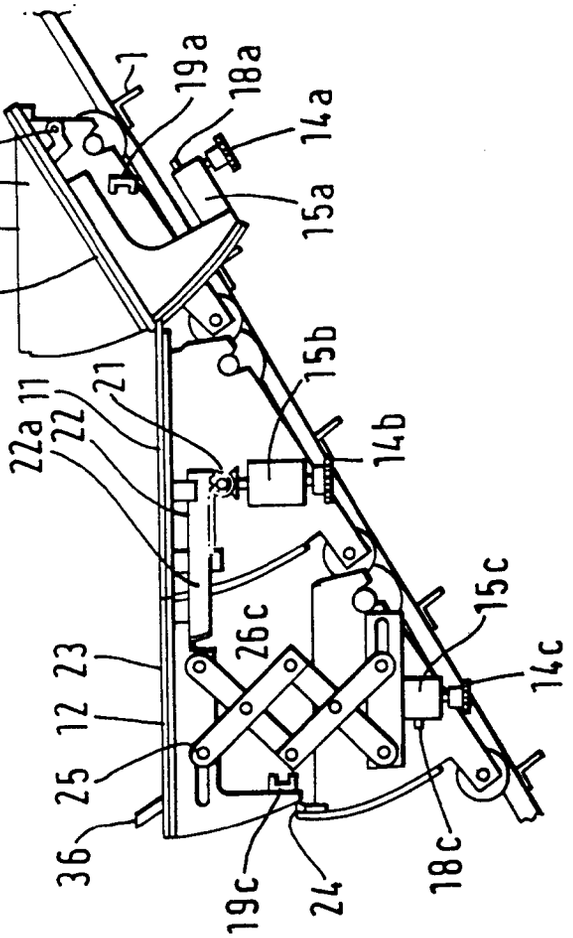


FIG. 18 (PRIOR ART)

FIG. 19 (PRIOR ART)

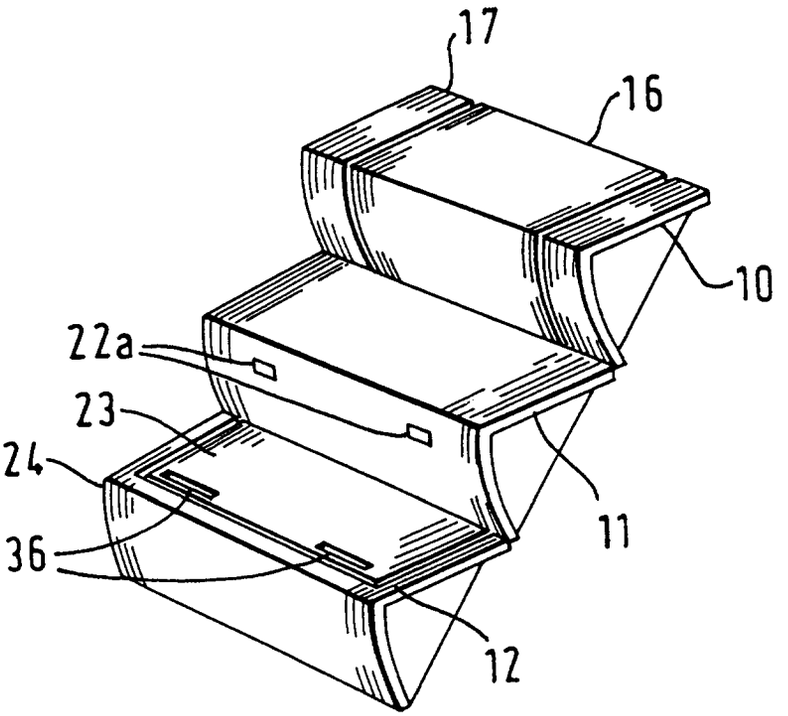


FIG. 20 (PRIOR ART)