

ELEVATOR ROPE CLEANING DEVICE

FIELD

Embodiments described herein relate generally to an elevator rope cleaning device used for cleaning a
5 wire rope.

BACKGROUND

In elevators, a wire rope is used as a main rope or compensating rope for coupling a car or a counterweight. The wire rope is made by winding a
10 plurality of strands around a fiber core, each strand being formed by twisting thin steel wires together.

Grease is usually applied to the wire rope for lubrication or rust prevention. However, if the wire rope is used for a long time, hardening of grease or
15 adhering of dust to grease may impede elevator operation. Therefore, maintenance such as regularly removing old grease and applying new grease is required.

Generally, workers clean the wire rope with a
20 scraper or a brush. However, such cleaning by hand is hard work and time consuming. Further, it is difficult to remove grease in grooves (between strands) on the rope by hand.

Therefore, rope cleaning devices for automatically
25 cleaning wire ropes have been conceived. For example, there has been a rope cleaning device including a member with a hole in the shape corresponding to the

outer circumference of a wire rope. The member is attached to the wire rope. The rope cleaning device removes grease by rotating the member around the axis of the rope.

5 However, the above-mentioned rope cleaning device is used for one wire rope, and cannot clean a plurality of wire ropes at the same time. A plurality of wire ropes are coupled to a car or a counterweight, and the ropes are very close to one another. Thus, if the rope
10 cleaning device is attached to each rope, the rope cleaning device interferes with the adjacent rope, and grease removed from one rope by the rope cleaning device may adhere again to the adjacent rope.

 The object of the present invention is to provide
15 an elevator rope cleaning device capable of efficiently removing grease from a plurality of wire ropes.

SUMMARY

 In general, according to one embodiment, an elevator rope cleaning device includes a pair of bases
20 configured to be attached to a plurality of wire ropes to be cleaned to interpose the wire ropes altogether therebetween from sides, each of the bases including an upper tier and a lower tier arranged in an axial direction of the wire ropes; a spacer for interval
25 adjustment interposed between the bases; and a plurality of rotating members rotatably attached to the wire ropes zigzag in correspondence with positions of

the upper tiers and the lower tiers of the bases, and configured to be brought into contact with the upper tiers and lower tiers of the bases by movement of the wire ropes in one direction and rotate, thereby removing grease attached to the wire ropes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing a configuration of an elevator rope cleaning device according to the first embodiment.

FIG. 2 is a perspective view showing a configuration of a rotating member used for the rope cleaning device according to the first embodiment.

FIG. 3 shows the relationship between an upper rotating member and a lower rotating member of the rope cleaning device according to the first embodiment.

FIG. 4 shows the relationship between the lower rotating member and a scraper of the rope cleaning device according to the first embodiment.

FIG. 5 is a perspective view showing a configuration of a rotation support mechanism of the rope cleaning device according to the first embodiment.

FIG. 6 is a perspective view showing part of the rotation support mechanism of the rope cleaning device according to the first embodiment.

FIG. 7 shows the relationship between the rotating member and the rotation support mechanism of the rope cleaning device according to the first embodiment.

FIG. 8A shows a spacer used for a rope having a small diameter in the rope cleaning device according to the first embodiment.

5 FIG. 8B shows a spacer used for a rope having a large diameter in the rope cleaning device according to the first embodiment.

FIG. 9 shows a case where the rope cleaning device according to the first embodiment is applied to ropes having a small diameter.

10 FIG. 10 shows a case where the rope cleaning device according to the first embodiment is applied to ropes having a large diameter.

15 FIG. 11 is a diagram for explanation of a method for cleaning main ropes of an elevator according to the first embodiment, and shows a case where cleaning is performed by attaching the rope cleaning device to main ropes on the car side.

20 FIG. 12 is a diagram for explanation of a method for cleaning main ropes of an elevator according to the first embodiment, and shows a case where cleaning is performed by attaching the rope cleaning device to main ropes on the counterweight side.

25 FIG. 13 is a diagram for explanation of a method for cleaning compensating ropes of an elevator according to the first embodiment, and shows a case where cleaning is performed by attaching the rope cleaning device to compensating ropes on the car side.

FIG. 14 is a diagram for explanation of a method for cleaning compensating ropes of an elevator according to the first embodiment, and shows a case where cleaning is performed by attaching the rope cleaning device to compensating ropes on the counterweight side.

FIG. 15 is a perspective view showing a configuration of a rotation support mechanism in the rope cleaning device according to the second embodiment.

FIG. 16 is a perspective view showing part of the rotation support mechanism of the rope cleaning device according to the second embodiment.

FIG. 17 shows the relationship between the rotating member and the rotation support mechanism of the rope cleaning device according to the second embodiment.

FIG. 18 is a perspective view showing a configuration of the rope cleaning device according to the third embodiment.

FIG. 19 shows a configuration of stop members in the rope cleaning device according to the third embodiment.

FIG. 20 is a perspective view showing a configuration of the rope cleaning device according to the fourth embodiment.

FIG. 21 is a perspective view showing a

configuration of the rope cleaning device according to the fifth embodiment.

FIG. 22 is a perspective view showing a configuration of an oiling member used for the cleaning device according to the fifth embodiment.

DETAILED DESCRIPTION

Referring to the drawings, embodiments will be described below.

(First Embodiment)

FIG. 1 is a perspective view showing a configuration of a rope cleaning device of an elevator according to the first embodiment. FIG. 2 is a perspective view showing a configuration of a rotating member used for the rope cleaning device according to the first embodiment.

As shown in FIG. 1, a rope cleaning device 11 comprises a pair of bases 12a, 12b, each comprising upper and lower tiers arranged in the axial direction of a plurality of wire ropes 10a-10f to be cleaned. Wire ropes 10a-10f are, for example, main ropes or compensating ropes of an elevator (see FIGS. 11-14).

Base 12a comprises an upper tier 13a and a lower tier 14a. Base 12b comprises an upper tier 13b and a lower tier 14b. The bases 12a, 12b are installed to interpose wire ropes 10a-10f altogether therebetween from the sides. Spacers 16 for interval adjustment are interposed between the bases 12a, 12b. The spacers 16

prevent interference between the bases 12a, 12b and wire ropes 10a-10f. The spacers 16 are each made of a cylindrical member having a predetermined length.

5 The bases 12a, 12b are assembled by inserting fixing bolts 18, 19 in cavities of the spacers 16. Fixing bolt 18 is inserted from each end of upper tier 13a of base 12a through a spacer 16 to upper tier 13b of base 12b. Fixing bolt 19 is inserted from each end of upper tier 14a of base 12b through a spacer 16 to
10 upper tier 14b of base 12b. Fixing bolt 19 is also used as a pin to attach a grease correction member 20, which will be described later, to lower tier 14a of base 12a.

15 A plurality of rotating members 15 are arranged zigzag at two levels for wire ropes 10a-10f in correspondence with the positions of the upper tiers 13a, 13b and lower tiers 14a, 14b of the bases 12a, 12b. Those rotating members 15 are used as grease removal members for removing grease from wire ropes
20 10a-10f.

For the sake of simplicity, a rotating member 15 attached to wire rope 10a will be representatively described.

25 As shown in FIG. 2, the rotating member 15 is cylindrical and has, at its center, an engagement hole in a shape corresponding to the uneven shape of the outer circumference of wire rope 10a. The rotating

member 15 is made of an elastic member such as a urethane resin, and comprises a split 22 formed between the engagement hole 21 and the outer circumference. The rotating member 15 is attached to wire rope 10a by opening the split 22 by hand. After attachment, the split 22 may be clamped by, for example, a bolt (not shown).

The diameter d of the engagement hole 21 is substantially the same as the diameter w of wire rope 10a. When the rotating member 15 is attached to wire rope 10a, the engagement hole 21 comes into close contact with the outer circumference of wire rope 10a. Therefore, the rotating member 15 can remove grease attached to wire rope 10a by rotating along the twist of wire rope 10a.

The diameter D of the rotating member 15 is designed according to rope intervals P so that grease removed by the upper rotating member 15 flows down wire rope 10b adjacent to the rotating member 15 to the lower rotating members 15.

If the rotating member 15 is in contact with adjacent wire rope 10b, the rotating member 15 may not smoothly rotate because of friction, and may damage wire rope 10b. Thus, the diameter D of the rotating member 15 is designed to be slightly smaller than the rope interval P so that the rotating member 15 stays a few millimeters away from wire rope 10b.

The rotating members 15 attached to the other wire ropes 10b-10f also have the configuration shown in FIG. 2.

FIG. 3 shows the relationship between an upper rotating member and a lower rotating member of the rope cleaning device according to the first embodiment.

Grease removed from wire rope 10a by rotation of the upper rotating member 15 flows down the adjacent wire rope 10b to the lower rotating member 15. In this case, grease removed from wire rope 10a can be attached to wire rope 10b by rotation of the upper rotating member 15 even when the outer circumference of the upper rotating member 15 is not in direct contact with wire rope 10b.

A grease collection member 20 having an approximately U-shaped cross-section is attached to a side surface of the lower tier 14a of base 12a by fixing bolts 19. Scrapers 23 are provided on the upper surface of the lower tier 14a. The positions of the scrapers 23 are adjustable by a slide mechanism 24.

The scrapers 23 remove grease accumulated on the lower rotating members 15. The scrapers 23 are provided between the lower rotating members 15 and the grease collection member 20, and used as guiding members for guiding grease removed from the lower rotating members 15 to the grease collection member 20.

The slide mechanism 24 adjusts the attachment

positions of the scrapers 23. The slide mechanism 24 comprises a long hole 25 extending in a longitudinal direction of lower tier 14a, and clamps 26 which fix the scrapers 23 at arbitrary positions of the long hole 25. With the slide mechanism 24, the scrapers 23 can be attached at positions corresponding to the installation positions of the lower rotating members 15 regardless of the number of ropes or intervals between ropes.

FIG. 4 shows the relationship between the lower rotating member and a scraper of the rope cleaning device according to the first embodiment.

The scrapers 23 are interposed between the lower rotating members 15 and the grease collection member 20, remove grease accumulated on the rotating members 15 and guide the grease to the grease collection member 20. The scrapers 23 are attached to stay slightly (a few millimeters) away from the lower rotating members 15 so that the scrapers 23 do not interfere with rotation of the lower rotating members 15.

Next, the configuration of a rotation support mechanism 30 will be described.

When wire ropes 10a-10f are moved in the direction indicated by arrow A in FIG. 1 (downward), the bottoms of the rotating members 15 attached to wire ropes 10a-10f are brought into contact with the upper tiers 13a, 13b and lower tiers 14a, 14b of the bases 12a, 12b.

As shown in FIG. 2, the rotating members 15 each have the engagement hole 21. Therefore, when the rotating members 15 come into contact with the upper tiers 13a, 13b and lower tiers 14a, 14b of the bases 12a, 12b, the rotating members 15 rotate along the twists of wire ropes 10a-10f while maintaining their positions. To support this rotation of the rotating members 15, the rotation support mechanism 30 is provided on each of the upper tiers 13a, 13b and lower tiers 14a, 14b of the bases 12a, 12b.

The rotation support mechanism 30 provided on the upper tiers 13a, 13b of the bases 12a, 12b will be representatively described. The rotation support mechanism 30 provided on the lower tiers 14a, 14b of the bases 12a, 12b has the same configuration.

FIG. 5 is a perspective view showing a configuration of a rotation support mechanism of the rope cleaning device according to the first embodiment. FIG. 6 is a perspective view showing part of the rotation support mechanism. FIG. 7 shows the relationship between the rotating member and the rotation support mechanism of the rope cleaning device.

The rotation support mechanism 30 comprises a plurality of balls 31 arranged in line on each of the upper tiers 13a, 13b of the bases 12a, 12b, and support members 32 rotatably supporting the balls 31, and rotatably supports the upper rotating members 15 on the

upper surfaces of the upper tiers 13a, 13b.

As mentioned above, when wire ropes 10a-10f are moved in one direction, the bottoms of the upper rotating members 15 are brought into contact with the upper tiers 13a, 13b of the bases 12a, 12b and rotate at the positions. Since the balls 31 of the rotation support mechanism 30 are interposed between the rotating members 15 and the upper tiers 13a, 13b, the rotating members 15 can smoothly rotate on the balls 31.

The same applies to the lower rotating members 15. When the bottoms of the lower rotating members 15 are brought into contact with the lower tiers 14a, 14b of the bases 12a, 12b, the lower rotating members 15 can smoothly rotate on the balls 31 of the rotation support mechanism 30 provided on the lower tiers 14a, 14b.

FIG. 8 shows examples of the spacer used for the rope cleaning device.

Various types of spacers 16 for adjusting the distance between the bases 12a, 12b are prepared for different diameters of wire ropes to be cleaned. Spacer 16a shown in FIG. 8A is used for a rope having a small diameter. Spacer 16b shown in FIG. 8B is used for a rope having a large diameter. Spacer 16a differs from spacer 16b in length in the axial direction. Spacer 16b is longer.

Further, various types of rotating members 15 are

prepared for different diameters of wire ropes to be cleaned. FIG. 9 shows a case where the rope cleaning device is applied to ropes having a small diameter. FIG. 10 shows a case where the rope cleaning device is applied to ropes having a large diameter. Rotating member 15a differs from rotating member 15b in the diameter d of the engagement hole 21 and the diameter D of the whole body shown in FIG. 2. Rotating member 15b is larger.

10 Next, the case where main ropes and compensating ropes of an elevator are cleaned using the rope cleaning device 11 will be described.

15 FIG. 11 is a diagram for explanation of a method for cleaning main ropes of an elevator according to the first embodiment.

20 A controller 100 is installed in a machine room (not shown), and performs operation control of the entire elevator including drive control of a hoisting machine 101. The hoisting machine 101 is installed in the machine room together with the controller 100. A main sheave (traction sheave) 102 is attached to the drive axis of the hoisting machine 101. Main ropes 103 are wound around the outer circumference of the main sheave 102. One end of each of the main ropes 103 is coupled to a car 104, and the other end is coupled to a counterweight (C/W) 105.

25 When the hoisting machine 101 is driven, the main

sheave 102 rotates. Accordingly, the main ropes 103 wound around the main sheave 102 move, and the car 104 and counterweight 105 move up and down in opposite directions.

5 The compensating ropes 107 are coupled via a compensating sheave 106 to the bottoms of the car 104 and the counterweight 105. The compensating ropes 107 move in accordance with the up and down movement of the car 104 and the counterweight 105.

10 The case where the main ropes 103 of the elevator are cleaned using the rope cleaning device 11 will be described.

 Before the main ropes 103 are cleaned, the car 104 is moved to the top floor, and the rope cleaning device
15 11 is fixed to a predetermined place in the machine room (such as an installation rack of the hoisting machine 101) with a fixing bracket (not shown). In the case of an elevator without a machine room, the rope cleaning device 11 is fixed at the uppermost part in
20 the hoist way.

 The main ropes 103 correspond to wire ropes 10a-10f shown in FIG. 1. The bases 12a, 12b of the rope cleaning device 11 are installed to interpose wire ropes 10a-10f therebetween from sides. Spacers 16 for
25 interval adjustment are interposed between the bases 12a, 12b, and the upper tiers 13a, 13b are joined by fixing bolts 18. The grease collection member 20 is

attached to the lower tier 14a of base 12b, and the lower tiers 14a, 14b are joined by fixing bolts 19.

Then, the rotating members 15 shown in FIG. 5 are attached zigzag at two levels for wire ropes 10a-10f in
5 correspondence with the positions of the upper tiers 13a, 13b and lower tiers 14a, 14b of the bases 12a, 12b. The upper rotating members 15 are located on the upper tiers 13a, 13b of the bases 12a, 12b. The lower rotating members 15 are located on the lower tiers 14a,
10 14b of the bases 12a, 12b. The scrapers 23 are attached at positions corresponding to the installation positions of the lower rotating members 15 by use of the slide mechanism 24.

After the rope cleaning device 11 is installed in
15 the above-described manner, the car 104 of the elevator is moved. The case 104 is moved in such a direction that the rotating members 15 attached to wire ropes 10a-10f are pushed to the bases 12a, 12b of the rope cleaning device 11. Namely, when the rope cleaning
20 device 11 is installed above the car 104 as shown in FIG. 11, the car 104 is moved from the top floor to the bottom floor.

Since the rope cleaning device 11 is fixed at a position, the rotating members 15 attached to wire
25 ropes 10a-10f are brought into contact with the bases 12a, 12b of the rope cleaning device 11 via the rotation support mechanism 30. Then, the rotating

members 15 scrape grease attached to wire ropes 10a-10f while rotating at the same positions.

Grease attached to wire ropes 10a, 10c, 10e is scraped by the upper rotating members 15. The scraped grease is accumulated on the upper surfaces of the rotating members 15, and attaches to the adjacent wire ropes 10b, 10d, 10f to flow down to the lower rotating members 15 when the amount of accumulated grease exceeds a predetermined value.

Grease attached to wire ropes 10b, 10d, 10f is scraped by the lower rotating members 15, and accumulated on the upper surfaces of the rotating members 15. Since the scrapers 23 are provided for the lower rotating members 15, the grease accumulated on the upper surfaces of the lower rotating members 15 is scraped by the scrapers 23 and flows down to the grease collection member 20.

Accordingly, grease attached to the main ropes 103 can be easily removed only by moving the car 104. The cleaning is completed by disposing grease accumulated in the grease collection member 20 of the rope cleaning device 11.

In the example shown in FIG. 11, the rope cleaning device 11 is attached to the main ropes 103 on the car 104 side. However, the rope cleaning device 11 may be attached to the main ropes 103 on the counterweight 105 side for cleaning.

FIG. 12 shows a case where the rope cleaning device 11 is attached to the main ropes 103 on the counterweight 105 side. Before cleaning, the car 104 is moved to the bottom floor (the counterweight 105 is moved to the top floor), and the rope cleaning device 11 is fixed in the machine room or at the uppermost part in the hoist way. From this condition, the car 104 is moved from the bottom floor to the top floor so that the rotating members 15 attached to the main ropes 103 (wire ropes 10a-10f) on the counterweight 105 side are brought into contact with the bases of 12a, 12b of the rope cleaning device 11, and grease is removed by rotation of the rotating members 15.

The compensating ropes 107 can also be cleaned by the rope cleaning device 11. Generally, the compensating ropes 107 are located lower in the hoist way than the main ropes 103, and thus have more grease and dust accumulated thereon.

FIGS. 13 and 14 are diagrams for explanation of a method for cleaning compensating ropes of an elevator according to the first embodiment. FIG. 13 shows the case where cleaning is performed by attaching the rope cleaning device to the compensating ropes on the car side, and FIG. 14 shows the case where cleaning is performed by attaching the rope cleaning device to the compensating ropes on the counterweight side.

When the compensating ropes 107 are cleaned, the

rope cleaning device 11 is fixed in a pit in a hoist way using, for example, a fixing bracket. In this case, the compensating ropes 107 correspond to wire ropes 10a-10f shown in FIG. 1. The compensating ropes
5 107 are cleaned by moving the car 104 in such a direction that the rotating members 15 attached to wire ropes 10a-10f are pushed to the bases 12a, 12b of the rope cleaning device 11.

Namely, when the rope cleaning device 11 is
10 attached to the compensating ropes 107 on the car 104 side as shown in FIG. 13, the car 104 is moved from the top floor to the bottom floor. When the rope cleaning device 11 is attached to the compensating ropes 107 on the counterweight 105 side as shown in FIG. 14, the car
15 104 is moved from the bottom floor to the top floor. Accordingly, the rotating members 15 are brought into contact with the bases 12a, 12b of the rope cleaning device 11 via the rotation support mechanism 30, and can scrape grease attached to wire ropes 10a-10f while
20 rotating at the same positions.

The main ropes 103 and compensating ropes 10 have different diameters and are provided at different intervals. As explained with reference to FIGS. 8-10, the rope cleaning device 11 can be applied to both of
25 the main ropes 13 and compensating ropes 107 by changing the rotating members 15 and spacers 16 in accordance with the diameter of the wire ropes to be

cleaned.

As described above, with the rope cleaning device 11, grease can be easily removed from wire ropes 10a-10f by moving wire ropes 10a-10f in one direction without workers manually cleaning wire ropes 10a-10f one by one. Therefore, the load on workers can be greatly reduced, and even when there are many ropes, cleaning can be completed in a short time.

(Second Embodiment)

Next, the second embodiment will be described.

FIG. 15 is a perspective view showing a configuration of a rotation support mechanism in the rope cleaning device according to a second embodiment. FIG. 16 is a perspective view showing part of the rotation support mechanism. FIG. 17 shows the relationship between the rotating member and the rotation support mechanism.

The rotation support mechanism 40 comprises a plurality of rings 41 and support members 42 rotatably supporting the rings 41, and rotatably supports the upper rotating members 15 on side surfaces of the upper tiers 13a, 13b which face wire ropes 10a-10f. The rings 41 and support members 42 are arranged in line on each of the side surfaces of the upper tiers 13a, 13b of the bases 12a, 12b.

The same rotation support mechanism 40 is provided on the lower tiers 14a, 14b of the bases 12a, 12b,

although it is not shown. The rotation support mechanism 40 provided on the lower tiers 14a, 14b rotatably support the lower rotating members 15 on side surfaces of the lower tiers 14a, 14b.

5 The upper rotating members 15 attached to wire ropes 10a, 10c, 10d are located on the rings 41 of the rotation support mechanism 40. Therefore, when wire ropes 10a-10f are moved in one direction, the upper rotating members 15 can smoothly rotate on the rings 41
10 of the rotation support mechanism 40.

 The same applies to the lower rotating members 15, and the lower rotating members 15 can smoothly rotate on the rings 41 of the rotation support mechanism 40 provided on the lower tiers 14a, 14b of the bases 12a,
15 12b.

(Third Embodiment)

Next, the third embodiment will be described.

As described above, cleaning of wire ropes 10a-10f is performed by moving wire ropes 10a-10f in such a
20 direction that the rotating members 15 attached to wire ropes 10a-10f zigzag are pushed to the bases 12a, 12b of the rope cleaning device 11. At that time, wire ropes 10a-10f may be moved in the reverse direction by, for example, workers' mistake. In this case, the upper
25 rotating members 15 may be detached from the rope cleaning device 11, and break the elevator by, for example, hitting the main sheave 102 shown in FIG. 11.

In the third embodiment, the rope cleaning device 11 is provided with a function of preventing the upper rotating members 15 from being detached from the rope cleaning device 11 by such reverse-direction movement of wire ropes 10a-10f.

FIG. 18 is a perspective view showing a configuration of the rope cleaning device according to the third embodiment. FIG. 19 shows a configuration of stop members in the rope cleaning device according to the third embodiment. The basic configuration of the rope cleaning device 11 is the same as that in the first embodiment, and different parts will be described below.

The bases 12a, 12b of the rope cleaning device 11 comprise upper tiers 13a, 13b and lower tiers 14a, 14b, and are installed to interpose wire ropes 10a-10f to be cleaned therebetween from sides. Spacers 16 for interval adjustment are provided between the bases 12a, 12b. A pair of L-shaped stop members 50a, 50b are attached by fixing bolts 18 to the upper tiers 13a, 13b of the bases 12a, 12b from sides of the upper tiers 13a, 13b to embrace the upper tiers 13a, 13b.

The stop members 50a, 50b prevent the upper rotating members 15 attached to wire ropes 10a, 10c, 10e from being detached from the rope cleaning device 11. Tips 51a, 51b of the stop members 50a, 50b are bent toward the rope. On the tips 51a, 51b, rotation

support mechanisms 52a, 52b, which are the same as rotation support mechanism 30 described with reference to FIGS. 5-7, are provided.

5 With this configuration, even when wire ropes 10a-10f are moved in the reverse direction for cleaning by mistake, the reverse-direction movement is stopped by the upper rotating members 15 hitting the tips 51a, 51b of the stop members 50a, 50b. Since the rotation support mechanisms 52a, 52b are provided on the inner
10 surfaces of the tips 51a, 51b, only reverse-direction movement can be stopped without preventing rotation of the rotating members 15.

If wire ropes 10a-10f are moved in the reverse direction, the lower rotating members 15 stop as they
15 come into contact with the lower surfaces of the upper tiers 13a, 13b, and thus are detached from the rope cleaning device 11. The rotation support mechanisms 52a, 52b may be provided on the lower surfaces of the upper tiers 13a, 13b as they are on the tips 51a, 51b
20 of the stop members 50a, 50b.

(Fourth Embodiment)

Next, the fourth embodiment will be described.

FIG. 20 is a perspective view showing a configuration of the cleaning device according to the
25 fourth embodiment. The basic configuration of the rope cleaning device 11 is the same as that in the first embodiment, and different parts will be described

below.

The bases 12a, 12b of the rope cleaning device 11
comprise upper tiers 13a, 13b and lower tiers 14a, 14b,
and are installed to interpose wire ropes 10a-10f to be
5 cleaned therebetween. A spacer 16 for adjustment is
provided between the bases 12a, 12b. A rope moving
distance detector 60 is attached by fixing bolts 18 to
the upper tiers 13a, 13b of the bases 12a, 12b.

The rope moving distance detector 60 detects a
10 moving distance of wire ropes 10a-10f, and comprises a
roller 61, a counter 62 and an indicator 63. The
roller 61 comes into contact with one of wire ropes
10a-10f (rope 10f in FIG. 20), and rotates as wire
ropes 10a-10f move.

15 The counter 62 counts the number of rotations of
the roller 61, and calculates a rope moving distance
from the count value. The indicator 63 indicates the
rope moving distance calculated by the counter 62.

With this configuration, when grease is removed by
20 moving wire ropes 10a-10f, the moving distance of wire
ropes 10a-10f is detected by the rope moving distance
detector 60, and the value is indicated by the
indicator 63.

When wire ropes 10a-10f are cleaned, a worker is
25 at a place where the rope cleaning device 11 is fixed
(for example, the machine room). By checking the
indicator 63 of the rope moving distance detector 60

attached to the rope cleaning device 11 while cleaning, the worker can tell the current rope moving distance (cleaning distance) and tell the progress of the cleaning from the rope moving distance.

5 Comparison of the rope moving distance and the amount of grease accumulated in the grease collection member 20 shows which part of the ropes much grease is attached to, and helps maintenance.

10 In the example shown in FIG. 20, the rope moving distance detector 60 is provided on the upper tiers 13a, 13b of the bases 12a, 12b. However, the rope moving distance detector 60 may be provided on the lower tiers 14a, 14b.

15 Further, the rope moving distance detector 60 may optically detect the rope moving distance by using, for example, infrared light, instead of using the roller 61 as shown in FIG. 20.

(Fifth Embodiment)

Next, the fifth embodiment will be described.

20 FIG. 21 is a perspective view showing a configuration of the cleaning device according to the fifth embodiment. FIG. 22 is a perspective view showing a configuration of an oiling member used for the cleaning device according to the fifth embodiment.

25 The basic configuration of the rope cleaning device 11 is the same as that in the first embodiment, and different parts will be described below.

The bases 12a, 12b of the rope cleaning device 11
comprise upper tiers 13a, 13b and lower tiers 14a, 14b,
and are installed to interpose wire ropes 10a-10f to be
cleaned therebetween from sides. Spacers 16 for
5 interval adjustment are provided between the bases 12a,
12b. A plurality of rotating members 15, which are
grease removal members, are concentrically disposed on
oiling members 70 having the same shape as the rotating
members 15. The oiling members 70 and the rotating
10 members 15 disposed thereon are arranged zigzag on the
upper tiers 13a, 13b and lower tiers 14a, 14b of the
bases 12a, 12b.

For the sake of simplicity, the oiling member 70
attached to wire rope 10a will be representatively
15 described.

The oiling member 70 has an engagement hole 71 in
a shape corresponding to the uneven shape of the outer
circumference of wire rope 10a. The diameter D_o of the
oiling member 70 is equal to the diameter D of the
20 rotating member 15, and the diameter d_o of engagement
hole 71 is equal to the diameter d of engagement hole
21. On the inner surface of the engagement hole 71,
i.e., the surface which comes into contact with the
rope, a sponge 73 dampened with grease is provided.

25 A split 72 is formed between the engagement hole
71 and the outer circumference of the oiling member 71.
The oiling member 70 is attached to wire rope 10a by

opening the split 72 by hand. After attachment, the split 72 may be clamped by, for example, a bolt (not shown).

5 The oiling members 70 attached to the other wire ropes 10b-10f has the same configuration.

Generally, a moderate amount of grease needs to be applied to wire ropes 10a-10f for lubrication or rust prevention. However, long-term use causes hardening of grease or attachment of dust, which impedes elevator
10 operation. Therefore, grease needs to be removed and new grease needs to be applied regularly.

For this reason, the sponges 73 of the oiling members 70 are dampened with grease, and the oiling members 70 and the rotating members 15 disposed thereon
15 are rotatably attached to wire ropes 10b-10f zigzag. In advance, the upper rotating members 15 and oiling members 70 are provided on the upper tiers 13a, 13b of the bases 12a, 12b. The lower rotating members 15 and oiling members 70 are provided on the lower tiers 14a,
20 14b of the bases 12a, 12b. Further, scrapers 23 are attached to the lower rotating members 15 and oiling members 70, and positions of the scrapers 23 are adjusted by the slide mechanism 24 in advance.

From this condition, wire ropes 10a-10f are moved
25 in such a direction that the rotating members 15 and oiling members 17 are pushed to the bases 12a, 12b of the rope cleaning device 11. Accordingly, while

removing old grease from wire ropes 10a-10f by rotation
of the rotating members 15, new grease can be applied
to wire ropes 10a-10f by rotation of the oiling members
70. Namely, the rope cleaning device 11 can remove old
5 grease and apply new grease concurrently. Therefore,
workers need not apply grease by hand, and special
apparatus for grease application need not be installed
in, for example, a machine room.

According to at least one of the embodiments
10 described above, an elevator rope cleaning device
capable of efficiently removing grease from a plurality
of wire ropes can be provided.

While certain embodiments have been described,
these embodiments have been presented by way of example
15 only, and are not intended to limit the scope of the
inventions. Indeed, the novel embodiments described
herein may be embodied in a variety of other forms;
furthermore, various omissions, substitutions and
changes in the form of the embodiments described herein
20 may be made without departing from the spirit of the
inventions. The accompanying claims and their
equivalents are intended to cover such forms or
modifications as would fall within the scope and spirit
of the inventions.

WHAT IS CLAIMED IS:

1. An elevator rope cleaning device,
characterized by comprising:

5 a pair of bases configured to be attached to a
plurality of wire ropes to be cleaned to interpose the
wire ropes altogether therebetween from sides, each of
the bases including an upper tier and a lower tier
arranged in an axial direction of the wire ropes;

10 a spacer for interval adjustment interposed
between the bases; and

a plurality of rotating members rotatably attached
to the wire ropes zigzag in correspondence with
positions of the upper tiers and the lower tiers of the
bases, and configured to be brought into contact with
15 the upper tiers and lower tiers of the bases by
movement of the wire ropes in one direction and rotate,
thereby removing grease attached to the wire ropes.

2. The elevator rope cleaning device of Claim 1,
characterized in that the rotating members are
20 cylindrical and respectively have center holes in a
shape corresponding to uneven shapes of outer
circumferences of the wire ropes.

3. The elevator rope cleaning device of Claim 1,
characterized in that grease removed by upper rotating
25 members of the rotating members flows down wire ropes
adjacent to the upper rotating members to lower
rotating members of the rotating members.

4. The elevator rope cleaning device of Claim 3, characterized by further comprising:

scrapers configured to remove grease from the lower rotating members; and

5 a grease collection member configured to collect grease removed by the scrapers.

5. The elevator rope cleaning device of Claim 1, characterized by further comprising a rotation support mechanism configured to support rotation of the
10 rotating members when the rotating members are in contact with the upper tiers and lower tiers of the bases.

6. The elevator rope cleaning device of Claim 5, characterized in that the rotation support mechanism is
15 configured to rotatably support the rotating members on upper surfaces of the upper tiers and lower tiers of the bases.

7. The elevator rope cleaning device of Claim 5, characterized in that the rotation support mechanism is
20 configured to rotatably support the rotating members on side surfaces of the upper tiers and lower tiers of the bases, the side surfaces facing the wire ropes.

8. The elevator rope cleaning device of Claim 1, characterized by further comprising a stop member
25 configured to prevent the upper rotating members from being detached from the upper tiers of the bases.

9. The elevator rope cleaning device of Claim 8,

characterized in that a rotation support member is provided on a portion of the stop member which the upper rotating members come into contact with.

10 10. The elevator rope cleaning device of Claim 1, characterized by further comprising a moving distance detector provided on the upper tiers or lower tiers of the bases and configured to detect a moving distance of the wire ropes.

10 11. The elevator rope cleaning device of Claim 1, characterized by further comprising a plurality of oiling members configured to apply new grease to the wire ropes while the rotating members are removing grease from the wire ropes.

15 12. The elevator rope cleaning device of Claim 11, characterized in that the oiling members are identical in shape with the rotating members and rotatably attached to the wire ropes with the rotating members disposed thereon.