

ELEVATOR GUIDE RAIL OILING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001]

The present invention relates to an elevator guide rail oiling device for oiling a guide surface of a guide rail of an elevator.

2. Description of the Background Art

[0002]

As a background-art elevator guide rail oiling device, there has been known a configuration in which an oiling case is attached to a portion moving up/down in connection with a cage, and lubricating oil and an oil permeable member are disposed in the oiling case so that the oil permeable member is supplied with the lubricating oil and supplies the oil to a guide surface of a guide rail while coming in contact with the guide surface. As for supply of lubricating oil to an oil permeable member, there have been known a configuration in which at least a part of an oil permeable member made of reinforced fibers is soaked into lubricating oil in an oiling case (for example, see JP-A-10-87229, JP-A-11-92053, JP-A-11-100187, JP-A-2000-247561 or JP-A-2007-15782) and a configuration in which provided is an impregnated member having one end portion soaked into lubricating oil in an oiling case, and the other

end portion connected to an oil permeable member disposed in another position of the oiling case so that the lubricating oil sucked up by the impregnated member can be supplied to the oil permeable member (for example, see JP-A-54-3745, JP-A-2000-136077 or JP-A-2006-264857).

[0004]

However, in the background-art elevator guide rail oiling device, it is difficult to supply an appropriate quantity of lubricating oil to the guide surface. That is, in the background-art oiling device disclosed in JP-A-10-87229, JP-A-11-92053, JP-A-11-100187, JP-A-2000-247561 or JP-A-2007-15782, oil permeability of the oil permeable member made of reinforced fibers and soaked into the lubricating oil in the oiling case is so excellent that the oil permeable member may supply excessive oil to the guide surface. In addition, since the volume of the oil permeable member to be used, which is made of reinforced fibers, is large, the oiling device becomes expensive. In addition, in the background-art oiling device disclosed in JP-A-54-3745, JP-A-2000-136077 or JP-A-2006-264857, which describes that supply of excessive oil may occur, there is therefore a proposal for a structure for recovering the excessive oil. However, the configuration for regulating the excessive oil supply is complicated, and it is not easy to adjust the configuration.

SUMMARY OF THE INVENTION

[0005]

It is therefore an object of the invention to provide an elevator guide rail oiling device which can perform good oil supply while regulating excessive oil supply easily.

[0006]

In order to attain the aforementioned object, according to a first configuration of the invention, there is provided an elevator guide rail oiling device including: a guide surface oiling portion which can touch a guide surface of a guide rail; an oiling case which receives lubricating oil so that the lubricating oil can be sucked up and supplied to the guide surface oiling portion; an oiling sheet unit which is disposed in the oiling case and which includes an oil permeable sheet and a pair of oil impermeable sheets holding the oil permeable sheet therebetween, the oil permeable sheet touching the guide surface oiling portion so that the oil permeable sheet can supply the oil to the guide surface oiling portion; a sucking member which is disposed under the oiling sheet unit so that a sucking-side portion as a part of the sucking member can be soaked into the lubricating oil in the oiling case; and a connecting oil guide member which guides the lubricating oil sucked up by the sucking member to the oil permeable sheet.

[0007]

According to this configuration, the lubricating oil sucked up from the oiling case through the sucking member is

supplied to the oil permeable sheet. Since the oil permeable sheet is held between the oil impermeable sheets disposed above and below the oil permeable sheet, lubricating oil can be prevented from being supplied excessively and dropping down as in the case where the oil permeable sheet is used alone, while a required amount of supplied lubricating oil can be secured. In addition, since the oil permeable sheet does not have a large volume as in the background art but has a sheet-like shape, the sectional area or width of the oil permeable sheet which decides the amount of lubricating oil supplied in a lubricating oil supply route can be easily adjusted to increase/decrease.

[0008]

According to a second configuration of the invention, there is provided an elevator guide rail oiling device described in the first configuration, wherein: the oil permeable sheet has a main body portion which is held between the pair of oil impermeable sheets, and the connecting oil guide member is formed integrally with the main body portion so as to protrude outward from the oil impermeable sheets, and folded so as to be able to touch the sucking member.

[0009]

According to this configuration, the folded connecting oil guide member is brought into contact with the sucking member so that the lubricating oil can be guided from the sucking member

to the oil permeable sheet of the oiling sheet unit through the connecting oil guide member. In addition, it is easy to form the connecting oil guide member, and the sectional area or width of the connecting oil guide member can be changed to adjust the amount of supplied lubricating oil easily.

[0010]

According to a third configuration of the invention, there is provided an elevator guide rail oiling device described in the first configuration, wherein: the oiling sheet unit includes a plurality of oiling sheet units stacked, a spacer made of an oil impermeable sheet is disposed between adjacent ones of the oiling sheet units, the sucking member is disposed under the lowest one of the oiling sheet units, and the connecting oil guide member includes a plurality of connecting oil guide members which connect the oil permeable sheets of the oiling sheet units with the sucking member respectively.

[0011]

According to this configuration, the number of oiling sheet units can be increased or decreased in accordance with the amount of lubricating oil supplied to the guide surface of the guide rail. In addition, since the spacer is formed out of an oil impermeable sheet and held between adjacent ones of the oiling sheet units, movement of the lubricating oil from one oiling sheet unit to another can be limited by the spacer. Accordingly, oil supply to the guide surface of the guide rail

in accordance with each oiling sheet unit can be taken into consideration to make it easy to adjust the balance among the oiling sheet units or to adjust the amount of lubricating oil supplied by each oiling sheet unit.

[0012]

According to a fourth configuration of the invention, there is provided an elevator guide rail oiling device described in the first configuration, wherein: the oil permeable sheet is not thicker than 2 mm.

[0013]

According to this configuration, the oiling sheet unit uses the oil permeable sheet which is not thicker than 2 mm and which is held between the oil impermeable sheets disposed above and below the oil permeable sheet. Accordingly, excessive oil supply can be prevented easily while an appropriate amount of lubricating oil can be supplied. In addition, the sectional area or width of the oil permeable sheet can be changed and adjusted easily, and the oil permeable sheet can be formed into a desired shape easily. Further, the oil permeable sheet can be made small in thickness direction and simple, as compared with the case where a member having a large volume as in the background art is used.

[0014]

According to a fifth configuration of the invention, there is provided an elevator guide rail oiling device described in

the first configuration, wherein: the sucking member is formed into a sheet-like shape, including an oil-feed-side retention portion as a main body portion and a sucking portion formed integrally with the oil-feed-side retention portion, the sucking portion is soaked into the lubricating oil in the oiling case, and the oil-feed-side retention portion touches the oil permeable sheet through the connecting oil guide member.

[0015]

According to this configuration, the sucking member is also formed into a sheet-like shape. Accordingly, a receiving and sending effect can be expected due to the combination of the sucking member and the oil permeable sheet, so that excessive oil supply can be prevented easily while an appropriate amount of lubricating oil can be supplied. In addition, the sectional areas or widths of the oil permeable sheet and the sucking member can be changed and adjusted easily in accordance with the amount of lubricating oil to be supplied to the guide surface oiling portion, and the oil permeable sheet and the sucking member can be formed into desired shapes easily. In addition, the oil permeable sheet and the sucking member can be made thin in their lamination direction, as compared with the case where members having large volumes as in the background art are used.

[0016]

According to the invention, while a required amount of supplied lubricating oil can be secured, lubricating oil can

be prevented from being supplied excessively and dropping down as in the case where the oil permeable sheet is used alone. The sectional area or width of the oil permeable sheet which decides the amount of lubricating oil supplied in the lubricating oil supply route can be easily adjusted to increase/decrease.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017]

Fig. 1 is an exploded perspective view showing an elevator guide rail oiling device according to an embodiment of the invention;

Fig. 2 is a perspective view showing an oil permeable sheet in the elevator guide rail oiling device shown in Fig. 1;

Fig. 3 is a perspective view showing another configuration example of a sucking member in the elevator guide rail oiling device shown in Fig. 1;

Fig. 4 is an exploded perspective view showing an elevator guide rail oiling device according to another embodiment of the invention;

Fig. 5 is a perspective view showing oiling sheet units in the elevator guide rail oiling device shown in Fig. 4; and

Fig. 6 is an exploded perspective view showing oiling sheet units as a main portion of an elevator guide rail oiling device according to a further embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0018]

Fig. 1 is an exploded perspective view showing an elevator guide rail oiling device according to an embodiment of the invention.

[0019]

The elevator guide rail oiling device has an oiling case 1 which receives lubricating oil, an oiling sheet unit 2 which is retained in the oiling case 1 so as to touch a guide surface of a not-shown guide rail to thereby supply the lubricating oil to the guide surface, and a sucking member 3 which consists of a sucking sheet for sucking up the lubricating oil in the oiling case 1 and supplying the lubricating oil to the oiling sheet unit 2.

[0020]

The oiling case 1 is formed like a bottomed vessel and has an insertion concave portion 4 which is formed by notching the oiling case 1 in order to prevent the oiling case 1 from touching the guide surface of the guide rail when the oiling device is attached to the guide surface of the guide rail so that the oiling device can supply the oil to the guide surface. The lubricating oil is stored inside the oiling case 1. An outer peripheral portion of the oiling case 1 as a whole is surrounded by a slightly high side wall. However, a portion of the outer peripheral portion corresponding to the insertion concave portion 4 is a side wall a little lower but higher than

the oil level of the lubricating oil. In practical use, an openable and closable cover is attached to the oiling case 1, and a similar notch is formed in a position corresponding to the insertion concave portion 4 in the cover which is closed. According to another embodiment, an oiling case 1 may be formed by receiving the illustrated oiling case as an inner oiling case in an outer oiling case to which an openable and closable cover is attached.

[0021]

A plurality of columnar pieces 5 to 7 and a retention portion 8 are provided in the bottom portion of the oiling case 1. The columnar pieces 5 to 7 are placed erectly and located to surround the insertion concave portion 4. The columnar pieces 5 to 7 serve to position the oiling sheet unit 2 and the sucking member 3 which will be described in detail later. The retention portion 8 retains the sucking member 3 located under the oiling sheet unit 2 while regulating the height direction of the sucking member 3. The retention portion 8 may have various configurations. Here, the retention portion 8 is formed to be lower than the outer peripheral side wall of the oiling case 1 formed in the position corresponding to the insertion concave portion 4 and higher than the oil level of the lubricating oil in the oiling case 1. More specifically, a plurality of upstanding pieces 9 are provided erectly and discretely in the bottom portion of the oiling case 1, and support

portions 10 are formed to be as high as the upstanding pieces 9 respectively. Thus, the retention portion 8 is constituted by all the support portions 10 so as to support an outer peripheral portion of the sucking member 3 in a plurality of places.

[0022]

The oiling sheet unit 2 is formed as a laminated body consisting of an oil permeable sheet 11 and a pair of oil impermeable sheets 12 and 13 holding the oil permeable sheet 11 from above and below respectively. The oil permeable sheet 11 will be described in detail later. The oiling sheet unit 2 is bundled up integrally by fixing units such as tacks provided in appropriate positions.

[0023]

As each of the oil impermeable sheets 12 and 13 disposed on the opposite upper and lower sides of the oiling sheet unit 2, a quadrangular sheet which has flexibility but does not have oil impregnatability is used. Each of the oil impermeable sheets 12 and 13 is formed as the quadrangular sheet including a notched portion corresponding to the insertion concave portion 4 formed in the oiling case 1, and has insertion holes 14 to 16 penetrating the quadrangular sheet in the lamination direction so as to be provided in positions where the columnar pieces 5 to 7 of the oiling case 1 are inserted. In addition, each oil impermeable sheet 12, 13 consists of a soft plastic sheet, a foam plastic sheet, a closed-cell urethane sheet, a

polyethylene sheet or a polypropylene sheet, which does not have oil impregnatability but has oil resistance. The thickness of the oil impermeable sheet 12, 13 is 1 to 7 mm, preferably 1.5 to 5 mm.

[0024]

In addition, the oil permeable sheet 11 of the oiling sheet unit 2 is formed out of a quadrangular sheet notched as shown in the perspective view of Fig. 2. The oil permeable sheet 11 of the oiling sheet unit 2 has a thickness and a width to supply an appropriate amount of oil but not excessive oil to the guide surface of the guide rail when the oil permeable sheet 11 is sufficiently impregnated and saturated with lubricating oil. The oil permeable sheet 11 is formed out of a sheet of woven or nonwoven fibrous fabric using capillary action. The thickness of the oil permeable sheet 11 is not thicker than 2 mm, preferably not thicker than 1 mm.

[0025]

The oil permeable sheet 11 has a main body portion in which insertion/retention portions 20 to 23 are formed. The insertion/retention portions 20 to 23 have the insertion holes 14 to 16 into which the columnar pieces 5 to 7 of the oiling case 1 are inserted respectively so that the oil permeable sheet 11 can be retained in a predetermined position inside the oiling case 1. The main portion including the insertion/retention portions 20 to 23 has a size to be received in a project area

which is substantially as large as each oil impermeable sheet 12, 13 shown in Fig. 1. However, a connecting oil guide portion 28 extending to protrude outward from the project area is formed. In use, the connecting oil guide portion 28 is folded so that the insertion hole 15 of the insertion/retention portion 23 is aligned with the insertion hole 15 of the insertion/retention portion 21. As a result, the connecting oil guide portion 28 can touch the sucking member 3 which will be described in detail later.

[0026]

In addition, the oil permeable sheet 11 has contact portions 24 to 26 formed to extend in three directions to positions corresponding to the insertion concave portion 4. The contact portions 24 to 26 are folded and retained to touch guide surface oiling portions 17 to 19 by fixing units shown in Fig. 1. Further, the main body portion of the oil permeable sheet 11 is provided with a comparatively narrow oil guide portion 27 and so on. The oil guide portion 27 is formed to connect the insertion/retention portions 20 to 22 with one another. Since the oil permeable sheet 11 is not thicker than 2 mm, those portions can be formed easily by notching or the like. In addition, the sectional areas or particularly the widths of the oil guide portion 27 and the connecting oil guide portion 28 can be adjusted easily so as to supply an appropriate amount of oil but not excessive oil to the guide surface of

the guide rail when the oil guide portion 27 and the connecting oil guide portion 28 are sufficiently impregnated and saturated with lubricating oil.

[0027]

The oiling sheet unit 2 having the aforementioned oil permeable sheet 11 held between the pair of oil impermeable sheets 12 and 13 includes the guide surface oiling portions 17 to 19 which protrude slightly inward from the outer peripheral side wall of the oiling case 1 in positions corresponding to the insertion concave portion 4 to touch the three sides of the guide surface of the guide rail directly respectively so as to be able to supply oil to the guide surface of the guide rail when the oiling device is mounted to have the guide surface of the guide rail placed in the insertion concave portion 4 formed in the oiling case 1. The guide surface oiling portions 17 to 19 are fixed using parts of the aforementioned fixing units for bundling the aforementioned laminated body of the oil permeable sheet 11 and the oil impermeable sheets 12 and 13 so as to be tacked or sewn through the laminated body. In addition, the guide surface oiling portions 17 to 19 may be formed out of nonwoven fibrous fabric or the like, such as a simplex of nylon-based, urethane-based or polyester-based fibers or a complex thereof.

[0028]

The sucking member 3 disposed under the aforementioned

oiling sheet unit 2 is here formed out of a nonwoven fiber bundle sheet consisting of natural fibers or synthetic fibers, or the like. The thickness of the sucking member 3 is not larger than 3 mm. The sucking member 3 has satisfactory oil impregnatability and satisfactory oil transportability even in winter when the viscosity of lubricating oil is high. Thus, the sucking member 3 always keeps saturated with lubricating oil.

[0029]

However, the sucking member 3 may use another configuration than the sheet generally known. The sucking member 3 mentioned herein is arranged to have an oil-feed-side retention portion 29 and a sucking-side portion 30 as shown in Fig. 1. The oil-feed-side retention portion 29 is formed by notching a quadrangular sheet so as to serve as a substantially U-shaped main body portion including the insertion holes 14 to 16 into which the columnar pieces 5 to 7 of the oiling case 1 are inserted. The sucking-side portion 30 is formed by using the quadrangular sheet without cutting away the portion corresponding to the insertion concave portion 4. In use, the sucking-side portion 30 is folded and soaked into the lubricating oil in the oiling case 1. When the sucking member 3 is formed thus like a sheet, the sucking member 3 can be formed integrally by cutting a single quadrangular sheet. Thus, the number of parts can be reduced and the sucking-side portion 30 can be

obtained easily by folding.

[0030]

In an assembled state, the connecting oil guide portion 28 shown in Fig. 2 is folded downward in the oil permeable sheet 11 of the oiling sheet unit 2, so as to make the insertion hole 15 of the insertion/retention portion 23 aligned with the insertion hole 15 of the insertion/retention portion 21. Thus, the folded insertion/retention portion 23 touches the vicinity of the insertion hole 15 of the sucking member 3 shown in Fig. 1 so that the connecting oil guide portion 28 connecting the folded insertion/retention portion 23 with the insertion/retention portion 21 can serve as an oil guide portion which is located in an outer peripheral portion of the oiling sheet unit 2 and which guides the lubricating oil sucked up by the sucking member 3 toward the main body portion of the oil permeable sheet 11. In this manner, the oil permeable sheet 11 can be also formed integrally by cutting a single quadrangular sheet. Accordingly, the number of parts can be reduced and the main body portion of the oil permeable sheet 11 and the sucking member 3 can be connected easily by folding.

[0031]

This embodiment has been described in the case where the oiling sheet unit 2 constituted by the oil permeable sheet 11 and the oil impermeable sheets 12 and 13 disposed above and below the oil permeable sheet 11 is bundled by fixing units

disposed in appropriate positions. However, the aforementioned oiling sheet unit 2 and the sucking member 3 disposed under the oiling sheet unit 2 may be regarded as one laminated body and bundled together by shared fixing units. In this case, the insertion/retention portion 23 of the oil permeable sheet 11 shown in Fig. 2 is brought into alignment and contact with the oil-feed-side retention portion 29 as a main body portion of the sucking member 3 shown in Fig. 1 in advance. Thus, the oiling sheet unit 2 and the sucking member 3 can be then integrated by fixing units so as to always keep good contact in the contact portion between the oiling sheet unit 2 and the sucking member 3. In addition, the insertion holes 14 to 16 formed in the lamination direction of the oiling sheet unit 2 and the sucking member 3 can be aligned in the lamination direction in advance. Thus, a work of inserting the columnar pieces 5 to 7 into the insertion holes 14 to 16 can be performed easily when the oiling sheet unit 2 and the sucking member 3 are received in the oiling case 1.

[0032]

When any one of the aforementioned configurations is used as the laminated body, a predetermined amount of lubricating oil is poured into the oiling case 1 so that the oil level will not be higher than the height of each of the support portions 10 of the upstanding pieces 9 formed in the oiling case 1 when the elevator guide rail oiling device is assembled. After that,

when the laminated body is received in the oiling case 1, the insertion holes 14 to 16 of the oiling sheet unit 2 and the sucking member 3 are fitted to the columnar pieces 5 to 7 provided in the bottom portion of the oiling case 1, to thereby position the oiling sheet unit 2 and the sucking member 3 in the oiling case 1. At the same time, the outer peripheral portions of the sucking member 3 and the oiling sheet unit 2 are aligned with the retention portion 8 constituted by the support portions 10 of the upstanding pieces 9 formed in the bottom portion of the oiling case 1 as shown in Fig. 1, to thereby decide the position and height of the oiling sheet unit 2 and the sucking member 3. On this occasion, the sucking member 3 is retained at a predetermined level higher than the oil level of the lubricating oil due to the height of each support portion 10. The sucking member 3 and the oiling sheet unit 2 do not have to be disposed substantially horizontally. Here, however, the sucking member 3 and the oiling sheet unit 2 are disposed substantially horizontally. In this case, the oil-feed-side retention portion 29 serving as the main body portion of the sucking member 3 is located substantially horizontally and above the surface of the lubricating oil, while only the sucking-side portion 30 as a part of the sucking member 3 extends to the bottom portion of the oiling case 1 to be thereby inserted into the lubricating oil.

[0033]

Either when the oiling sheet unit 2 and the sucking member 3 in the oiling case 1 are retained substantially horizontally or when the oiling sheet unit 2 and the sucking member 3 in the oiling case 1 are retained at a slight slant, the retention portion 8 is formed so that the vertical project area of the oiling sheet unit 2 and the sucking member 3 can be set inside the oiling case 1 when the oiling sheet unit 2 and the sucking member 3 are received in the oiling case 1. Particularly it is desired to form the sucking member 3 by notching so that a part of the sucking member 3 is prevented from being located above the portion corresponding to the insertion concave portion 4. With this configuration, lubricating oil dropping down can be recovered surely in the oiling case 1 even if the lubricating oil drops down from the oiling sheet unit 2 and the sucking member 3.

[0034]

At least one upstanding piece 9A other than the aforementioned upstanding pieces 9 is provided inside the oiling case 1. The upstanding piece 9A has a surface touching the lower surface of the sucking member 3 when the sucking member 3 is retained in a position regulated by the retention portion 8. The aforementioned upstanding pieces 9 decide the height and position of the sucking member 3 and the oiling sheet unit 2. On the other hand, the upstanding piece 9A is formed like a plate in contact with the lower surface of the sucking member

3, and serves to guide and allow excessive lubricating oil to drop or fall down even if the lubricating oil is excessively supplied to the sucking member 3. Thus, the excessive lubricating oil can be surely recovered in the oiling case 1.

[0035]

As is understood from the description, the columnar pieces 5 to 7, the upstanding pieces 9 and the upstanding piece 9A provided in the oiling case 1 have similar functions respectively. Accordingly, the columnar pieces 5 to 7, the upstanding pieces 9 and the upstanding piece 9A may be designed to have a plurality of functions concurrently. For example, each of the columnar pieces 5 to 7 may have a large-diameter portion on its axial way so that the insertion depth of the sucking member 3 and the oiling sheet unit 2 can be regulated by the large-diameter portion. In this case, the upstanding pieces 9 can also serve as the retention portion 8, or the upstanding pieces 9 and the upstanding piece 9A can be formed integrally to have the functions of the both together.

[0036]

When the sucking member 3 and the oiling sheet unit 2 have been received in the oiling case 1, the lubricating oil in the oiling case 1 is sucked up from the sucking-side portion 30 of the sucking member 3, and supplied to the oil-feed-side retention portion 29 serving as the main body portion. After that, the lubricating oil is guided to the oil permeable sheet

11 of the oiling sheet unit 2 through the connecting oil guide portion 28. When the elevator guide rail oiling device is not in use but the sucking member 3 is saturated, excessive lubricating oil drops or falls down through the upstanding piece 9A located under the sucking member 3 as described above. Thus, the excessive lubricating oil can be recovered in the oiling case 1. Further, even when the oil permeable sheet 11 is saturated, undesired oil drops can be prevented because the oil permeable sheet 11 is put between the oil impermeable sheets 12 and 13 disposed above and below the oil permeable sheet 11.

[0037]

In addition, when the elevator guide rail oiling device is operated to supply lubricating oil to the guide surface of the guide rail through the guide surface oiling portions 17 to 19, the lubricating oil is adjusted by the sucking-side portion 30 of the sucking member 3, the connecting oil guide portion 28 or the oil guide portion 27 of the oil permeable sheet 11, etc., so that an appropriate amount of the lubricating oil can be supplied to the guide surface. It is therefore possible to supply a desired amount of lubricating oil while preventing excessive oil supply to the guide surface.

[0038]

According to the elevator guide rail oiling device according to this embodiment, as described above, lubricating oil sucked up from the inside of the oiling case 1 through the

sucking member 3 is supplied to the oil permeable sheet 11. Since the oil permeable sheet 11 is put between the oil impermeable sheets 12 and 13 disposed above and below the oil permeable sheet 11, lubricating oil can be prevented from being supplied excessively and dropping down as in the case where the oil permeable sheet 11 is used alone, while a required amount of the lubricating oil supplied can be secured. In addition, the oil permeable sheet 11 does not have to have a large volume as in the background art, but has a sheet-like shape. Thus, the sectional area or width of the oil permeable sheet 11 which decides the amount of lubricating oil fed in the lubricating oil supply route can be easily adjusted to increase/decrease. As a result, the lubricating oil can be easily prevented from being supplied excessively as in the background art, while a required amount of the lubricating oil supplied to the guide surface oiling portions 17 to 19 can be secured.

[0039]

Compare a more specifically preferred embodiment with a background-art configuration. In the background-art configuration, when the guide surface oiling portions 17 to 19 move up/down while touching the guide surface of the guide rail, the thickness of an oil film increases suddenly beyond 50 μm till the sliding distance reaches 1 km, with the result that the thickness cannot be measured by a simplified measuring device. On the other hand, in the preferred embodiment, when

the guide surface oiling portions 17 to 19 move up/down while touching the guide surface of the guide rail in the same manner, the thickness of an oil film increases till the sliding distance reaches 1 km, but the gradient of the increase is gentler than that in the background art. In addition, the thickness of the oil film is stable to be about 20 μm when the sliding distance is beyond 1 km. Thus, according to the preferred embodiment, a required amount of supplied oil can be kept stably while excessive oil supply as in the background art can be prevented easily.

[0040]

In addition, since the oil permeable sheet 11 has a sheet-like shape not thicker than 2 mm, the oil permeable sheet 11 can be notched easily so as to be formed into various shapes and bent easily. As a result, the insertion/retention portion 21 including the insertion hole 15, the insertion/retention portion 23 including the insertion hole 15 and the connecting oil guide portion 28 connecting these insertion/retention portions 21 and 23 can be formed integrally easily, and the connecting oil guide portion 28 can be folded in use so that the insertions holes 15 of the insertion/retention portions 21 and 23 can be aligned with each other. The folded insertion/retention portion 23 can be easily brought into contact with the vicinity of the insertion hole 15 of the sucking member 3. In addition, due to the connecting oil guide portion

28, it is possible to easily obtain an oil guide portion which is located outside the oiling sheet unit 2 and which guides lubricating oil sucked up by the sucking member 3 toward the main body portion of the oil permeable sheet 11. The connecting oil guide portion 28 may be formed integrally with the main body portion of the oil permeable sheet 11 or may be formed separately from the oil permeable sheet 11. Then, the connecting oil guide portion 28 connects the oil permeable sheet 11 and the sucking member 3 so as to serve as an oil guide portion between the oil permeable sheet 11 and the sucking member 3. However, when the connecting oil guide portion 28 is formed integrally with the oil permeable sheet 11 as shown in Fig. 2, the connecting oil guide portion 28 can be produced by cutting a single sheet. Thus, the number of parts can be reduced and the configuration can be simplified.

[0041]

In the same manner as in the aforementioned oil permeable sheet 11, when the sucking-side portion 30 is formed out of a sheet not thicker than 3 mm, the sucking-side portion 30 can be notched easily so as to be formed into various shapes and bent easily. The oil-feed-side retention portion 29 and the sucking-side portion 30 may be formed integrally easily, and the sucking-side portion 30 may be folded easily to be soaked into lubricating oil. In addition, the sucking member 3 is disposed above the oil level of the lubricating oil in the oiling

case 1, and the sucking-side portion 30 thereof is soaked into the lubricating oil in the oiling case 1 so that the lubricating oil can be sucked up and supplied to the oil permeable sheet 11 through the sucking member 3. Accordingly, the width or the like of the sucking-side portion 30 can be easily adjusted to increase/decrease the amount of supplied lubricating oil as compared with the case where an oil-impregnated member is soaked directly into the lubricating oil in the oiling case 1 as in the background art. It is therefore possible to supply an appropriate amount of oil while preventing excessive oil supply. In addition, the sucking member 3 also has a sheet-like shape. Thus, the sectional area or width of the sucking member 3 which decides the amount of oil fed in the lubricating oil supply route can be easily adjusted to increase/decrease. When the sucking member 3 is used in combination with the oil permeable sheet 11, it becomes easy to keep a balance in amount of fed oil between the both. Thus, a synergistic effect can be expected.

[0042]

In order to adjust the amount of oil supplied from the sucking-side portion 30 of the sucking member 3 to the oil permeable sheet 11, the width of the sucking-side portion 30 may be changed as described above. However, when the sucking member 3 is notched to form the sucking-side portion 30 as shown in Fig. 3, a plurality of sucking-side portions 30A and 30B

may be formed using portions corresponding to the insertion concave portion 4 in advance. In this case, the number of sucking-side portions 30A and 30B to be soaked into the lubricating oil in the oiling case 1 can be adjusted to increase/decrease the amount of fed oil as a whole.

Particularly in such a configuration, the amount of fed oil can be easily adjusted only by increase/decrease of the number of sucking-side portions 30A and 30B of the sucking member 3 to be used, though the same structure is used as the oiling device.

[0043]

Figs. 4 and 5 are a main portion exploded perspective view and a main portion perspective view showing an elevator guide rail oiling device according to another embodiment of the invention.

[0044]

In this embodiment, two oiling sheet units 2A and 2B are used. Each oiling sheet unit 2A, 2B is constituted by one oil permeable sheet 11 put between two oil impermeable sheets 12 and 13 in the same manner as the oiling sheet unit 2 described in the previous embodiment. A spacer 31 consisting of an oil impermeable sheet is disposed between the two oiling sheet units 2A and 2B. The sucking member 3 described in the previous embodiment is disposed under the oiling sheet unit 2B located on the lower side. The whole is bundled by fixing units. Thus,

a laminated body is formed out of a total of eight sheets.

[0045]

Next, description will be made on connection between the shared sucking member 3 and the oil permeable sheet 11 of each of the two oiling sheet units 2A and 2B.

[0046]

First, the oiling sheet unit 2B located on the lower side and the sucking member 3 are connected in the same manner as the oiling sheet unit 2 and the sucking member 3 shown in Fig. 1. As shown in Fig 4, an insertion/retention portion 23B (not shown) of the oil permeable sheet 11 put between the oil impermeable sheets 12 and 13 in the oiling sheet unit 2B is folded downward. The folded insertion/retention portion 23B (not shown) is brought into contact with the vicinity of the insertion hole 15 of the sucking member 3. On the other hand, in the oiling sheet unit 2A located on the upper side, an insertion/retention portion 23A (not shown) of the oil permeable sheet 11 is folded to be interposed between the folded insertion/retention portion 23B of the oiling sheet unit 2B and the sucking member 3.

[0047]

When the oiling sheet units 2A and 2B configured thus substantially in the same manner are in use, the insertion/retention portions 23A and 23B of the oiling sheet units 2A and 2B are located in substantially one and the same

position as shown in Fig. 5. When the insertion/retention portions 23A and 23B of the oil permeable sheets 11 of the oiling sheet units 2A and 2B have the same configuration, deflection is formed in the insertion/retention portion 23B of the oiling sheet unit 2B located on the lower side, as compared with the insertion/retention portion 23A of the oiling sheet unit 2A located on the upper side. Since the insertion/retention portion 23B consists of a sheet with flexibility, the insertion/retention portion 23B can bend easily to absorb the deflection. In addition, bodies having one and the same configuration can be used as the oiling sheet units 2A and 2B. Accordingly, the oiling device can be produced inexpensively as a whole. However, the oiling sheet units 2A and 2B may be designed to have the insertion/retention portions 23A and 23B with different lengths. Connecting oil guide portions 28A and 28B connected to the insertion/retention portions 23A and 23B in Fig. 5 are depicted in Fig. 4.

[0048]

In this manner, the oil permeable sheet 11 of the oiling sheet unit 2A is connected to the sucking member 3 so that oil can be fed therebetween. The oil permeable sheet 11 of the oiling sheet unit 2B is connected to the sucking member 3 so that oil can be fed therebetween. Due to the connections using the insertion/retention portions 23A and 23B in the two systems, lubricating oil from the sucking member 3 can be supplied to

the oil permeable sheet 11 of the oiling sheet unit 2A and the oil permeable sheet 11 of the oiling sheet unit 2B.

[0049]

The spacer 31 disposed between the oiling sheet unit 2A and the oiling sheet unit 2B is formed out of an oil impermeable sheet, which has substantially the same shape as the oiling sheet units 2A and 2B disposed above and below the spacer 31, as shown in Fig. 4. The spacer 31 is formed into a substantially U-shape with insertion holes 14 to 16 into which the columnar pieces 5 to 7 of the oiling case 1 shown in Fig. 1 are inserted respectively. The spacer 31 may be omitted.

[0050]

According to the elevator guide rail oiling device in this embodiment, the oiling sheet units 2A and 2B each constituted by the oil permeable sheet 11 put between the oil impermeable sheets 12 and 13 are regarded as one unit to be handled. Accordingly, the number of oiling sheet units can be increased/decreased easily in accordance with the amount of oil supplied to the guide surface of the guide rail. In addition, when a plurality of oiling sheet units are used, movement of lubricating oil between the two oiling sheet units 2A and 2B can be prevented or limited by the spacer 31 because the spacer 31 formed out of an oil impermeable sheet is put between the oiling sheet units 2A and 2B. For example, the movement of lubricating oil between the upper and lower oiling

sheet units 2A and 2B through the guide surface oiling portions 17 to 19 may be suppressed to limit the oil supply substantially only to oil supplies through the insertion/retention portions 23A and 23B of the oiling sheet units 2A and 2B respectively. In this manner, it becomes easy to adjust the balance between the oil supply from the oiling sheet unit 2A to the guide surface of the guide rail and the oil supply from the oiling sheet unit 2B to the guide surface of the guide rail, or to adjust the respective amounts of oil fed by the oiling sheet units 2A and 2B.

[0051]

With the configuration in which the oil permeable sheet 11 is put between the oil impermeable sheets 12 and 13 disposed above and below the oil permeable sheet 11 and the configuration in which the sucking member 3 including the sucking-side portion 30 sucked into the lubricating oil in the oiling case 1 is used for supplying the lubricating oil to the oil permeable sheet 11, a similar effect to that in the previous embodiment can be obtained also in this embodiment.

[0052]

In the aforementioned embodiment, the two oiling sheet units 2A and 2B having almost the same configuration are put on each other in use. However, five oil impermeable sheets and two oil permeable sheets may be used so that the configuration having one oil permeable sheet put between two oil impermeable

sheets can be formed in two sites. As is understood from this description, it will go well if there is provided a configuration in which one oil permeable sheet 11 is put between two oil impermeable sheets 12 and 13. The number of oil impermeable sheets to be used and the number of oil permeable sheets to be used may be set desirably, and the number of units to be handled as one unit may be decided desirably.

[0053]

Fig. 6 is a perspective view showing oiling sheet units as a main portion of an elevator guide rail oiling device according to another embodiment of the invention.

[0054]

Oiling sheet units 2A and 2B each constituted by one oil permeable sheet put between two oil impermeable sheets are similar to those described in Figs. 4 and 5. However, a plurality of oiling holes 32 penetrating all the sheets in the lamination direction of the sheets are formed in substantially symmetric positions. As compared with the oiling holes 32 of the oil impermeable sheet 12 located on the upper side, oiling holes 33 formed in the oil permeable sheet 11 located under the oil impermeable sheet 12 are smaller. Though not shown, similar oiling holes are also formed in the oiling sheet unit 2B disposed on the further lower side.

[0055]

Now, when lubricating oil is poured through the oiling

holes 32 of the oil impermeable sheet 12 of the oiling sheet unit 2A located on the uppermost side. Then, the lubricating oil is supplied to the oil permeable sheet 11 through the oiling holes 32 of the oil impermeable sheet 12. Since the oiling holes 33 of the oil permeable sheet 11 are smaller, the lubricating oil drops down to the oil permeable sheet 11 of the oiling sheet unit 2B located on the further lower side, and at the same time, permeates the oil permeable sheet 11 of the oiling sheet unit 2A located on the uppermost side.

[0056]

The elevator guide rail oiling device is constituted using the thus configured oiling sheet units 2A and 2B. When the elevator guide rail oiling device is mounted or replaced, an oil guide route through which lubricating oil in another vessel can be supplied through the oiling holes 32 of the oil impermeable sheet 12 of the oiling sheet unit 2A located on the uppermost side can be formed in addition to the oil guide route through which lubricating oil in the oiling case 1 can be sucked up through the sucking member 3 soaked in the lubricating oil and supplied to the oil permeable sheet 11 as described above. Due to use of these two oil guide routes, the oil permeable sheets 11 of the two oiling sheet units 2A and 2B can be saturated with lubricating oil rapidly.

[0057]

In each of the aforementioned embodiments, the insertion

holes 14 to 16 formed in each oiling sheet unit or the like are fitted to the three columnar pieces 5 to 7 erected on the bottom surface of the oiling case 1 so as to position the oiling sheet unit or the like. However, the number of the columnar pieces 5 to 7, the positions thereof, the shapes thereof, etc. may be set desirably, or another positioning method may be used. In addition, each connecting oil guide portion 28A, 28B in the oil permeable sheet 11 in each oiling sheet unit is formed near the columnar piece 6. However, the connecting oil guide portions 28A and 28B may be provided in other displaced positions or in different positions from one oiling sheet unit to another, or a plurality of connecting oil guide portions may be provided in one oiling sheet unit.

[0058]

In addition, various forms may be used when the elevator guide rail oiling device is used. When, for example, only the effect of the oiling sheet unit 2 using the oil permeable sheet 11 is made use of, the oiling sheet unit 2 constituted by the oil permeable sheet 11 which is not thicker than 2 mm, and the oil impermeable sheets 12 and 13 which are disposed above and below the oil permeable sheet 11 so as to hold the oil permeable sheet 11 therebetween is used in the same manner. However, the sucking member 3 is not limited to a sheet, but a typical sucking member partially soaked into the lubricating oil in the oiling case 1 may be used as the sucking member 3. In this

configuration, the lubricating oil sucked up by the sucking member is supplied to the oil permeable sheet 11 of the oiling sheet unit 2. In this case, the lubricating oil sucked up from the inside of the oiling case 1 through the sucking member is supplied to the oil permeable sheet 11. Since the oil permeable sheet 11 is put between the oil impermeable sheets 12 and 13 disposed above and below the oil permeable sheet 11, it is possible to secure a required amount of oil supplied to the guide surface of the guide rail while preventing excessive oil supply as in the case where a member having a large volume is used as the oil permeable sheet 11. In addition, since the oil permeable sheet 11 has a sheet-like shape which is not thicker than 2 mm, the sectional area or width of the oil permeable sheet 11 which decides the amount of lubricating oil supplied in the lubricating oil supply route can be easily adjusted to increase/decrease. Thus, it is possible to keep a required amount of supplied oil while easily preventing excessive oil supply as in the background art.

What is claimed is:

1. An elevator guide rail oiling device comprising:
a guide surface oiling portion which can touch a guide surface of a guide rail;

an oiling case which receives lubricating oil so that the lubricating oil can be sucked up and supplied to the guide surface oiling portion;

an oiling sheet unit which is disposed in the oiling case and which includes an oil permeable sheet and a pair of oil impermeable sheets holding the oil permeable sheet therebetween, the oil permeable sheet touching the guide surface oiling portion so that the oil permeable sheet can supply the oil to the guide surface oiling portion;

a sucking member which is disposed under the oiling sheet unit so that a sucking-side portion as a part of the sucking member can be soaked into the lubricating oil in the oiling case; and

a connecting oil guide member which guides the lubricating oil sucked up by the sucking member to the oil permeable sheet.

2. An elevator guide rail oiling device according to Claim 1, wherein:

the oil permeable sheet has a main body portion which is put between the pair of oil impermeable sheets, and the connecting oil guide member is formed integrally with the main body portion so as to protrude outward from the oil impermeable

sheets, and folded so as to be able to touch the sucking member.

3. An elevator guide rail oiling device according to Claim 1, wherein:

the oiling sheet unit includes a plurality of oiling sheet units stacked;

a spacer made of an oil impermeable sheet is disposed between adjacent ones of the oiling sheet units;

the sucking member is disposed under the lowest one of the oiling sheet units; and

the connecting oil guide member includes a plurality of connecting oil guide members which connect the oil permeable sheets of the oiling sheet units with the sucking member respectively.

4. An elevator guide rail oiling device according to Claim 1, wherein:

the oil permeable sheet is not thicker than 2 mm.

5. An elevator guide rail oiling device according to Claim 1, wherein:

the sucking member is formed into a sheet-like shape, including an oil-feed-side retention portion as a main body portion and a sucking portion formed integrally with the oil-feed-side retention portion;

the sucking portion is soaked into the lubricating oil in the oiling case; and

the oil-feed-side retention portion touches the oil

permeable sheet through the connecting oil guide member.