

DESCRIPTION

PASSENGER CONVEYER

TECHNICAL FIELD

5 The present invention relates to a passenger conveyer such as an escalator and an electric road, particularly to a passenger conveyer suitable to the installation in a narrow place.

BACKGROUND ART

10 In the prior art, to narrow the size of the width of the passenger conveyer, the configuration by which the drive shaft is driven directly by installing an electric motor around the drive shaft for driving the steps (for instance, the Japanese Patent Application Laid-Open No. 56-108683) and the
15 configuration by which the step driving chain is driven directly on the way of the approach route (for instance, the Japanese Patent Application Laid-Open No. 55-40185) have already been proposed.

 It is possible to omit the extra driving chain and driving
20 sprocket for the power transmission in the above-mentioned prior art, since the steps and the step chain are driven directly by the electric motor. Accordingly, there is an advantage that can reduce the size of the width.

 However, in the above-mentioned configuration, the

driving machinery such as the motor and the deceleration mechanism are arranged between an approach route and a return route of the steps coupled one another in an endless state, that is, inside of a step traveling track. Therefore, it is required to install the driving machinery before mounting the steps on the step chain when assembling. Further, the maintenance and the inspection works must be carried out after demounting the steps from the step chain, and it takes much time to carry out these works, because of the works in a narrow area.

An object of the present invention is to provide a passenger conveyer, in which the assembly, the maintenance and the inspection of the driving machinery are easy and the size of the width can be reduced.

DISCLOSURE OF INVENTION

To achieve the above-mentioned object of the present invention, the vertical projection of the bearing of the drive shaft for driving the step chain by which a plurality of steps are coupled in an endless state is superimposed on the teeth part of a driving sprocket for driving the step chain, or it is arranged so as to become closer to the middle portion of the drive shaft than this teeth. These members are fixed to the main frame.

Because the teeth part and the bearing spaced each other

are superimposed in an axial direction by superimposing the vertical projection of the bearing on the teeth of the driving sprocket in the configuration described above, it becomes possible to shorten the length of the drive shaft so. Further, 5 the driving sprocket can be arranged on the edge of the drive shaft by shifting the bearing so as to become closer to the middle portion of the drive shaft than the teeth part of the driving sprocket. As a result, it is possible to arrange the driving sprocket so that the vertical projection of the driving sprocket 10 can be superimposed on the side frames of a right and left couple. It becomes possible to shorten the length of the drive shaft so.

In addition, because the driving machinery is provided outside of a longitudinal direction of the traveling track of 15 the step, it is possible to perform the above works without being blocked by the steps coupled endlessly in the assembling, the maintenance and the inspection of the driving machinery

BRIEF DESCRIPTION OF DRAWINGS

20 Fig.1 is a longitudinal sectional view taken along the line I-I of Fig.2, which shows an escalator according to a first embodiment of the present invention.

Fig.2 is a schematic side elevation showing how to install the escalator according to the first embodiment of the present

invention in the stairs.

Fig.3 is a plan showing the vicinity of the upper floor of the escalator shown in Fig.2.

Fig.4 is a side elevation showing the inside of the vicinity
5 of the upper floor of the escalator shown in Fig.2.

Fig.5 is a plan view of Fig.4.

Fig.6 is a view equivalent to Fig.1, which shows an escalator according to a second embodiment of the present invention.

10 Fig.7 is a view equivalent to Fig.1, which shows an escalator according to a third embodiment of the present invention.

BEST MODE FOR IMPLEMENTING THE INVENTION

15 Hereinafter, a first embodiment of the present invention will be explained based on the escalator shown in Fig.1 to Fig.5. In general, escalator 1 is constructed by using main frame 4 bridging the upper floor 2 and the lower floor 3 of the building as a base. Main frame 4 is composed of side frames 5A, 5B of
20 a right and left couple, and trusses (not shown) and base plate 6 coupling these right and left side frames 5A, 5B as shown in Fig.1. Further, said side frames 5A, 5B are composed of top chord member 7 extending in a longitudinal direction of the escalator, bottom chord member 8, and longitudinal member 9

coupling the top chord 7 and the bottom chord 8. Upper horizontal part 10, that is, the upper machine room is formed on the side of the upper floor 2 of the main frame 4 in the above-mentioned configuration, and Lower horizontal part 11 which is the lower
5 machine room is formed on the side of the lower floor 3 of the main frame 4. The upper horizontal part 10 and the lower horizontal part 11 are connected by inclination part 12. In general, the upper parts of the upper horizontal part 10 and the lower horizontal part 11 are blocked by the foot floors for
10 the passenger to get on and off.

A couple of main sprockets 13 and a couple of slave sprockets 14 are pivoted below the floor levels of the upper horizontal part 10 and the lower horizontal part 11 of the main frame 4, respectively. A couple of main sprockets 13 are fixed to the
15 drive shaft 15, and the edge part of this drive shaft 15 is supported rotatably by the bearing 16. This bearing 16 is fixed to the longitudinal member 9 of said side frames 5A and 5B, and its vertical projection resides within the width h of the side frames 5A and 5B.

20 The endless step chain 17 is hung on said main sprockets 13 and slave sprockets 14. The axis 19 of the front wheel fixed to the step 18, of which the edge part is pivoted on the front wheel is connected to the step chain 17, thereby a plurality of steps 18 are formed in an endless state.

Rails 20 are provided in a vertical direction of said side frames 5A and 5B, respectively. Movement handrail 21 is guided in the rim of this rail 20. This movement handrail 21 is driven by handrail drive unit 22 provided inside of the rail 20. The
5 motive power for this handrail drive unit 22 is obtained by guiding handrail driving chain 24 hung on the handrail drive sprocket 23 installed on the main sprocket 13 of said drive shaft 15 through turning roller 25. Here, said handrail drive sprocket 23 has smaller radius than the radius formed when the front wheel moves
10 around the drive shaft 15 so that the vertical projection of said handrail drive sprocket 23 can superimpose on the front wheel of the step 18.

On the other hand, driving sprocket 26 is fixed to said handrail drive sprocket 23 at one end of said drive shaft 15
15 and at the side opposed to step 18. This driving sprocket 26 is formed like a plate. The fixed side of the driving sprocket 26 to drive shaft 15 is provided on the side opposed to the step 18 with respect to said handrail drive sprocket 23. Three vertical projections of the teeth part of the driving sprocket
20 26, the bearing 16 and the side frame 5B of the main frame 4 are superimposed one another and reside within the width h of the side frame 5B.

The power transmission chain 27 is hung on the teeth part of the driving sprocket 26. This power transmission chain 27

is also hung on sprocket 29 of the driving machinery 28 provided outside of the approach and the return routes of the step 18. The driving machinery 28 comprises electric motor 30, decelerator 31 and brake 32. However, the decelerator 31 is not always
5 necessary.

Because the configuration described above is used, the space required by reason that the teeth of the driving sprocket 26 are essentially arranged between the bearing 16 and the handrail drive sprocket 23, and the equal space required on the
10 opposite side of the driving sprocket 26 in consideration of the installation balance of main frame 4, rail 20, etc. become unnecessary. As a result, the full width W_f of main frame 4 can be reduced, and the width size W_o for the installation of escalator 1 can be narrowed. Additionally, the axial length
15 of drive shaft 15 can be shortened also by superimposing the vertical projection of the front wheel of the step 17 on the handrail drive sprocket 23.

When the escalator 1 of which the width is narrow as described above is installed in a narrow area, for example, in
20 the existing stairs of the station house, the escalator 1 is drew to the side of one wall 41 of stairs 40 and is installed therein as shown in Fig.2 and Fig.3. The rail 20 of the escalator 1 on the side opposed to the wall 41 is used as a partition wall between the stairs 40 and the escalator 1. When the escalator

1 of which the installation width is W_o is installed in the stairs
40 of which the full width is W_s , The width size of the stairs
used by the pedestrian becomes W_u and does narrow. However,
because the installation width W_o of the escalator 1 has been
5 narrow as described above, the decrease in the available width
of the stairs 40 can be made minimum. By the way, driving
machinery 28 is provided in the upper horizontal part 10, that
is, in the upper machine room which is outside a longitudinal
direction of the travel track of the step 18 and the step chain
10 17 in the first embodiment. Therefore, the assembly, the
maintenance and the inspection of the driving machinery 28 of
escalator 1 can be easily performed by detaching the floor
blocking the upper part and by opening the upper horizontal part
10.

15 Next, a second embodiment of the present invention will
be explained based on Fig.6.

 The differences between the first embodiment and one shown
in Fig.6 reside in that the driving sprocket 42 is not a plate
type, but a disk type, and the whole driving sprocket 42 is arranged
20 within the width h of the side frame 5B which makes up the main
frame 4. However, the points that the vertical projections of
the teeth part of the driving sprocket 42, the bearing 16 and
the side frame 5B of the main frame 4 are superimposed on one
another, the size of the width of the main frame can be reduced,

and the installation of driving machinery are the same as the first embodiment.

Because the driving sprocket 42 is not plate shape in this embodiment, the manufacturing is easier. This embodiment is
5 superior to any other embodiments in that point.

Fig.7 shows a third embodiment. In this embodiment, the installation position of the bearing supporting the drive shaft 15 is different from the first and the second embodiments. That is, bearing 44 is arranged between the approach and the return
10 routes of the step 18, and is supported to the longitudinal member 9 of side frames 5A, 5B (not shown) through the bracket (not shown), etc. Further, main sprocket 45, handrail drive sprocket 46 and driving sprocket 47 are fixed to the edge of drive shaft 15. Those arrangement are similar to those in the first and the
15 second embodiments. That is, main sprocket 45 is arranged on the side of the step 18, handrail drive sprocket 46 is arranged on the opposite side of the step 18 with respect to the main sprocket 45, and driving sprocket 47 is arranged most outside.

And, the points that the outermost driving sprocket 47
20 is of the disk shape and is arranged within the width h of the side frame 5B, and the operation and the effects are the same as the second embodiment.

Although the escalator has been explained as a passenger conveyer in the above-mentioned embodiments, the present

invention is not limited to the escalator, and it is possible to apply to an electrically driven road where the difference is not caused between steps. In this case, it is necessary to read the step recited in each claim as the footplate in a different way. Further, although the existing stairs in the station house has been explained as one example of narrow area, the present invention is not limited to the existing stairs for the station, and it is possible to use as a space-saving passenger conveyer for a general building and a smooth passage.

10 As described above, a passenger conveyer can be obtained according to the present invention, in which the assembly work, the maintenance and the inspection of the driving machinery are easy and the size of the width can be reduced.

CLAIMS:

1. A passenger conveyer comprising:
an endless step chain coupling a plurality of steps and driving them,
a main sprocket and a slave sprocket on which said step chain is hung in the vicinity of the underfloors of platforms,
a driving sprocket provided on a drive shaft to which said main sprocket is fixed,
a driving machinery for transmitting the turning effort to said driving sprocket, and
a main frame having side frames of a right and left couple, for supporting them;
wherein the vertical projection of the teeth part of said driving sprocket resides within the size of the width of said side frame.
2. A passenger conveyer comprising:
an endless step chain coupling a plurality of steps and driving them,
a main sprocket and a slave sprocket on which said step chain is hung in the vicinity of the underfloors of platforms,
a driving sprocket provided on a drive shaft to which said main sprocket is fixed,
a driving machinery installed outside of a longitudinal direction of the travel track, for transmitting the turning effort to said driving sprocket, and

a main frame having side frames of a right and left couple,
for supporting them;

wherein the bearing supporting the edge portion of said
drive shaft resides within the size of the width of said side
5 frame, and the vertical projection of the teeth part of said
driving sprocket resides within the size of the width of said
side frame.

3. A passenger conveyer comprising:

10 an endless step chain coupling a plurality of steps and
driving them,

a main sprocket and a slave sprocket on which said step
chain is hung in the vicinity of the underfloors of platforms,

a driving sprocket provided on a drive shaft to which said
15 main sprocket is fixed,

a driving machinery installed outside of a longitudinal
direction of the travel track, for transmitting the turning
effort to said driving sprocket, and

a main frame having side frames of a right and left couple,
20 for supporting them;

wherein the bearing supporting the edge portion of said
drive shaft and the teeth part of said driving sprocket resides
within the size of the width of said side frame, and their vertical
projections are superimposed each other.

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4. A passenger conveyer comprising:

an endless step chain coupling a plurality of steps and
driving them,

a main sprocket and a slave sprocket on which said step
30 chain is hung in the vicinity of the underfloors of platforms,

a driving sprocket provided on a drive shaft to which said
main sprocket is fixed,

a driving machinery installed outside of a longitudinal direction of the travel track, for transmitting the turning effort to said driving sprocket, and

a main frame having side frames of a right and left couple, for supporting them;

wherein said driving sprocket is located on the edge of the drive shaft, and said driving sprocket resides within the size of the width of said side frame.

5. A passenger conveyer according to any one of claims 2, 3 and 4, wherein a main sprocket, a handrail driving sprocket and a driving sprocket are fixed to the drive shaft, said handrail driving sprocket is located on the opposite side of the steps with respect to the main sprocket, said driving sprocket is located on the opposite side of the steps with respect to the handrail driving sprocket.

6. A passenger conveyer according to any one of claims 2, 3, 4 and 5, wherein said step has a front wheel axis of which the edge parts pivot the front wheels, and the vertical projections of said handrail driving sprockets and said front wheels are superimposed.

7. A passenger conveyer comprising:
an endless step chain coupling a plurality of steps and driving them,

a main sprocket and a slave sprocket on which said step chain is hung in the vicinity of the underfloors of platforms,

a driving sprocket provided on a drive shaft to which said main sprocket is fixed,

a driving machinery installed outside of a longitudinal direction of the travel track, for transmitting the turning

effort to said driving sprocket, and

a main frame having side frames of a right and left couple,
for supporting them;

wherein the teeth part of said driving sprocket resides
5 within the size of the width of said side frame.