

SPROCKET UNIT

FIELD

Embodiments described herein relate generally to a sprocket unit.

BACKGROUND

Conventionally, an escalator, a moving sidewalk (so-called movable sidewalk), or others, which is a passenger conveyor, includes, as a driving mechanism of moving steps, a reduction gear using a motor as a driving source. An output shaft of the reduction gear is fixed with a sprocket. When the drive chain stretched around the sprocket travels in a circulating manner, the tread chain travels and a plurality of treads (moving steps) connected to the traveling chain is continuously moved in a predetermined direction. Various types of sprocket fixing structures that can be used in such a driving mechanism have been proposed.

Conventional techniques are described in JP S63-57856 U, JP S09-79356 A, and JP H03-65022 U

The service life of a passenger conveyor, which is a movable device, is shorter than the service life of a facility in which the passenger conveyor is installed, and may be renewed in several tens of years, for example. Since new types of passenger conveyors are continuously being developed, the passenger conveyor may be renewed without waiting for the end of its service life. Such renewal work is often performed when the installed facility is out of service (e.g., at night or on closed days). Therefore, the work process may be divided into multiple processes and performed little by little over a plurality of days. In this case, although there is a case where a part of the passenger conveyor becomes a new structure and a part of the passenger conveyor becomes an old structure, the passenger conveyor needs to be operated during the daytime, and therefore there

is a case where a tread in the new structure is temporarily operated by using, for example, a reduction gear in the old structure. In this case, since the drive chain in the new structure needs to be driven by the change gear in the old structure, there has been a case where a working sprocket having an outer peripheral side adapted to the drive chain in the new structure and a radially inner side adapted to the output shaft of the reduction gear in the old structure has been temporarily used. However, the specifications of the reduction gear in the old structure vary depending on the installation time, application, required power, and others, and there are various types such as a difference in the shaft diameter of the sprocket used and a difference in the thickness in the axial direction. Therefore, it is necessary to prepare various kinds of working sprockets to be temporarily used at the time of renewal, and there is a problem that arrangement and management are complicated. Therefore, it is advantageous to provide a sprocket unit capable of being easily standardized and easily arranged and managed.

SUMMARY

A sprocket unit according to an embodiment includes a sprocket body, an adjustment collar member, and a boss member. The sprocket body includes a first opening into which an output shaft of a driving device of a passenger conveyor can be inserted. The adjustment collar member has an outer peripheral portion which can be fitted into the first opening, and a second opening which is located radially inside the outer peripheral portion and is coaxial with the outer peripheral portion, into which the output shaft can be inserted, and which has a diameter smaller than a diameter of the first opening. The boss member has an extension shaft portion extending an axial length of the sprocket body and a third opening which is formed in the extension shaft portion

and is coaxial with the sprocket body, and into which the output shaft can be inserted.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exemplary and schematic side view illustrating a structure of an escalator as an example of a passenger conveyor to which a sprocket unit of an embodiment can be applied at the time of renewal work;

FIG. 2 is an exemplary and schematic explanatory view illustrating a configuration of a reduction gear (output shaft) to which the sprocket unit of the embodiment can be applied and a sprocket in an old structure mounted on the reduction gear;

FIG. 3 is an exemplary and schematic explanatory view illustrating a configuration of another reduction gear (output shaft) to which the sprocket unit of the embodiment can be applied and a sprocket in the old structure mounted on the reduction gear;

FIG. 4 is an exemplary and schematic explanatory view illustrating a state in which a sprocket body and an adjustment collar member of the sprocket unit of the embodiment are combined;

FIG. 5 is an exemplary and schematic explanatory view illustrating a detailed shape of the adjustment collar member of the sprocket unit of the embodiment;

FIG. 6 is an exemplary and schematic explanatory view illustrating a state in which the sprocket body and a boss member of the sprocket unit of the embodiment are combined;

FIG. 7 is an exemplary and schematic cross-sectional view illustrating a case where an auxiliary adjustment collar member is mounted on the adjustment collar member of the sprocket unit of the embodiment to form a multiple structure;

FIG. 8 is an exemplary and schematic cross-sectional view illustrating a case where an auxiliary adjustment boss

member is mounted on the boss member of the sprocket unit of the embodiment to form a multiple structure; and

FIG. 9 is an exemplary and schematic cross-sectional view illustrating a modified example of the adjustment collar member of the sprocket unit of the embodiment.

DETAILED DESCRIPTION

A sprocket unit according to an embodiment will be described below in detail with reference to the drawings. Note that components described in the embodiment include components that are replaceable and easily conceivable by those skilled in the art or components that are substantially identical to one another, and the present invention is not limited by the following embodiment.

FIG. 1 is an exemplary and schematic side view illustrating a structure of an escalator 12 as an example of a passenger conveyor to which a sprocket unit 10 of the embodiment can be applied. The escalator 12 conveys passengers and baggage by moving a plurality of treads 14 connected in an endless shape around (in a circulating manner) to operate. In FIG. 1, a truss 16 is installed between an upstairs floor UF and a downstairs floor DF of an architectural structure (building). A deck 18 is installed on the truss 16 and a balustrade panel 20 is supported on the deck 18. A balustrade deck 22 is attached to the upper end portion of the balustrade panel 20, and a handrail rail 24 is provided above the balustrade deck 22. A balustrade lighting device is attached to the lower portion of the handrail rail 24.

The drive mechanism of the escalator 12 mainly includes a motor 26 as a drive source, a reduction gear 28, a drive chain 30, a drive sprocket 32, a driven sprocket 34, and a tread chain 36. The motor 26 and the reduction gear 28 constitute a driving device M. The motor 26 is provided, for

example, on the upstairs side. The reduction gear 28 is attached to an output shaft of the motor 26.

The reduction gear 28 decelerates the rotation of the motor 26 and amplifies the rotational torque of the motor 26. A reduction sprocket 38 is provided on an output shaft of the reduction gear 28 and has a plurality of teeth. The drive chain 30 is formed in an endless shape and is stretched around the reduction sprocket 38 and the drive sprocket 32. The drive chain 30 rotates the drive sprocket 32 by traveling in a circulating manner around the drive sprocket 32 and the reduction sprocket 38 by the driving force of the motor 26 transmitted via the reduction gear 28. In other words, the drive chain 30 transmits the driving force of the motor 26 transmitted via the reduction gear 28 to the drive sprocket 32. The drive sprocket 32 has a plurality of teeth meshing with the tread chain 36, and is rotated by the driving force from the driving device M.

The escalator 12 is operated by driving the tread chain 36 stretched between the drive sprocket 32 and a driven sprocket 34 to move a plurality of treads 14 connected in an endless shape around. Thus, the tread chain 36 causes the plurality of treads 14 connected in an endless shape to travel.

When the escalator 12 is operated in the descending direction, the treads 14 adjacent to each other in the advancing direction among the plurality of treads 14 are horizontally advanced from the inside of the truss 16 at the upper entrance (the upstairs entrance/exit UE). In the upper transition curve, the step difference between the adjacent treads 14 is increased, and the plurality of treads 14 is transitioned to a staircase state. In the intermediate tilting portion, the plurality of treads 14 is descended in a staircase state. Subsequently, in the lower transition curve, the step difference between the adjacent treads 14 is reduced, and the plurality of treads 14 is transitioned to a

horizontal state. At the lower exit (downstairs entrance/exit DE), the plurality of treads 14 is entered into the truss 16 again in a horizontal state. The plurality of treads 14 is inverted upward after being entered into the truss 16, and is ascended in a horizontal state in the return path. The plurality of treads 14 is inverted again and is advanced from the inside of the truss 16 at the upstairs entrance/exit UE. In the case of the escalator 12 operating in the ascending direction, the operation is opposite to the operation described above. As described above, at the upstairs entrance/exit UE and the downstairs entrance/exit DE, the tread 14 is advanced from the inside of the truss 16 or is entered into the truss 16, with the footstep surface which is the upper surface which carries the user being horizontal.

The escalator 12 includes a pair of balustrades W on both sides along the advancing direction of the plurality of treads 14. The balustrade W is mainly composed of a skirt guard panel (not illustrated), an inner deck 40, a balustrade panel 20, a balustrade deck 22, a handrail rail 24, and a handrail belt 42 provided on the handrail rail 24. The skirt guard panels are provided close to each other on both sides in a direction (width direction) orthogonal to a traveling direction of the plurality of treads 14 (a descending direction and an ascending direction in which the escalator 12 is operated) and are provided between the upstairs entrance/exit UE and the downstairs entrance/exit DE. The inner deck 40 is attached on the upper side of the skirt guard panel. On the upper side of the inner deck 40, for example, the balustrade panel 20 composed of a transparent or translucent member such as a glass plate is attached. The handrail belt 42 is movably fitted into a handrail rail 24 attached to the outer periphery of the balustrade panel 20. The escalator 12 is configured such that the handrail belt 42 of the balustrade W is moved around by a handrail belt drive

chain (not illustrated) in the advancing direction of the plurality of treads 14 in accordance with the advancing of the treads 14.

Such an operation of the escalator 12 is realized by controlling the reduction gear 28 and the motor 26 by a control panel (control device) 44 installed in the truss 16. The control panel 44 is physically realized by a computer including a central processing unit (CPU), a random-access memory (RAM), a read only memory (ROM), and others. The functions executed in the control panel 44 are realized by loading an application program held in the ROM into the RAM and executing the application program by the CPU, thereby operating various devices in the escalator 12 under the control of the CPU and reading and writing data from and to the RAM and the ROM.

As described above, the renewal work of the escalator 12 is often performed when the facility in which the escalator 12 is installed is out of service (at night or on closed days) or others, and the renewal work may be performed by being divided into a plurality of work schedules. For example, when a renewal work is performed at night for three days, the work is as follows. For example, the moving portions such as the tread 14 are replaced at night on the first day of work. In the daytime on the second day of the work, the moving portions such as the renewed tread 14 are operated by the reduction gear 28 in the old structure before the renewal. At night on the second day of work, the motor 26 is replaced. In the daytime on the third day of work, the reduction gear 28 in the old structure is driven by the renewed motor 26 to operate the moving portions such as the renewed tread 14. At night on the third day (final day) of work, the reduction gear is replaced. At this time, the sprocket unit 10 is replaced with a dedicated reduction sprocket in the new structure. Thus, the renewal work is completed.

As described above, since the new equipment after the renewal is operated by the reduction gear 28 in the old equipment during the daytime on the second day and the third day, the temporary reduction sprockets compatible with both the new equipment and the old equipment is temporarily mounted and used during the above time. However, in the old equipment, the type of reduction gear may be different depending on the installation time, and it is necessary to prepare a temporary reduction sprocket suitable for the reduction gear before renewal. Therefore, it is necessary to stock a plurality of types of temporary reduction sprockets, and it is necessary to select and arrange a temporary reduction sprocket every time the renewal work is performed, and therefore the work efficiency is low. The management of inventory and the design for each shape are also required, which causes an increase in cost.

Therefore, the present embodiment realizes efficiency of component management, suppression of complexity, improvement of work efficiency, cost reduction, and others, due to commonality of components, by using the sprocket unit 10 capable of coping with various pieces of old equipment by combination. The details of the sprocket unit 10 will be described below in comparison with the configuration of the reduction sprocket of the reduction gear in the old equipment.

FIG. 2 is an exemplary and schematic explanatory view illustrating a configuration of the reduction gear 28 (output shaft 28a) to which the sprocket unit 10 of the embodiment can be applied and the reduction sprocket 38 in the old structure mounted on the reduction gear 28.

The reduction gear 28 includes, for example, an output shaft 28a (e.g., ΦA) having a small diameter and a short axis. Therefore, the diameter of an opening 38a formed in the reduction sprocket 38 into which the output shaft 28a is inserted is also ΦA . Note that, although not illustrated in

FIG. 2, after the reduction sprocket 38 is inserted into the output shaft 28a, the output shaft 28a and the reduction sprocket 38 are non-rotatably fixed to each other by using a key member not illustrated. On the outer peripheral surface of the reduction sprocket 38, a tooth portion around which the drive chain 30 is wound and a tooth portion around which the tread chain 36 is wound are provided together.

FIG. 3 is an exemplary and schematic explanatory view illustrating a configuration of another reduction gear 28A (output shaft 28Aa) to which the sprocket unit 10 of the embodiment can be applied and a reduction sprocket 52 in the old structure mounted on the reduction gear.

The reduction gear 28A includes, for example, an output shaft 28Aa (e.g., ΦB) having a larger diameter and a longer axis than those of the output shaft 28a of the reduction gear 28. Therefore, the diameter of an opening 52a formed in the reduction sprocket 52 into which the output shaft 28Aa is inserted is also ΦB . Note that, although not illustrated in FIG. 3, after the reduction sprocket 52 is inserted into the output shaft 28Aa, the output shaft 28Aa and the reduction sprocket 52 are non-rotatably fixed to each other by using a key member not illustrated. On the outer peripheral surface of the reduction sprocket 52, a tooth portion around which the drive chain 30 is wound and a tooth portion around which the tread chain 36 is wound are provided together.

As illustrated in FIGS. 2 and 3, the shapes of the output shafts 28a and 28Aa are different depending on the installation time and application of the escalator 12, required power, and others. Therefore, the sprocket unit 10 of the present embodiment has a function of adjusting the diameter of the opening into which the output shaft is inserted and the shaft length (thickness) in the axial direction of the sprocket by a combination of members, so that the sprocket unit 10 can cope with the specifications of various reduction gears. As illustrated in FIGS. 4 to 6, the

sprocket unit 10 is composed of a sprocket body 10a, an adjustment collar member 10b, and a boss member 10c, and the adjustment collar member 10b and the boss member 10c are selectively used.

The sprocket body 10a is a member having a first opening into which the output shaft of the driving device of the passenger conveyor can be inserted. The adjustment collar member 10b is a member having an outer peripheral portion which can be fitted into the first opening and a second opening which is located radially inside the outer peripheral portion and is coaxial with the outer peripheral portion, into which the output shaft can be inserted, and which has a diameter smaller than the diameter of the first opening. The boss member 10c is a member having an extension shaft portion extending the axial length of the sprocket body and a third opening which is formed in the extension shaft portion and is coaxial with the sprocket body, and into which the output shaft can be inserted.

A configuration capable of coping with a difference in the shaft diameter of the output shaft of the reduction gear will first be described with reference to FIGS. 4 and 5.

FIG. 4 is an exemplary and schematic explanatory view illustrating a state in which the sprocket body 10a and the adjustment collar member 10b of the sprocket unit 10 of the embodiment are combined. In FIG. 4, a case where the diameter of the output shaft of a reduction gear in the new structure after renewal is a diameter ΦB similar to that of the reduction sprocket 52 in FIG. 3, and the diameter of the reduction gear in the old structure before renewal is a diameter ΦA similar to that of the reduction sprocket 38 will be described as an example.

On the outer peripheral surface of the sprocket body 10a, a tooth portion around which the drive chain 30 is wound and a tooth portion around which the tread chain 36 is wound are provided together, as in the conventional reduction

sprocket 38. On the inner peripheral side, a first opening 10aa into which the output shaft 28a of the reduction gear 28 (of the driving device) of the escalator 12 can be inserted, is formed. The first opening 10aa is formed so as to correspond to a diameter of the output shaft of the reduction gear in the new structure after renewal, and has, for example, a diameter ΦB similar to that of the reduction sprocket 52. The sprocket body 10a is formed of, for example, carbon steel for machine structural use (S45C) as in the reduction sprocket 38 or others that are commonly used.

The adjustment collar member 10b is a substantially cylindrical member formed to be capable of being fitted into the first opening 10aa of the sprocket body 10a, and has an outer peripheral portion 10ba. The adjustment collar member 10b has a second opening 10bb which is located radially inside the outer peripheral portion 10ba and is coaxial with the outer peripheral portion 10ba, and into which the output shaft 28a can be inserted. In other words, the diameter of the second opening 10bb is smaller than the diameter of the first opening 10aa. The diameter of the second opening 10bb is ΦA . The adjustment collar member 10b is formed of, for example, carbon steel for machine structural use (S45C) as in the sprocket body 10a.

FIG. 5 is an exemplary and schematic explanatory view illustrating a detailed shape of the adjustment collar member 10b of the sprocket unit 10 of the embodiment.

As described above, the adjustment collar member 10b is a substantially cylindrical component that can be fitted into the first opening 10aa of the sprocket body 10a. In a part of the outer peripheral portion 10ba of the adjustment collar member 10b, a first key portion 10bc (width K1), which can be fitted with a key groove 10ab formed in a part of the first opening 10aa of the sprocket body 10a and extending in the axial direction, is formed so as to protrude radially outwardly. When the key groove 10ab and the first key

portion 10bc are fitted to each other, the sprocket body 10a and the adjustment collar member 10b are non-rotatably integrated with each other.

The adjustment collar member 10b is formed with a second key portion 10bd (width K2) protruding radially inwardly from the second opening 10bb at a position radially corresponding to the first key portion 10bc. The second key portion 10bd is fitted into a key groove formed in the output shaft 28a of the reduction gear 28 in the old structure to which the sprocket unit 10 is connected, so that the sprocket unit 10 in which the sprocket body 10a and the adjustment collar member 10b are integrated can be non-rotatably fitted to the output shaft 28a.

As described above, selecting whether or not the adjustment collar member 10b is mounted on the sprocket body 10a at the time of renewal work allows to easily cope with the case where a change gear in the old structure before renewal is the small-diameter type of ΦA or the large-diameter type of ΦB . Thus, the number of types of temporary reduction sprockets to be prepared for renewal can be reduced, and the complexity of arrangement and management of components can be reduced. The sprocket unit 10 enables a plurality of temporary reduction sprockets to be unified (standardized), requires the management of inventory and the design for each shape, and can contribute to suppression of cost increase.

Note that, in the adjustment collar member 10b, arranging the first key portion 10bc and the second key portion 10bd at the same position in the radial direction of the cylindrical adjustment collar member 10b allows to secure a thickness K3, and to improve the strength of the key portion to which a large rotational load is applied.

A configuration capable of coping with a difference in the shaft length of the output shaft of the reduction gear will be subsequently described with reference to FIG. 6.

As illustrated in FIG. 6, when the output shaft 28Aa of the reduction gear 28A in the old structure has, for example, a larger diameter and a longer axis than the output shaft 28a of the reduction gear 28, the axial length of the output shaft 28Aa in the sprocket body 10a is insufficient only with the sprocket body 10a (without mounting the adjustment collar member 10b) described with reference to FIG. 5, and the shaft cannot be stably mounted. Therefore, the sprocket unit 10 performs shaft length adjustment by combining the sprocket body 10a and the boss member 10c.

As described above, the boss member 10c is a ring-shaped member having an extension shaft portion 10ca extending the axial length of the sprocket body 10a and a third opening 10cb which is formed in the extension shaft portion 10ca and is coaxial with the sprocket body 10a, and into which the output shaft 28Aa can be inserted. The boss member 10c is also formed of, for example, carbon steel for machine structural use (S45C) as in the sprocket body 10a.

The boss member 10c is, for example, a member having a unit thickness such as 5 mm in the axial direction, and is a member that fills a clearance up to the end surface of the output shaft 28Aa when the sprocket body 10a is mounted on the output shaft 28Aa of the reduction gear 28A in the old structure. In other words, the boss member 10c is a member that compensates for the difference between the axial end surface of the sprocket body 10a and the end surface of the output shaft 28Aa. Therefore, the shaft length of the sprocket unit 10 can be adjusted by mounting and arranging a plurality of boss members 10c so as to overlap each other in the axial direction according to the clearance length. Note that the boss member 10c is mainly intended to adjust the axial length and does not need to be fixed so as not to be rotatable when mounted on the output shaft 28Aa. Therefore, the key portion engaging with the key groove of the output shaft 28Aa is not essential to the third opening 10cb, and

may or may not be provided. When the key portion is provided, the boss member 10c can be stably and firmly mounted on the output shaft 28Aa. On the other hand, when the key portion is not provided, the boss member 10c can be formed in a simple ring shape, which can contribute to reduction in manufacturing cost.

As described above, selecting whether or not the boss member 10c is mounted on the sprocket body 10a at the time of renewal work allows to easily cope with the realization of stable mounting of the sprocket body 10a even when the shaft length of the output shaft of the change gear in the old structure before renewal is longer than the shaft length of the sprocket body 10a. Thus, the number of types of temporary reduction sprockets to be prepared for renewal can be reduced, and the complexity of arrangement and management of components can be reduced. The sprocket unit 10 enables a plurality of temporary reduction sprockets to be unified (standardized), requires the management of inventory and the design for each shape, and can contribute to suppression of cost increase.

Note that, as corresponding variations of the sprocket unit 10, the combination of the sprocket body 10a and the adjustment collar member 10b has been described in FIG. 5, and the combination of the sprocket body 10a and the boss member 10c has been described in FIG. 6. In another corresponding variation, for example, combining the sprocket body 10a, the adjustment collar member 10b, and the boss member 10c allows to cope with a case where the output shaft of the reduction gear in the old structure has a smaller diameter and a longer axis and to obtain the same effect as described above. The sprocket body 10a can be used alone, depending on the shape of the output shaft.

FIG. 7 is an exemplary and schematic cross-sectional view illustrating a modified example of the adjustment collar member 10b of the sprocket unit 10, and illustrates a

structure that allows to cope with a case where the shaft diameter of the output shaft of the reduction gear in the old structure is of a further smaller diameter type. In other words, illustrated is a case where an auxiliary adjustment collar member 54 is mounted radially inside the second opening 10bb of the adjustment collar member 10b to form a multiple structure.

The auxiliary adjustment collar member 54 can be fitted radially inside the second opening 10bb of the adjustment collar member 10b and has a fourth opening 54a having a diameter smaller than the diameter of the second opening 10bb. The auxiliary adjustment collar member 54 is a cylindrical member formed of, for example, carbon steel for machine structural use (S45C) as in the adjustment collar member 10b. The auxiliary adjustment collar member 54 includes a third key portion 54b in a part of the fourth opening 54a, for example, at a position radially aligned with the second key portion 10bd of the adjustment collar member 10b. The third key portion 54b is engaged with a key groove formed in the output shaft of the change gear on which the sprocket unit 10 is mounted. The outer peripheral surface of the auxiliary adjustment collar member 54 is formed with a key groove 54c which can be fitted with the second key portion 10bd of the adjustment collar member 10b. Therefore, the auxiliary adjustment collar member 54 is non-rotatably integrated with the adjustment collar member 10b. As described above, the adjustment collar member 10b can be integrated with the sprocket body 10a in a non-rotatable state. Therefore, combining the sprocket body 10a, the adjustment collar member 10b and the auxiliary adjustment collar member 54 allows to stably and firmly fix the sprocket unit 10 (temporary reduction sprocket) to the output shaft of the change gear having a further smaller shaft diameter. Note that using an auxiliary adjustment collar member having a further smaller diameter to form a multiple structure

allows to cope with output shafts having different shaft diameters.

Note that, when the auxiliary adjustment collar member 54 is used and it is necessary to mount the boss member 10c for further shaft length adjustment (corresponding to extension), it is desirable to adjust the diameter of the third opening 10cb of the boss member 10c according to the fourth opening 54a.

FIG. 8 is an exemplary and schematic cross-sectional view illustrating a modified example of the boss member 10c of the sprocket unit 10, and illustrates an example in which an auxiliary adjustment boss 56 is mounted on the boss member 10c to form a multiple configuration, so that the sprocket unit 10 can be stably mounted on the output shaft. In other words, the auxiliary adjustment boss 56 is fitted radially inside the third opening 10cb of the boss member 10c and has a fifth opening 56a having a diameter smaller than the diameter of the third opening 10cb so as to correspond to the fourth opening 54a of the auxiliary adjustment collar member 54. The auxiliary adjustment boss 56 is a ring-shaped member formed of, for example, carbon steel for machine structural use (S45C) as in the boss member 10c. Mounting the auxiliary adjustment boss 56 radially inside the boss member 10c allows to stably mount the boss member 10c on the output shaft even when the shaft diameter of the output shaft on which the boss member 10c is mounted is further smaller. In other words, the sprocket unit 10 (sprocket body 10a + adjustment collar member 10b) on which the auxiliary adjustment collar member 54 is mounted can be more stably fixed to the output shaft.

Note that the auxiliary adjustment boss 56 is also mainly intended to adjust the axial length as in the boss member 10c and does not need to be fixed so as not to be rotatable when mounted on the output shaft. Therefore, it is not essential to fix the boss member 10c and the auxiliary adjustment boss 56 by using a key member or other members,

and a rotation prevention structure with the key structure may or may not be provided. When the rotation prevention structure is provided, the auxiliary adjustment boss 56 can be stably and firmly mounted on the boss member 10c. On the other hand, when the rotation prevention structure is not provided, the auxiliary adjustment boss 56 can be formed in a simple ring shape, which can contribute to reduction in manufacturing cost. Note that using an auxiliary adjustment boss having a further smaller diameter to form a multiple structure also allows the auxiliary adjustment boss 56 to cope with output shafts having different shaft diameters.

FIG. 9 is an exemplary and schematic cross-sectional view illustrating a modified example of the adjustment collar member of the sprocket unit 10 of the embodiment. As illustrated in FIG. 9, an adjustment collar member 58 has a second opening 58b on the inner peripheral side of an outer peripheral portion 58a as in the adjustment collar member 10b illustrated in FIG. 5. The adjustment collar member also includes a first key portion 58c in a part of the outer peripheral portion 58a, and includes a second key portion 58d protruding radially inward from the second opening 58b at a position in the radial direction corresponding to the first key portion 58c. The adjustment collar member 58 further includes at least one subsidiary key 58e protruding radially outwardly from the outer peripheral portion 58a at a position different from the first key portion 58c. In the case of FIG. 9, three subsidiary keys 58e are formed. In other words, the adjustment collar member 58 forms a rotation prevention structure with respect to the sprocket body 10a by a plurality of key members by the first key portion 58c and the subsidiary key 58e. Thus, it is possible to improve the rigidity in a case where the sprocket unit 10 in which a plurality of components is combined and integrated is configured. In other words, the sprocket unit 10 composed of a plurality of components in order to cope with a change in

the shaft diameter can be configured as a component having high rigidity as if the sprocket unit were a sprocket dedicated to the output shaft to be mounted. Note that FIG. 9 illustrates an example in which the subsidiary keys 58e including the first key portion 58c are arranged at intervals of 90°, but the number and arrangement positions of the subsidiary keys 58e can be appropriately selected, and an adjustment collar member having rigidity corresponding to the number of the subsidiary keys 58e and having the same function as that of the adjustment collar member 10b can be obtained. Note that the adjustment collar member 58 can also be mounted with the auxiliary adjustment collar member 54 to cope with a change in shaft diameter.

Note that a case where the sprocket unit 10 described above is applied when the escalator 12 is renewed has been described. As another embodiment, it is also possible to apply the sprocket unit 10 described above to, for example, a moving sidewalk (so-called movable sidewalk), as another example of the passenger conveyor, and to obtain the same effect.

While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel methods and systems described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the methods and systems described herein 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.

CLAIMS

1. A sprocket unit comprising:

a sprocket body including a first opening into which an output shaft of a driving device of a passenger conveyor can be inserted;

an adjustment collar member having an outer peripheral portion which can be fitted into the first opening, and a second opening which is located radially inside the outer peripheral portion and is coaxial with the outer peripheral portion, into which the output shaft can be inserted, and which has a diameter smaller than a diameter of the first opening; and

a boss member having an extension shaft portion extending an axial length of the sprocket body and a third opening which is formed in the extension shaft portion and is coaxial with the sprocket body, and into which the output shaft can be inserted.

2. The sprocket unit according to claim 1, wherein

the adjustment collar member includes at least one auxiliary adjustment collar member which can be fitted radially inside the second opening and has a fourth opening having a diameter smaller than a diameter of the second opening, and

the boss member includes at least one auxiliary adjustment boss member which is fitted radially inside the third opening and has a fifth opening having a diameter smaller than a diameter of the third opening so as to correspond to the fourth opening.

3. The sprocket unit according to claim 1 or 2, wherein the adjustment collar member includes a first key portion protruding radially outwardly from the outer peripheral portion and a second key portion protruding radially inwardly

from the second opening at a position corresponding to the first key portion.

4. The sprocket unit according to claim 3, wherein the adjustment collar member includes at least one subsidiary key portion protruding radially outwardly from the outer peripheral portion at a position different from the first key portion.