Citation List

Patent Literature

[0007] Patent Literature 1: Japanese Patent Publication No. 5073109

Patent Literature 2: Japanese-Laid Open Patent Application Publication No. 2013-173537

Summary of Invention

Technical Problem

[0008] Regarding the configurations disclosed in Patent Literature 1 and Patent Literature 2, easier maintenance is not sufficiently studied. For example, it is not easy to carry out maintenance for the floor members or the like of the movable walkway lying under the floor of the inner tunnel.

[0009] Embodiments of the present invention provide a passenger boarding bridge which allows maintenance to be easily carried out.

Solution to Problem

[0010] According to an aspect of the present invention, there is provided a passenger boarding bridge including a tunnel section including a plurality of tunnels which are telescopically fitted to each other and are movable relative to each other in a front-rear direction so that the tunnel section is extendable and retractable, the passenger boarding bridge including: a first walkway section constituting a walkway of an inner tunnel of adjacent tunnels; and a second walkway section constituting a walkway of an outer tunnel of the adjacent tunnels, the walkway of the outer tunnel including a plurality of floor members which are arranged in the front-rear direction and are coupled to each other, wherein the second walkway section includes an endless string-shaped member supported so that the endless string-shaped member is rotatable along a virtual vertical plane parallel to the front-rear direction, and the plurality of floor members are supported by the endless string-shaped member, wherein a walkway surface of the first walkway section of the inner tunnel and a walkway surface of the second walkway section of the outer tunnel are at a predetermined equal height position, wherein in a case where the tunnel section is retracted, the endless string-shaped member of the second walkway section is guided so that the floor members are moved down to an underside of the inner tunnel, and wherein in a case where

the tunnel section is extended, the endless string-shaped member of the second walkway section is guided so that the floor members are moved up from the underside of the inner tunnel.

[0011] In accordance with the above aspect, the second walkway section is configured so that the plurality of floor members are supported by the endless string-shaped member supported so as to be rotatable. In a case where maintenance for the second walkway section is carried out, the second walkway section can be rotated so that the floor members lying at the underside of the walkway surface of the second walkway section are exposed as the walkway surface. Therefore, the maintenance for the floor members, such as replacement or repair of the floor members can be easily carried out.

[0012] The passenger boarding bridge may comprise, to support the endless string-shaped member so that the endless string-shaped member is rotatable: a first guide member mounted at a front location of the outer tunnel and being engageable with the endless string-shaped member; a second guide member mounted at a rear location of the outer tunnel and below the inner tunnel, the second guide member being engageable with the endless string-shaped member; and a third guide member mounted on a front end of the inner tunnel and protruding into the outer tunnel, the third guide member being engageable with the endless string-shaped member which is located on an upper side and is between the first guide member and the second guide member, wherein the walkway section of the outer tunnel is constituted by the floor members supported by the endless string-shaped member which is located on the upper side and is between the first guide member and the third guide member, and wherein in a case where the tunnel section is extended and retracted, the endless string-shaped member may be guided by the third guide member so that a length in the front-rear direction of the walkway surface of the second walkway section is increased and reduced.

[0013] The endless string-shaped member may include a pair of string-shaped members disposed to be spaced apart in a width direction of the second walkway section, the first guide member includes a pair of guide members disposed to be spaced apart in the width direction of the second walkway section, the second guide member includes a pair of guide members disposed to be spaced apart in the width direction of the second walkway section, and the third guide member includes a pair of guide members disposed to be spaced apart in the width direction of the second walkway section.

[0014] The outer tunnel may include: a plurality of support sections provided at the outer tunnel along the front-rear direction and configured to support from the underside, the endless string-shaped member which is located on the upper side and is between the first guide member and the third guide member so that the walkway surface of the second walkway section is maintained at the predetermined height position, the plurality of support sections being movable in the width direction of the second walkway section, and in a case where the tunnel section is retracted and the floor members of the second walkway section are moved down to the underside of the inner tunnel, the support sections may be moved outward in the width direction of the second walkway section away from the endless string-shaped member and ceases to support the endless string-shaped member, and in a case where the tunnel section is extended and the floor members of the second walkway section are moved up from the underside of the inner tunnel, the support sections may be moved inward in the width direction of the second walkway section and supports the endless string-shaped member.

[0015] The plurality of floor members may be supported over an entire periphery of the endless string-shaped member, and the passenger boarding bridge may comprise: a driving unit which drives the endless string-shaped member so that the endless string-shaped member is rotated in forward and reverse directions.

[0016] In accordance with this embodiment, for example, the second walkway section is rotatable according to the walking direction in each of a case where passengers get into an aircraft and a case where the passengers get off the aircraft. This makes it possible to reduce a walking distance of the passengers. In addition, this is convenient in the maintenance for the second walkway section.

[0017] The endless string-shaped member may be constituted by a chain, and each of the first, second, and third guide members may be constituted by a sprocket.

[0018] The endless string-shaped member may be constituted by a belt member or a wire, and each of the first, second, and third guide members may be constituted by a pulley.

Advantageous Effects of Invention

[0019] Embodiment of the present invention can obtain an advantage in that a passenger boarding bridge which allows maintenance to be easily carried out can be provided.

[0020] The above and further embodiments, features and advantages of the present invention will more fully be apparent from the following detailed description with accompanying drawings.

Brief Description of Drawings

[0021] Figs. 1(A) and 1(B) are views showing an example of a tunnel section of a passenger boarding bridge according to an embodiment.

Fig. 2 is a cross-sectional view taken along line A-A of Fig. 1(A).

Figs. 3(A), 3(B), and 3(C) are schematic cross-sectional views of a tunnel section, showing examples of layout of first, second, and third sprockets of a movable walkway section of a second tunnel.

Figs. 4(A), 4(B), and 4(C) are schematic cross-sectional views of the tunnel section, showing examples of layout of first, second, and third sprockets of of a movable walkway section of a third tunnel.

Figs. 5(A) to 5(F) are views showing floor members and chains constituting the movable walkway section.

Fig. 6 is a perspective view showing an extracted portion of the movable walkway section of the second tunnel which is in the vicinity of a fixed walkway section protruding to the front from the first tunnel, and a region which is in the vicinity of the movable walkway section.

Fig. 7(A) is a plan view of the portion of Fig. 6. Fig. 7(B) is a view showing the portion of Fig. 7(A), when viewed in a walkway length direction. Fig. 7(C) is a view showing the portion of 7(A), when viewed in a walkway width direction.

Fig. 8 is a plan view showing a guide groove, an unlocking part, or the like which are not shown in Fig. 6.

Fig. 9(A) is a front view of a locking mechanism. Fig. 9(B) is a side view of the locking mechanism.

Fig. 10(A) is a view showing a first state of a support section which is near the fixed walkway section protruding to the front from the first tunnel, and a region which is in the vicinity of the support section, when viewed in the walkway length direction. Fig. 10(B) is a view showing the same portion as that of Fig. 10(A), when viewed in the

Claims

1. A passenger boarding bridge including a tunnel section including a plurality of tunnels which are telescopically fitted to each other and are movable relative to each other in a front-rear direction so that the tunnel section is extendable and retractable, the passenger boarding bridge comprising:

a first walkway section constituting a walkway of an inner tunnel of adjacent tunnels; and

a second walkway section constituting a walkway of an outer tunnel of the adjacent tunnels, the walkway of the outer tunnel including a plurality of floor members which are arranged in the front-rear direction and are coupled to each other,

wherein the second walkway section includes an endless string-shaped member supported so that the endless string-shaped member is rotatable along a virtual vertical plane parallel to the front-rear direction, and the plurality of floor members are supported by the endless string-shaped member,

wherein a walkway surface of the first walkway section of the inner tunnel and a walkway surface of the second walkway section of the outer tunnel are at a predetermined equal height position,

wherein in a case where the tunnel section is retracted, the endless string-shaped member of the second walkway section is guided so that the floor members are moved down to an underside of the inner tunnel, and

wherein in a case where the tunnel section is extended, the endless string-shaped member of the second walkway section is guided so that the floor members are moved up from the underside of the inner tunnel.

2. The passenger boarding bridge according to claim 1, comprising, to support the endless string-shaped member so that the endless string-shaped member is rotatable:

a first guide member mounted at a front location of the outer tunnel and being engageable with the endless string-shaped member;

a second guide member mounted at a rear location of the outer tunnel and below the inner tunnel, the second guide member being engageable with the endless string-

shaped member; and

a third guide member mounted on a front end of the inner tunnel and protruding into the outer tunnel, the third guide member being engageable with the endless string-shaped member which is located on an upper side and is between the first guide member and the second guide member,

wherein the walkway section of the outer tunnel is constituted by the floor members supported by the endless string-shaped member which is located on the upper side and is between the first guide member and the third guide member, and

wherein in a case where the tunnel section is extended and retracted, the endless string-shaped member is guided by the third guide member so that a length in the front-rear direction of the walkway surface of the second walkway section is increased and reduced.

3. The passenger boarding bridge according to claim 2,

wherein the endless string-shaped member includes a pair of string-shaped members disposed to be spaced apart in a width direction of the second walkway section, the first guide member includes a pair of guide members disposed to be spaced apart in the width direction of the second walkway section, the second guide member includes a pair of guide members disposed to be spaced apart in the width direction of the second walkway section, and the third guide member includes a pair of guide members disposed to be spaced apart in the width direction of the second walkway section.

4. The passenger boarding bridge according to claim 3,

wherein the outer tunnel includes:

a plurality of support sections provided at the outer tunnel along the front-rear direction and configured to support from the underside, the endless string-shaped member which is located on the upper side and is between the first guide member and the third guide member so that the walkway surface of the second walkway section is maintained at the predetermined height position, the plurality of support sections being movable in the width direction of the second walkway section, and

wherein in a case where the tunnel section is retracted and the floor members of

the second walkway section are moved down to the underside of the inner tunnel, the support sections are moved outward in the width direction of the second walkway section away from the endless string-shaped member and cease to support the endless string-shaped member, and

wherein in a case where the tunnel section is extended and the floor members of the second walkway section are moved up from the underside of the inner tunnel, the support sections are moved inward in the width direction of the second walkway section and support the endless string-shaped member.

5. The passenger boarding bridge according to any one of claims 1 to 4,

wherein the plurality of floor members are supported over an entire periphery of the endless string-shaped member, the passenger boarding bridge comprising:

a driving unit which drives the endless string-shaped member so that the endless string-shaped member is rotated in forward and reverse directions.

6. The passenger boarding bridge according to any one of claims 2 to 5,

wherein the endless string-shaped member is constituted by a chain, and each of the first, second, and third guide members is constituted by a sprocket.

7. The passenger boarding bridge according to any one of claims 2 to 5,

wherein the endless string-shaped member is constituted by a belt member or a wire, and each of the first, second, and third guide members is constituted by a pulley.