DESCRIPTION

Title of Invention

TRANSPORT SYSTEM

Technical Field

[0001] An aspect of the present invention relates to a transport system.

Background Art

[0002] A surface mounting apparatus described in Patent Literature 1 is known as a technique related to a transport system. The surface mounting apparatus described in the Patent Literature 1 includes a head unit (transport device) and a cableveyor (registered trademark, cable unit) coupled to the head unit. In the surface mounting apparatus described in the Patent Literature 1, a damping member such as rubber is provided between the cableveyor and a guide member to guide the cableveyor.

Citation List

[0003] Patent Literature 1: Japanese Patent No. 4986668

Summary of Invention

Technical Problem

[0004] In the above-described technique, vibration caused by movement of a cable unit is suppressed by a damping member. However, in the above-described technique, the damping member is worn by a contact with the cable unit, thus there are problems in which the damping member easily degrades and durability of vibration suppression performance of the system is low.

[0005] Therefore, an example of the present invention provides a transport system capable of suppressing vibration caused by movement of the cable unit and improving durability of vibration suppression performance.

Solution to problem

[0006] According to an aspect of the present invention, there is provided a transport system, comprising a transport device to transport an article, a cable unit, one end of which is connected to the transport device, the other end of which is fixed to ground side, the cable unit configured to move in accordance with movement of the transport device, and a placement section on which the cable unit can be placed. The placement section has a base and a first damping member provided on the base and having damping properties higher than that of the base. The first damping member does not support the cable unit thereon, wherein the cable unit placed on the placement section is in contact with the placement section at both sides of its width direction, and wherein the first damping member is arranged between the said both sides of the cable unit viewed from above toward a direction perpendicular to both the longitudinal direction and width direction of the placement section.

[0007] In this transport system, vibration caused by movement of the cable unit can be suppressed by the first damping member. In addition, no abrasion is caused by a contact between the first damping member and the cable unit, and no load of the cable unit is applied to the first damping member, thus the first damping member is not easily degraded. Therefore, durability of vibration suppression performance can be improved.

[0008] In the transport system according to an example of the present invention, a part of the cable unit placed on the placement section is in contact with the placement section, and the first damping member may be provided at a position that does not overlap with a contact surface where the cable unit comes into contact with the placement section viewed from above. In this case, a configuration can be specifically realized in which the first damping member does not support the cable unit.

[0009] In the transport system according to an example of the present invention, the cable unit placed on the placement section is in contact with the placement section at both sides of its width direction, and the first damping member may be arranged between the said both sides of the cable unit viewed from above. In this case, a configuration can be specifically realized in which the first damping member does not overlap with the contact surface of the cable unit viewed from above. Further, a space between the both sides can be used, thus enabling a space

saving.

[0010] In the transport system according to an example of the present invention, the cable unit may have at least any one of a power cable and a signal cable that are connected with the transport device, and a cable housing unit connected to the transport device and configured to house at least any one of the power cable and the signal cable inside and to guide at least any

one of the power cable and the signal cable so that at least any one of the power cable and the signal cable follows movement of the transport device. In this case, the cable unit can be specifically configured. Further, at least any one of the power cable and the signal cable can follow movement of the transport device while being protected.

[0011] In the transport system according to an example of the present invention, the transport device may be configured to move in a first direction and the base may include a restriction unit to restrict movement of the cable unit placed on the said base in a second direction intersecting the first direction. In this case, the cable unit can be prevented by the restriction unit from shifting in the second direction.

[0012] In the transport system according to an example of the present invention, the placement section may have a second damping member provided on the base and made of a material different from that of the first damping member, and the second damping member may support the cable unit thereon. Vibration caused by movement of the cable unit can be further suppressed.

[0013] In the transport system according to an example of the present invention, the second damping material may be provided at a position that overlaps with a contact surface where the cable unit comes into contact with the placement section viewed from above. In this case, a configuration can be specifically realized in which the second damping member supports the cable unit.

[0014] In the transport system according to an example of the present invention, the placement section may have a protection member provided on the second damping member and made of a material harder than that of the second damping member. Whereby, the second damping member can be protected.

[0015] In the transport system according to an example of the present invention, the placement section may have a flat and smooth member provided on the protection member and made of a material having a friction coefficient lower than that of the protection member. Whereby, abrasion of the protection member caused by a contact with the cable unit can be suppressed.

[0016] The transport system according to an example of the present invention may include a stocker having a plurality of shelves to house an article and a stand to support the stocker, and the placement section may be attached to the stand. In this

case, vibration caused by movement of the cable unit is easily transmitted to the stocker and the article via the stand. Suppression of vibration to the article is important, thus the above mentioned effects to suppress vibration caused by movement of the cable unit are especially effective.

Advantageous Effects of Invention

[0017] According to an example of the present invention, a transport system capable of improving durability of vibration suppression performance while suppressing vibration caused by movement of a cable unit can be provided.

Brief Description of Drawings

[0018] [FIG.1] FIG. 1 is a front view of a transport system according to an embodiment.

[FIG.2] FIG. 2 is a perspective view of a stacker crane according to the embodiment.

[FIG.3] FIG.3 is a front view of outline of a cable unit according to the embodiment.

[FIG.4] FIG.4 is a perspective view of the cable unit, a fixed guide, and a guide roller according to the embodiment.

[FIG.5] FIG.5 is a side view of the fixed guide and the guide roller according to the embodiment.

[FIG.6] FIG. 6 is a side view of the fixed guide according to the embodiment.

[FIG.7] FIG. 7 is a perspective view of the fixed guide according to the embodiment.

[FIG.8] FIG. 8 is an enlarged side sectional view of a part of the fixed guide according to the embodiment.

[FIG.9] FIG. 9 is a perspective view of the guide roller according to the embodiment.

[FIG.10] FIG. 10 is a sectional view along X-X line of FIG.9.

[FIG.11] FIG. 11 is a view illustrating a noise test result of the embodiment and comparison example.

CLAIMS

1. A transport system, comprising:

a transport device to transport an article;

a cable unit, one end of which is connected to the transport device, the other end of which is fixed to ground side, the cable unit configured to move in accordance with movement of the transport device; and

a placement section where the cable unit can be placed,

wherein the placement section has a base, and a first damping member provided on the base and having damping properties higher than that of the base,

wherein the first damping member does not support the cable unit thereon,

wherein the cable unit placed on the placement section is in contact with the placement section at both sides of its width direction, and

wherein the first damping member is arranged between the said both sides of the cable unit viewed from above toward a direction perpendicular to both the longitudinal direction and width direction of the placement section.

2. The transport system according to claim 1,

wherein a part of the cable unit placed on the placement section is in contact with the placement section, and

the first damping member is provided at a position that does not overlap with a contact surface where the cable unit comes into contact with the placement section viewed from above toward a direction perpendicular to both the longitudinal direction and width direction of the placement section.

3. The transport system according to claims 1 or 2,

wherein the cable unit including:

at least any one of a power cable and a signal cable that are connected to the transport device; and

a cable housing unit connected to the transport device and configured to house at least any one of the power cable and the

signal cable inside and to guide at least any one of the power cable and the signal cable so that at least any one of the power cable and the signal cable follows movement of the transport device.

4. The transport system according to any one of claims 1 to 3,

wherein the transport device is configured to move in a first direction and

the base has a restriction unit configured to restrict movement of the cable unit placed on the said base in a second direction intersecting the first direction.

5. The transport system according to any one of claims 1 to 4,

wherein the placement section has a second damping member provided on the base and made of a material different from that of the first damping member,

wherein the second damping member support the cable unit thereon.

6. The transport system according to claim 5,

wherein the second damping material is provided at a position that overlaps with a contact surface where the cable unit comes into contact with the placement section viewed from above toward a direction perpendicular to both the longitudinal direction and width direction of the placement section.

7. The transport system according to claims 5 or 6,

wherein the placement section has a protection member provided on the second damping member and made of a material harder than that of the second damping member.

8. The transport system according to claim 7,

wherein the placement section has a flat and smooth member provided on the protection member and made of a material having a friction coefficient lower than that of the protection member.

9. The transport system according to any one of claims 1 to 8,

comprising:

a stocker having a plurality of shelves to house the article; and

a stand to support the stocker,

wherein the placement section is attached to the stand.