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SYNCHRONIZATION APPARATUSES AND METHODS OF USE

Abstract

A synchronization device for synchronizing a hanging dolly assembly to a conveyor includes a first pole body assembly comprising a first pole body and a first spring that is configured to bias the first pole body in a first direction and a second pole body assembly with a second pole body slidably connected to the first pole body and a second spring that is configured to bias the second pole body in a second direction opposite the first direction.

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Background/Summary

TECHNICAL FIELD

[0001] The present specification generally relates to dolly apparatuses for an assembly line and, more specifically, to synchronization devices for synchronizing overhead dolly apparatuses to a conveyor line.

BACKGROUND

[0002] Dolly structures may be used on an assembly line, such as a vehicle assembly line. It may be desirable to synchronize the dolly structures with a conveyor so that the dolly structure moves along the assembly line with the conveyor. Such a synchronized arrangement can facilitate an assembly operation on a structure moving with the conveyor.

[0003] What is needed are synchronization apparatuses for synchronizing movement of a dolly apparatus with conveyors.

SUMMARY

[0004] In one embodiment, a synchronization device for synchronizing a hanging dolly assembly to a conveyor includes a first pole body assembly comprising a first pole body and a first spring that is configured to bias the first pole body in a first direction and a second pole body assembly with a second pole body slidably connected to the first pole body and a second spring that is configured to bias the second pole body in a second direction opposite the first direction.

[0005] In another embodiment, a dolly assembly includes a frame and a synchronization device mounted to the frame. The synchronization device includes a first pole body assembly comprising a first pole body and a first spring that is configured to bias the first pole body in a first direction and a second pole body assembly with a second pole body slidably connected to the first pole body and a second spring that is configured to bias the second pole body in a second direction opposite the first direction.

[0006] These and additional features provided by the embodiments described herein will be more fully understood in view of the following detailed description, in conjunction with the drawings.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The embodiments set forth in the drawings are illustrative and exemplary in nature and not intended to limit the subject matter defined by the claims. The following detailed description of the illustrative embodiments can be understood when read in conjunction with the following drawings, where like structure is indicated with like reference numerals and in which:

[0008] FIG. **1** is a diagrammatic view of part of a dolly apparatus including a synchronization device in a desynchronized configuration, according to one or more embodiments shown and described herein; and

[0009] FIG. **2** is a diagrammatic view of the part of the dolly apparatus of FIG. **1** including the synchronization device in a synchronized configuration, according to one or more embodiments shown and described herein; and

[0010] FIG. **3** is a diagrammatic, exploded view of the synchronization device of FIG. **1**, according to one or more embodiments shown and described herein.

DETAILED DESCRIPTION

[0011] Embodiments described herein are generally related to dolly apparatuses with synchronization devices that include a first pole body assembly including a first pole body and a first spring that is configured to bias the first pole body in a first direction and a second pole body assembly with a second pole body and a second spring that is configured to bias the second pole body in a second direction opposite the first direction. The dolly apparatuses may be used on a vehicle assembly line, as an example. The dolly apparatus may be a wheeled device that is moveable along an elevated track that conveys the dolly apparatuses in a conveying direction. The

dolly apparatuses can synchronize with a conveyor beneath the elevated track to move in the conveying direction with the conveyor during an assembly process. Once the assembly process is complete, the dolly apparatuses may be uncoupled from the conveyor using the synchronization device and then moved in an upstream direction toward a next vehicle part for another assembly process.

[0012] Referring to FIGS. **1-3**, a dolly apparatus **10** includes a frame **12** and a synchronization device **14** that is mounted to the frame **12**. In particular, the synchronization deice **14** includes a first pole body assembly **16** and a second pole body assembly **18** that is connected to the first pole body assembly **16**. The first pole body assembly **16** includes a first pole body **20** that is slidably connected to a vertical frame member **22** of the frame **12** using linear mounts **24** and **26** (e.g., linear bearings) that are configured to allow the first pole body **16** to slide relative to the frame member **20**. The first pole body assembly **16** further includes a spacer connector **28** that extends laterally outward from the first pole body **20** beneath an actuation assembly **30** fixedly mounted to the frame member **22** that is used to move the first pole body **20** between a retracted configuration (FIG. **1**) and an extended configuration (FIG. **2**).

[0013] The first pole body assembly **16** further includes a spring **32** that is sandwiched between a flange **34** carried by the first pole body **20** and the linear mount **26**. The linear mount **26** has an inner diameter that is sized smaller than an outer diameter of the spring **32** and the flange **34** such that the spring **32** and flange **34** cannot pass through the linear mount **26**. As the flange **34** is pushed toward the linear mount **36**, the spring **32** compresses and applies a biasing force against the flange **34** mounted to the first pole body **20**.

[0014] The second pole body assembly **18** includes a second pole body **40** that is slidably mounted to the first pole body **20** using linear mounts **42** and **44** (e.g., linear bearings) that are configured to allow the second pole body **40** to slide relative to the first pole body **20**. The linear mounts **42** and **44** are fixedly mounted to the first pole body **20** such that they move along with the first pole body **20**.

[0015] The second pole body assembly **18** further includes a spring **46** that is sandwiched between a flange **48** carried by the second pole body **40** and the linear mount **44**. The linear mount **44** also has an inner diameter that is sized smaller than an outer diameter of the spring **46** and the flange **48** such that the spring **46** and flange **48** cannot pass through the linear mount **44**. As the linear mount **44** is pushed toward the spring **46**, the spring **46** compresses and applies a biasing force against the linear mount **44** mounted to the first pole body **20**.

[0016] FIGS. **1** and **2** illustrate operation of the synchronization device **14**. Referring first to FIG. **1**, the synchronization device **14** is illustrated in an unsynchronized, rest configuration with a handle **50** of the actuation assembly **30** in an unactuated, initial position where a pusher **52** is in a retracted position. In the rest configuration, the first pole body **20** is in the retracted configuration, which also places the second pole body **40** in a retracted configuration and no force is applied on an end **54** of the second pole body **40**.

[0017] When the dolly apparatus **10** is in a desired position above a moving or stationary conveyor (represented by line **56** in FIG. **2**), the handle **50** can be actuated by pushing the handle **50** down, which causes the pusher **52** to extend and push the spacer connecter **28** down relative to the frame **12** as shown by FIG. **2**. Pushing the spacer connector **28** pushes the entire first pole body **20** down through the linear mounts **24** and **26**, which also pushes the flange **34** closer to the linear mount **26** and compresses the spring **32**. Because the position of the linear mount **26** is fixed relative to the frame **12** and the position of the flange **34** is not fixed, the spring **32** applies an upward biasing force against the flange **34** and first pole body assembly **16**.

[0018] The linear mounts **42** and **44** are fixedly connected to the first pole body **20** and move down therewith, which causes the linear mount **44** to move toward the flange **48** and pushes on the spring **46**. The second pole body **40** can slide downward within the linear mounts **42** as the first pole body assembly **16** is moved down toward the extended position. The second pole body assembly **18**

moves downward toward the extended position on the end **54** contacts the conveyor **56**, which impedes further extension of the second pole body **40**. As the linear mount **44** continues downward movement, the spring **46** is compressed until the handle **50** of the actuation assembly **30** locks into place, applying a downward biasing force against the flange **48**, the second pole body assembly **18** and the conveyor **56** thereby locking the dolly apparatus **10** to the conveyor **56**. Moving the handle **50** back to its initial position allows the springs to force the first and second pole body assemblies **16** and **18** back to their retracted configurations and releases the dolly apparatus **10** from the conveyor **56** so that the dolly apparatus **10** can then be moved relative to movement of the conveyor **56**.

[0019] The above-described synchronization devices can allow for more ergonomic synchronization between a hanging dolly assembly and a moving conveyor. The synchronization device is spring-loaded to apply a constant downward pressure against the conveyor and constant upward pressure against the dolly assembly simultaneously, which can allow for synchronization and desynchronization of the dolly assembly easily, with reduced concern for movement of the synchronization device before, during and and after an assembly process.

[0020] It is noted that the terms “substantially” and “about” may be utilized herein to represent the inherent degree of uncertainty that may be attributed to any quantitative comparison, value, measurement, or other representation. These terms are also utilized herein to represent the degree by which a quantitative representation may vary from a stated reference without resulting in a change in the basic function of the subject matter at issue.

[0021] While particular embodiments have been illustrated and described herein, it should be understood that various other changes and modifications may be made without departing from the spirit and scope of the claimed subject matter. Moreover, although various aspects of the claimed subject matter have been described herein, such aspects need not be utilized in combination. It is therefore intended that the appended claims cover all such changes and modifications that are within the scope of the claimed subject matter.

Claims

1. A synchronization device for synchronizing a hanging dolly assembly to a conveyor, the synchronization device comprising: a first pole body assembly comprising a first pole body and a first spring that is configured to bias the first pole body in a first direction; and a second pole body assembly with a second pole body slidably connected to the first pole body and a second spring that is configured to bias the second pole body in a second direction opposite the first direction.

2. The synchronization device of claim 1, wherein the first pole body assembly comprises a linear mount that is configured to slidably receive the first pole body, the linear mount configured to mount to the hanging dolly assembly.

3. The synchronization device of claim 2, wherein the linear mount is a first linear mount, the first pole body assembly comprising a second linear mount that is configured to slidably receive the first pole body, the second linear mount configured to mount to the hanging dolly assembly.

4. The synchronization device of claim 2, wherein the linear mount is a first linear mount, the second pole body assembly comprising a second linear mount that is configured to slidably receive the second pole body, the second linear mount mounted to the first pole body.

5. The synchronization device of claim 4, wherein the first pole body assembly comprises a spring located between the first linear mount and a flange mounted on the first pole body.

6. The synchronization device of claim 5, wherein the second pole body assembly comprises another spring located between the second linear mount and another flange mounted on the second pole body.

7. The synchronization device of claim 1 further comprising an actuation assembly comprising a pusher that is configured to push the first pole body away from the actuation assembly.

8. A dolly assembly comprising: a frame; and a synchronization device mounted to the frame, the synchronization device comprising: a first pole body assembly comprising a first pole body and a first spring that is configured to bias the first pole body in a first direction; and a second pole body assembly with a second pole body slidably connected to the first pole body and a second spring that is configured to bias the second pole body in a second direction opposite the first direction.
9. The dolly assembly of claim 8, wherein the first pole body assembly comprises a linear mount that is configured to slidably receive the first pole body, the linear mount configured to mount to the hanging dolly assembly.
10. The dolly assembly of claim 9, wherein the linear mount is a first linear mount, the first pole body assembly comprising a second linear mount that is configured to slidably receive the first pole body, the second linear mount configured to mount to the hanging dolly assembly.
11. The synchronization device of claim 9, wherein the linear mount is a first linear mount, the second pole body assembly comprising a second linear mount that is configured to slidably receive the second pole body, the second linear mount mounted to the first pole body.
12. The synchronization device of claim 11, wherein the first pole body assembly comprises a spring located between the first linear mount and a flange mounted on the first pole body.
13. The synchronization device of claim 12, wherein the second pole body assembly comprises another spring located between the second linear mount and another flange mounted on the second pole body.
14. The synchronization device of claim 8 further comprising an actuation assembly comprising a pusher that is configured to push the first pole body away from the actuation assembly.
15. A method of synchronizing a hanging dolly assembly to a conveyor, the method comprising: moving the hanging dolly assembly to a desired location along a conveyor; and engaging the conveyor with a synchronization device that is mounted to the hanging dolly assembly with the synchronization device in a synchronized configuration, the synchronization device comprising: a first pole body assembly comprising a first pole body and a first spring that is configured to bias the first pole body in a first direction; and a second pole body assembly with a second pole body slidably connected to the first pole body and a second spring that is configured to bias the second pole body in a second direction opposite the first direction.
16. The method of claim 15 further comprising biasing the first pole body in an upward direction using the first spring with the synchronization device in the synchronized configuration.
17. The method of claim 15 further comprising biasing the second pole body in a downward direction using the second spring with the synchronization device in the synchronized configuration.