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DIVERTING MECHANISM FOR A CONVEYOR

Abstract

A diverting mechanism for a conveyor is disclosed. The diverting mechanism comprises a first wheel, a driving gear and at least one belt stretched around the first wheel and the driving gear. The at least one belt having a plurality of cleats of variable thickness and the driving gear is configured to rotate the at least one belt.

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Background/Summary

TECHNOLOGICAL FIELD

[0001] Example embodiments of the present disclosure relate generally to conveyor systems and, more particularly, to a diverting mechanism for the conveyor systems thereof.

BACKGROUND

[0002] Conveyors are widely used in various industrial applications that demand transportation of

packages from one place to another place. A conveyor comprises rollers and belts to carry and transfer the packages at different locations. The rollers and belts are traditionally built to carry the packages upstream or downstream in an industrial space. However, in many industrial processes, there comes a requirement of diverting the packages from one conveyor to another conveyor or even change the package direction to single or multiple locations. Therefore, different methods and components are used in the industries to divert these packages effectively. Traditionally, diverters and gates are used to actuate, control and direct the flow of the packages. Also, pushing mechanisms and lane guiding units are used to accumulate a large quantity of the packages and divert in a desired direction. However, such methods and components are made of complex structures that require a high degree of mechanical inputs and therefore are costly to run and maintain. Further, by using these components, the packages may get damaged when moved by gravity.

[0003] Applicant has identified numerous areas of improvement in the existing technologies and processes, which are the subjects of embodiments described herein. Through applied effort, ingenuity, and innovation, many of these deficiencies, challenges, and problems have been solved by developing solutions that are included in embodiments of the present disclosure, some examples of which are described in detail herein.

BRIEF SUMMARY OF THE INVENTION

[0004] The following presents a simplified summary in order to provide a basic understanding of some aspects of the present disclosure. This summary is not an extensive overview and is intended to neither identify key or critical elements nor delineate the scope of such elements. Its purpose is to present some concepts of the described features in a simplified form as a prelude to the more detailed description that is presented later.

[0005] In an example embodiment, a diverting mechanism for a conveyor is disclosed. The diverting mechanism for a conveyor comprising a first wheel, a driving wheel, and at least one belt. Further, the at least one belt is stretched around the first wheel and the driving gear. The at least one belt having a plurality of cleats of variable thickness. Further, the driving gear is configured to rotate the at least one belt.

[0006] In some embodiments, a thinnest cleat of the plurality of cleats has a thickness of at least 1 mm and up to 10 mm. In some embodiments, a thickest cleat of the plurality of cleats has a thickness of at least 10 mm and up to 50 mm.

[0007] In some embodiments, the plurality of cleats collectively defines a first end and a second end, and the plurality of cleats defines a gradient such that the thickness of each of the cleats sequentially increases from the first end to the second end.

[0008] In some embodiments, a difference between the thickness of adjacent cleats is at least 0 mm and up to 5 mm. In some embodiments, the difference between the thickness of each of the plurality of cleats allows the diverting mechanism to divert one or more packages by maintaining orientation of the one or more packages.

[0009] In some embodiments, the further comprising a second wheel. Further, a position of the first wheel is higher than a position of the second wheel. Further, a height difference between the first wheel and the second wheel defines a first angle relative to a horizontal plane. The plurality of cleats of variable thickness collectively defines a second angle relative to a main body of the at least one belt. The first angle corresponds to the second angle.

[0010] In some embodiments, the at least one belt defines a width. In some embodiments, a width of each of the plurality of cleats is between 10-100 mm of the width of the at least one belt.

[0011] In some embodiments, each of the plurality of cleats is spaced apart from an adjacent cleat by a distance and the distance is at least 1 mm and up to 100 mm.

[0012] In some embodiments, the at least one belt defines a circumference. Further, a first portion of the at least one belt comprises the plurality of cleats and a second portion of the at least one belt does not comprise the plurality of cleats. In some embodiments, a length of the first portion is less

than a length of the second portion.
[0013] In some embodiments, the first wheel is further connected to a second wheel via the at least one belt such that the first portion and the second portion of the at least one belt is disposed between the first wheel and the second wheel.
[0014] In some embodiments, the driving gear is configured to drive the first wheel and the second wheel by rotating the at least one belt in clockwise or anticlockwise direction.
[0015] In some embodiments, the diverting mechanism is configured to operate in a diverting mode and in a non-diverting mode. In some embodiments, when the diverting mechanism is operating in the diverting mode, the at least one belt is rotating around the first wheel and the driving gear such that each of the plurality of cleats are position over the first wheel, the driving gear, or both. In some other embodiments, when the diverting mechanism is operating in the non-diverting mode, the at least one belt is positioned such that each of the plurality of cleats is positioned below the first wheel, the driving gear, or both.
[0016] In another example embodiment, a conveyer system is disclosed. The conveyor system comprising a diverting mechanism. The diverting mechanism comprises a first wheel, a driving gear, and at least one belt that is stretched around the first wheel and the driving gear. The at least one belt having a plurality of cleats of variable thickness. Further, the conveyer system comprises one or more idler rollers installed between at least two longitudinal frames for carrying one or more packages. Further, the plurality of cleats is positioned at least partially above the one or more idler rollers to divert the one or more packages when the diverting mechanism is in a diverting mode.
[0017] In some embodiments, the plurality of cleats is made from a material selected from a group of materials of rubber, polymer, plastic, steel, or wood.
[0018] The above summary is provided merely for purposes of summarizing some example embodiments to provide a basic understanding of some aspects of the present disclosure. Accordingly, it will be appreciated that the above-described embodiments are merely examples and should not be construed to narrow the scope or spirit of the present disclosure in any way. It will be appreciated that the scope of the present disclosure encompasses many potential embodiments in addition to those here summarized, some of which will be further described below.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0019] Having thus described certain example embodiments of the present disclosure in general terms, reference will hereinafter be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:
[0020] FIG. **1** illustrates an isometric view of a conveyor system in accordance with an example embodiment of the present disclosure;
[0021] FIG. **2**A illustrates an isometric view of the conveyor system with a diverting mechanism, in accordance with an example embodiment of the present disclosure;
[0022] FIG. **2**B illustrates a side view of the diverting mechanism, in accordance with an example embodiment of the present disclosure;
[0023] FIG. **2**C illustrates an exploded view of the diverting mechanism, in accordance with an example embodiment of the present disclosure;
[0024] FIG. **2**D illustrates at least one belt stretched around a first wheel and a second wheel of the diverting mechanism, in accordance with an example embodiment of the present disclosure;
[0025] FIGS. **3**A-**3**C illustrate side views of operation of the diverting mechanism in a diverting mode, in accordance with an example embodiment of the present disclosure;
[0026] FIGS. **4**A-**4**C illustrate isometric views of operation of the diverting mechanism in the diverting mode, in accordance with an example embodiment of the present disclosure;

[0027] FIGS. **5**A-**5**C illustrate another side views of operation of the diverting mechanism in the diverting mode, in accordance with an example embodiment of the present disclosure;
[0028] FIG. **6** illustrates another embodiment of the diverting mechanism comprising a plurality of another cleats and at least one pair of sidewalls monolithic with the at least one belt, in accordance with an example embodiment of the present disclosure; and
[0029] FIG. **7** illustrates another embodiment of the diverting mechanism comprising a plurality of another cleats, in accordance with an example embodiment of the present disclosure.

DETAILED DESCRIPTION

[0030] Some embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all, embodiments of the present disclosure are shown. Indeed, various embodiments may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements.
[0031] The components illustrated in the figures represent components that may or may not be present in various embodiments of the present disclosure described herein such that embodiments may include fewer or more components than those shown in the figures while not departing from the scope of the present disclosure. Some components may be omitted from one or more figures or shown in dashed line for visibility of the underlying components.
[0032] As used herein, the term “comprising” means including but not limited to and should be interpreted in the manner it is typically used in the patent context. Use of broader terms such as comprises, includes, and having should be understood to provide support for narrower terms such as consisting of, consisting essentially of, and comprised substantially of.
[0033] The phrases “in various embodiments,” “in one embodiment,” “according to one embodiment,” “in some embodiments,” and the like generally mean that the particular feature, structure, or characteristic following the phrase may be included in at least one embodiment of the present disclosure and may be included in more than one embodiment of the present disclosure (importantly, such phrases do not necessarily refer to the same embodiment).
[0034] The word “example” or “exemplary” is used herein to mean “serving as an example, instance, or illustration.” Any implementation described herein as “exemplary” is not necessarily to be construed as preferred or advantageous over other implementations.
[0035] If the specification states a component or feature “may,” “can,” “could,” “should,” “would,” “preferably,” “possibly,” “typically,” “optionally,” “for example,” “often,” or “might” (or other such language) be included or have a characteristic, that a specific component or feature is not required to be included or to have the characteristic. Such a component or feature may be optionally included in some embodiments or it may be excluded.
[0036] Various embodiments of the present disclosure include a conveyor system and a diverting mechanism for a conveyor. Embodiments may be configured to detect a position of one or more packages using one or more sensors. Embodiments may be configured to divert the one or more packages based on the detected position of the one or more packages. Embodiments may be configured operate in at least two modes, a diverting mode and a non-diverting mode. Embodiments may be configured to divert the one or more packages by using a belt having a plurality of cleats that rotate in a clockwise direction or in an anti-clockwise direction. Embodiments may divert the one or more packages without changing orientation of the one or more packages. Embodiments may transfer the one or more packages of various size and dimensions. Additionally, embodiments may be integrated into various settings, from industrial facilities to household applications, providing a stable and accurate solution to transfer the one or more packages from one conveyor to another and while moving from one location to another.
[0037] FIG. **1** illustrates an isometric view of a conveyor system **100**, in accordance with an example embodiment of the present disclosure.
[0038] The conveyor system **100** may comprise a diverting mechanism **102**, one or more idler

rollers **104**, and a scan tunnel **106**. In some embodiments, the conveyor system **100** may be configured to carry one or more packages **108** in a downstream movement or in an upstream movement with the help of the one or more idler rollers **104**. In some embodiments, the conveyor system **100** may be configured to divert the one or more packages **108** by using the diverting mechanism **102**.

[0039] The conveyor system **100** may comprise the one or more idler rollers **104** that may be arranged between at least two longitudinal frames **110** for carrying the one or more packages **108**. Further, each of the one or more idler rollers **104** may be configured with an axle (not shown) to secure attachment of the one or more idler rollers **104** with the at least two longitudinal frames **110**. In some embodiments, the one or more idler rollers **104** may assist the one or more packages **108** to move from the one end to other end of the conveyor system **100**. In some embodiments, the one or more idler rollers **104** may be self-powered and/or requires at least one actuation media (not shown) for carrying the one or more packages **108** to move from one end of the conveyor system **100** to other end of the conveyor system **100**. In some exemplary embodiments, the at least one actuation media may correspond to at least one belt drive assembly **112**.

[0040] In some embodiments, the at least one belt drive assembly **112** may be configured to provide rotational motion to the one or more idler rollers **104**. Further, the one or more idler rollers **104** upon actuation from the at least one belt drive assembly **112** may allow translation of the one or more packages **108** from one end of the conveyor system **100** to another end. In some embodiments, the at least one belt drive assembly **112** may be powered by a motor (not shown). Further, actuation of the motor may initiate rotational motion of the at least one belt drive assembly **112**. Such rotational motion of the at least one belt drive assembly **112** may further drive the one or more idler rollers **104** in a clockwise direction or in an anti-clockwise direction. It may be noted that the at least one belt drive assembly **112** may be an arrangement of one or more belts that may be looped around the one or more idler rollers **104**. In an alternative embodiment, the at least one belt drive assembly **112** may be an arrangement of one or more belts that may be looped around the axle of the one or more idler rollers **104**, without departing from the scope of the disclosure.

[0041] In an exemplary embodiment, the at least one belt drive assembly **112** comprises a belt **112**A that may be engaged into one or more grooves **112**B. The one or more grooves **112**B may be configured to secure the belt **112**A within the one or more idler rollers **104**. The one or more grooves **112**B may be grooved towards one side of the one or more idler rollers **104**. Further, the one or more grooves **112**B may prevent slipping of the belt **112**A from the one or more idler rollers **104**. In some embodiments, the one or more idler rollers **104** may have a shape of a cylindrical body with the one or more grooves **112**B machined towards the one end. Further, the one or more idler rollers **104** may be arranged equidistantly along the at least two longitudinal frames **110**. The at least two longitudinal frames **110** may be configured to provide support to the one or more idler rollers **104** while carrying the one or more packages **108**.

[0042] As illustrated in FIGS. **1** and **2**B, the diverting mechanism **102** may comprise a plurality of cleats **114** and at least one belt **116**. The plurality of cleats **114** may be positioned over the at least one belt **116** and at least partially above the one or more idler rollers **104** to divert the one or more packages **108**. In some embodiments, the at least one belt **116** may be stretched around a first wheel (FIG. **2**B) and a driving gear (FIG. **2**B). As will be discussed further, the driving gear may be configured to rotate the at least one belt **116**. In some embodiments, the plurality of cleats **114** may collectively have a variable thickness. It may be noted that the thinnest cleat of the plurality of cleats **114** may have a thickness of at least 1 mm and up to 10 mm, and the thickest cleat of the plurality of cleats **114** may have a thickness of at least 10 mm and up to 50 mm. In some example embodiments, each of the plurality of cleats **114** may be spaced apart from an adjacent cleat by a distance. The distance may be at least 1 mm and up to 100 mm.

[0043] Further, the plurality of cleats **114** may collectively define a first end **114**A and a second end **114**B. The plurality of cleats **114** may define a gradient such that the thickness of each cleat may

sequentially increase from the first end **114**A to the second end **114**B. In some embodiments, a difference between the thickness of adjacent cleats may be at least 0 mm and up to 5 mm. Further, the difference between the thickness of each of the plurality of cleats **114** may allow the diverting mechanism **102** to divert the one or more packages **108** by maintaining orientation of the one or more packages **108**. In various embodiments, the plurality of cleats **114** over the at least one belt **116** may be arranged such that a predefined number of the plurality of cleats **114** may come in contact with the one or more packages **108** to divert the one or more packages **108**. In some embodiments, the predefined number of the plurality of cleats **114** may depend on the size and dimensions of the one or more packages **108**.

[0044] Further, the at least one belt **116** may define a width, such that a width of each of the plurality of cleats **114** may be between 10 mm-100 mm of the width of the at least one belt **116**. Further, the at least one belt **116** may define a circumference. Further, the at least one belt **116** may have a first portion **116**A and a second portion **116**B. Further, the first portion **116**A of the at least one belt **116** may comprise the plurality of cleats **114**. The second portion **116**B of the at least one belt **116** may not comprise the plurality of cleats **114**. Stated differently, either the first portion **116**A or the second portion **116**B of the at least one belt **116** may be fabricated with the plurality of cleats **114**. In some embodiments, the length of the first portion **116**A may be less than a length of the second portion **116**B. In some example embodiments, the diverting mechanism **102** may be configured to operate in a diverting mode and in a non-diverting mode. The detailed working of the diverting mechanism **102** will be described in conjunction with FIGS. **2**A-**5**B.

[0045] In some embodiments, as illustrated in FIG. **1**, the scan tunnel **106** may be configured to determine positioning of the one or more packages **108** while moving on the conveyor system **100**. In some embodiments, the scan tunnel **106** may be operationally coupled to the diverting mechanism **102**. Further, the scan tunnel **106** may comprise one or more sensors **106**A, **106**B communicatively coupled to a controller (not shown). In some embodiments, the one or more sensors **106**A, **106**B may correspond to at least one optical sensor. In some exemplary embodiments, the one or more sensors **106**A, **106**B may be configured to work in collaboration to determine positioning of the one or more packages **108**. In various embodiments, the at least one optical sensor may comprise one or more emitters (not shown) and one or more detectors (not shown). The one or more emitters may be configured to emit one or more optical signals towards the one or more packages **108** while moving on the conveyor system **100**. Further, the one or more detectors may be configured to receive the one or more optical signals reflecting from the one or more packages **108**. In some embodiments, the controller may receive an input data from the one or more sensors **106**A, **106**B related to the positioning of the one or more packages **108**. In some embodiments, the controller may activate the driving gear in the diverting mode to rotate the at least one belt **116** using the plurality of cleats **114** based at least on the input data.

[0046] In various example embodiments, the controller may include suitable logic, circuitry, and/or interfaces that are operable to execute one or more instructions stored in a memory may be electrically connected with the controller. The controller may be configured to perform predetermined operations. In some embodiments, the controller may be configured to decode and execute any instructions received from one or more other electronic devices or server(s). The controller may be configured to execute one or more computer-readable program instructions, such as program instructions to carry out any of the functions described in this description. Further, the controller may be implemented using one or more processor technologies known in the art. Examples of the controller include, but are not limited to, one or more general purpose processors (e.g., INTEL® or Advanced Micro Devices® (AMD) microprocessors) and/or one or more special purpose processors (e.g., digital signal processors or Xilinx® System on Chip (SOC) Field Programmable Gate Array (FPGA) processor).

[0047] Further, the memory may store a set of instructions and data. In some embodiments, the memory may include the one or more instructions that are executable by the controller to perform

specific operations. It is apparent to a person with ordinary skill in the art that the one or more instructions stored in the memory enable the hardware of the system to perform the predetermined operations. Some of the commonly known memory implementations include, but are not limited to, fixed (hard) drives, magnetic tape, floppy diskettes, optical disks, Compact Disc Read-Only Memories (CD-ROMs), and magneto-optical disks, semiconductor memories, such as ROMs, Random Access Memories (RAMs), Programmable Read-Only Memories (PROMs), Erasable PROMs (EPROMs), Electrically Erasable PROMs (EEPROMs), flash memory, magnetic or optical cards, or other type of media/machine-readable medium suitable for storing electronic instructions.

[0048] As illustrated in FIG. **1**, the at least two longitudinal frames **110** may be fabricated with a plurality of mounting grooves **118**. The plurality of mounting grooves **118** may be cut-out from the at least two longitudinal frames **110**. In some embodiments, the plurality of mounting grooves **118** may be configured to allow connection of auxiliary conveyor systems and/or attachments with the at least two longitudinal frames **110**. It will be apparent to one skilled in the art that above-mentioned components of the conveyor system **100** have been provided only for illustration purposes, without departing from the scope of the disclosure.

[0049] FIG. **2**A illustrates an isometric view of the diverting mechanism **102** integrated with the conveyor system **100**, in accordance with an example embodiment of the present disclosure. FIG. **2**B illustrates a side view of the diverting mechanism **102**, in accordance with an example embodiment of the present disclosure. FIG. **2**C illustrates an exploded view of the diverting mechanism **102**, in accordance with an example embodiment of the present disclosure. FIGS. **2**A-**2**C are described in conjunction with FIG. **1**.

[0050] As discussed above, the diverting mechanism **102** may comprise a first wheel **208** (FIG. **2**B), a second wheel **210** (FIG. **2**B), a driving gear **202**, and the at least one belt **116** stretched around at least the first wheel **208** and the driving gear **202**. For example, the at least one belt **116** may be stretched around the first wheel **208**, the second wheel **210**, and the driving gear **202**. Further, and as discussed, the at least one belt **116** may have the plurality of cleats **114**. Further, the driving gear **202** may be configured to rotate the at least one belt **116**. In some embodiments, the driving gear **202** may be configured to drive the first wheel **208** and the second wheel **210** by rotating the at least one belt **116** in clockwise or anticlockwise directions.

[0051] As illustrated in FIG. **2**A, the one or more idler rollers **104** may be coupled between the at least two longitudinal frames **110**. The at least two longitudinal frames **110** may be provided with one or more provisions (not shown) for receiving either ends of the one or more idler rollers **104**. Further, each of the one or more idler rollers **104** may comprise extended portions **204** disposed at the either ends of each of the one or more idler rollers **104**. Such extended portions **204** may be received by the one or more provisions of the at least two longitudinal frames **110**. In various embodiments, the one or more provisions may correspond to the plurality of mounting grooves **118**, as described earlier. In some other embodiments, the one or more provisions may correspond to holes or slots cut-out or machined along the length of the at least two longitudinal frames **110**.

[0052] Further, the at least one belt **116** may comprise the first portion **116**A and the second portion **116**B. The first portion **116**A of the at least one belt **116** with the plurality of cleats **114** may be positioned downwards and the second portion **116**B of the at least one belt **116** may be positioned in between the one or more idler rollers **104**. Such positioning of the first portion **116**A and the second portion **116**B with respect to the plurality of cleats **114** may correspond to the non-diverting mode. Further, the driving gear **202** may comprise a plurality of teeth **206** that may be configured to provide friction to drive the at least one belt **116**.

[0053] As illustrated in FIG. **2**B, the diverting mechanism **102** may comprise the driving gear **202** having the plurality of teeth **206**, a first wheel **208**, and a second wheel **210**. In some embodiments, the first wheel **208** and the second wheel **210** may correspond to pulleys having grooved structure (not shown) to prevent slipping of the at least one belt **116** while rotating along the first wheel **208** and second wheel **210**. In some embodiments, the first wheel **208** may be configured with a first

axle **208**A to secure attachment of the first wheel **208** with the one or more idler rollers **204**. In some embodiments, the second wheel **210** may be configured with a second axle **210**A to secure attachment of the second wheel **210** with the one or more idler rollers **204**.
[0054] In some embodiments, the first wheel **208** may be further connected to the second wheel **210** via the at least one belt **116** such that the first portion **116**A and the second portion **116**B of the at least one belt **116** may be disposed between the first wheel **208** and the second wheel **210**. In some embodiments, the driving gear **202** may be configured to drive the first wheel **208** and the second wheel **210** by rotating the at least one belt **116** in clockwise or anticlockwise direction. In some exemplary embodiments, during rotations of the at least one belt **116**, the plurality of cleats **114** move with the at least one belt **116**.
[0055] In various exemplary embodiments, the driving gear **202** may be operationally coupled with at least one motor drive (not shown) that may be controlled by the controller. In some embodiments, the controller may receive information regarding the position of the one or more packages **108** from the one or more sensors. Further, based on the received information the controller may activate the driving gear **202**. The driving gear **202** may provide rotational motion to the at least one belt **116** in the anti-clockwise direction that may allow diverting of the one or more packages **108** from one end of the conveyor system **100** to another end of the conveyor system **100**. In some embodiments, the plurality of cleats **114** may be positioned at least partially above the one or more idler rollers **104** to divert the one or more packages **108** from the one or more idler rollers **104**. In some embodiments, the plurality of cleats **114** may be made from a material selected from a group of materials such as, but is not limited to, rubber, polymer, plastic, steel, or wood.
[0056] As discussed earlier, the diverting mechanism **102** may be communicatively coupled with the controller. Further, the controller may direct the diverting mechanism **102** to operate in the diverting mode and in the non-diverting mode based at least on the detected positioning of the one or more packages **108**. In the non-diverting mode, the at least one belt **116** may be positioned such that each of the plurality of cleats **114** may be positioned below the first wheel **208**, the driving gear **202**, or both. In this case, the driving gear **202** may be configured to remain in an idle state. Further, the idle state of the driving gear **202** may restrict movement of the first wheel **208**, the at least one belt **116**, and the second wheel **210** and thereby allowing the one or more packages **108** to move without diverting from one end of the conveyor system **100** to another end using of the one or more idler rollers **104**.
[0057] In the diverting mode, the at least one belt **116** may be rotating around at least the first wheel **208** and the driving gear **202** such that each of the plurality of cleats **114** may be positioned over the first wheel **208**, the driving gear **202**, or both. Further, the driving gear **202** may facilitate movement of the first wheel **208**, the at least one belt **116**, and the second wheel **210** and thereby directing the one or more packages **108** towards a diversion from one end of the conveyor system **100** to another end using the at least one belt **116**.
[0058] FIG. **2**D illustrates the at least one belt **116** stretched around the first wheel **208** and the second gear **210** of the diverting mechanism **102**, in accordance with an example embodiment of the present disclosure. FIG. **2**D is described in conjunction with FIGS. **1**-**2**C.
[0059] The first wheel **208** may be positioned above the driving gear **202**, as shown in FIG. **2**B, such that the rotation of the first wheel **208** may impart rotation of the second wheel **210**. As discussed earlier, the first wheel **208** and the second wheel **210** may also be referred as pulleys having a grooved structure **212**. Such grooved structure **212** may prevent skidding or slipping of the at least one belt **116** that may be wound around the first wheel **208** and the second wheel **210**.
[0060] FIGS. **3**A-**3**C illustrate side views of operation of the diverting mechanism **102** as the diverting mechanism **102** transitions from the non-diverting mode to the diverting mode, in accordance with an example embodiment of the present disclosure. FIGS. **3**A-**3**C are described in conjunction with FIGS. **1**-**2**D.
[0061] As discussed earlier, the controller may be configured to receive the input data from the one

or more sensors **106**A, **106**B related to the positioning of the one or more packages **108**. Further, the controller may activate the driving gear **202** in the diverting mode to rotate the at least one belt **116** having the plurality of cleats **114** in the anti-clockwise direction based at least on the input data. In some embodiments, when the diverting mechanism **102** may operate in the diverting mode, the at least one belt **116** may rotate around the first wheel **208** and the driving gear **202** in anti-clockwise direction as shown by an arrow **300**. In this case, at least one of the plurality of cleats **114** may have a position that is higher than the first wheel **208**, the second wheel **210**, or both as shown in FIGS. **3**B and **3**C.

[0062] As illustrated in FIGS. **3**B-**3**C, the anti-clockwise rotation of the at least one belt **116** may position at least one of the cleats **114** higher than the one or more idler rollers **104** to divert the one or more packages **108** from the one or more idler rollers **104**. In some embodiments, during the anti-clockwise rotation of the at least one belt **116**, the one or more packages **108** may be diverted from one conveyor to another conveyor using the plurality of cleats **114**. In some embodiments, during the anti-clockwise rotation of the at least one belt **116**, a predefined number of the plurality of cleats **114** may come in contact with the one or more packages **108** to divert the one or more packages **108** . . . . Further, the predefined number of cleats **114** may be configured to lift and divert the one or more packages **108** from one end of the conveyor system **100** to another end. In an exemplary embodiment, upon activation of the diverting mode, the first end **114**A of the plurality of cleats **114** may first start to position over the one or more idler rollers **104** and the second end **114**B of the plurality of cleats **114** may follow the first end **114**A of the plurality of cleats **114** to position over the one or more idler rollers **104** and divert the one or more packages **108**.

[0063] In various examples, and with reference to FIG. **3**C, the position of the first wheel **208** may be higher than the position of the second wheel **210**. The difference in the height position of the first wheel **208** and the second wheel **210** may be substantially equal to (e.g., within manufacturing or engineering tolerances) a thickness of the thickest cleat **114**. In various examples, the height difference between the first wheel **208** and the second wheel **210** may define a first angle relative to a horizontal plane. The plurality of cleats **114** of variable thickness may collectively define a second angle relative to a main body of the at least one belt. The first angle may correspond to the second angle (e.g., the first angle and the second angle may be opposite angles). As such, and as best seen in FIG. **3**C, when the diverting mechanism is in the diverting mode, the tops of each of the plurality of cleats **114** may be aligned along a horizontal plane. As such, at least some of the plurality of cleats may make contact with the package **108** to be diverted at the same time. This configuration has various benefits. For example, this configuration may reduce a likelihood of damage to the one or more packages **108** being diverted because each package **108** is gently lifted upward by the cleats **114** and is not pushed to the side by the cleats **114**.

[0064] FIGS. **4**A-**4**C illustrate isometric views of operation of the diverting mechanism in the diverting mode, in accordance with an example embodiment of the present disclosure. FIGS. **4**A-**4**C are described in conjunction with FIGS. **1**-**3**C.

[0065] In some embodiments, the difference between the thickness of each of the plurality of cleats **114** allows the diverting mechanism to divert one or more packages **108** by maintaining orientation of the one or more packages **108**. As discussed in FIGS. **3**A-**3**C, the plurality of cleats **114** on the at least one belt **116** may be arranged in such a manner that a predefined number of the plurality of cleats **114** may come in contact with the one or more packages **108** to divert the one or more packages **108**. In some embodiments, the predefined number of the plurality of cleats **114** may depend on the size and dimensions of the one or more packages **108**.

[0066] As discussed above, the driving gear **202** is configured to drive the first wheel **208** and the second wheel **210** by rotating the at least one belt **116** in anti-clockwise direction. Further, during rotations of the at least one belt **116** in the anti-clockwise direction, the one or more packages **108** may be diverted from right to left direction. In an exemplary embodiment, the rotational direction of the driving gear **202** may be controlled by the controller. Further, the rotations of the driving

gear **202**, the first wheel **208**, the second wheel **210**, and at least one belt **116** depends upon application and settings of the diverting mechanism **102** and conveyor system **100**. As such, the driving gear **202**, the first wheel **208**, the second wheel **210**, and the at least one belt **116** may rotate clockwise to divert one or more packages **108**.

[0067] FIGS. **5**A-**5**C illustrate another side views of operation of the diverting mechanism **102** in the diverting mode, in accordance with an example embodiment of the present disclosure. FIGS. **5**A-**5**C are described in conjunction with FIGS. **1**-**4**C.

[0068] In some embodiments, the diverting mechanism **102** may be integrated within the conveyor system **100** in such a configuration that translates the one or more packages to another conveyor.

[0069] As illustrated, the at least one belt **116** may move in a clockwise direction shown by an arrow **500**. In the diverting mode, the driving gear **202**, the first wheel **208**, the second wheel **210**, and the at least one belt **116** may rotate in the clockwise direction. In some exemplary embodiments, during the clockwise rotation of the at least one belt **116**, the one or more packages **108** may be diverted from the another conveyor. In an exemplary embodiment, the rotational direction of the driving gear **202** may be controlled by the controller. Further, the rotations of the driving gear **202**, the first wheel **208**, the second wheel **210** and at least one belt **116** may depend upon application and settings of the diverting mechanism **102** and conveyor system **100**.

[0070] FIG. **6** illustrates another embodiment of the diverting mechanism **102** comprising a plurality of another cleats **600** and at least one pair of sidewalls **602** monolithic with the at least one belt **116**, in accordance with an example embodiment of the present disclosure. FIG. **7** illustrates another embodiment of the diverting mechanism **102** comprising at least one belt **116** fabricated with another plurality of cleats **700**, in accordance with an example embodiment of the present disclosure. FIGS. **6** and **7** are described in conjunction with FIGS. **1**-**5**C.

[0071] In another embodiment, the diverting mechanism **102** may comprise the plurality of another cleats **600** and the at least one pair of sidewalls **602**. Further, the plurality of another cleats **600** and the at least one pair of sidewalls **602** may be monolithic with the at least one belt **116**. In some embodiments, the plurality of another cleats **600** and the at least one pair of sidewalls **602** may be crafted with a variable thickness. Further, in the diverting mode the driving gear **202**, the first wheel, the second wheel **210**, and the at least one belt **116** may rotate in clockwise or anti-clockwise direction. In the diverting mode the plurality of another cleats **600** and the at least one pair of sidewalls **602** comes in contact with the one or more packages **108**. In some embodiments, the at least one pair of sidewalls **602** may be crafted with a shape that may be selected from a group of shapes such as, but not limited to a sinusoidal shape. Further, the sinusoidal shape of the at least one pair of sidewalls **602** may be configured to provide grip to the diverting mechanism **102** while diverting the one or more packages **108**.

[0072] As illustrated in FIG. **7**, the at least one belt **116** may be crafted with the another plurality of cleats **700**. In some embodiments, the another plurality of cleats **700** may be constructed with a variable thickness. In diverting mode, the another plurality of cleats **700** may come in contact with the one or more packages **108**.

[0073] In some alternate embodiments, the diverting mechanism **102** of the conveyor system **100** may be simple in operation with a minimalistic configuration of parts. Such simplicity streamlines the conveyor system **100** and also contributes significantly to cost savings by obviating the need for elaborate lifting mechanisms. In some alternate embodiments, the elimination of intricate mechanical and electrical components further underscores its economic benefits, translating into substantial savings. Additionally, the diverting mechanism **102** facilitates labor cost savings through reduced assembly time and simplified maintenance procedures. In some embodiments, the conveyor system **100** may be a compact design that optimizes space utilization and enhances overall efficiency, making it a versatile and cost-effective solution for various applications.

[0074] Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings

presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the inventions are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Moreover, although the foregoing descriptions and the associated drawings describe example embodiments in the context of certain example combinations of elements and/or functions, it should be appreciated that different combinations of elements and/or functions may be provided by alternative embodiments without departing from the scope of the appended claims. In this regard, for example, different combinations of elements and/or functions than those explicitly described above are also contemplated as may be set forth in some of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

Claims

1. A diverting mechanism for a conveyor comprising: a first wheel; a driving gear; and at least one belt stretched around the first wheel and the driving gear, the at least one belt having a plurality of cleats of variable thickness, wherein the driving gear is configured to rotate the at least one belt.
2. The diverting mechanism of claim 1, wherein a thinnest cleat of the plurality of cleats has a thickness of at least 1 mm and up to 10 mm, and wherein a thickest cleat of the plurality of cleats has a thickness of at least 10 mm and up to 50 mm.
3. The diverting mechanism of claim 1, wherein the plurality of cleats collectively defines a first end and a second end, and wherein the plurality of cleats defines a gradient such that the thickness of each of the cleat sequentially increases from the first end to the second end.
4. The diverting mechanism of claim 1, wherein a difference between a thickness of adjacent cleats is at least 0 mm and up to 5 mm.
5. The diverting mechanism of claim 4, wherein the difference between the thickness of each of the plurality of cleats allows the diverting mechanism to divert one or more packages by maintaining orientation of the one or more packages.
6. The diverting mechanism of claim 1, further comprising a second wheel, wherein: a position of the first wheel is higher than a position of the second wheel, a height difference between the first wheel and the second wheel defines a first angle relative to a horizontal plane, the plurality of cleats of variable thickness collectively defines a second angle relative to a main body of the at least one belt, and the first angle corresponds to the second angle.
7. The diverting mechanism of claim 1, wherein the at least one belt defines a width, wherein a width of each of the plurality of cleats is within 10-100 mm of the width of the at least one belt.
8. The diverting mechanism of claim 1, wherein each of the plurality of cleats is spaced apart from an adjacent cleat by a distance, wherein the distance is at least 1 mm and up to 100 mm.
9. The diverting mechanism of claim 1, wherein the at least one belt defines a circumference, wherein a first portion of the at least one belt comprises the plurality of cleats and a second portion of the at least one belt does not comprise the plurality of cleats, wherein a length of the first portion is less than a length of the second portion.
10. The diverting mechanism of claim 9, wherein the first wheel is further connected to a second wheel via the at least one belt such that the first portion and the second portion of the at least one belt is disposed between the first wheel and the second wheel.
11. The diverting mechanism of claim 10, wherein the driving gear is configured to drive the first wheel and the second wheel by rotating the at least one belt in clockwise or anticlockwise direction.
12. The diverting mechanism of claim 1, wherein: the diverting mechanism is configured to operate in a diverting mode and in a non-diverting mode, when the diverting mechanism is operating in the diverting mode, the at least one belt is rotating around the first wheel and the driving gear such that

at least one of the plurality of cleats is positioned higher than the first wheel, the driving gear, or both, and when the diverting mechanism is operating in the non-diverting mode, the at least one belt is positioned such that each of the plurality of cleats is positioned below the first wheel, the driving gear, or both.

13. A conveyer system comprising: a diverting mechanism comprising: a first wheel; a driving gear; and at least one belt stretched around the first wheel and the driving gear, the at least one belt having a plurality of cleats of variable thickness; and one or more idler rollers installed between at least two longitudinal frames for carrying one or more packages, wherein the plurality of cleats is positioned at least partially above the one or more idler rollers to divert the one or more packages when the diverting mechanism is in a diverting mode.

14. The conveyor system of claim 13, wherein a thinnest cleat of the plurality of cleats has a thickness of at least 1 mm and up to 10 mm, and wherein a thickest cleat of the plurality of cleats has a thickness of at least 10 mm and up to 50 mm.

15. The conveyor system of claim 13, wherein the plurality of cleats collectively defines a first end and a second end, and wherein the plurality of cleats defines a gradient such that the thickness of each of the cleat sequentially increases from the first end to the second end.

16. The conveyor system of claim 13, wherein a difference between a thickness of adjacent cleats is at least 0 mm and up to 5 mm.

17. The conveyor system of claim 13, wherein the at least one belt defines a width, wherein a width of each of the plurality of cleats is between 10-100 mm of the width of the at least one belt.

18. The conveyor system of claim 13, wherein each of the plurality of cleats is spaced apart from an adjacent cleat by a distance, wherein the distance is at least 1 mm and up to 100 mm.

19. The conveyor system of claim 13, wherein the at least one belt defines a circumference, wherein a first portion of the at least one belt comprises the plurality of cleats and a second portion of the at least one belt does not comprise the plurality of cleats, wherein a length of the first portion is less than a length of the second portion.

20. The conveyer system of claim 13, wherein the plurality of cleats is made from a material selected from a group of materials of rubber, polymer, plastic, steel, or wood.