METHOD AND CONVEYOR SYSTEM FOR TRANSFERRING CONTINUOUSLY SUPPLIED PRODUCTS TO A STATIONARY POSITION

Abstract: Method and conveyor system for transferring products to a stationary position. The conveyor system comprises a continuously running endless first conveyor (10) for carrying the products randomly spaced along the conveyor, and an endless second conveyor (11) having regularly spaced carriers (27) overlapping said first conveyor along a linear distance defined by two pulleys (20, 21). One of them is mounted for linear displacement along the conveyors. Arrival of a product on said first conveyor (10) at said second conveyor (11) is sensed, and in dependence thereof said one pulley (21) is displaced to extend the length of said distance in a direction opposite to the moving direction (19) of said first conveyor (10) each extension corresponding to the length of the spacing between two adjacent carriers (27). After a predetermined number of extensions said second conveyor (11) is driven in the moving direction (19) of said first conveyor to place a corresponding number of spacings with products caught therein in said stationary position.
Title of the Invention
Method and conveyor system for transferring continuously supplied products to a stationary position

Background of the invention

Field of the invention

The invention relates to a method in operating a conveyor system for transferring products to a stationary position, comprising a continuously running endless first conveyor and an intermittently driven endless second conveyor having regularly spaced carriers the products being carried on said first conveyor randomly spaced along the conveyor, and being transferred from said first conveyor to said second conveyor, a linear distance of said second conveyor being defined by two pulleys and overlapping said first conveyor, the arrival of a product on said first conveyor at said second conveyor being sensed.

The invention also relates to a conveyor system for transferring products to a stationary position, comprising a continuously running endless first conveyor for carrying the products randomly spaced along the conveyor, an intermittently driven endless second conveyor having regularly spaced carriers and overlapping said first conveyor along a linear distance defined by two pulleys, means for sensing the arrival of a product on said first conveyor at said second conveyor, and means for controlling the movement of said second conveyor in dependence of such sensing.
Description of the Prior Art

EP 0781 249 B1 describes method and conveyer system of the kind referred to above wherein the second conveyer is mounted in its entirety on a reciprocating carriage and is indexed in the moving direction of the first conveyer in order to receive products from the first conveyer in the spacings between the carriers. When the predetermined number of products has been received the carriage is indexed opposite to the indexing movement of the second conveyer in order to place the products on the second conveyer in the stationary position.

Brief Summary of the Invention

The primary object of the invention is to provide a simpler and more compact conveyer system. Another object is to facilitate adaption of the conveyer system to products of different sizes. These and other objects which will be apparent from the description to follow are achieved by the characterizing features of the method and the conveyer system which are defined in claim 1 and claim 5, respectively. Further features of the invention are defined in the dependent claims.

Brief Description of the Drawing

Illustrative embodiments of the invention will be described with reference to the accompanying drawings in which

- FIG 1 is a diagrammatic side view of a conveyer system according to a first embodiment of the invention,
- FIG 2 is a diagrammatic plan view of the conveyer system shown in FIG 1,
FIG 3 is an enlarged vertical cross sectional view taken along line III-III in FIG 2,

FIG 4 is an enlarged vertical cross sectional view taken along line IV-IV in FIG 2,

FIG 5 is an enlarged fragmentary side view of the conveyer system in FIGS 1 to 4 at the upstream end of said second conveyer,

FIG 6 is a view similar to that in FIG 5 of a modification of the embodiment in FIGS 1 to 4, and

FIG 7 is a diagrammatic side view of a conveyer system according to a second embodiment of the invention.

**Detailed Description of the Invention**

Referring to FIGS 1 to 5 in the drawings the conveyer system disclosed therein comprises a first endless conveyer 10 which will be referred to herein as the feeder conveyer, and a second endless conveyer 11 which will be referred to herein as the collector conveyer. The feeder conveyer includes four belts 12 which run over grooved end pulleys 13 and 14. An upper part 10A of the feeder conveyer extends in a straight path between the pulleys 13 and 14. A lower part 10B of the feeder conveyer extends over pulleys 15, 16 and 17 to be held close to the upper part in the region of the collector conveyer 11. Between pulleys 13 and 17 the feeder conveyer includes three further belts 12'. The pulley 14 is driven by a motor 18 moving the upper part 10A in the direction indicated by an arrow 19. Pulleys 13, 15, 16 and 17 are idling pulleys.

The collector conveyer 11 runs over three pulleys 20, 21 and 22 each including three sections and comprises three cogged belts 23 engaging teeth 24 on the pulleys 20, 21 and 22 and having a V-belt profile 25 on the lower side thereof which engages a groove 26 in the associated section of each pulley determining the axial position of the belt on the
pulley. Carriers 27 formed by plates project at right angles from the upper side of the collector conveyer uniformly spaced in the longitudinal direction of the conveyer. The carriers thus define compartments 28 therebetween which are dimensioned to receive each one of the products to be handled by the conveyer system.

The sections of the pulley 20 are mounted on a rotatable shaft 29, FIG 3, for rotation together with the shaft and are mutually spaced axially by sleeves 30. The shaft is connected with a drive motor 31.

The sections of the pulley 21 are rotatably mounted on a shaft 32, FIG 4, by means of anti-friction bearings 33 spaced axially by sleeves 34. The shaft 32 is supported by a slide 35 which can be reciprocated in a straight path by a linear drive 36 connected with a motor 37 for displacement of the pulley 21 along the feeder conveyer 10.

The sections of the pulley 22 are rotatably mounted on a lever 38 at one end thereof the lever being pivoted at the other end 39 thereof. A biasing element 40, e.g. a spring, is pivoted to the lever 38 between the ends thereof at 41 and to a fixed point 42 and biases the lever in clockwise direction in order to keep the collector conveyer tightened over the pulleys 20, 21 and 22.

It should be understood that motors 18, 31, and 37 as well as the drive 36 are fixedly mounted in a stationary construction such as a frame which has not been shown in the drawings, and that the pulleys 13, 14, 15, 16, 17 and 20 are rotatably mounted in said construction. Also pivot pins at 39 and 42 are located in the stationary construction.

As shown in FIGS 3 and 4 the belts of the feeder conveyer 10 extend in the spacings between the sections of pulleys 20 and 21 and laterally thereof, respectively. The pulleys 20 and 21 define a straight path of the collector conveyer, extending along the feeder conveyer 10.
A photo cell 43 is mounted on the slide 35 and is operatively connected with the motor 37 over an electric circuit for intermittently energizing the motor in dependence of electric pulses supplied by the photo cell. Also the motor 31 is operatively connected to this electric circuit to be energized when a predetermined number of pulses have been supplied by the photo cell.

The conveyor system described functions as follows when used for working the method of the invention.

The feeder conveyor 10 is kept running by means of the motor 18 and supplies products randomly spaced on the conveyor. When the leading product on the conveyor 10 arrives at the photo cell 43 a signal is supplied by the photo cell to the electric circuit controlling the energizing of the motor 37 which will start and will index the slide 35 by displacement to the left as seen in FIGS 1 and 2 a distance which corresponds to the spacing between the carriers 27 on the collector conveyor 11. The leading product thus will be caught between two adjacent carriers 27.

When the next product on the feeder conveyor arrives at the photo cell 43 the same procedure will be repeated: the slide 35 will be indexed to the left a distance corresponding to the spacing between the carriers 27. When the slide is indexed the distance between the pulleys 20 and 21 will be extended by one spacing for each indexing step and finally the slide will reach a left hand end position indicated by dot and dash lines in FIG 1. The collector conveyor overlaps the feeder conveyor over the distance between the pulleys 20 and 21 and the products are successively transferred one after the other from the feeder conveyor to the collector conveyor. FIG 5 discloses in more detail how the product indicated at P is caught between two adjacent carriers 27. The product lays on the feeder conveyor and the carriers 27 are inserted between two adjacent products separating them at opposite side surfaces thereof.
During the indexing operation the collector carrier 11 is kept tightened over the pulleys 20, 21 and 22 by the biasing element 40 the lever 38 being swung counterclockwise for each indexing step against the bias of the element 40. After a predetermined number of indexing steps—in this example four indexing steps—the slide has reached the left hand end position and the motor 31 will be energized over the electric circuit to drive the collector conveyor in the direction of the arrow 19 to place said predetermined number of spacings between adjacent carriers 27 and the products received therein in the straight path between the pulleys 20 and 21 the slide 35 at the same time being returned along the linear drive 36 to the right hand end position shown in FIGS 1 and 2 by means of the motor 37. The pulley 22 will be returned to the position shown in FIG 1 by the biasing element 40 swinging the lever 38 clockwise. During the following indexing of the slide 35 with the pulley 21 the collector conveyor will stay stationary and a working station 44 will perform operating steps on the products caught in the spacings between the carriers located in the straight path between the pulleys 20 and 21 either by working steps being performed on the products or by removing said products from the collector conveyor and transferring them to a location where they are to be processed further.

The electric circuit for controlling the energization of the motor 31 and the motor 37 has not been disclosed or described in more detail since it would be obvious to the average skilled man how to design such a circuit in order to achieve the function described.

FIG 6 discloses a modification of the transfer of the products from the feeder conveyor 10 to the collector conveyor 11 wherein the products P are raised and placed edgewise. This is achieved by locating the upper part 10A of the feeder conveyor 10 below the center of the pulley 21 so
that the product laying on a flat side on the feeder conveyor will be engaged by a carrier 27 on said flat side and will be raised to an edgewise position between two adjacent carriers when transferred from the feeder conveyor to the collector conveyor.

Referring now to FIG 7 in the drawings the conveyor system disclosed therein comprises a feeder conveyor 10, and a collector conveyor 11. The feeder conveyor extends in a straight path between end pulleys 13 and 14 and may include a number of belts, which run over pulleys 13 and 17 and two cogged belts which run over circumferential teeth on pulleys 14 and 17. The feeder conveyor is driven in the direction indicated by an arrow 19.

As in the first embodiment described the collector conveyor 11 has carriers 27 which are formed by plates projecting at right angles from one side of the collector conveyor uniformly spaced in the longitudinal direction of the conveyor. The carriers thus define compartments 28 therebetween which are dimensioned to receive each one of the products to be handled by the conveyor system.

The cogged collector conveyor runs over five pulleys 50, 51, 52, 53 and 54 in engagement with circumferential teeth on the respective pulleys. Pulley 50 is connected to a servo motor 55, and pulleys 51 and 52 are rotatably mounted on a slide 56 which is displaceable along a linear guide 57 by means of a servo motor 58. The circumferential teeth on pulley 51 are axially spaced so that there is a circumferential axial space between the teeth allowing the carriers 27 to pass around the pulley with the carriers facing the pulley.

A working station 44 and a photo cell are provided in the manner described above.

When the leading product on conveyor 10 arrives at the photo cell motor 58 will be energized and will index the slide 56 to the left as seen in FIG 7 a distance corre-
sponding to the spacing of the carriers 27 which are raised to an upstanding position between the belts of the feeder conveyer below the working station. During this step the collector conveyer is stationary the collector conveyer belt being transferred from the length between pulleys 50 and 51 to the length between pulleys 52 and 53. When the slide after a predetermined number of indexing steps has reached the left end position motor 55 will be energized to place the predetermined number of products in the straight path between pulleys 52 and 53 below the working station 44. Slide 56 at the same time is returned to the right end position disclosed in FIG 7.

It will be seen that the method of the invention thus is practised by means of the embodiment of FIG 7 in the same manner as with the embodiment of FIGS 1 to 6. However, slack of the collector conveyer caused during indexing is taken up in a different manner than that applied with the embodiment of FIGS 1 to 6.
CLAIMS

1. A method in operating a conveyor system for transferring products to a stationary position comprising a continuously running endless first conveyor (10) and an intermittently driven endless second conveyor (11) having regularly spaced carriers (27) the products being carried on said first conveyor randomly spaced along the conveyor, and being transferred from said first conveyor to said second conveyor, a linear distance of said second conveyor being defined by two pulleys (20, 21) and overlapping said first conveyor, the arrival of a product on said first conveyor at said second conveyor being sensed characterized by the steps of indexing in dependence of such sensing one of said pulleys (21) located at an upstream end of said linear distance, along the conveyors (10, 11) to extend the length of said distance in a direction opposite to the moving direction (19) of said first conveyor (10) each extension corresponding to the length of the spacing between two adjacent carriers (27), and after a predetermined number of extensions driving said second conveyor (11) in the moving direction (19) of said first conveyor to place a corresponding number of spacings with products caught therein in said stationary position.

2. The method of claim 1 wherein said second conveyor (11) is biased to be kept tightened over said pulleys (20, 21).

3. The method of claim 1 or 2 wherein the carriers (27) are each engaged between two adjacent products supplied on said first conveyor (10).

4. The method of claim 1 or 2 wherein the carriers (27) are each engaged with a bottom surface of a product laying with said bottom surface against said first conveyor (10), to raise the product to an edgewise position.
5. A conveyer system for transferring products to a stationary position by the method comprising a continuously running endless first conveyer (10) for carrying the products randomly spaced along the conveyer, an intermittently driven endless second conveyer (11) having regularly spaced carriers (27) and overlapping said first conveyer along a linear distance defined by two pulleys (20, 21), means (43) for sensing the arrival of a product on said first conveyer (10) at said upstream end of said second conveyer (11), and means for controlling the movement of said second conveyer in dependence of such sensing, characterized by means (35) mounting one of said pulleys (21) located at the upstream end of said linear distance for linear displacement along the conveyers for adjustment of the length of said distance in dependence of said sensing.

6. The conveyer system of claim 5 wherein said one of said pulleys (21, 52) is rotatably mounted on a slide (35, 56) displaceable along said distance by a linear drive (36, 57).

7. The conveyer system of claim 5 or 6 wherein said second conveyer (11) is passed over a third pulley (22) biased to keep said second conveyer (11) tightened over the pulleys (20, 21) defining said linear distance.

8. The conveyer system of claim 8 wherein said third pulley (22) is rotatably mounted on a pivoted lever (38) connected with a biasing element (40).

9. The conveyer system of any of claims 5 to 8 wherein a lower part (10B) of said first conveyer (10) is guided to run closely below an upper part (10A) of said first conveyer at least along said distance.

10. The conveyer system of any of claims 5 to 9 wherein an upper part (10A) of said first conveyer (19) extends below the rotation axes of said pulleys (20, 21) defining said linear distance.
INTERNATIONAL SEARCH REPORT

INTERNATIONAL APPLICATION No. PCT/SE 2003/002065

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65G 47/31, B65G 47/84
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Relevant to claim No.</th>
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<td>EP 0366200 A1 (TROMPERT, STEPHANUS F), 2 May 1990 (02.05.1990), column 1, line 48 - column 3, line 13, figure 1, claim 1</td>
<td>5-10</td>
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<td>A</td>
<td>US 4294344 A (VAN MAANEN), 13 October 1981 (13.10.1981), column 1, line 7 - column 2, line 10, figure 6, claims 1-3</td>
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☐ Further documents are listed in the continuation of Box C. [X] See patent family annex.

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