UNITED STATES PATENT OFFICE

2,389,696

CONVEYER FEEDING SYSTEM

John W. Stiles, New York, N. Y.

Application August 10, 1944, Serial No. 548,872

3 Claims. (Cl. 198—32)

This invention relates to a conveyer feeding system for discharging upon a main conveyer belt a continuous line of units, the invention here described being in the same general category as that of my Patent No. 2,318,889 granted April 6, 1943.

It is primarily within the contemplation of this invention to effect a continuous feed of such units as bottles, jars and containers to a main conveyer belt without interruption to the continuity of the feed and without gaps between successive units. In my previous patent above-referred-to, this objective was sought to be attained through the use of an oscillating guide rail obliquely disposed over a plurality of parallel adjacent feed belts arranged with progressively increasing speeds. In the present invention this objective is attained by the use of a traveling guide belt instead of a guide rail, the belt being movable, in accordance with one aspect of my invention, towards the discharge feed belt and at a speed bearing a predetermined ratio to the speeds of the feed belts.

And it is another object of my invention to provide adjusting means for increasing or decreasing the effective carrying width of the discharge feed belt in order to accommodate units of various proportions, and also for varying the level of the traveling guide belt in accordance with the height of the traveling units.

Other objects, features and advantages will appear from the drawings and description hereinafter given.

Referring to the drawings:

Figure 1 is a plan view of a preferred form of my invention, illustrating in broken lines the position of traveling units, and showing an adjusted position of one of the idler pulleys and supporting arm.

Figure 2 is a fragmentary side elevation of the structure of Figure 1 looking in the direction of line 2—2, parts being shown broken away and partially in section.

Figure 3 is a fragmentary side view of Figure 1 looking in the direction of line 3—3.

In the particular embodiment of my invention shown in the drawings, the conveyer apparatus contains three continuous feed belts 10, 11 and 12, these being preferably of the open-link type with smooth upper surfaces. These belts are operated at different speeds, belt 10 having the lowest speed, intermediate belt 11 a greater speed, and end belt 12 the greatest speed and substantially equal to that of the main conveyer belt 13 upon which the units being fed are to be discharged. With this arrangement the end belt 12 serves also as a discharge belt, to discharge the units upon the main conveyer belt 13. Each of the belts is in coactive engagement with two suitable sprocket wheels, belt 10 being in engagement with wheels 14 and 15, and belt 11 with wheels 16 and 17, and belt 12 with wheels 18 and 19. These wheels are driven by a conventional belt and pulley system connected to the motor 20, the ratios of the pulley diameters determining the relative speeds of feed belts 10, 11 and 12. The details of the driving mechanism are not here described, inasmuch as they are substantially like those described in my said prior Patent No. 2,318,889, and are of a construction well known in the art. Suffice it to say, for the purpose of this specification, that the said motor 20 is also operatively connected through the said pulley system with the transverse drive shaft 21 which extends through casing 22 and has attached to its terminal end the bevel gear 23. The latter gear is in coactive engagement with gear 24 keyed to vertical shaft 25 which is
maintained in position by bearing brackets 26 and 27. The said vertical shaft 25 has keyed thereto the two spaced drive pulleys 28a and 28b. Operatively mounted over said pulleys are the guide belts 29a and 29b, these being preferably of the V type and made of frictional material. Said belts operate also in operative engagement with the idler pulleys 30a and 30b located in advance of the discharge gate 31 of the apparatus, and the rear idler pulleys 32a and 32b, and 33a and 33b.

Idler pulleys 30a and 30b are supported by the adjustable arm 34, said arm being rotatably mounted in brackets 35 and extending transversely over discharge belt 12. Said arm 34 is of inverted U-shape so as to permit the passage thereunder of units traveling on discharge belt 12 towards the discharge gate. The collars 36 attached to post 37 hold the said pulleys 30a and 30b in place.

The rear idler pulleys 32a and 32b are rotatably mounted upon the vertical post 35 secured to the bar 39 with slot 40 therein, said bar being additionally secured to the cover plate 41 by the bolt and nut 42. Similarly the rear idler pulleys 33a and 33b are rotatably mounted upon the vertical post 43 secured to the base bar 44 with slot 45 therein, said bar being additionally secured to the cover plate 41 by the bolt and nut 46.

The said idler pulleys are all maintained at predetermined levels by collars 47 similar to the collars above described with reference to pulleys 30a and 30b. These collars are slidably movable along their respective posts and are held fixed in predetermined positions by set-screws 48 the terminals of which engage longitudinal surfaces 49. By adjusting the collars to predetermined positions, the pulleys and the guide belts can be operatively maintained at any desired levels with respect to the level of the feed belts. The drive pulleys 28a and 28b are also additionally movable by keying them to shaft 25 at levels to correspond with the levels of their coacting idler pulleys.

In the preferred form of the apparatus illustrated, the forward operative portions 50a and 50b and 51a and 51b of the guide belts extend farwardly from behind the discharge gate 31 and obliquely across the feed belts, the oblique outlet wall 52 cooperating with the gate 31 to form an outlet corridor for the traveling units. In the particular arrangement shown in the drawings, the forward surfaces of guide belt portions 50a and 51a are in one vertical plane where such portions are adapted to engage upper and lower portions of cylindrical jars of uniform diameter. Where, however, the units being conveyed have, for example, a neck of less diameter than the body portion, the portions 50a and 51a can be positioned out of vertical alignment so as to correspond with the shape of the units. It will also be observed that in the form of my invention illustrated, the forward operative portions 50a and 51a of the guide belts are disposed less obliquely with respect to the feed belts than are the portions 50b and 51b, the former portions extending across feed belts 10 and 11 to the region of the discharge belt 12.

In the preferred arrangement the feed belts 10, 11 and 12 travel toward the guide belts, and the portions 50a and 51a of the guide belts travel towards the discharge feed belt 12. It is important that the linear speed of the guide belts be different from that of the discharge belt 12, it being preferred that it be considerably less than that of the discharge belt. A satisfactory arrangement has proven to be speed ratios of 1, 2 and 4 for the feed belts, and a guide belt speed less than that of any of the feed belts, more specifically, feet-per-minute speeds of 30, 60 and 120 for the feed belts, and 55 for the guide belts.

In the operation of this system, units to be conveyed, such as the jars 55, are deposited upon the feed belts 10, 11 and 12, substantially as described in my said previous Patent No. 2,310,880. As the traveling units reach the moving guide belts, they are deflected toward the discharge belt 12, due to both the inclination of the guide belts and to their frictional gripping action. The frictional surface of the guide belts also causes a counterclockwise rotation of the units, as indicated.

The danger of jamming is eliminated in the following manner. Assuming a jar 54 in engagement with the guide belt comes into engagement with a jar 55 traveling on discharge belt 12, both jars attempting to simultaneously to enter the next portion 56 of the discharge belt. At the time of such engagement between the two said jars, jar 54 is rotating counterclockwise, and being contiguous to jar 55, also causes said latter jar to rotate, but in a clockwise direction, an action which is enhanced under the influence of the moving discharge belt 12. It has been found that the speed of rotation of jar 55 is greater than that of jar 54. This is probably due to the fact that the speed of rotation of jar 54 is substantially equal to that of the relatively slow-moving guide belts, whereas the speed of jar 55 is relatively greater due to the fact that the moving floor upon which it is supported, to wit, the discharge belt 12, is comparatively fast-moving. Since, then, jars 54 and 55 are rotating at different speeds, one will either overtake or thrust the other in the direction of its travel, or will itself be propelled in the same general direction. Regardless, however, of what the precise action of the forces may be, the results have always been the same, to wit, that one of any two abutting jars at the region of entry to the outlet portion 56 of discharge belt always moves past the other, thereby preventing jamming, and providing a continuous and uninterrupted feed.

The use of two spaced guide belts herein shown is merely illustrative of one adaptation of my invention. Where the traveling units are sufficiently high, more guide belts may be employed at different levels. And it is equally obvious that for low units, a single guide belt will be sufficient, and will accomplish the objectives of this invention with equal effectiveness. And if it is desired to adjust a single guide belt arrangement, or a multiple guide belt arrangement, for units of different heights or different centers of gravity, the adjustment to different levels can be made by moving the pulleys on their respective posts or shafts in the manner described.

A further adjustment may be made with respect to the effective width of outlet portion 56 of discharge belt 12, for the purpose of accommodating units of different diameters. By rotatably moving the arm 34 about its mounting 38, the pulley-carrying post 37 can be swung to different positions with respect to the discharge belt 12, as indicated by the broken lines in Figure 1, thereby either increasing or decreasing entrance width A. When such an adjustment is made, corresponding adjustments must also be.
made with respect to the rear posts 38 and 43, by means of the adjustable slotted bases 39 and 44 above described, thereby maintaining a proper tension in the guide belts.

It has also been found that the use of the guide belts above described decreases the danger of breakage of glass bottles and jars, due to the yieldability of the belts, in contradistinction to the impact effect upon such traveling units when rigid guide means are employed.

In the accompanying drawings, the invention has been shown merely by way of example and in preferred form, but obviously many variations and modifications may be made therein which will still be comprised within its spirit. It is to be understood, therefore, that the invention is not limited to any specific form or embodiment, except insofar as such limitations are specified in the appended claims.

I claim:

1. In a conveyor apparatus, a plurality of parallel adjacent feed belts, one of said belts also serving as a discharge belt, a guide belt disposed over and extending obliquely across certain of said feed belts, means to actuate said feed belts in a direction toward said guide belt, a plurality of pulleys in operative engagement with said guide belt, one of said pulleys being a drive pulley and the others idler pulleys, one of said idler pulleys being adjacent said discharge belt and spaced from the outer lateral edge thereof to permit the passage therepast of units traveling on said discharge belt, an adjustable mounting for said last-mentioned idler pulley for changing its position relative to the discharge belt, adjusting means associated with at least one of the other idler pulleys for cooperative action with said mounting, and means to operate the drive pulley for actuating the guide belt toward the discharge belt, whereby units traveling on the feed belts will be deflected by the guide belt in the general direction of its movement.

3. In a conveyor apparatus, a plurality of parallel adjacent feed belts, one of said belts also serving as a discharge belt, a guide belt disposed over and extending obliquely across certain of said feed belts, means to actuate said feed belts in a direction toward said guide belt, a plurality of pulleys in operative engagement with said guide belt, one of said pulleys being a drive pulley and the others idler pulleys, one of said idler pulleys being adjacent said discharge belt and spaced from the outer lateral edge thereof to permit the passage therepast of units traveling on said discharge belt, a rotatably mounted arm operatively supporting said last-mentioned idler pulley for changing its position relative to the discharge belt, said arm being substantially of inverted U-shaped form and extending transversely across and over the discharge belt to permit units traveling thereon to pass under the arm, adjusting means associated with at least one of the other idler pulleys for cooperative action with said arm, and means to operate the drive pulley for actuating the guide belt toward the discharge belt, whereby units traveling on the feed belts will be deflected by the guide belt in the general direction of its movement.

JOHN W. STILES.