

March 4, 1958

S. T. CARTER

2,825,442

ARTICLE ORIENTING MECHANISM FOR CONVEYORS

Filed March 16, 1955

4 Sheets-Sheet 1

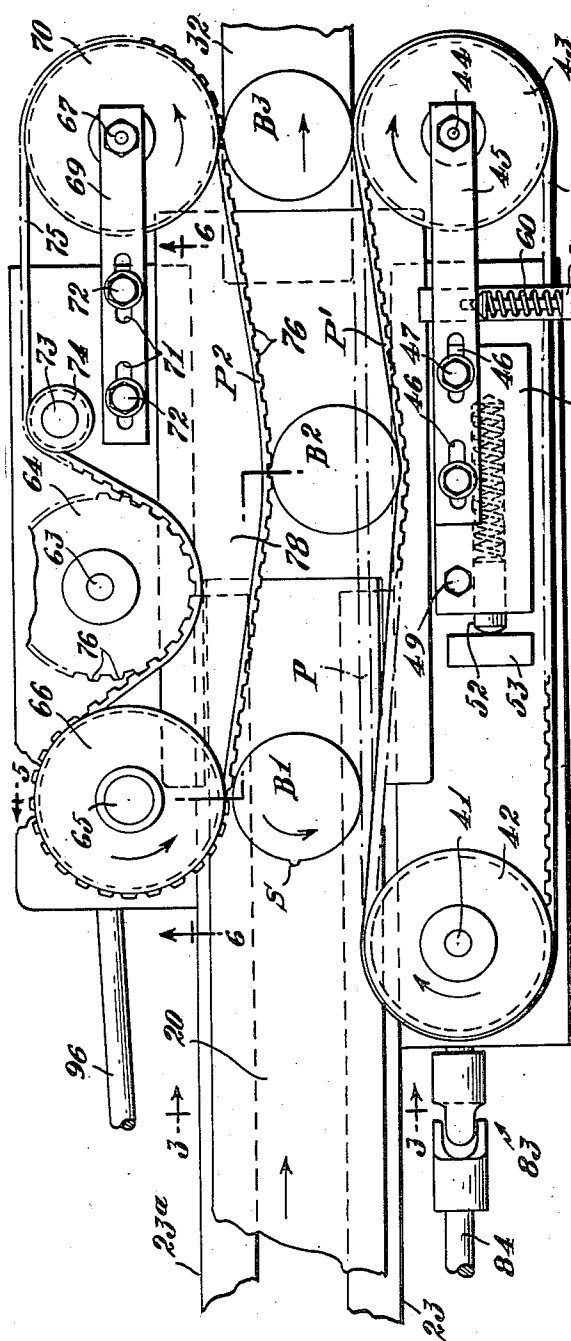


Fig. 1

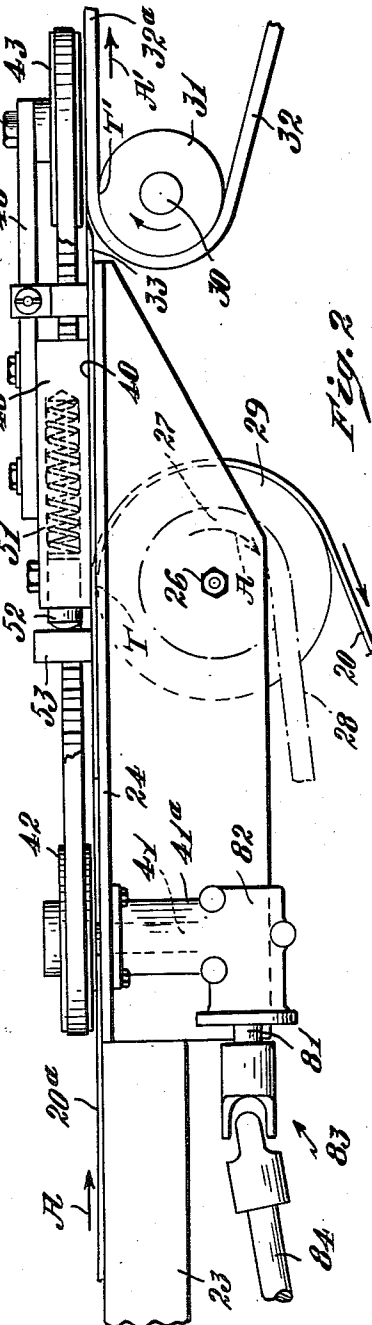


Fig. 2

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4 Sheets-Sheet 2

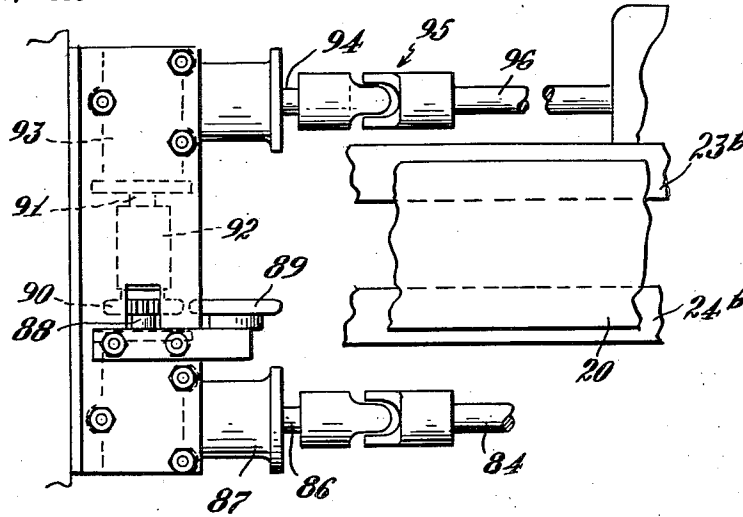


Fig. 1a

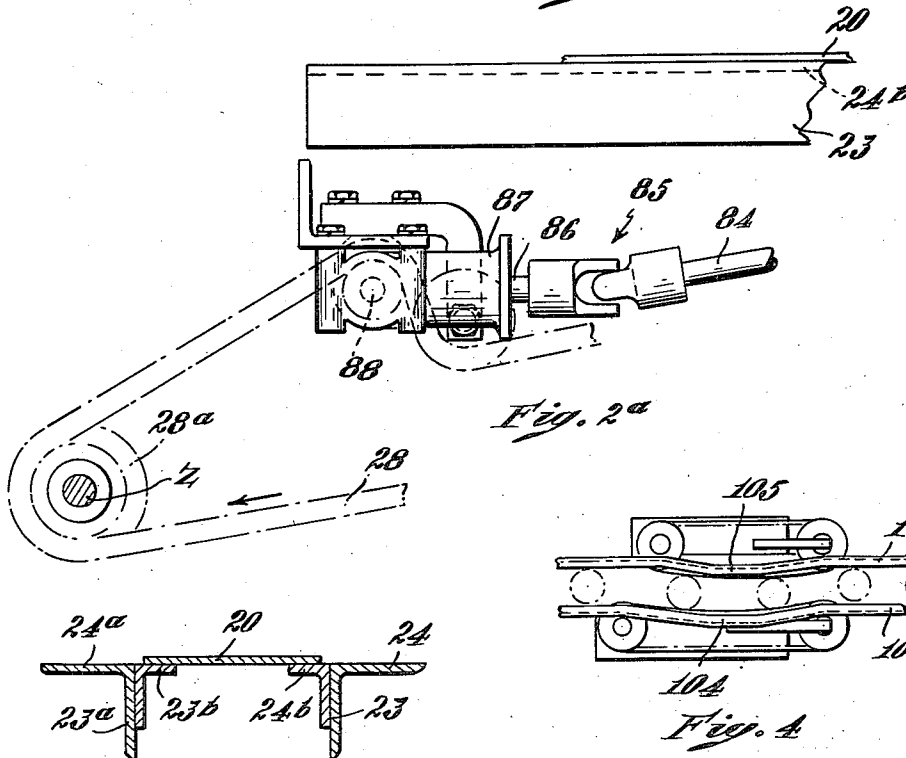


Fig. 3

Fig. 4

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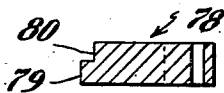
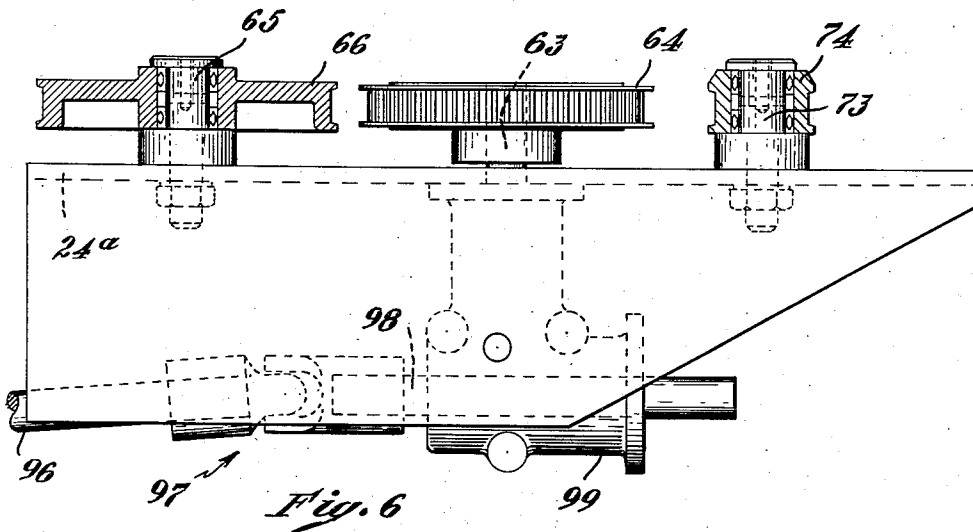
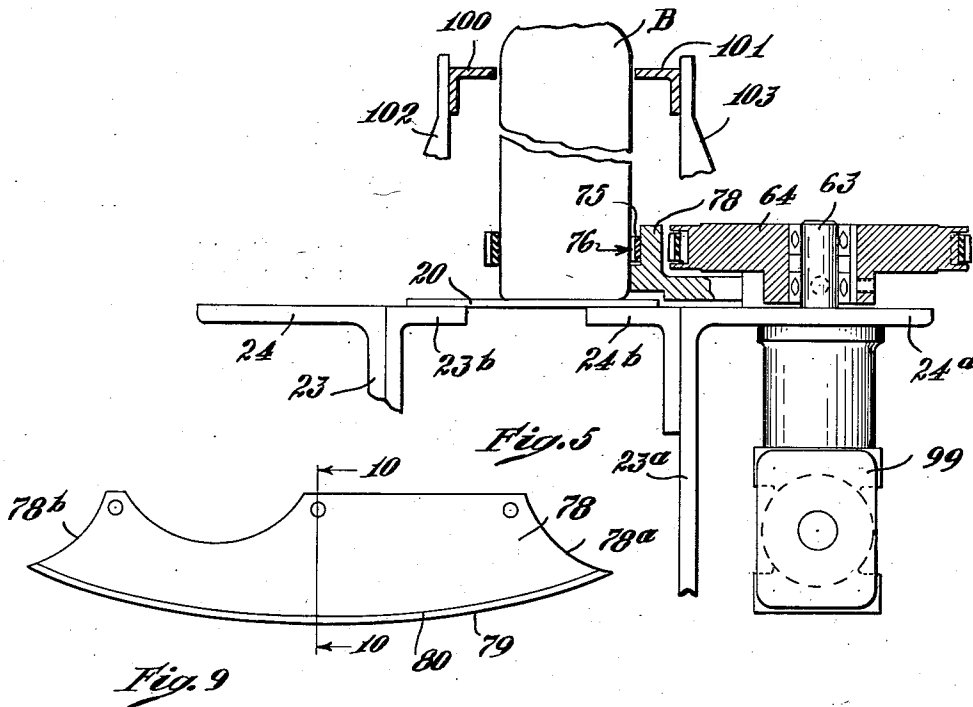
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ARTICLE ORIENTING MECHANISM FOR CONVEYORS

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4 Sheets-Sheet 3



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ARTICLE ORIENTING MECHANISM FOR CONVEYORS

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4 Sheets-Sheet 4

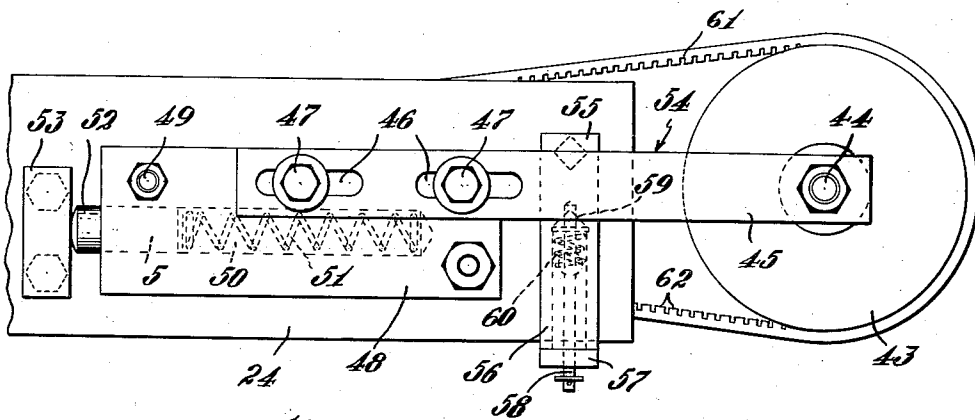


Fig. 7

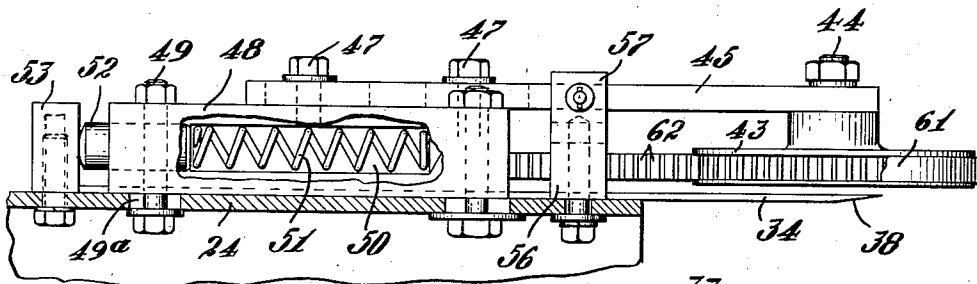


Fig. 8

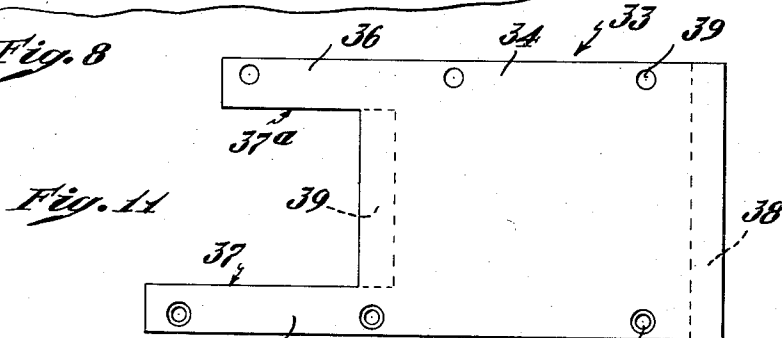


Fig. 11

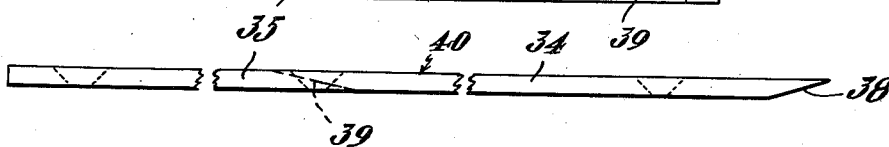


Fig. 12

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ARTICLE ORIENTING MECHANISM FOR CONVEYORS

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Application March 16, 1955, Serial No. 494,741

17 Claims. (Cl. 198—33)

This invention pertains to conveyors and more especially to means for orienting an article while it is moving uninterruptedly from one conveyor device to another, so that each successive article, when deposited on the receiving conveyor, will face in the same direction.

The invention is of particular utility in the labeling art, where it is often necessary to apply a label or the like to a definite predetermined area of the article being labeled. For example, in labeling round bottles it may be required that the label be accurately located with reference to certain letters or designs molded in the bottle glass. As a more specific example, round whiskey bottles commonly have both front and back labels and a strip revenue stamp which must be located correctly with reference to both labels.

To make possible such accurate location of labels or stamps, when applied automatically by machinery, it is customary to provide the bottle with a small integral boss, commonly referred to as a "spotting projection" or sometimes as a "tear-drop" projecting from its circumferential surface, usually near but spaced upwardly from its bottom. Immediately prior to its journey through the label applying zone the bottle is caused to rotate about its vertical axis until this tear-drop or spotting projection engages an abutment forming an element of so-called "spotting mechanism" whereby rotation of the bottle is stopped with the tear-drop in a definite position of orientation relatively to the label applying device.

While in some bottling plants machinery is available for applying the strip revenue stamp before the bottle leaves the labeling machine proper, this is not universally true. In some plants the stamp must be applied by hand. Moreover, it is usual to inspect the bottles after the labels have been applied, the inspection being performed while the bottles stand on a table conveyor.

When the strip revenue stamp, or in fact any other label, must be applied by hand, and/or when the bottle is to be inspected, it is very desirable, and in fact substantially necessary, that each bottle face in the same direction, either to insure accurate location of the stamp or label, or to present the bottle with its applied labels in proper position for inspection. However, when the bottle leaves the delivery conveyor of the labeling machine, it is pushed across a stationary support or so-called "dead plate" on its way to the next operating station, and usually onto another conveyor which carries it through stamp applying and/or inspection zones. During this journey, the bottle tends to rotate more or less so that prior to the application of the stamp or to inspection the operator must restore the bottle by hand to its previous position of orientation.

The present invention has for its principal object the provision of simple and relatively inexpensive mechanism of such a design that it may be installed at the location of the dead plate between the delivery conveyor and another support, for example, a receiving conveyor, and which, without interruption of the forward advance of

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the bottle, restores the latter to the proper position of orientation so that successive bottles, as they pass through the stamp applying or inspection zones, all face in the same direction.

A further object is to provide automatic mechanism for orienting an article, for instance, a round bottle provided with a spotting projection, such mechanism comprising a constantly moving part, for instance, an endless belt having spaced projecting teeth, and means for so contacting the bottle with the moving part that its spotting projection enters the space between two successive teeth, thereby causing the bottle to rotate about its vertical axis. A further object is to provide spotting means whereby an article, having a spotting projection, is caused to enter between two spaced, endless belts moving in the same direction and at the same linear speed, one of the belts being so devised as to engage the spotting projection on the article and positively to prevent rotation as the article advances bodily between the belts. Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings wherein:

Fig. 1 is a partial plan view of the spotting devices of the present invention;

Fig. 1^a is a plan view showing those parts of the spotting device which are omitted from Fig. 1;

Fig. 2 is a side view, with certain parts omitted, of the mechanism shown in Fig. 1;

Fig. 2^a is a side view of the parts shown in Fig. 1^a;

Fig. 3 is a small scale vertical section, on the line 3—3 of Fig. 1 showing that part of the machine frame which supports the conveyor belt;

Fig. 4 is a small scale, diagrammatic plan view showing the relation of the upper guide rails to the spotting belts;

Fig. 5 is a fragmentary section on the line 5—5 of Fig. 1;

Fig. 6 is a fragmentary side elevation showing the drive pulley and two of the idler pulleys for the toothed spotting chain;

Fig. 7 is a fragmentary plan view of the swivel block and associated parts for supporting one of the guide pulleys for one of the belts;

Fig. 8 is a side elevation, with parts in vertical section, of the apparatus of Fig. 7;

Fig. 9 is a plan view of the guide for the toothed spotting belt;

Fig. 10 is a section on the line 10—10 of Fig. 9;

Fig. 11 is a plan view of a stationary transfer plate across which the articles move from one conveyor to another; and

Fig. 12 is an edge elevation, to larger scale, of the transfer plate of Fig. 11.

Referring to the drawings, the numeral 20 indicates the upper, horizontal run of an endless conveyor which may, for example, be the delivery conveyor of a labeling machine of conventional type, it being understood, however, that the present invention is not in any way limited as respects the source of the articles which are to be handled.

Referring to Figs. 3 and 5, the angle members 23 and 23^a may be understood to form parts of the frame of the machine which delivers articles onto the conveyor 20, these angle members 23 and 23^a being spaced apart horizontally and having upper horizontal flanges 24 and 24^a which extend outwardly away from each other and whose upper surfaces are in the plane of the lower surface of the horizontal upper run of the conveyor 20. As illustrated in Fig. 3, the angle members 23 and 23^a are provided with inwardly directed brackets 23^b and

24^b which provide supports for the right and left margins of the conveyor.

The angle members 23 and 23^a support bearings for a transversely extending horizontal shaft 26 (Fig. 2), to which a driving sprocket 27 is fixed, this sprocket receiving an endless drive chain 28, which is trained about a sprocket 28^a (Fig. 1^a) on a shaft Z forming an element of the machine (not shown) which delivers the articles to the conveyor 20 and which is constantly driven at a definite predetermined angular velocity. Fixed to the sprocket 27 or to the shaft 26 is a sprocket 29, over which the conveyor 20 is trained and which positively drives the conveyor in the direction of the arrow A (Fig. 2).

Just to the right of the right-hand ends of the angle members 23 and 23^a there is arranged a horizontal shaft 30 (Fig. 2) supported in suitable bearings (not here shown) and which carries a guide pulley or sprocket 31, about which is trained a receiving conveyor 32 which is intended to convey the articles received from the conveyor 20 to any desired point, for example, to a machine for applying strip revenue stamps, or for further example, through an inspection zone. As shown in Fig. 2, the upper surfaces 20^a and 32^a of the horizontal upper runs of the two conveyors 20 and 32 are in the same plane, the conveyor 32 moving in the same direction as the conveyor 20, as indicated by the arrow A'. Usually the conveyor 32 will move at the same linear velocity as the conveyor 20, although under some circumstances it may move at a greater linear velocity.

As shown in Fig. 2, the points of tangency T and T' where the upper run of the conveyor 20 passes the vertical plane through the axis of the shaft 26, and where the conveyor 32, after passing about the pulley 31, becomes horizontal, that is to say, the vertical plane through the axis of the shaft 30, are spaced apart a substantial distance horizontally, and this space between the points of tangency is bridged by the "dead plate" 33. This dead plate, as more clearly illustrated in Figs. 11 and 12, comprises a rectangular main portion 34 from which extend the parallel leg portions 35 and 36 whose inner edges 37 and 37^a are parallel and spaced apart a distance approximately equal to the width of the conveyor 20. The main portion 34 of this dead plate is beveled at its under side, as shown at 38 and 39 respectively, thus providing inclined surfaces which, respectively, closely overlie the conveyor 20 at the point of tangency T and the conveyor 32 where the latter approaches the point of tangency T'—the thickness of the dead plate 33 being such that its upper surface 40 (Fig. 2) is flush with the upper surfaces 20^a and 32^a of the two conveyors. The dead plate is provided with a plurality of holes 39 (Fig. 11) designed to receive fasteners, by which the dead plate is anchored to the flanges 24 and 24^a of the angle members 23 and 23^a.

The conveyors 20 and 32 will usually be of the type wherein the article supporting surface consists of a series of thin metal plates, the several plates being flexibly connected by a link chain so that these plates collectively provide a smooth upper surface on which the articles may rest and on which the articles may slide or rotate without difficulty, and the upper surface of the dead plate 40 is smooth so that the articles can slide along this plate, or rotate while on this plate, in response to the action of the article advancing and article rotating means of the present invention.

A vertical shaft 41 (Figs. 1 and 2) projects upwardly through an opening in the horizontal flange 24 of the angle bracket 23, this shaft being journaled below the flange 24 in bearings in bracket 41^a adjustably bolted to the underside of the flange. Above the flange the shaft carries a drive pulley or sprocket 42.

A similar pulley 43 is carried by a stub shaft 44 (Figs. 1, 7 and 8) projecting downwardly from the right-hand end of an elongate slide bar 45 having horizontally elongate slots 46 which receive bolts 47 by means of

which the slide bar is adjustably secured to the upper surface of a swivel block 48 (Figs. 1, 2, 7 and 8). This swivel block is provided with a pivot stud 49 which extends down through an elongate slot 49^a (Fig. 8) in the flange 24, the parts being so arranged that the swivel block 48 may be adjusted bodily from right to left (as viewed in Fig. 1), and may also swing horizontally about the axis of stud 49. The swivel block 48 (Fig. 8) is provided with an elongate cylindrical bore 50 to one side of the axis of the stud 49, and within this bore is housed a coil spring 51 whose left-hand end, as viewed in Fig. 1, contacts the inner end of a plug 52 which slides in the bore 50, and whose outer or left-hand end engages a fixed stop member 53 bolted to the flange 24.

The inner edge 54 (Fig. 7) of the slide bar 45 normally bears against an upwardly directed leg 55 of a transversely elongate, U-shaped bracket 56 bolted to the upper surface of the flange 24, this bracket having a second upwardly directed leg 57 having a horizontal bore in which slides a pin 58, having a conical head 59 which seats in a socket in the outer face of the slide bar 45. A spring 60, pressing against the head 59 at one end and at its other against the leg 57, resiliently urges the slide bar 45 and the swivel block 48 to turn in a counter-clockwise direction about the axis of the stud 49, such movement being limited by the contact of the surface 54 with the leg 55. However, the slide bar 45 with the pulley 43 may swing in a clockwise direction about the axis of the stud 49 in opposition to the pressure of the spring 60.

The pulleys or sprockets 42 and 43 are embraced by an endless belt 61. This belt 61 is desirably of the type known as a "cog belt" having spaced teeth 62 on one side, and the pulleys or sprockets 42 and 43 are desirably toothed for cooperation with a cog belt of this type so that by engagement of the belt teeth with the teeth of the drive pulley 42, the belt is driven at an accurate, predetermined linear speed without possibility of slippage. While the inner surface of this belt is provided with teeth 62, its outer surface is smooth, being for example of textile fabric or the like.

The slide bar 45 is initially adjusted to tension the belt 61 to the desired degree, and the bracket 56 is so positioned that when the machine is idle that run P (Fig. 1) of the belt which lies near the right-hand margin of the conveyor 20 (the right-hand margin being that at the right-hand side of an article advancing along the belt) will occupy a position such as indicated in broken lines in Fig. 1. However, at times, during the operation of the apparatus, this run of the belt may assume a contour such as indicated in full lines at P'.

A vertical shaft 63 (Fig. 1) is arranged at the opposite side of the conveyor path from the belt 61, the axis of the shaft being approximately in a vertical transverse plane through the axis of the pivot member 49 for the swivel block 48. A pulley or sprocket 64 is fixed to the upper end of this shaft 63 above the flange 24^a of the frame. To the left of the shaft 63, as viewed in Figs. 1 and 6, there is arranged a vertical stub shaft 65 whose lower end is fixed in the flange 24^a and which provides a bearing for a rotary guide pulley or sprocket 66 in the same horizontal plane as the sprocket 64.

Another stub shaft 67 is fixed in an elongated adjustable bar 69, this stub shaft 67 carrying the guide pulley or sprocket 70 which is in the same plane as the sprockets 64 and 66. The bar 69 has elongate slots 71 which receive bolts 72, by means of which it is secured to the flange 24^a, the slots and bolts permitting the bar 69 to be adjusted longitudinally thereby to move the sprocket 70 toward or from the sprocket 66. Another stub shaft 73 (Figs. 1 and 6) secured to the flange 24^a carries an idler roll 74. An endless belt 75 (Fig. 1) is trained about the sprockets 66 and 70 and contacts the guide roll or pulley 74, this belt having teeth 76 on its outer surface which engage teeth on the pulley or sprocket 64. This

belt 75 is substantially like the belt 61, except that whereas that run P' of the belt 61 which is exposed at the path along which the articles travel is smooth, the outer surface of the run P² of the belt 75 which is exposed at the conveyor path is the toothed face of the belt. This belt 75, by engagement with the teeth 76 of the pulley or sprocket 64, is positively driven without slip in the same way as the belt 61, and the drive mechanism is so devised that the linear speeds of the two belts are equal, the runs P' and P² of the two belts moving in the same direction, that is to say, in the direction of advance of articles along the conveyor path.

The run P² of the belt 75 is guided at the side of the conveyor path by a fixed guide 78 (Figs. 9 and 10). This guide is mounted on the upper surface of the flange 24^a of the frame, and has concave end faces 78^a and 78^b which partly embrace the pulleys 66 and 70, respectively. The guide also has a vertical surface 79 which is designed to be contacted by the periphery of the bottle or other circular article as the latter moves along the conveyor path, the vertical height of this surface 79 being such that the spotting projection S (Fig. 1) on the periphery of the bottle is above the surface 79 so that the projection does not contact this surface. The guide 78 has a second vertical surface 80 which is above the surface 79 and which is set back from the surface 79, that is to say, it is further away from the conveyor path than the surface 79. This surface 80 is in the horizontal plane of movement of the spotting projection S on the bottle as the latter moves along the conveyor path, but forms a guide for the smooth inner surface of the run P² of the endless belt 75. The surfaces 79 and 80 are arcuate in plan view, as seen in Fig. 9, being convex toward the conveyor path, so that the run P² of the belt 75 is caused to bulge transversely of the conveyor path so that an article entering the conveyor path, as indicated at B' (Fig. 1) is constrained by contact with the guide-supported belt 75 to move in a transverse direction across the conveyor path until it reaches some such position as the bottle B² (Fig. 1) approximately opposite to the pivot 47, at which time the bottle has already been delivered onto the dead plate. Beyond this point the bottle moves transversely in the opposite direction as it advances until it reaches the final position B³, where it is on the receiving conveyor 32^a.

The normal position of the run P of the belt 61 is substantially parallel to the edge of the conveyor 20, but as the advancing article reaches the position indicated at B' it enters the space between the two belts and is pressed strongly against the belt 61 by the bulge of the run P² of the belt 75, thus tensioning the belt 61 and resiliently forcing the periphery of the bottle against the guide surface 79 (Fig. 10). The conveyor 20 is driven at approximately one-half the linear velocity of the belts 61 and 75, so that the articles are spaced as they travel along between the two belts. The frictional contact of the periphery of the article with the stationary surface 79, while the article is being bodily advanced, causes the article to rotate about its own axis in a counterclockwise direction, as viewed in Fig. 1, thus rolling the article along the surface 79 and causing it to advance along the conveyor path. This rotation of the article about its own axis effectively brings the spotting projection into registry with a space between adjacent teeth 77 of the belt 75. As soon as the spotting projection enters one of these spaces the belt 75 becomes effective to terminate further turning of the bottle, and since the bottle is now gripped between the two belts, the latter act positively to advance the bottle along the conveyor path, while its projection S is held between teeth of the belt 75 as shown at B² so that it cannot change its position of orientation. The bottle being gripped between the two belts which are moving at the same linear speed is thus conveyed without the possibility of rotation, until its delivery from the dead plate onto the conveyor 32, at which point the two belts

disengage the bottle B³, leaving it properly oriented on the belt 32.

The shaft 41 on which the sprocket 42 is mounted extends down into the bearing bracket 41^a, as above described, and at its lower end is provided with a bevel gear (not shown) which meshes with a corresponding bevel gear which is carried by a shaft 81 journaled in the lower part 82 of the bearing 41^a. This shaft 81 is connected by a universal joint 83 with a shaft 84, which in turn is connected by a universal joint 85 (Figs. 1^a and 2^a) with a shaft 86 journaled in a casing 87. This shaft is provided with a bevel gear (not shown) which meshes with a similar bevel gear on a shaft 88 journaled in the casing 87. A stub shaft mounted on the casing 87 carries a guide sprocket 89 (Fig. 1^a), which turns in the same plane as a drive sprocket 90 mounted on the shaft 88. The shaft 88 is connected with a shaft 91 by a coupling 92, the shaft 91 being journaled in a casing 93 and being provided with a bevel gear (not shown) which meshes with a bevel gear on another shaft 94 journaled in the same casing. This latter shaft is connected by a universal joint 95 to a shaft 96 which is connected by a universal joint 97 (Fig. 6) to a shaft 98 journaled in a casing 99 (Fig. 5), the shaft 98 having a bevel gear (not shown) which meshes with a bevel gear at the lower end of the shaft 63 on which the sprocket 64 is mounted. The endless drive chain 28 which drives the sprocket 27, and thus drives the delivery conveyor 20, passes about the sprockets 89 and 90 and thus drives both shafts 84 and 96, and through the connections above described turns the sprockets 42 and 64 in opposite directions and at the same angular velocity, thus driving the endless belts as above described.

As already pointed out, the teeth of endless belt 75 constitute the abutment means for stopping the rotation of the bottle during the spotting operation, that is to say, while the bottle is traveling along the dead plate between the belt runs P' and P², but while a tooth of the belt 75 thus acts as an abutment for terminating the rotation of the article about its own axis, the belt likewise provides positive means for causing the oriented article to advance across the dead plate until it has been deposited to the conveyor 32. Thus, in a very simple manner and merely by means of the two belts and the fixed guide 78, the spotting operation is accomplished and the delivery of the oriented article in proper position onto the conveyor 32 or any other support, is assured.

In order to steady the bottles as they advance between the belt runs, fixed guide rails 100 and 101 (Figs. 4 and 5) are provided. These rails are supported at the proper elevation by brackets 102 and 103 arranged at suitable intervals. As shown in Fig. 4, the rails comprise curved portions 104 and 105 respectively, contoured to conform substantially to the runs P' and P² of the belts 61 and 75. These rails are so spaced apart horizontally as to define between them a guideway of the proper width for the passage of the upper portions of the bottles B, as seen in Fig. 5.

While the mechanism herein disclosed has been suggested as of a special utility in connection with the labeling of articles, it is to be understood that it is of broad applicability to the orienting of articles for any desired purpose, and that while herein certain specific arrangements of parts have been described by way of example, the invention is broadly inclusive of any and all modifications falling within the scope of the appended claims.

I claim:

1. Apparatus for orienting an article having a spotting projection, said apparatus comprising means for advancing the article bodily along a predetermined path, two endless belts having runs disposed at opposite sides respectively, of said path, said runs moving in the direction of advance of the article and at their nearest point of approach being normally spaced apart a distance less than the diameter of the article, one of said belt runs having uniformly

spaced teeth projecting from it into the space between said runs, a fixed article-contacting guide extending along said toothed belt run, means resiliently urging said run of the other belt toward said toothed run, and means for moving said belt runs at the same linear velocity and in the direction of the advance of the article.

2. Apparatus for orienting an article provided with a spotting projection, said apparatus comprising an endless belt having means providing uniformly spaced cavities, each of a width to receive a single spotting projection, means for driving said belt at a predetermined linear speed, and means operative resiliently to urge the article toward said belt while turning the article until its spotting projection enters one of said cavities of the belt thereby positively to prevent further rotation of the article.

3. Apparatus for use in orienting a round article provided with a spotting projection as the article moves along a predetermined path, said apparatus comprising an elongate, stationary guide along one side of said path; the guide having an article-contacting surface shaped first to deflect the article transversely of the path in one direction and then to permit the article to move transversely of the path in the opposite direction, means for advancing the article bodily along said path while it is turned by frictional contact with said guide, said means comprising a belt having a toothed run adjacent to said guide and a second belt comprising a run having a substantially smooth article-contacting surface at the opposite side of the path, said latter belt being so constructed and arranged as resiliently to urge the article into contact with the guide.

4. Apparatus according to claim 3, wherein the toothed run of the first-named belt extends longitudinally of the guide and closely adjacent to the latter, the teeth of the belt defining between them pockets, each of a size to receive a single spotting projection; and means for driving the belt at a linear velocity exceeding that of the article prior to the entry of the spotting projection into a pocket of the belt.

5. Apparatus according to claim 3, comprising spaced pulleys about which the belt having the smooth article-contacting surface is trained, means for driving one of said pulleys, a movable support for the other pulley so constructed and arranged as to permit said latter pulley to move bodily both longitudinally and transversely of said path, spring means urging the pulley longitudinally of the path in a direction to tension the belt, and spring means urging said pulley toward the fixed guide.

6. In combination, in conveyor apparatus for handling circular articles, each provided with a spotting projection and wherein aligned delivery and receiving conveyors have runs with a dead plate between them over which articles pass in advancing from the delivery to the receiving conveyor, said apparatus comprising an elongate stationary guide extending along one edge of the dead plate, said guide being shaped to deflect the moving article transversely of the dead plate, means for advancing the article bodily along said path while causing it to turn by frictional contact with said guide, and means engageable by the spotting projection to terminate rotation of the article and to accelerate its bodily motion along said path, the means for terminating rotation of the article comprising an endless belt having teeth projecting from its outer face, belt-guiding means associated with the aforesaid fixed guide, said belt-guiding means being so constructed and arranged as to guide a run of the belt to follow the contour of the fixed guide, a toothed drive roll engaging the teeth of the belt, and means for turning the roll thereby to drive the belt.

7. Apparatus according to claim 6, wherein the fixed guide along which the article rolls is arcuate and convex toward the path along which the article travels.

8. Apparatus for use in orienting a round article provided with a spotting projection as the article moves along a predetermined path, said apparatus comprising an

elongate stationary guide extending along one side of said path, said guide comprising a lower portion having a surface along which the article rolls, and an upper portion having a surface which is spaced away from the article path relatively to the first-named surface, both surfaces being arcuate and convex toward the path along which the article advances, means for advancing the article bodily along said path while causing it to turn by frictional contact with said guide, and means engageable by the spotting projection to terminate rotation of the article, said last-named means comprising an endless belt including a run having a smooth side which contacts the upper of the aforesaid arcuate surfaces while the article rolls along the lower of said surfaces, said belt having spaced teeth on its outer side, adjacent teeth being spaced to admit a single spotting projection between them, and means for moving said run of the belt in the direction of the advance of the article.

9. In combination, in conveyor apparatus for handling circular articles, each provided with a spotting projection and wherein delivery and receiving conveyors have aligned runs with a dead plate between them over which articles pass in advancing from the delivery to the receiving conveyors, a fixed elongate guide extending along one edge of the dead plate, said guide having an article-engaging surface shaped to urge an article transversely of the dead plate, an endless, smooth-surfaced belt having a run extending along the other edge of the dead plate, means for driving said belt at a linear velocity exceeding that of the delivery conveyor, means resiliently urging said run of the belt toward the fixed guide thereby frictionally to contact the article with the guide and thus to cause the article to roll along the guide, and a toothed belt having a run which extends along and closely adjacent to the guide, the teeth of the belt projecting outwardly and defining pockets, each of a size to receive a single spotting projection, and means for driving the toothed belt at the same linear velocity as the smooth-surfaced belt.

10. In combination, in conveyor apparatus for handling circular articles, each provided with a spotting projection and wherein aligned delivery and receiving conveyors have runs with a dead plate between them across which articles pass in advancing from the delivery to the receiving conveyor, a fixed guide extending along one edge of the dead plate, said guide being so contoured as to deflect the article from its normal path, means for advancing the article bodily along said path while causing it to turn by frictional contact with said guide, and means engageable by the spotting projection to terminate rotation of the article, said latter means comprising an endless belt having a run which extends along one edge of the dead plate, means for driving said belt so that said run moves in the direction of the advance of the article, said run being smooth on one side and having equally spaced teeth on its opposite side, means for advancing an article onto the dead plate while so orienting it that its spotting projection approaches the toothed belt while moving oppositely to the latter.

11. In combination, in conveyor apparatus for handling circular articles, each provided with a spotting projection and wherein delivery and receiving conveyors have runs with a dead plate between them across which articles move in advancing from the delivery to the receiving conveyor, a pair of endless belts having spaced runs disposed respectively along opposite margins of said dead plate, a rigid guide which is arcuate and convex toward the path along which the articles move, said guide being operative to cause a run of one of said belts to move in a non-linear, predetermined path, means resiliently urging the other run toward said last-named run thereby to grip the article between said runs, means for moving said runs at the same linear velocity and in the same direction thereby to move the articles bodily onto the receiving conveyor, and means on one of said belts

providing a series of evenly spaced cavities, each of a size to receive a single spotting projection thereby positively to prevent rotation of the article while it continues along said path.

12. In apparatus for orienting a round article having a spotting projection, a fixed guide defining one side of a path along which the article is advanced, said guide comprising a part having a vertical surface with which the periphery of the advancing article has rolling contact, the guide having a second vertical surface above said first surface but set back from the latter away from the article path, an endless belt comprising a run having a substantially smooth surface which contacts the second of said vertical surfaces of the guide, said run having equally spaced teeth at its opposite side which project into said path and which define cavities between them, each of a size to receive a single spotting projection thereby to prevent the article from rotating as it continues along said path, means resiliently urging the article toward said toothed belt run, and means for driving the belt so that said run moves in the direction of article advance.

13. In apparatus for orienting a round article having a spotting projection, a fixed guide defining one side of a path along which the article is advanced, said guide comprising a part having a vertical surface with which the peripheral surface of the article has rolling contact, the guide having a second vertical surface, an endless belt comprising a run having a substantially smooth surface which contacts the second of said vertical surfaces, and a second belt comprising a run having a substantially smooth side which is spaced from the aforesaid run of the first belt, thereby to provide between said runs a path along which the article advances, and means for resiliently urging said run of the second belt toward said run of the first belt, thereby to grip the article between them, the first-named belt having spaced teeth on its opposite side which project into said path, any one of said teeth, by contact with the spotting projection on an article, being operative to prevent rotation of the article as the latter advances while gripped between the two belt runs.

14. In combination, in apparatus for orienting an article, having a spotting projection, as the article advances uninterruptedly along a predetermined path, two belt runs arranged respectively at opposite sides of said path and which move in the same direction and at the same velocity, one of said belt runs having a substantially smooth outer surface for contact with the article and a toothed inner surface for contact with a driving element, a bodily movable rotatable idler sprocket which engages the toothed side of said belt run, means resiliently urging the idler sprocket in a direction to tension the latter belt run, and means resiliently urging the idler sprocket to-

ward the second belt run thereby to grip the article between said runs, the second belt run carrying means operative, by engagement with the spotting projection on the article, to prevent the article from rotating while held between the belt runs.

15. In combination, in apparatus for orienting an article having a spotting projection as the article advances uninterruptedly along a predetermined path, two endless belts each having a run arranged at one side respectively of said path, said runs moving in the same direction and at the same velocity, one of said runs having a substantially smooth outer side for contact with the article and a toothed inner side for contact with a drive sprocket, an idler sprocket which engages the toothed side of said belt, a pivoted support on which the idler sprocket is mounted, the pivotal axis of said support being adjacent to one side of the article path, resilient means urging said support to swing in a direction to move the idler sprocket toward the opposite belt run thereby to grip the article between them, and adjustable means for limiting such motion of the support, the other of said belt runs carrying means operative, by engagement with the spotting projection on the article, to prevent the article from rotating while held between the belt runs.

16. In apparatus of the class described, in combination, two endless belts, guide pulleys for each belt operative to define two spaced belt runs, means for driving the belts so that said runs move in the same direction and at the same linear velocity, one of the belt runs having spaced teeth and the other run having a smooth surface opposed to said teeth, one of said belt runs being resiliently yieldable away from the other run.

17. In apparatus of the class described, in combination, two endless belts, guide pulleys for each belt operative to define two spaced belt runs, means for positively driving both belts so that said runs move in the same direction and at the same linear velocity, one of the belts having spaced teeth which are exposed at its aforesaid run, and the other belt run having a smooth surface opposed to said teeth, a rigid guide for the toothed belt operative to cause its aforesaid toothed run to follow an arcuate path convex toward the other belt run, and the latter belt run being resiliently yieldable away from said toothed run.

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