Oct. 21, 1952 C. E. KEIL 2,614,681

ARTICLE-ORIENTING MECHANISM FOR LABELING MACHINES

Filed Aug. 6, 1949 3 Sheets-Sheet 1

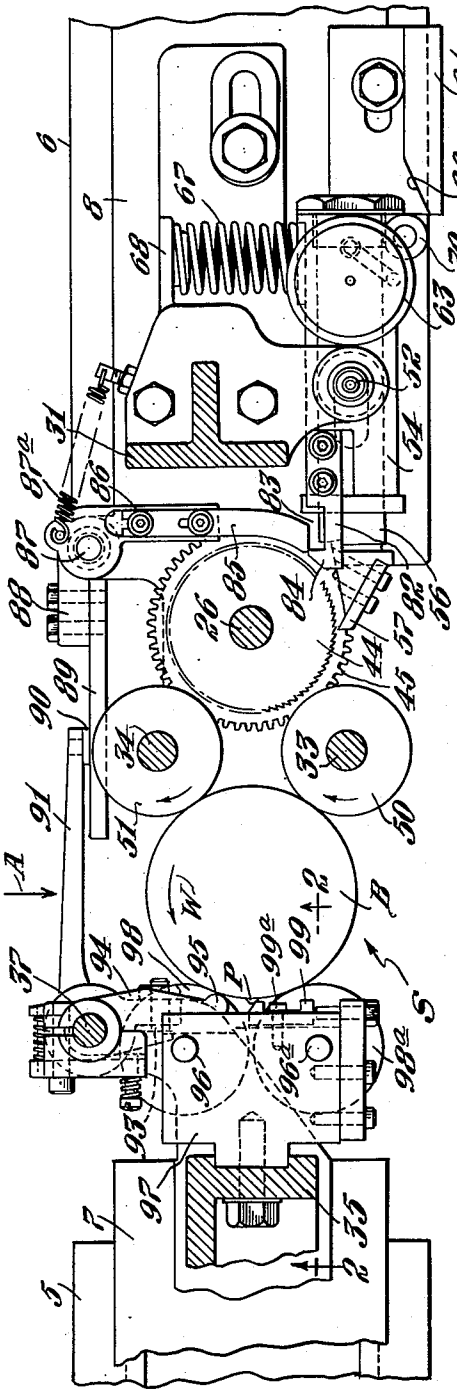


Fig. 1

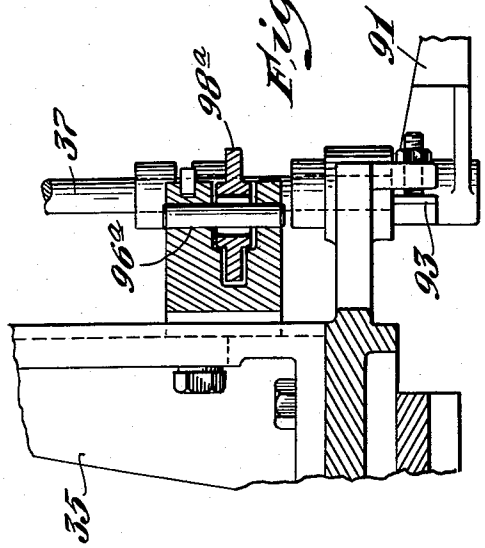


Fig. 2

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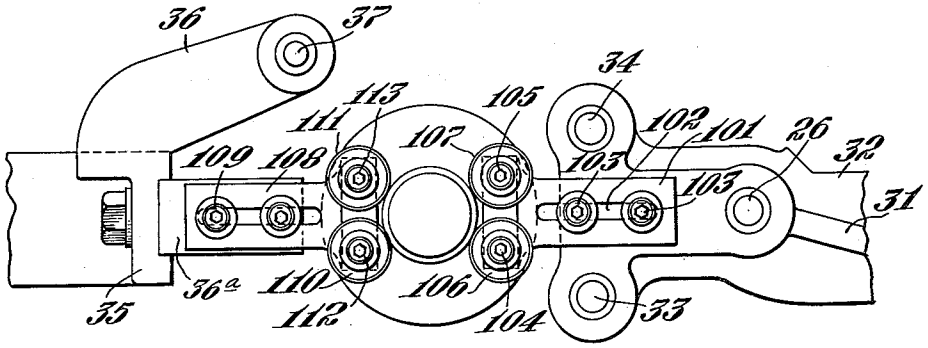


Fig. 4

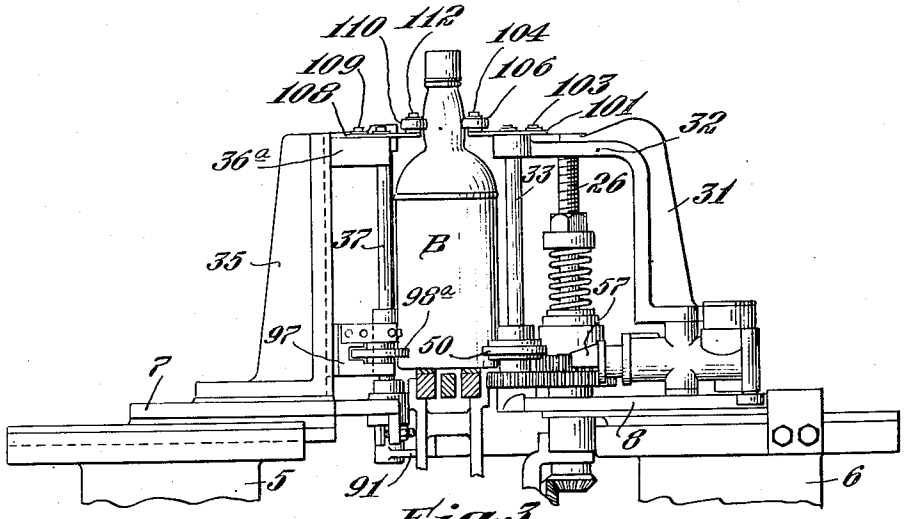


Fig. 3

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Filed Aug. 6, 1949 3 Sheets-Sheet 3

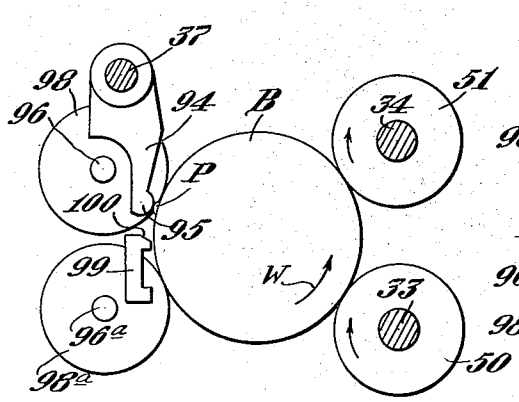


Fig. 5

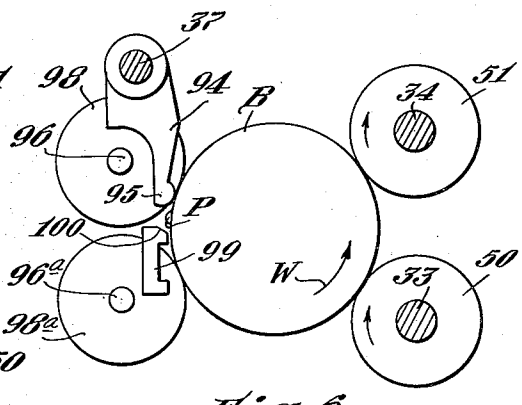


Fig. 6

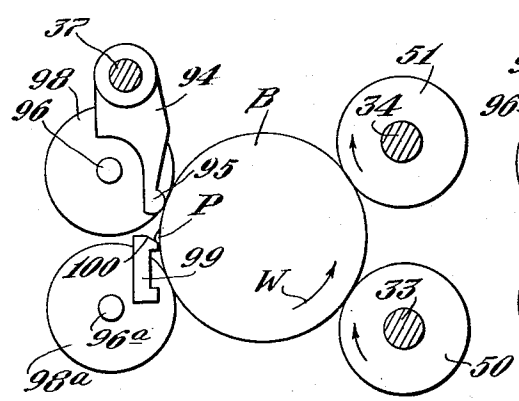


Fig. 7

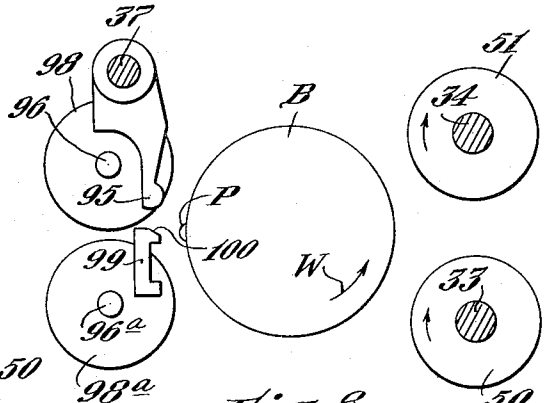


Fig. 8

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UNITED STATES PATENT OFFICE

2,614,681

ARTICLE-ORIENTING MECHANISM FOR LABELING MACHINES

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Application August 6, 1949, Serial No. 108,902

10 Claims. (Cl. 198—33)

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This invention pertains to labeling machines and more especially to article-orienting or so-called "spotting" apparatus operative to turn the article which is to be labeled so that the label will be accurately applied to a predetermined part of the peripheral surface of the article. The present invention constitutes an improvement in such apparatus, particularly with respect to the means for rotating the article, and is here described in a specific embodiment as applied to a machine such as illustrated in the patent to Carter, No. 2,426,433, dated August 26, 1947. This patent describes mechanism including means for conveying successive articles, each having a projecting element, to a spotting station where the article is rotated at a normally high angular velocity through a partial rotation until the projection on the article engages a movable detector whose consequent motion results in a sudden reduction in the angular velocity of the article from its normal high velocity to a relatively low substantially constant velocity—a fixed stop then engaging the projecting element to bring the article to rest with the projecting element in a predetermined position. In the mechanism disclosed in the Carter patent, a pair of spaced rotating drive rolls and a single idle or abutment roll (the axis of the latter roll being in a plane midway between the axes of the two drive rolls) are moved in opposite directions toward the article so as to engage its periphery, the drive rolls being at one side of the article and the idler roll being at its opposite side. This arrangement provides a three-point contact between the article and the positioning and driving elements. Such a three-point contact appears to be characteristic of the prior mechanisms of this general type.

However, while devices of this type, in particular apparatus such as shown in the Carter patent above referred to, function very satisfactorily at usual prior speeds of operation, for example speeds not exceeding sixty cycles per minute, it has been found that at the high speeds now demanded in modern bottling establishments, for example, ninety or more cycles per minute, the articles are spun so fast that they sometimes escape from between the rolls, spinning outwardly about the contact point of the article with one of the rolls as a fulcrum.

With a three-point contact, as in the arrangement shown in the Carter patent, slight inaccuracy or wear of the cam which advances the rolls toward and from the article, or looseness in the motion-transmitting mechanism, may be sufficient at high speeds, to permit escape of the

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article from between the rolls, in particular, if the article is not absolutely symmetrical with respect to its axis of rotation, for under such circumstances an eccentric force is developed which is sufficient to crowd the rolls apart and permit escape of the rapidly rotating article, and this may result in a smash, with serious injury to nearby workmen or to the machine itself.

Attempts have been heretofore made, when using the three-point contact by the use of a single drive roll and two spaced idler rolls, to decrease the arc intervening between the points of contact of the drive and idler rolls, by increasing the space between the idler rolls, but this necessitates increased travel of the roll-carrying slides in order to admit the article between the rolls, and at the very high speeds required, this consumes too large a percentage of the time interval between cycles and introduces difficulties resultant from inertia, slight inaccuracy of the parts and wear such that this attempted solution of the problem has not been successful.

The principal object of the present invention is to provide such improvements in the means for rotating the article at the spotting station as to permit the operation to be carried out successfully at very high speeds. A further object is to provide mechanism of the above type wherein the arc of contact between the drive and idler rolls is substantially less than in the machine shown in the Carter patent, but without necessitating an undesirably long travel of the roll-carrying slides, the lesser arc of contact insuring retention of the article between the rolls regardless of the speed and even though wear may develop between the operating parts. A further object is to provide an article-orienting mechanism wherein the article is more closely confined than in prior machines of this type but without interfering with the free entry into and delivery of an article from the orienting station. A further object is to provide mechanism of the above type which is simple, rugged and reliable in action. A further object is to provide means for steadying a tall or long-necked bottle while it is being rotated at the spotting station. A further object is to provide article-orienting mechanism of the above type having provision for adjusting the article-stopping element so as to permit accurate stopping of the article and to accommodate the mechanism for use with articles having projections of different sizes. Other and further objects and advantages of the invention will be pointed out in the following more detailed de-

scription and by reference to the accompanying drawings, wherein

Fig. 1 is a fragmentary horizontal section, on a plane immediately above the plane of rotation of the spotting projection on the article which is being oriented, the machine being of the general type illustrated in the patent to Carter No. 2,426,433;

Fig. 2 is a fragmentary vertical section, to larger scale, substantially on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary elevation, partly in vertical section, showing the upper portion of the mechanism illustrated in Fig. 1, and showing means for steadying the neck of a bottle during the spotting operation;

Fig. 4 is a fragmentary plan view of the parts shown in Fig. 3; and

Figs. 5 to 8 inclusive are diagrammatic plan views, partly broken away and in vertical section, showing various stages in the operation of orienting an article.

The above patent to Carter No. 2,426,433, dated August 26, 1947, may be referred to for such further details of construction as are not herein fully illustrated.

The article to be oriented is here shown by way of example as a bottle having a substantially cylindrical body portion B (Fig. 3) having a projection P (Fig. 8) which may be a special "tear drop" designed solely for use in spotting or which may be a letter, numeral or other character or element which has a primary function in addition to its secondary function as a spotting element.

The articles to be oriented are advanced in succession, step by step in the direction of the arrow A (Fig. 1) for example along fixed conveyor rails (Fig. 3) by means of a reciprocating feed bar as is customary in the art, and when they arrive at the spotting station S (Fig. 1) their forward advance is intermitted while the spotting operation takes place.

In the following description corresponding parts are designated by the same reference characters as in the above patent to Carter.

At the spotting station, fixed supports 5 and 6 located at opposite sides of the path of advance of the bottles provide guideways for horizontally movable oposed slides 7 and 8 respectively. The slide 7 supports the detecting and stop elements and abutment rolls while the slide 8 supports the article-driving rolls. The slides 7 and 8 are moved toward and from each other in properly timed relation by appropriate means, for example cams and motion-transmitting levers (not here shown) such for example as are more fully shown and described in the above patent to Carter, the two slides moving at the same speed and with the same length of stroke.

The slide 8 has a bearing for the lower end of a vertical shaft 26 which is constantly driven (regardless of the position of the slide) for example by gearing as illustrated in the Carter patent. The slide 8 also carries an upstanding post or bracket 31 (Fig. 3) provided with an overhanging portion 32 at its upper end in which is a bearing for the upper end of the shaft 26. This overhanging portion 32 also has bearings for the upper ends of a pair of horizontally spaced, vertical shafts 33 and 34 (Fig. 1) respectively, whose lower ends turn in bearings provided in the slide 8. The slide 7 also carries the upstanding post or bracket 35 (Fig. 3) provided with the overhanging portion 36 (Fig. 4) having a bearing for the upper end of a vertical shaft 37 whose lower end turns in a bearing in the slide 7. On the lower portion of the constantly rotating shaft 26 there is mounted (Fig. 1) a combined ratchet wheel 44 and spur gear 45. A friction clutch normally transmits motion from the rotating shaft 26 to the ratchet wheel and spur gear, as more fully described in the above patent to Carter, but by means of a pawl member 57 which may be engaged with the ratchet wheel 44, it is possible to stop the rotation of the ratchet wheel and spur gear 45 without stopping the rotation of the shaft 26. The spur gear 45 constantly meshes with pinions (not shown) fixed to the lower ends of the shafts 33 and 34 respectively, thus turning the shafts 33 and 34 in the same direction. These pinions are provided with hub portions on which are secured the friction drive rolls 50 and 51 (Fig. 1) respectively formed of suitable friction material, for example rubber, synthetic rubber, felt or the like, and which are designed to bear against the periphery of the body portion of the bottle so as to rotate the latter in the direction of the arrow W (Fig. 1).

A short vertical shaft 52 (Fig. 1) is fixed at its upper end in an opening in the lower part of the bracket 31 and at its lower end in an opening in the slide 8. On this shaft there is mounted to turn a horizontally elongate housing 54 (Fig. 1). This housing has an elongate cylindrical bore in which slides the carrier member 56 to whose left-hand end (Fig. 1) is secured the pawl 57. The carrier 56 is provided with a horizontally elongate slot for the accommodation of the shaft 52. At its right-hand end the carrier 56 is shaped to constitute a piston which slides within the bore in the housing. A cylindrical reservoir 63 is mounted on the right-hand portion of the housing 54. This reservoir 63 is filled with oil or other fluid and by means of suitable passages and valves (as more fully described in the above Carter patent) a dashpot effect is provided for damping the sliding motion of the pawl carrier 56. A spring 67 (Fig. 1) bears against the rear side of the housing 54 at the right-hand end of the latter, the other end of the spring engaging a fixed abutment 68 carried by the slide 8. The spring 67 thus tends to swing the housing 54 in a clockwise direction so as to engage the pawl 54 with a tooth of the ratchet wheel 44.

The housing 54 is provided with a cam follower roll 79 (Fig. 1) turning about a vertical axis and designed at times to engage an inclined cam surface 80 formed on a block 81 adjustably secured to the side of the support 6.

Fixed to the upper part of the housing 54, adjacent to its left-hand end, is a latch member 82 (Fig. 1) having a recess 83 and a projecting latch toe 84 at the left-hand end of the recess. This toe 84 is designed to be engaged, at times, by a movable retainer 85 adjustably secured to one arm 86 of a bell crank lever pivoted to turn on a vertical stub shaft 87 carried by the support 6. A spring 87^a tends to turn this bell crank in a clockwise direction. This bell crank has a second arm 88 (Fig. 1) to which is secured one end of an elongated horizontally extending abutment arm 89 whose substantially straight vertical rear surface is engaged by a pad 90 at the right-hand end of an arm 91 of a bell crank secured to the lower part of the shaft 37. This bell crank comprises a second arm 93 to which there is adjustably secured a detector arm 94 having a feeler portion 95 designed to contact the peripheral surface of the body of the bottle.

Two shafts 96 and 96a (Fig. 2) are fixed at their upper and lower ends in bores in a block 97 fixed to the bracket or post 35. Idle abutment rolls 98 and 98a, housed in a slot in the block, turn freely on the respective shafts 96 and 96a.

A stop member 99 (Figs. 1 and 8) having a horizontally elongate slot, is adjustably secured by means of a bolt 99a to the right-hand face of the block 97. This stop member also has a toe portion provided with a beveled face 100 (Fig. 8) which is designed to be engaged by the spotting projection P on the bottle and thus positively to stop rotation of the bottle. As illustrated, (Figs. 5 to 8), the stop surface 100 is spaced approximately 10° of arc from the detector 95.

As shown in Fig. 1, a bottle has been delivered to the spotting station S and the body B of the bottle is confined between the rolls 50 and 51 and 98 and 98a respectively, all of which engage the body of the bottle at the same time, thus providing a four-point contact.

As illustrated, the rolls 50 and 51 are spaced symmetrically with respect to a diametrical plane of the bottle perpendicular to the path of advance of the bottle, while the rolls 98 and 98a are similarly located but at the opposite end of the diameter of the bottle. As here illustrated the angle between the points of contact of the rolls 50 and 51 with the bottle is of the order of 66° of arc, while the angle between the points of contact of the idle or abutment rolls 98 and 98a with the bottle is of the order of 46° of arc. Thus the angle of arc between the point of contact of the abutment roll 98 with the bottle and the point of contact with the driven roll 51, which is last to contact the bottle (as the bottle turns in the direction of the arrow W) is approximately of the order of 124°. Thus the path of possible escape of the bottle in a direction tangent to the roll 51 is so narrow as substantially to assure the proper confinement of the bottle during the spotting operation, even though the parts may develop some degree of looseness or lost motion from the effects of wear.

In accordance with the present invention, and particularly when the apparatus is designed for spotting tall bottles having long necks, provision is made for steadying the bottle during the spotting operation so that it is constrained to rotate about a vertical axis and cannot nutate and thus set up vibrations which, if not prevented, might be sufficient to snap off the neck of the bottle.

To this end a slide 101 (Figs. 3 and 4) having an elongate slot 102, is adjustably secured by bolts 103 to the upper face of the overhang 32 of the post 31. Spaced parallel stub shafts 104 and 105 are fixed to the left-hand end of the slide 101. Steadying rolls 106 and 107 are mounted to turn freely on the shafts 104 and 105 respectively, these rolls being of suitable material, for example rubber or felt, for yielding contact with the bottle neck.

A block 36a is bolted to the upper part of the post 35 and a slotted, horizontally adjustable slide 108 is connected by bolts 109 to the top of this block. Steadying rolls 110 and 111 like the rolls 106 and 107, turn freely on the stub shafts 112 and 113 fixed to the right-hand end of the slide 108. The slides 101 and 108 are so relatively adjusted that when the rolls 50 and 51, and 98 and 98a contact the body of the bottle, the rolls 106 and 107 and 110 and 111 engage the bottle neck, thus confining the latter with a four-point contact. If desired, the slides 107 and 108 may be yieldingly urged toward each other by spring means instead of being fixed to the slides by bolts.

The operation of the mechanism is diagrammatically illustrated in Figs. 5 to 8 inclusive. Just prior to delivery (by the conveyor) of the bottle to the orienting or spotting station S, the slides 7 and 8 are moved apart to the position shown in Fig. 8, so as to provide free entrance to the spotting station. The bottle comes to rest on the conveyor in a position such that its vertical axis is in the vertical plane which is midway between the axes of the shafts 33 and 34 and 96 and 96a, respectively, that is to say, a vertical plane which is perpendicular to the path of advance of the bottle. The slides 7 and 8 are now moved toward each other until the friction drive rolls 50 and 51 engage the body of the bottle at one side while the abutment rolls 98 anl 98a engage the body of the bottle at the other side. At the same time the steadying rolls 106 and 107 and 110 and 111, if the latter are employed, engage the neck of the bottle at its opposite sides.

The shaft 26 being constantly rotated at a permissive speed of the order of 90 R. P. M., turns the combined ratchet wheel and gear 45 by means of the friction clutch connections, thus turning the shafts 33 and 34 at a predetermined speed in the same direction. The speed of the drive rolls 50 and 51 is such as to start the bottle into rotation at a high angular velocity.

At the beginning of the operation, the retainer member 85 is in engagement with the toe 84, thus holding the pawl 57 out of engagement with the teeth of the ratchet wheel 44, as shown in Fig. 1, so that the latter, with the gear 45, is free to rotate. As shown in Fig. 5 the spotting projection P has just contacted the detector or feeler member 95 and has pushed the latter radially away from the bottle. This outward movement of the detector 95 is accompanied by a swinging of the arms 94 and 91 in a clockwise direction about the shaft 37, thus causing the pad 90 to bear against the arm 89 so as to swing the arm 89 and the arm 86 in a counterclockwise direction. This movement removes the retainer 85 from the latch toe 84, enabling the spring 67 to swing the housing 54 in a clockwise direction so as to cause the pawl or detent 57 to engage a tooth of the ratchet 44. During this movement the detent 85 enters the recess 83. As soon as the pawl 57 engages a tooth of the ratchet 44, the free rotational movement of the latter is interfered with and further rotation of the ratchet 44 and the gear 45 can only take place as permitted by the rectilinear recession of the pawl 57, and as a result of the slippage of the elements of the friction clutch. The pawl may move slowly to the right, as shown in Fig. 5, at a predetermined rate as permitted by the movement of the fluid in the dashpot device, thus allowing the gear 45 to turn, but at a much slower rate than initially. Correspondingly, the rotative speed of the drive rolls 50 and 51 is very much reduced from normal so that the speed of rotation of the bottle is reduced from its original high angular velocity to a very low angular velocity immediately after the spotting projection P engages and actuates the detector 95. The bottle now continues to turn at this very slow angular velocity until the spotting projection P engages the stop surface 100 of the stop member 99. Although during this travel (Fig. 6) of the projection P, it disengages the detector 95 and allows the latter to return to its normal position, the retainer 85 is still within the recess 83 so that

the pawl 57 still engages the ratchet wheel 44. When the spotting projection P engages the fixed stop 100 (Fig. 7), rotation of the bottle is positively stopped, the friction rolls 50 and 51 then slipping on the bottle at their points of contact. As soon as the bottle is thus stopped, the slides 7 and 8 are retracted, to the initial position of Fig. 8, thus removing the rolls 50 and 51 and 98 and 98a from the body of the bottle and simultaneously removing the steadying rolls, if used, from the neck of the bottle. At the same time the stop 99 and the detector 95 are withdrawn from the bottle so that the latter is free to be moved along the conveyor while another bottle is being advanced into the spotting station.

As the slide 8 moves to the right, the roll 79 engages the inclined cam surface 80, thus swinging the housing 54 in a counterclockwise direction until the retainer 85 is permitted to ride up over the latch toe 84, thus disengaging the pawl 57 from the ratchet 44 and holding it out of engagement with the ratchet until the beginning of the next cycle of operation.

The arrangement as thus described, permits a very rapid rotation of the bottle, for example such that whatever the angular position of the spotting projection, as the bottle enters the spotting station, the spotting operation may be completed within a period of, for example 1/60th of a minute, the initial speed of rotation of the bottle being suddenly reduced as the spotting projection encounters the feeler so that when the spotting projection contacts the fixed stop surface 100, the velocity is so small that there is no danger of breakage or rebound.

As above pointed out, by the use of the four-point contact, the bottle is so confined during the spotting operation that it cannot escape even though driven at the extreme high initial velocity above suggested. By the employment of the steadying rolls which engage the neck of the bottle, it is possible to impart this high speed of rotation to a tall bottle, even though the drive rolls engage the bottle near the lower part of its body, without danger of tipping the bottle even though its center of gravity be eccentrically located.

While a bottle has here been suggested as the article which is to be oriented or spotted, it is to be understood that a bottle has been referred to merely by way of example and that the apparatus is useful in orienting articles other than bottles, for example jars or cartons, particularly those which are cylindrical or substantially cylindrical, and which must be properly positioned prior to the application of a label. Moreover, while but two idle or abutment rolls are here illustrated, it is obvious that more than two such rolls may be employed if desirable, and thus, when reference is made to a "pair" of rolls, it is not intended thereby to exclude a greater number than two.

While a desirable embodiment of the invention has herein been illustrated by way of example, it is to be understood that the invention is broadly inclusive of any and all modifications falling within the scope of the appended claims, and while the invention has herein been described with particular reference to its embodiment in a machine such as shown in the above patent to Carter, it is to be understood that in its broader aspects it is capable of embodiment in spotting machines of other types.

I claim:

1. In a combination, in an article-orienting apparatus of the kind wherein successive articles, each having a projecting stop element, are delivered in succession to a spotting station, and having article-rotating means at the spotting station including a pair of spaced drive rolls engageable with the periphery of the article for rotating the latter, two spaced abutment rolls disposed respectively at opposite sides of a diameter of the article passing midway between the axis of the drive rolls, a detector located between the abutment rolls and engageable by the projection on the article as the latter is rotated by the drive rolls, and means for moving the two sets of rolls toward and from each other simultaneously.

2. In combination in an article-orienting apparatus of the kind wherein successive articles, each having a projecting stop element, are delivered in succession to a spotting station, article-confining elements at said station providing a four-point contact with the article when it is positioned at the spotting station, said article-confining elements comprising two drive rolls and two abutment rolls, the arc of contact between corresponding rolls of the opposite sets with the surface of the article being of the order of 124°.

3. In combination in an article-orienting apparatus of the kind wherein successive articles, each having a projecting stop element, are delivered in succession to a spotting station, and article-confining elements providing a four-point contact with the article when it is positioned at the spotting station, said confining elements comprising two driven rolls and two abutment rolls, and means for moving each respective pair of rolls, as a unit, toward and from an article positioned at the spotting station at a speed of the order of 90 cycles per minute.

4. In combination in an article-orienting apparatus of the kind wherein successive articles, each having a projecting stop element, are delivered in succession to a spotting station, and article-confining elements providing a four-point contact with the article when it is positioned at the spotting station, said confining elements comprising two spaced driven rolls turning about parallel axes symmetrically disposed relatively to one end of a diameter of the article and whose points of contact with the article are approximately 66° apart, and two spaced abutment rolls turning about parallel axes and symmetrically disposed relatively to the opposite end of said diameter of the article and whose points of contact with the article are approximately 46° apart.

5. In combination in an article-orienting apparatus of the kind wherein successive articles, each having a projecting stop element, are delivered in succession to a spotting station, and wherein the article, while at the spotting station, is turned by two spaced driven rolls located adjacent to one end of the diameter of the article, characterized in that the article is held in contact with the drive rolls during the spotting operation by two freely rotatable abutment rolls turning about parallel axes and disposed adjacent to the opposite end of said diameter of the article, the points of contact of said abutment rolls with the article being closer together than the points of contact of the drive rolls with the article.

6. In combination in an article-orienting apparatus of the kind wherein successive articles, each having a projecting stop element, are delivered in succession to a spotting station, and

wherein the article, while at the spotting station, is turned by two spaced drive rolls located adjacent to one end of the diameter of the article, and means for holding the article in contact with the drive rolls, said holding means comprising spaced elements, engageable with the periphery of the article adjacent to the opposite end of said diameter, said elements being spaced apart approximately 46° of arc.

7. In combination in article-orienting apparatus wherein successive articles, each having a peripheral projection, are delivered in succession to a spotting station and having means at the spotting station for rotating an article, said article-rotating means including two drive rolls turning in the same direction about parallel axes and so spaced that they contact the periphery of the article at points approximately 66° apart, spaced article-contacting abutment rolls disposed respectively at the opposite sides of that diameter of the article which bisects the angle between the points of contact of the drive rolls, that abutment roll which is nearest to the drive roll which is last to contact the article being so located as to contact the periphery of the article at a point spaced approximately 124° from the point of contact of the last-named drive roll with the article.

8. In combination in article-orienting apparatus wherein successive articles, each having a peripheral projection, are delivered in succession to a spotting station and having means at the spotting station for rotating the article, said article-rotating means including a pair of drive rolls turning in the same direction about parallel axes and so spaced that they contact the periphery of the article at points approximately 66° apart, a pair of spaced abutment rolls disposed symmetrically with respect to that diameter of the article which bisects the angle between the points of contact of the drive rolls with the article, the abutment rolls being so spaced apart that the arc between their points of contact with the periphery of the article is of the order of 46°, and means for moving the two sets of rolls toward and from each other simultaneously.

9. Article-orienting apparatus of the class described wherein bottles, each having a neck and a substantially cylindrical body having a peripheral projection, are advanced one by one to a spotting station, bottle-confining elements at said station comprising a pair of spaced drive rolls located at one side of the path of advance of the bottle, a pair of idle rolls located at the opposite side of the path of advance of the bottle, slides supporting the respective rolls, means for moving the slides simultaneously to engage the rolls with the bottle, and a pair of steadying rolls mounted on each slide and engageable with the neck portion of the bottle while the latter is being rotated by the drive rolls.

10. Article-orienting apparatus of the class described wherein bottles, each having a neck and a substantially cylindrical body having a peripheral projection, are advanced one by one to a spotting station, bottle-confining elements at said station comprising a pair of spaced drive rolls turning in the same direction about parallel axes and located at one side of the path of advance of the bottle, a pair of idle abutment rolls rotatable about parallel axes and located at the opposite side of the path of advance of the bottle, slides supporting the respective pairs of rolls, means for moving the slides simultaneously to engage the rolls of each respective pair with the periphery of the body, and a detector element carried by the slide which supports the abutment rolls and which is engageable by the projection on the body of the bottle as the latter is rotated.

CLARENCE E. KEIL.

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