Fig. 9
MACHINE, PARTICULARLY FOR LABELING BOTTLES

Theo Stellamanns and Werner Emmerling, Berlin, Germany, assignors to Johann Weiss Maschinenfabrik und Apparatebau GmbH, Berlin, Germany

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ABSTRACT OF THE DISCLOSURE

A machine for labeling objects, particularly containers, and especially bottles wherein an endless belt-like element travels around two spaced guide rolls and has a run parallel with a conveyor transporting the objects to be labeled, through, and from the machine. The element has a cavity alternatingly connected to a source of subatmospheric pressure air and to a source of superatmospheric pressure air. Passages are connected to said cavity and terminate in openings in the outside surface of said belt-like element for alternately producing suction therefor holding labels on said outside surface and air pressure for blowing the labels onto the objects to be labeled. A counteracting device is placed alongside the conveyor and opposite said run of said belt-like element for holding the objects on said run while the labels are applied.

The present invention relates to a machine for labeling objects, particularly containers and especially bottles. Such machines, so far, operate with a labeling cylinder on whose circumference label receiving surfaces are provided which are made of soft-elastic material, for example rubber, having suction openings for holding the labels to the surfaces. The labels are taken, by means of a labeling device which usually consists of a suction roll, from a label supply container arranged close to the circumference of the labeling cylinder and are conveyed to the label receiving surfaces of the labeling cylinder. The objects to be labeled are moved by a conveyor belt tangentially to the labeling cylinder. At the labeling station a stationary or movable counter-holding device with an elastic active surface, preferably made of sponge rubber, is arranged opposite the labeling cylinder alongside the conveyor belt. The trouble-free effective operating speed of the conventional labeling machines is limited because the duration of the pressure applying the labels to the objects, which is also important for assuring the stability of the objects on the conveyor belt, is very short because it is limited to the moment when the active label receiving surface passes the point where said surface moves parallel with the conveyor belt.

It is among the principal objects of the present invention to provide a labeling machine which avoids the shortcomings of the conventional labeling machines and makes possible any duration of pressing the gummed label onto the object, also at top operating speeds of the labeling machine, whereby adhesion of the label to the object is improved because ample time is available for setting the adhesive and instability of the position of the objects on the conveyor belt caused by the sudden release of the objects immediately after passage of the labeling position is avoided.

The aforesaid and other objects are obtained, according to the invention, by employing an endless, flexible band-, strand-, belt- or chain-like element which travels around at least two spaced, substantially cylindrical guide elements rotating around parallel axes, at least one of the guide elements being positively driven. The belt-like element contains at least one hollow space which is connected by a flexible conduit to a conventional distributing valve placed in the space surrounded by the belt-like element and rotating synchronously therewith, for alternately connecting said hollow space to a source of air of subatmospheric pressure and of superatmospheric pressure. The aforesaid hollow space is connected to at least one opening in the outside surface of the belt-like element. A counteracting device is placed opposite a first run of said belt-like element parallel therewith and alongside of a conventional conveyor belt forsupplyingand removing the objects to be labeled which belt travels alongside said run of the belt-like element at a speed equal to the traveling speed of the latter, a gumming device, a label supply container and a label applying apparatus being arranged alongside said belt-like element, particularly alongside the second run of said belt-like element.

In a particularly simple and useful arrangement of the machine according to the invention the belt-like element comprises a first rubber belt vulcanized to a second, toothed rubber belt, the aforesaid hollow space being formed by a piece of rubber hose vulcanized into the first belt, the aforesaid opening being at the end of a conduit, terminating laterally in said hose.

Connection of said hollow space to said valve can be simply effected by projecting a portion of the aforesaid rubber hose from the first rubber belt and connecting a suitable conduit to said projecting portion.

This conduit is preferably formed by a thin walled rubber hose having reinforcing means placed therein to prevent compression of the hose by the exterior air pressure.

In order to make it possible to apply long labels to the outside of the belt-like element an additional hollow space may be provided in the element extending longitudinally thereof, communicating with the first hollow space and having conduits laterally connected thereto and terminating in the outside surface of the element.

In many cases it is of advantage to provide the counteracting device with a rigid plate whose position normal to the plane of the plate is adjustable and whose active surface is preferably provided with a sponge rubber covering.

For labeling bottles having two parallel opposite plane surfaces it may be of advantage to provide the counteracting device in the conventional manner with an elastic belt preferably made of rubber and traveling around at least two guide rolls. This belt may be driven at the speed of the conveyor belt or may be arranged to move freely.

A particularly compact arrangement of the apparatus according to the invention is obtained by placing the label supply container next to the second run of the belt-like element with the longitudinal axis of the container parallel with said second run.

If it is desired to simultaneously label two opposite plane surfaces of an object, for example a flat bottle, the counteracting device may be in the form of a second belt-like element.

If several labels, for example belly-, breast- and collar-labels, must be simultaneously applied, one above the other, several beltlike elements with accessories are arranged one above the other.

In some cases it may be advisable to arrange the belt-like element in the form of a chain carrying segments, one for each object to be labeled, the segments being provided with rubber coverings having a hollow space.
and a conduit connected thereto and an opening as described before.

For simultaneous application of front and back labels it may be advisable to arrange the labeling machine so that the intersecting device comprises at least one belt traveling around at least two rolls alongside the conveyor belt and at the same speed and direction as the run of said belt-like element which run is adjacent the conveyor belt, the rolls being supported on a frame which is swingable around the axis of the roll which is downstream of the second roll with respect to the direction of movement of the supplied objects, swinging of the frame synchronously with the supply of the objects being effected by a driven cam disc supported by the machine frame. A rigid, straight roll-on surface provided with a soft-elastic covering preferably made of sponge rubber is placed immediately downstream of the run of the belt which run is alongside the conveyor belt and in line therewith, the roll-on surface having a front edge tonguelike reaching around the belt or the belts.

The application, particularly of the front labels, is facilitated if the outside of the belt-like element is provided with preferably rectangular recesses suitable to receive a portion of the circumference of the objects to be labeled.

Adaptability of the apparatus to solve various labeling problems can be improved by providing, on the machine frame, an adjustable belt tighter for the belt of the countereffacing device. The novel features which are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, and additional objects and advantages thereof will best be understood from the following description of embodiments thereof when read in connection with the accompanying drawing, wherein:

FIG. 1 is a diagrammatic plan view of an apparatus according to the invention.

FIG. 2 is a diagrammatic plan view of a modified portion of the apparatus shown in FIG. 1.

FIG. 3 is a diagrammatic plan view of vital parts of a further modification of an apparatus according to the invention.

FIG. 4 shows a large scale top view of a portion of an element forming part of the apparatus according to the invention.

FIG. 5 is a diagrammatic deviation of the portion shown in FIG. 4.

FIG. 6 is a diagrammatic top view of a modification of the element shown in FIG. 4.

FIG. 7 is a diagrammatic side view of the portion shown in FIG. 6.

FIG. 8 is a diagrammatic plan view of a portion of another modification of an apparatus according to the invention.

FIG. 9 shows the portion illustrated in FIG. 8 in a different operating position.

FIG. 10 is a diagrammatic illustration of some of the parts shown in FIGS. 8 and 9, as seen from the conveyor belt.

Referring more particularly to FIG. 1 of the drawing, numeral 13 designates an essentially conventional frame of a labeling machine comprising a conveyor belt 1 for supporting the objects to be labeled. The conventional laveling cylinder is replaced by spaced guide elements 3 and 4 which are formed by rolls whose faces are vertical and around which extends a flexible element 2 in the form of a belt, band or chain. One of the elements 3, 4 is driven at such speed that a run 19 of the element 2 which run is parallel with the conveyor belt 1 and adjacent thereto maintains the same speed and in the same direction as the conveyor belt. A label supply container 17 has a longitudinal axis which is placed parallel with a second run 20 of the element 2. A placing roll 7 for taking the labels out of the container 6 and applying the labels to label receiving surfaces on the outside of the element 2 and a gluing or gumming device 8, known per se, for applying an adhesive to the labels placed on the label receiving surfaces of the element 2 are alongside the second run and on the outside of the element 2.

As seen in FIG. 2 element 2 preferably comprises a toothed belt 15 made of rubber to which a plain rubber belt 14 is vulcanized. Rubber hose sections 16 are vulcanized into the belt 14, spaced equally to the spacing of the label receiving surfaces at the outside of the belt 14, the longitudinal axis of the hose sections 16 extending transversely to the longitudinal axis of the belt 14. The size of the rubber hose sections 16 is such that they are also inserted into the rubber belt 14 that a portion of 23 of each hose section projects beyond the upper surface of the belt 14. Passages 24 extend from openings in the free outer surface of the rubber belt 14 into the hose sections 16 as shown in FIGS. 4 and 5. The portions 23 of the rubber hose sections 16 projecting from the top of the rubber belt 14 serve for connecting flexible conduits 12 (FIG. 1) preferably made of rubber and connected to a conventional distributing valve 11' which rotates synchronously with the element 2. The valve 11' is placed on top of the frame 13 in the space surrounded by the element 2 and is adapted to control the passages 24 traveling with the element 2 around the guide elements 3 and 4, similar to the control of the blow and suction air apertures known in connection with conventional labeling cylinders. The control is such that for taking out the labels by the element 2 from the label placing device 7 substomaphoretic pressure is used in the passage 24, in the rubber hose sections 16 and in the conduits 12. This substomaphoretic pressure is stopped and, if desired, is subsequently replaced by air of superatmospheric pressure when the labels are transferred to the objects 25 at engagement thereof with the element 2. Inside the conduits 12 reinforcing wire coils are preferably provided to prevent compression by the exterior air pressure during the substomaphoretic pressure periods. The lateral openings of the channels 24 in the rubber belt 14 have the same function as the conventional blow and suction air apertures which terminate in label receiving surfaces of the labeling cylinders. A plurality of such openings may be arranged superimposed in a row.

If long labels must be applied, for example labels extending completely around the objects 25, a plurality of openings of the channels 24 placed in the running direction of the belt 14 may be provided. In this case an oblong cavity 17 shown in FIG. 6 and extending parallel with the belt 14 which is made up of individual layers, is produced, for example, by vulcanizing a rubber element 38 into the rubber belt 14. The cavity or space 17 is connected by openings of the channels 24 with the outside. The passage openings of the channels 24 may be arranged superposed in rows as shown in FIG. 7. The space is connected by a connecting channel 39 to the interior of a rubber hose section 16.

The toothed belt 15 is in engagement with a correspondingly toothed portion of at least one of the guide elements 3, 4 which drives the element 2 so that correct relative position of the element 2 and the openings of the channels 24 thereon and stationary or synchronously operated parts of the machine is assured.

As shown in FIG. 2, the element may be in the form of a chain 28 comprising segments 22 individually correlated to the objects 25 to be labeled whereby the segments may be adjacent to one another along the runs 19 and 20 of the chain and may consist entirely or in part of rubber plates. The segments are provided with openings of the channels 24, hollow spaces 16, and rubber hose portions 23 for connecting conduits 12 which lead to a distributing valve 11' which is surrounded by the chain 28. The arrangement of the remaining parts 1, 6, 7, 8 etc. of the labeling machine which parts are not shown in FIG. 2, is analogous to the arrangement shown in FIG. 1 wherein a rubber belt 14, 15 having parallel runs 19, 20 is used.
A counteracting device 5 is placed on the side of the conveyor belt 1 which is opposite the element 2 for pressing the labeling machine on the conveyor belt 1 onto the element 2 which supplies the labels to the objects 25 and presses same thereunto.

If labeling is desired while the objects 25 roll on the element 2, the counteracting device 5 may be formed by a rigid plate 27 covered in a conventional manner by sponge rubber 26. The position of the plate 27 transverse of the travel direction of the conveyor belt 1 can be changed by manipulating a clamping screw 40 for adjusting the device to suit different operating conditions. If labeling of two opposite, for example, plane surfaces of the objects 25 is desired, a counteracting device 4 as shown in FIG. 3 may be used which comprises a rubber belt 9 running around two spaced guide rollers 10 and 11. This belt may travel freely or may be driven to travel at the speed of the conveyor belt 1.

Depending on the position and arrangement of the surfaces of the objects 25 to be labeled, the labeling system, essentially comprising the element 2 with the label supply container 6, the label applying device 7, the glue applying device 8, and the counteracting system 5 (FIG. 1) or 5′ (FIG. 3) may have active surfaces engaging with the surfaces of the objects 25 to be labeled which active surfaces are inclined relative to the vertical planes in which they are shown in the drawing.

If it is desired to simultaneously label opposite surfaces of the objects 25, in lieu of the counteracting or counter pressure device 5 shown in FIG. 1 or FIG. 3, a second element 2′ with elements 6′, 7′, 8′, 11′, 12′ may be placed on the side of the conveyor belt 1 which is opposite the first element 2.

In any case several superimposed labels (belly, breast, collar labels on bottles) may be simultaneously applied by superimposing several labeling systems comprising the elements 2′ and accessories 6′-8′ and superimposing several accompanying counteracting systems 5′ and 5′′, as is known in labeling machines operating with labeling cylinders.

If several labels must be placed simultaneously at about the same elevation on round objects, for example front and back labels on bottles, the embodiment shown in FIGS. 9 and 10 of the drawing may be used. Having the label receiving surfaces of the rubber belt 14 (FIGS. 3-7) or the segments 22 of a chain 28 (FIG. 2) are provided with recesses 36 which are preferably rectangular or trapezoidal for labeling frustum-shaped objects, so that a portion of the circumference of the objects 25 can enter a recess 36, it is known in labeling machines with labeling cylinders. The counteracting device 5′ may comprise one or several belts 9 which are looped around two spaced rolls 10 and 11 and travel alongside the conveyor belt at the same speed and in the same direction as the run 19 of the element 2′ neighboring the conveyor belt 1. The rolls 10, 11 are supported by a frame 29 which is swingable around the shaft 31 of the roll 10 which is last passed by the objects 25 relative to the roll 11 which is first passed. Swinging is effected according to the rate of supply of the objects 25 by a cam disc 32 supported by the frame 13 (FIG. 1). A roll-on plate 35 follows the run 33 of the belt 9 in alignment therewith. The plate 35 is rigid and provided with a sponge rubber covering 34. The forward edge 37 (FIG. 10) of the plate 35 extends tongue-like around the belt or belts 9. A spring 41 resting against the frame 13 (FIG. 1) and mounted on a stand 42 urges the edge 37 into the desired position relative to the active surface of the run 19 of the element 2.

If an object 25 to be labeled travels on the conveyor belt 1, after it has been spaced in the conventional manner from the neighboring objects by a conveyor worm 43 (FIG. 1) synchronously with the element 2, into the reach of the belt 9 which is at that moment in the position shown in FIG. 9, the belt 9 moves due to the action of the cam 32 toward the object 25, pressing it into the recess 36 in the rubber belt 14 (FIG. 1) or in a segment 22 which recess has just traveled around the guide element 4. A label to be applied is held in a suction above the recess 36. The suction emanates from apertures of channels 24 (FIG. 5) placed at the marginal portion of the recess 36. While the object 25 enters the recess 36 blow-air instead of suction-air is conducted through the conduits 14 to the openings of the channels 24 (FIG. 5) for suddenly blowing the label which has just been gummed by the gumming device 8, around the object 25 and firmly pressing the label thereunto. The blow-air can act on the label and make the adhesive force of the glue fully effective while a point of the object is on a path of, for example, 110 mm. extending alongside the run 33 of the belt 9 from the forward roll 11 to the rearward roll 10. While on this path the object 25 rests relative to the element 2. When the object 9 has arrived at the end of the run 33 of the belt 9 and has entered into the reach of the roll-on plate 35, 34 or of the forward edge 37 thereof projecting between the belts 9 (FIG. 10), torsion is exerted on the object by these stationary parts which rolls the object in a direction adverse to the travel direction of the portion 19 of the element 2 or of the conveyor belt 1 over the edge 43 of the recess 36 out of the latter and over a plane, not recessed part of the rubber belt 14 or over a neighboring segment 22 of a chain 28 (FIG. 2). A gummed back label is held on the element 2′ by suction emanating from openings of the channels 24. Front labels are in recesses 36 and back labels are supplied to the not recessed, plane portions 19 of the element 2 from label storage containers 6, if desired from a conventional double storage container holding front and back labels side by side.

When the objects 25 travel from the reach of the belt 9 into the reach of the stationary roll-on plate 35, 34 air is conducted through the distributing valve 11 and respective conduits 12 to the openings 24′, which up to this movement supplied suction for holding a back label on a plane surface portion 44 of the element 2. The air now blowing out of the openings of the channels 24, is assisted by the roll-on operation, presses a back label onto the circumference of the object. The end of the roll-on surface 35, 34 is opposite the guide element 3 for the element 2 so that after completion of, if desired multiple, rolling over of the object 25 between the roll-on surface 35, 34 and the plane portion 44 of the element 2 between two recesses 36, the object is released from the parts 2 and 5, cooperating for labeling, and left to the conveyor belt 1.

A belt tightening 30 fixable by a screw 45 is preferably provided for the belt 9 on the frame 29.

The shaft 31 of the roll 10, the cam disc 32 with its drive shaft, not shown, the frame 29, the stand 42 and the shaft of the roll 11, i.e., the entire counteracting device 5 may be borne by a slide resiliently supported on the machine frame 13 and movable transversely to the travel direction of the conveyor belt 1. This slide, not shown, is permanently pressed transversely to the travel direction of the conveyor belt and permits adjustment of the apparatus to various dimensions of the objects to be labeled.

Additionally, the roll-on surface 35, 34 may be arranged swingable around a shaft 46 mounted on the aforesaid slide, pressing that against or toward the travel direction of the conveyor belt being effected in the aforesaid manner by the spring 41 on the stand 42.

The time the blow air presses the label onto the object may be extended beyond the 110 mm. travel described before, by way of example, by corresponding increase of the distance between the guide elements 8 and 43. It is a particular advantage of the invention that, in spite of high operating speed of the labeling machine comparatively long periods are available for pressing the labels onto the objects, by suitable dimensioning of the element 2.

We wish it to be understood that we do not desire to be limited to the exact details of construction shown.
and described, for obvious modifications will occur to a person skilled in the art. Having thus described the invention, what we claim as new and desire to be secured by Letters Patent, is as follows:

1. A machine for gluing labels to upstanding objects, particularly containers, and especially bottles, comprising
   (a) at least two paraxial, rotatable, substantially cylindrical, spaced guide means,
   (b) an endless flexible, beltlke element looped around said guide means,
   (c) at least one hollow space in said beltlke element,
   (d) a distributing valve for alternately affording flow of air toward said valve and from said valve,
   (e) said valve being placed inside the loop formed by said beltlke element and driven to rotation substantially in synchronism with the run of said beltlke element around said guide means,
   (f) a flexible conduit connected to said valve and to said hollow space,
   (g) said beltlke element having an outside surface, an air passage connected to said hollow space and to said outside surface for effecting suction on said outside surface when said valve affords flow of air toward said valve for holding labels to said outside surface and for effecting pressure on said outside surface when said valve affords flow of air from said valve for pressing labels onto objects to be labeled,
   (h) a conveyor belt for transporting the upstanding objects to be labeled to, through and from the machine, said beltlke element having a first run alongside said conveyor belt and traveling in the same direction and at the same speed as said conveyor belt, and
   (i) a counteracting device placed alongside said conveyor belt opposite said first run for urging the objects to be labeled toward said first run.

2. A machine as defined in claim 1 comprising accessories comprising a label supply container, a label applying device arranged for receiving labels from said container and applying the labels to said beltlke element, and a label gumming device arranged for gumming the labels applied to said beltlke element, the latter having a second run, said accessories being arranged outside of the loop formed by said beltlke element and alongside said second run.

3. A machine as defined in claim 2 wherein a plurality of said beltlke elements and of said accessories are placed one above the other for simultaneously applying labels to objects at different elevations.

4. A machine as defined in claim 3 wherein a plurality of said counteracting devices are placed one above the other for simultaneously applying labels to objects at different elevations and locations around an object.

5. A machine as defined in claim 1 wherein said flexible conduit is formed by a rubber hose comprising an incompressible reinforcement for preventing compression of said conduit by the outside air pressure.

6. A machine as defined in claim 1 comprising a second hollow space in said beltlke element communicating with said first hollow space and extending longitudinally of said beltlke element, and air passages connected to said outside surface and to said second hollow space.

7. A machine as defined in claim 1 wherein said counteracting device comprises a rigid plate movable in a direction transverse to the traveling direction of said conveyor belt, said plate having a surface facing said conveyor belt and provided with a layer of sponge rubber.

8. A machine as defined in claim 1 wherein said label supply container is oblong and is placed alongside the second run of said beltlke element, the longitudinal axis of said container being parallel with said second run.

9. A machine as defined in claim 1 wherein said beltlke element comprises a chain, a plurality of segments mounted thereon, a rubber covering on each of said segments, said hollow space and said air passage being placed in said rubber covering.

10. A machine for gluing labels to objects, particularly containers, and especially bottles, comprising
   (a) at least two paraxial, rotatable, substantially cylindrical, spaced guide means,
   (b) an endless flexible, beltlke element looped around said guide means,
   (c) at least one hollow space in said beltlke element,
   (d) a distributing valve for alternately affording flow of air toward said valve and from said valve,
   (e) said valve being placed inside the loop formed by said beltlke element and driven to rotation substantially in synchronism with the run of said beltlke element around said guide means,
   (f) a flexible conduit connected to said valve and to said hollow space,
   (g) said beltlke element having an outside surface, an air passage connected to said hollow space and to said outside surface for effecting suction on said outside surface when said valve affords flow of air toward said valve for holding labels to said outside surface and for effecting pressure on said outside surface when said valve affords flow of air from said valve for pressing labels onto objects to be labeled,
   (h) a conveyor belt for transporting the objects to be labeled to, through and from the machine, said beltlke element having a first run alongside said conveyor belt and traveling in the same direction and at the same speed as said conveyor belt, and
   (i) a counteracting device placed alongside said conveyor belt opposite said first run for urging the objects to be labeled toward said first run, said beltlke element comprises a first rubber belt, a second, toothed rubber belt vulcanized onto said rubber belt, said hollow space being formed by a piece of rubber hose vulcanized into said first rubber belt, said passage terminating laterally in said piece of rubber hose.

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BENJAMIN A. BORCHELT, Primary Examiner
R. E. HART, Assistant Examiner

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