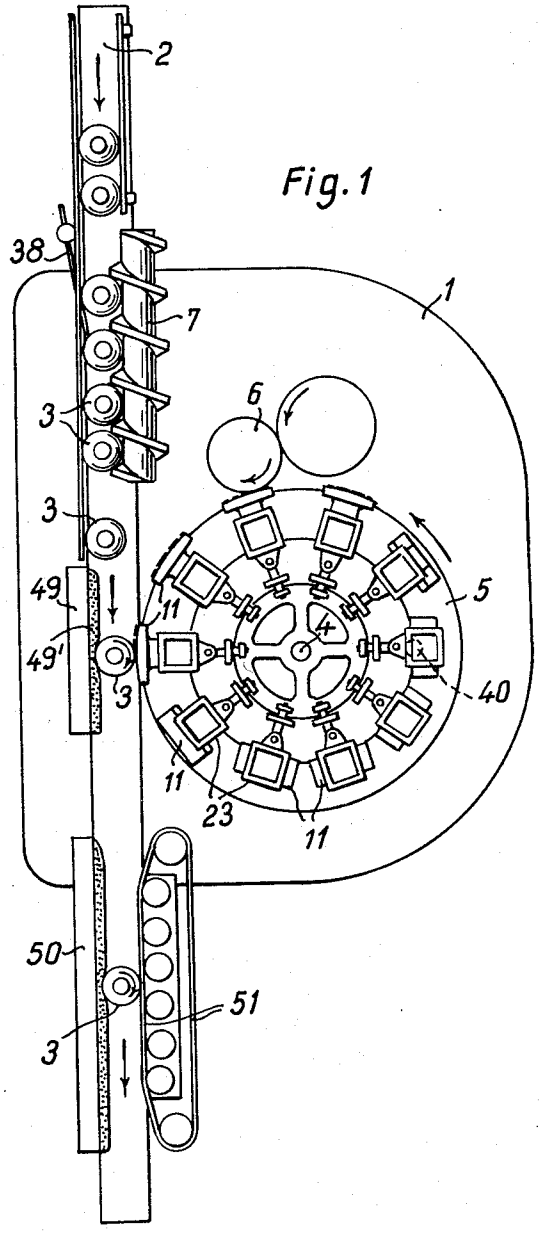
May 17, 1960 A. E. A. SCHULZ 2,936,921

LABELING MACHINE FOR WORKPIECES IN UPRIGHT POSITION

Filed Dec. 17, 1957 4 Sheets-Sheet 1

Fig. 1



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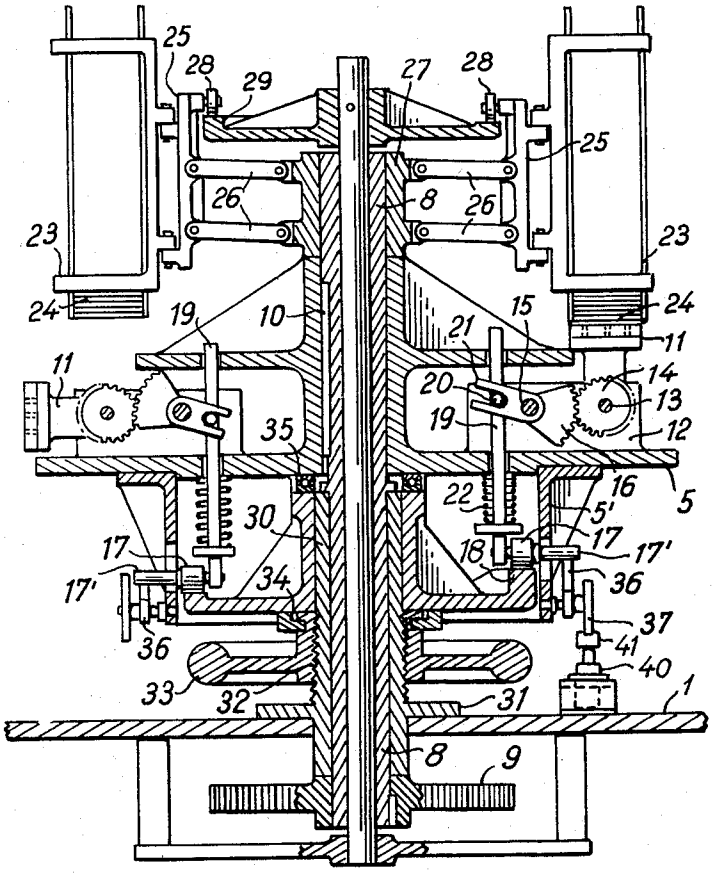
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LABELING MACHINE FOR WORKPIECES IN UPRIGHT POSITION

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Fig. 2



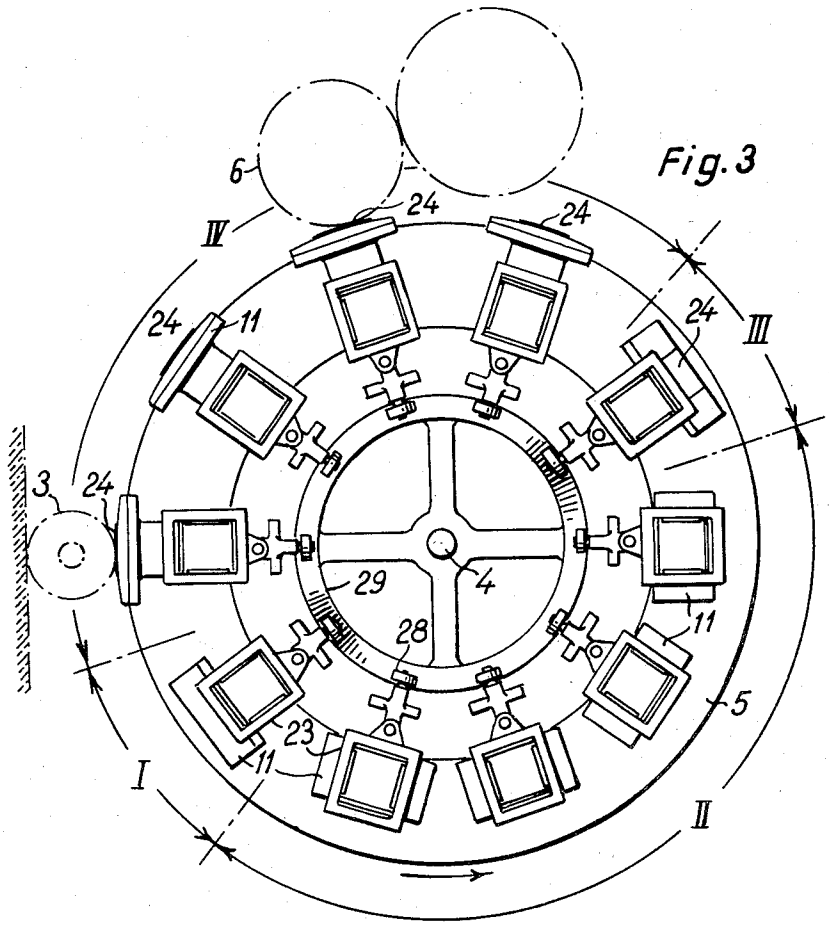
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LABELING MACHINE FOR WORKPIECES IN UPRIGHT POSITION

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Fig. 3



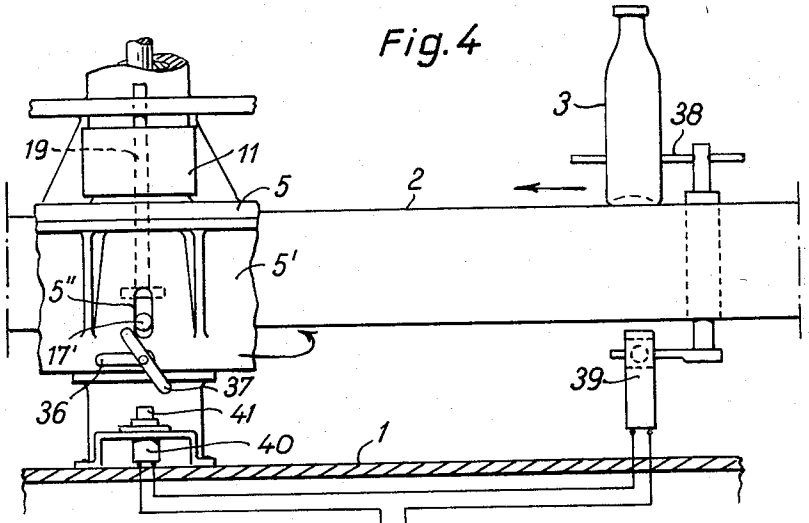
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LABELING MACHINE FOR WORKPIECES IN UPRIGHT POSITION

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Fig. 4



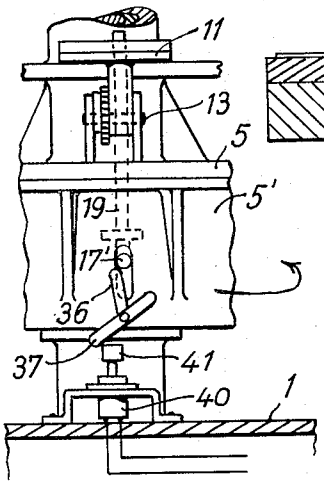


Fig. 5

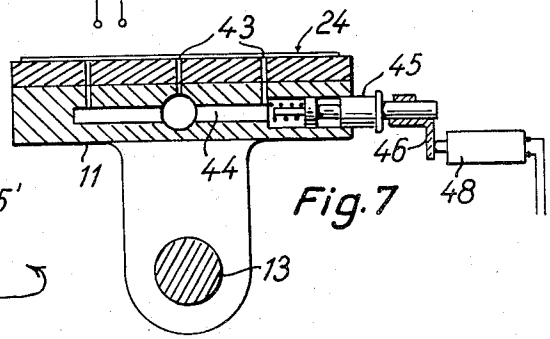


Fig. 7

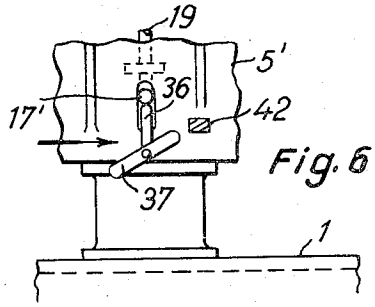


Fig. 6

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LABELING MACHINE FOR WORKPIECES IN UPRIGHT POSITION

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Claims priority, application Germany April 1, 1957

5 Claims. (Cl. 216—55)

The present invention relates to a machine attaining hitherto unknown speeds and dependable action for labeling of workpieces in upright position by means of a label-distributing drum rotating continuously around a vertical axis. The drum contains several suction surfaces which serve to take up and to supply one label at a time, and which pivot around horizontal axes. For each suction surface, there is a label container attached in such a manner that the suction surface, pivoting from its vertical position toward its label container, takes up a label. The pivoting motion of the suction surface, during the rotation of the label supply drum, is directed by a fixed cam.

A known and proven construction of labeling devices for workpieces in upright position, e.g., for bottles, is provided with a label supply drum rotating continuously, on whose circumference several suction surfaces are located for take-up and delivery of one or several labels. During the rotation of the label supply drum, each suction surface passes a label container, located outside the label supply drum, and takes up a label by suction. This label then lies on the suction surface with its reverse side directed outward. During the course of the rotation, the suction surface with the label meets a gluing device which also is located outside the label supply drum. Here, the adhesive is applied to the reverse side of the label, and then the suction surface with the glued label is aligned with the continuously moving workpieces or bottles in a manner that the workpiece or the bottle rolls off the suction surface and takes up the label therefrom.

Although with such known labeling devices fairly high speeds can be attained, the latter are limited by the facts that accurate synchronization complicates the machine and that sufficient time must be allowed for the suction surface of the label supply drum, while passing the label container, to pick up a label. The passing of the suction surface by the label container takes a definite minimum of time which cannot be decreased in order to maintain dependable action of label take-up from its container.

A long time ago, it was proposed (U.S. Patent 781,333) to build a labeling device according to a principle which is basically different from the known and proven construction described above, in that not just one single lable container is present outside the label supply drum which is passed by the several suction surfaces in succession to pick up a label. Instead, according to this old suggestion, several label containers are attached rigidly to the label supply drum, which, therefore, rotate with the label supply drum. Each of these containers has a suction surface assigned to it, so that the suction surface can pivot its vertical position towards the label container and pick up a label. This means that the label supply drum carries as many label containers as it has suction surfaces. The label containers consequently do not change their angle toward the suction surfaces.

However, this old labeling device cannot attain great speeds for several reasons and has not been used in actual practice to any significant extent. One of the reasons for slow speed is found in the control of the pivoting action of the suction surfaces.

The manner of directing the pivoting action of the suction surfaces works well for labeling at slow speeds as was satisfactory at the time when this device was proposed, but it is totally unsuited for the high speeds applied today in labeling. However, it has not been recognized to date that the long-forgotten device described above contains a principle which can serve as the basis for a modern high-speed labeling machine.

A major disadvantage of the above mentioned device consists in the fact that the suction surface approaches the label container controlled solely by its own weight which does not assure contact between the suction surface and the topmost label in the container at high speeds. It should be noted that at the presently used high speeds the suction surface makes contact with the label container for only fractions of a second, even when the latter is fastened to the label supply drum and rotates together with the suction surface. A dropping action merely by gravity, therefore, is not dependable, especially since the suction surface usually is curved, and that contact with the uppermost label in the container is not assured.

The present invention succeeds for the first time in improving a labeling machine of the construction described in U.S. Patent 781,333 by increasing the labeling speed beyond any speeds hitherto known.

The present invention teaches an important improvement which effects pivoting of the suction surface by means of the fixed cam and by way of a positively connected mechanism which controls pivoting of the suction surface from its vertical position upwards toward the label container which is installed above, and which, in turn, under the action of a second cam, likewise fixed, executes a vertical movement toward the upturned suction surface.

The machine according to the present invention differs in respect to form and manner of working from known devices, particularly by the positive control for the pivoting motion of the suction surface toward the label container which assures contact of the suction surface with the label which is in front. Furthermore, the contact attained by a positive drive can be carried out with much greater speed than one effected by gravity-fall of the suction surface onto the label container.

Another difference consists in the location of the label containers which no longer are situated below, but instead are installed above the positively pivoting suction surfaces. However, in contrast to the known devices, the label containers are not stationary, but execute a vertical movement, back and forth, which is synchronized with the pivoting motion of the suction surfaces. Each time that the suction surface pivots upward toward the label container, the latter lowers itself for a certain distance, so that the label container makes a good contact on the suction surface by its own weight. Shortly before the suction surface returns to its vertical position, the label container is raised a little, so that the pivot action of the suction surface is unhindered.

This manner of pivoting motion and the mode of installation of the label container above the suction surface entails the further advantage that in contrast to known devices, the label surface need not pass beyond the circumference of the label supply drum, when pivoting toward the label container. This is a simplification in the construction. In the known devices, the label containers had to protrude outward beyond the circumference of the label supply drum, thereby increasing considerably the moment of inertia of the label supply drum because of the distance from the axis of that drum. In contrast thereto, in the machine according to the present invention, the label containers are installed at comparatively short distances from the axis of the label supply drum. Moreover, due to the fact that they are attached above the suction surfaces, they do not interfere with the transportation of the workpieces.

The pivoting motion of the suction surfaces as well as the vertical movement of the label containers are controlled by fixed cams. Both these fixed cams are mutually synchronized so that the pivoting motion of the suction surface and the vertical movement of the label container occur at the correct sequence of time.

Both fixed cams form annular contact surfaces for one roller per cam. One of these rollers is connected with the positively connected drive of the suction surface; with the other roller, the label container is supported through its own weight, by the contact surface of the corresponding cam. Each label container is fastened to the label supply drum by means of a link parallelogram which permits vertical movement.

The roller connected with the positive drive for the suction surface strikes the latter upward as soon as it meets a bulge on the contact surface of the cam. Thereby, the roller moves the positive drive of the suction surface toward the action of a spring and swings the suction surface into the upward position.

The axle of the roller is fastened to a rod which stands vertically and can move vertically. This rod turns the suction surface by way of a pivoting gear link and a sprocket which is fastened to the pivot axis of the suction surface.

It has been found that it is possible to label 20,000 workpieces, particularly bottles, per hour with a machine as described. To date, the amount of 18,000 workpieces per hour has not been exceeded.

Another feature of the invention is a safety device. This device prevents, the suction surface, in upward position toward the label container, from moving downward and passing the adhesive dispenser, if the suction surface, for any reason, has not picked up a label from the label container, or if a key on the conveyor for the workpieces has ascertained that no workpiece is in place, which, if present, would receive a label from that particular suction surface. This measure prevents the application of adhesive to the suction surface itself when no label is in place, and also the carrying of a glued label when the workpiece is not in place.

The safety device comprises an extension of the axle of the roller which moves on the cam, under which a check lever, installed swingably on the label supply drum, can be placed when the roller has reached its highest point on the cam, preventing the downward movement of the roller if the corresponding suction surface has not picked up a label or if no corresponding workpiece is transported to that suction surface.

The check lever is actuated by a stationary electromagnet opposite the label supply drum. The armature of the magnet carries a push rod which presses the check lever in position upon excitation of the magnet.

There are several possible means of excitation of the electromagnet. One consists in closing the circuit of the magnet by a switch which is actuated by a key which extends into the conveyor for the workpieces when no workpiece is present on the particular part of the conveyor. To avoid lowering of the suction surface when the latter does not pick up a label from the label container for any reason, a second switch is wired in parallel to the switch mentioned above. This second switch is closed by a piston built movably into the suction surface when the suction surface does not pick up a label in its position toward the label container. However, if a label is taken up, the piston is retracted during the pick-up by the vacuum created on the suction surface and passes the switch without actuating the same.

Further details are contained in the description of the drawing which illustrates one embodiment of a bottle labeling machine.

In the drawings:

Fig. 1 is a diagrammatical plan view of the labeling machine according to the present invention;

Fig. 2 is a longitudinal cross section through the label supply drum;

Fig. 3 is a plan view of the label supply drum;

Figs. 4 to 6 show a safety device which prevents the pivoting of the label supply segment toward the glue applicator if no bottle is present, and

Fig. 7 is a second safety device which prevents pivoting if no label is present.

As can be seen in Fig. 1, the labeling machine is of the type in which on a conveyor chain **2**, continuously moving over a table **1**, the pieces to be labeled **3** (e.g., bottles, cans, or other cylindrical pieces) are conducted past label supply drum **5** which rotates continuously around a vertical axis **4**. The adhesive is applied to the label upon rotation of the drum by a dispenser **6**. The gummed label is taken up by the workpiece (in the drawing: bottle **3**) when the label and the piece on the conveyor meet. Worm gear **7** is located beside the conveyor and facilitates the keeping of equal distance of the bottles in a known manner.

Figs. 2 and 3 illustrate the construction of the label supply drum. A tubular shaft **8** is seated, easily rotatable, on the stationary axis **4**. Shaft **8** carries on its lower end, below table **1**, a gear **9** by which the drum is driven. Label drum **5**, connected with tubular shaft **8** by spring and groove **10**, carries on a disc near the circumference a number of (in this example 10) equally distant label carriers **11** which can be turned outward and are provided with suction ducts. The label carriers are seated in bearing blocks **12** with their axes **13** rotatable and carry a gear **14** into which a gear segment **16** meshes, which pivots around an axis **15**, and which turns gear **14** through an angle of 90°. The gear segment is driven by a push rod **19**. The latter is movable vertically and travels by means of a roller **17** on a fixed cam disc **18** underneath the label drum. Rod **19** is locked by means of pin **20** in a fork **21** which is rigidly connected with the gear segment.

The labeling drum **5** is provided with a housing **5'** which covers cam disc **18** and which has slits **5''**, through which lead the axles **17'** of the rollers **17** which travel on the cam disc. The axles **17'** guide the push rod.

A compression spring **22**, installed on rod **19**, holds the roller **17** in constant contact with the cam disc **18**.

A label container **23**, hanging vertically, is installed above each label carrier, so that an opening provided on the underside for the take-up of a label **24** covers exactly the label carrier **11** which is located below, pointing upward. Each label carrier is held by a support **25** which is suspended by means of a link parallelogram **26**, on a sleeve **27**, fastened to the tubular shaft **8**, whereby a roller **28**, seated on the upper end of the support, is braced on a stationary cam disc **29**, which rests on the axis **4**.

Take-up of a label from the label containers and delivery to the bottle proceeds as follows:

Upon rotation of label drum **5**, push rod **19**, which moves gear segment **16**, is lifted against the pressure of

spring 22 in sector I (Fig. 3) by means of cam disc 18 (Fig. 2), thereby causing pivoting of label carrier 11 by 90°, so that its suction surface points to the lower opening of the label container. The latter is situated high enough to pivot without obstruction. Thereafter, label container 23 in sector II is lowered by cam disc 29, located on the upper end of axis 4, and carrying support 25 with roller 28. Label container 23 is lowered so far that the lowest label in the opening of the container lies on the suction surface of the label carrier 11. The label is sucked onto the surface and held in place by a suction source, not shown.

When roller 28 reaches sector III, it travels onto a raised part of track 29, whereby the label container is lifted again, while label carrier 11, carrying the label by suction, is turned by 90°, carrying the label turned outward, by lowering of push rod 19 on the cam disc 18.

On the last sector IV, the labels are conducted past the adhesive dispenser roll, and the adhesive applied to them. Then, the suction surface with the glued label meets the workpiece 3 which moves in a straight line on the conveyor. The workpiece is pressed onto a pressure pad and rolled off the same, thereby picking up the label. With the delivery of the label, one revolution of the drum has been completed, and the cycle is repeated.

The height of the label drum is adjustable in order to attain the correct position when the label container 23 is lowered for take-up of a label, so that contact between the label with the suction surface of label carrier 11 is assured. As shown in Fig. 2, for this purpose the tubular shaft 8 is enclosed in a hub 30 below the label drum. This hub rests solidly on table plate 1. Hub 30 has a thread 32 on the outside, onto which a handwheel 33 has been screwed, which in turn is connected to the cam disc 18 above, by means of a linkage 34. Cam disc 18 also is fastened to hub 30 and is movable axially. The label drum is seated, with insertion of a bearing 35, on the upper front end of cam disc 18. Through rotation of the hand wheel 33, cam disc 18, and, consequently, the label supply drum can be adjusted most accurately to the position best suited for the take-up of a label from the label container.

The labeling machine is provided with safety devices which prevent pivoting of the label carrier when a bottle is missing on the conveyor, or when, for any reason, no label has been taken by the carrier. Pivoting of the label carrier 11 can be prevented by a bolt 36, which is situated on the drum housing 5' below the slits 5'' and which is rotatable. Bolt 36 is connected with a swivel arm 37, located on the same axis, and is regulated by impact on a stop.

On the conveyor 2 (Figs. 1 and 4), a feeler 38 is rotatably positioned in a known manner opposite the distributor screw 7 for the bottles 3 which extends into the track of the conveyor and which is pressed down when a bottle passes it. Thereby, an electric switch 39 is actuated which opens a circuit to the magnet 40 which is installed below the rotating label supply drum on table 1, so that a rod 41 is pushed back and bolt 36 is not actuated (Fig. 4).

If a bottle is missing in the track of the distributor screw 7, feeler 38 is not actuated and switch 39 remains closed. Rod 41, seated in the track of bolts 36 on drum housing 5', swings, during the turning of the drum, bolt 36 into the passage of axle 17' of roller 17, so that the latter cannot follow the cam 18 any longer and supports push rod 19 in raised position. Label carrier 11 stops below the label container 23, and thus passes the adhesive dispenser without making contact with the same. The label carrier passes the point of delivery of the label to the bottle, if present, but remains in the upper position since no bottle is in place. The swinging lever 37 meets a stud 42 which protrudes into the track (Fig. 6), pushes bolt 36 back into its initial position and releases the push rod.

A second safety device is shown in Fig. 7. This device gets into action when the label carrier cannot take up a label.

A duct 44, connecting the suction openings 43 and situated transversely to the swinging axis 13 of label carrier 11, raises a piston 45 which protrudes outward and is provided with a stud 46. Piston 45 is constantly pressed outward by a spring, thereby actuating a switch 48 which closes a current leading to the magnet 40.

When a label 24 is sucked from the container and the openings on the suction surfaces are covered, piston 45 is retracted into the duct inversely to the spring action, so that switch 48 is opened, the current interrupted and swinging lever 37 (Fig. 4) is not actuated during the rotation of the label supply drum 5.

If, however, no label is sucked up, piston 45 is not influenced by the suction air and remains in the position which closes the circuit. The magnet holds rod 41 in the track of swinging lever 37 (Fig. 5) and locks the track of push rod 19, so that label carrier 11 is not pivoted outward.

Fig. 1 shows the position of magnet 40 on table 1. The bottles 3, carried on conveyor 2, by means of the distributor screw 7, pass feeler 38 and are rolled off a stationary wall 49 which stands beside the conveyor and is made of foam rubber, when they meet label carrier 11 which pivots out from the label supply drum 5, said bottles thereby taking up label 24. As the labeled bottles pass along, they are rolled through a passage consisting of a fixed wall 50 and an endless belt 51, serving as support. This concludes the labeling action.

What I claim is:

1. In a machine for labeling workpieces in upright position by suction operated means: a machine base; a vertically disposed shaft member fixedly secured to said base; a drum rotatable about said shaft; conveyor means for workpieces, movable adjacent said drum; a plurality of spaced label carriers pivotally secured on the periphery of said drum, said label carriers being provided with suction surfaces; means for maintaining said label carriers in a vertical position with the suction surfaces directed upwardly; first cam means secured to said base below said drum and operatively connected with said label carriers for horizontally tilting the latter at predetermined intervals so that the suction surfaces face outwardly of said drum and contact the workpieces; and a mechanism for supplying labels to said carriers when these are in a vertical position, said mechanism comprising second fixed cam means secured to said shaft above said drum, a plurality of vertically movable label containers and parallelogram linkage securing said label containers to said drum above said label carriers and operably engaging with said second cam means, both said cam means operable in timed relationship with one another for lowering the label containers to contact the suction surfaces of said label carriers when these are in an upright position and for raising said containers out of the path of said label carriers when the latter are tilted to a horizontal position.

2. The machine according to claim 1, wherein said means for maintaining the label carrier in a vertical position comprise a bearing block secured to said drum, a shaft to which the label carrier is secured, a pinion secured to said shaft, a rack engaging with said pinion a push rod operatively connected to said rack, said push rod having a flanged end disposed below said drum and a spring interposed between said flanged end and said drum.

3. The machine according to claim 2 wherein said cam means comprise a circular horizontally disposed disc formed with a cam surface and a plurality of rollers rotatably secured to said drum between said flanged ends of the push rods and said cam surface.

4. The machine according to claim 1, wherein said second cam means comprise a circular horizontally disposed disc formed with a cam surface and a plurality of rollers secured to said parallelogram linkage and engaging with said cam surface.

5. The machine according to claim 1 further provided with means for manually adjusting the height of said first cam means and said drum in a vertical direction.

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