June 29, 1971 R. R. DELLA VITE 3,589,968

LABELLING MACHINE

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Fig. 1.

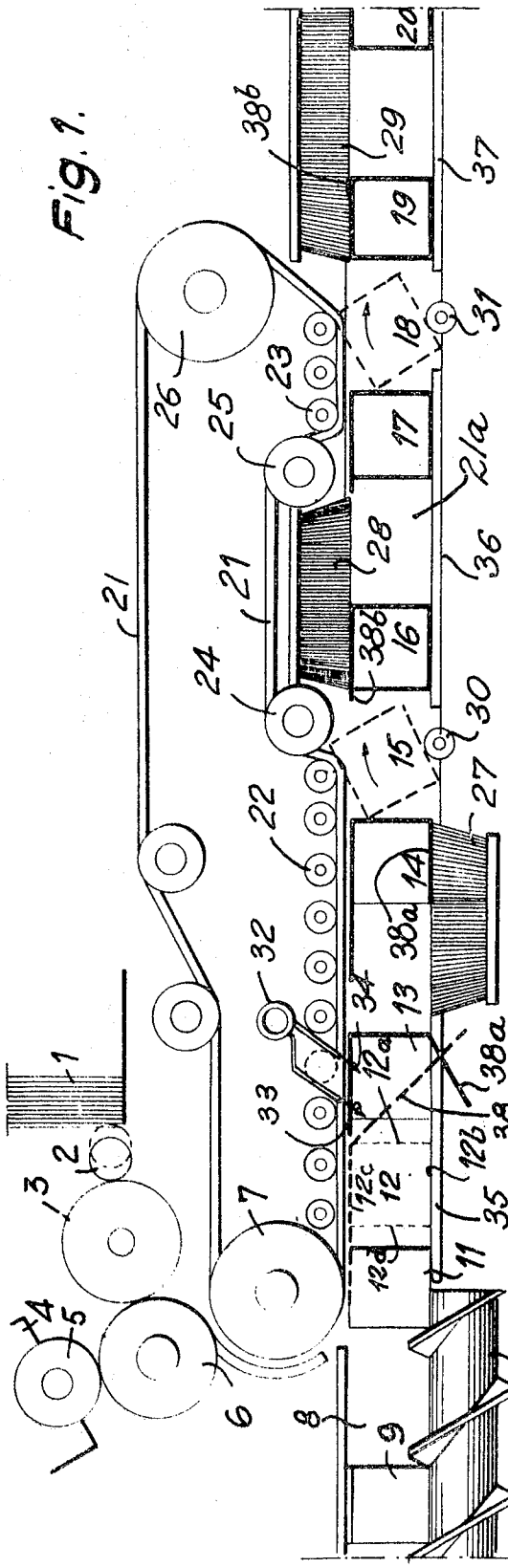
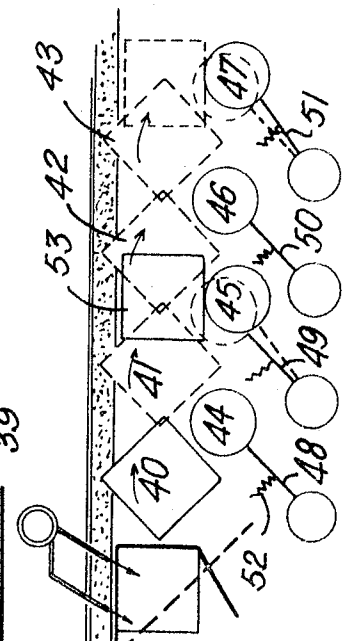


Fig. 2.



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LABELLING MACHINE

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U.S. Cl. 156—455 20 Claims

ABSTRACT OF THE DISCLOSURE

A machine for labelling bottles or containers comprises a label feeding unit for feeding labels to a labelling channel of the machine and a container feeding unit for feeding containers to the channel, the containers being turned during their movement along the channel so that they can be applied to the containers and wrapped fully around the latter during movement of the containers along the channel.

The present invention relates to a machine for labelling bottles or containers of various shapes and of any given cross-section, which may be curvilinear or polygonal, which machine is adapted to position a label and apply it in an even manner, so that it overlaps itself and surrounds the whole of the periphery of the bottle or container.

The difficulty in a label-positioning operation of this kind resides primarily in ensuring that the leading part of the label is overlapped evenly by the trailing part upon completion of the labelling operation. In fact, although one never attempts to bring these parts edge-to-edge, which would be a still more delicate operation, nevertheless one attempts to make the marginal overlapping of the two superposed parts as even as possible.

Full-wrap labelling machines have previously been proposed in which the label is first applied to the container at its leading edge, either by laying it on by direct contact, or through the intermediary of an air-jet system, and the application of the label to the container then proceeds progressively as far as the trailing edge. Unfortunately, if the label is badly poistioned at the start, it wraps itself around the container in a helix, and as a result of the overlap of the trailing and leading edges of the label, upon completion of the labelling a pronounced offset is observed.

An undesirable offset of the said edges relatively to each other also arises if, despite correct positioning of the label at its leading edge, the bottle has irregularities in its periphery.

It is one object of the present invention to provide a machine which will enable full-wrap labelling to be carried out in an even manner without the employment of delicate or complicated means; it is a further object of the invention to provide means enabling the labelling operation to be simplified, while being considerably accelerated so that the time required for positioning the label is reduced.

According to the invention there is provided a full-wrap labelling machine for labelling containers, comprising a label-feeding unit which is phased to lead a container-feeding unit to a certain extent, so that when a container is engaged in a labelling channel of the machine, a label fed by the label-feeding unit already precedes the container by a relatively great length on one side of the channel, means being provided for folding back the portion of the label which is advanced relatively to the container, around the part of the container which is directed forwardly in relation to the movement of the container,

and for smoothing, from the other side of the channel, the part of the label thus folded back, so as to apply it to the container, the container then being rotated about its axis before the smoothing and final application of the label is completed by appropriate means, so that overlap is complete.

In one advantageous embodiment of said machine suitable more particularly for the full-wrap labelling of containers of circular or square section, the portion of the label preceding the container on the said one side of the channel is of a length corresponding substantially to a half the total length of the label, so that when the label is turned back over the said forwardly directed part of the container, the label is folded back approximately at its middle. The main importance of this feature resides in the fact that in bending the label back at its middle portion, and thus effect wrapping thereof, in a single movement, over half the length of the label, even positioning is ensured since after having applied the label in a single movement to the container, and over a large portion of the surface, thereof, slipping is avoided or minimised; much larger slipping occurs when contact takes place initially along a generatrix of the surface of the container, with the contact area progressively increasing little by little.

In addition, this instantaneous wrapping over half the length of the label greatly increases the positioning speed.

A further advantage of the machine according to the invention resides in the fact that if the periphery of the container is deformed, folding back the label at its middle portion counterbalances and reduces the offsetting effect of the deformation, whereas the offsetting effect would be magnified if wrapping were to be commenced at the leading edge of the label and continued progressively to the trailing edge.

The invention will now be described more fully, by way of example only, with reference to the accompanying drawings in which:

FIG. 1 is a diagrammatic plan view of one form of machine according to the invention, and

FIG. 2 is a corresponding view showing a part of the modified form of machine.

Referring to FIG. 1 of the accompanying drawings, a label box is provided at **1**, transfer rollers at **2** and **3**, a glue tank at **4**, into which a glueing roller **5** extends, a further transfer roller at **6**, and at **7**, a label-feed roller at the entrance to a channel **8** for conveying the containers **9**. The containers are passed into the labelling channel from the channel **8** in the direction from left to right by means of an endless screw **10**. At **11**, **12**, **13**, **14**, **15**, **16**, **17**, **18**, **19** and **20** are indicated the various special positions of the container along the length of the labelling channel. The container can be of any desired shape: square, rectangular, oval or even cylindrical. In addition to feeding the labels, the roll **7** also drives a set of belts **21**, arranged vertically one above the other, which transport the containers along by frictional engagement with the sides thereof, together with the labels, over a certain length of the channel, the speed of the travel of the belts being equal to the speed of travel of a horizontal band **21***a* which supports the bottoms of the containers in the channel **8**. The belts are guided by various rollers such as **22** and **23**, and also by further rollers **24**, **25** and **26** which change the direction of the belts. At **27**, **28** and **29** there are provided smoothing stations, which may be constituted by brushes for instance, and at **30** and **31** there are check rollers interposed in the path of the containers, which cause the containers to pivot, as shown in the case of the containers at the positions **15** and **18**. At **32** there is provided an air jet station which delivers jets of compressed air in the direction of the arrows **33** and **34**.

At **35**, **36** and **37** there are shown slide rails which guide the containers, these rails being either opposite the conveyor belts or opposite the smoothing stations.

Upper guide means for the containers are also provided above and parallel with the slide rails **35**, **36** and **37** (not shown in the drawing) which bear on the upper faces of the containers to hold them, under a certain pressure, on the conveyor band of the channel **8**. The arrangement is, however, such that these means for applying pressure from above are not present opposite the check rollers **30** and **31**, so that at these positions, the upper faces of the containers are unobstructed and the containers can pivot about their own axis, just to the right of the check rollers **30** and **31**.

The machine briefly described above functions in the following manner:

A label which has previously emerged from the magazine is gummed, in the usual way, and passes to the roll **7** which contains suction orifices distributed both along its generatrices and around its entire circumference.

However, the label is fed in advance of the container, so that a free length **38** of label precedes the container **12**, this length corresponding substantially to the length which is required to cover the faces **12***a* and **12***b* of the container **12**.

The label is held in position by the suction orifices in the roll **7**, which act on it progressively from its leading end to its trailing end, and by the pressure of the face **12***c* against the belts **21**, and it thus remains in a particular vertical position, while itself maintaining a precisely horizontal direction.

At a precisely predetermined moment, the label is blown by the air jet system **32** so that it is turned or folded and flattened onto the front face of the container. When the container is in position **13**, the label is no longer in contact with the roller **7**, but it continues to be held in position by the gum that has been applied to the face **12***c*. The overhanging part **38***a*, which is not yet gummed, then passes in front of the brush **27** opposite the conveyor belts **21**, so that on leaving the brush or smoothing station **27**, the container **14** will have the label gummed to three faces thereof in a single operation. Continuing to move to the right, the container then pivots twice about its own axis, firstly at **15**, when it encounters the check roller **30**, secondly at **18**, when it encounters the check roller **31**. The course of the conveyor belts **21** is arranged to have a particular configuration opposite the said check rollers, to permit the containers to pivot. Beyond the check roller **30**, the container reaches the position **16** which enables the smoothing brush **28** to apply the label to the fourth face of the container. Towards the rear, at **38***b*, there still remains a part of the label which stands proud of the container, and it is only after the container **18** has been rotated opposite the check roller **31** that it is possible for the final flattening of this unattached part **38***b* to be effected by the smoothing brush **29**, so as to complete finally, the application of the label to the container.

In the case of a container of square section the portion of the label which precedes the container upon leaving the roller **7** is substantially equal to half the length of the label, so that at the moment when the air jet system **32** is brought into action, the label is turned back or folded at approximately its middle portion.

The function of the pressure applied by the air jet system **32** is simply to bend and turn back the label, and it is insufficient for applying the label to the faces of the container which are to be covered. Only the smoothing stations can apply sufficient pressure to deal with the complete application of the label to the container. It is important to point out that in these conditions the air jet system acts upon the leading portion of the label without the container pivoting about itself, rotation only occurring later when the first smoothing operation has been carried out.

In the modified form of apparatus shown in FIG. 2, the conveyor belts **39** are made of spongy material and the corners of the containers can be pressed gently into them when the containers pivot about their own axes in positions such as **40**, **41**, **42**, and **43**. The pivoting is controlled by retractable non-driven rollers **44**, **45**, **46** and **47**, mounted at the ends of articulated levers **48**, **49**, **50** and **51** which are biassed by resilient means such as springs **52**. The rollers **44**, **45**, **46** and **47** perform the same function as the check rollers **30** and **31** of FIG. 1, but they also constitute smoothing means. Between positions **41** and **42**, the container occupies the position indicated at **53**, wherein one of its faces is substantially horizontal and tangential to the surface of the roller **45**.

It is of course possible to modify the embodiments that have been described in many ways, without departing from the scope of the invention as defined by the appended claims.

In particular, the brushes or non-driven smoothing rollers used in the case of containers having flat faces could be replaced by guides made of foam rubber or some other spongy material, when used in the case of containers of circular section, so as to cause the containers to rotate about their own axes, due to the braking action applied circumferentially of the rollers.

It was stated earlier that at the entrance to the channel, the label is perfectly located in the correct vertical alignment and is normally pressed against the feed belts due to the fact that the belts hold it straight in a vertical plane after it has been deformed into a curve by the roll **7**. However, in the case of long or heavy labels, in order to prevent the leading portion of the label from collapsing in front of the conveyor belts, it would be possible to employ an air jet system (not illustrated) which would tend to press the label against the conveyor belts or, conversely, a suction system disposed behind the conveyor belts. In either case, these air jet or suction systems would be considerably less strong in their action than the air jet system **32**. Also, although check rollers are shown in the drawings as being used to cause the containers to pivot about their axes, it would also be possible to employ other means, for example systems of oppositely directed air jets acting on opposite faces of the containers.

It should also be pointed out that the portion **38***a* of the label that stands proud of the front of the container must be of a length such that the brush **27** at the first smoothing station can apply it to cover completely the corresponding face **12***b* of the container as it arrives at the position **13** and before it proceeds to position **14** after the operation of applying the portion **38***a* has been completed.

It would be possible to fit, between the conveyor belts, to the right of the stations at which the containers are rotated about their axes, spring blades projecting slightly into the path along which the containers are moved, the function of these blades being to direct the containers into engagement with the check rollers which, in this case, can be rearward of the positions illustrated in FIG. 1. This arrangement would have the advantage of avoiding any possibility of the containers being forced against the conveyor belts.

It will be seen that by disposing along a straight line, all the stations necessary for carrying out the labelling operation, it is made possible for the work in question to be carried out on a single conveyor line.

In the case of containers of considerable height and/or in cases where the depth of the label is less than the height of the container, it would be possible to replace the conveyor means bearing against the upper faces of the containers as shown in the drawings, by a system of auxiliary belts situated at that side of the channel opposite the conveyor belts, the auxiliary belts being in contact with the container on either side (above and below) the part of the surface which is covered by the label,

so as to enable the label to be turned back onto the face opposite the conveyor belts.

These auxiliary belts would of course have to be interrupted or diverted to the right of the station at which the container rotates about its vertical axis.

Although an air jet system **32** has been indicated as being the means for turning back the label onto the front part of the container, other means could also be used. For example, a brush employing a reciprocating movement could be used, or a pair of pincers, or other like means.

I claim:

1. A full-wrap labelling machine for labelling containers, comprising a conveyor channel for containers to be labelled, a container-feeding unit for feeding containers to the channel and a label-feeding unit for feeding labels of elongated form at one side of the channel, said label-feeding unit including means to feed a label for each container conveyed in said channel, to be engaged with and wrapped around said container, characterised by the fact that said container-feeding and label-feeding units include means to move a container in one direction in said channel and to feed a label lengthwise in a path parallel with and alongside a container and at the same speed thereof and means to initially tangentially apply only a trailing portion of a label to the adjacent side of each container while moving in said channel and to position the remaining portion of the length of each label thus initially applied ahead of the corresponding container in said channel, and by the fact that said machine further comprises means to deflect said remaining portion of each label laterally of said channel ahead of said containers, first label-engaging means to engage a portion of said remaining portion of each said label after it has been deflected and to apply a portion of the length of said label to the corresponding container, means to engage said containers in said channel, after labels have been applied thereto by said first label-engaging means to turn said containers about their axes, and further label-engaging means positioned to engage said labels after they have been applied to said containers by said first label-engaging means and after said containers have been turned by said container-engaging means to complete the application of said labels to said containers, with each said label wrapped fully around a container and having leading and trailing end-portions thereof in overlapping relationship on said container.

2. A machine according to claim **1**, characterised by the fact that said remaining label-portions which precede said containers each correspond to substantially a half the total length of said labels, whereby when said labels are deflected they are folded at about the midpoints of their length.

3. A machine according to claim **1**, characterised by the fact that said deflecting means comprise at least one air nozzle and means to supply air to said nozzle under a pressure sufficient only to deflect said label-portions laterally of said channel without causing them to adhere to said containers.

4. A machine according to claim **1**, characterised by the fact that said deflecting means are provided at said one side of said channel and said first label-engaging means are provided at the other side of said channel.

5. A machine according to claim **1**, characterised by the fact that said deflecting means and said first label-engaging means are spaced from one another along said channel so that after said labels are deflected laterally of said channel ahead of said containers, they are brought by said containers into engagement with said first label-engaging means.

6. A machine according to claim **1**, for labelling containers having a plurality of flat faces, characterised by said channel having a surface at said one side thereof to retain said labels fed at said one side of said channel in engagement with a first face of said containers, said deflecting means serving to deflect said labels across a second face of said containers and said first label-engaging means serving to apply said labels to a third face of said containers, and said machine comprising at least two of said further label-engaging means, to apply said labels to respective further faces of said containers, and further container-engaging means to cause said containers to turn about their axes at a position between said two further label-engaging means.

7. A machine according to claim **1**, characterised by the fact that said channel has a surface at said one side thereof cooperating with said containers in said channel to maintain said labels fed at said one side of said channel, in engagement with said containers.

8. A machine according to claim **7**, characterised by endless belts disposed at said one side of said channel, providing said surface, and guide rollers to support and drive said belts, whereby said belts serve to drive said containers along said channel while maintaining said labels in engagement therewith.

9. A machine according to claim **8**, characterised by a guide roller which supports said belts and which serves to guide labels fed by said label-feeding unit, into engagement between said belts and said containers.

10. A machine according to claim **1**, characterised by a guide roller which serves to guide labels fed by said label-feeding unit into engagement with said containers at said one side of said channel and which has orifices therein and by means for maintaining reduced pressure at said orifices so as to retain said labels in engagement with said roller.

11. A machine according to claim **1**, characterised by the fact that said container-engaging means comprise at least one check roller at the other side of said channel, projecting into the path of movement of said containers in said channel, so as to engage said containers during such movement and to cause them to turn about their axes.

12. A machine according to claim **11**, characterised by endless belts disposed at said one side of said channel and guide rollers to support and drive said belts, said guide rollers being arranged to guide said belts in driving engagement with said containers over a part of said channel but to divert said belts over at least one other part of said channel opposite said check roller so as to accommodate lateral movement of said containers in said channel and thereby to allow turning movement thereof.

13. A machine according to claim **1**, characterised by means at the upper part of said channel to apply pressure to said containers to hold them in position in said channel over at least a part of their travel along said channel.

14. A machine according to claim **8**, characterised by the fact that said endless belts are made of spongy material so as to accommodate lateral movement of said containers in said channel and thereby to allow turning movement thereof.

15. A machine according to claim **1**, characterised by the fact that said label-engaging means comprise brushes.

16. A machine according to claim **1**, characterised by yieldably mounted idler rollers spaced along said channel, which provide said label-engaging means and said container-engaging means, said idler rollers being adapted to bear against said containers to apply said labels thereto and to cause them to turn about their axes during yielding movement of said idler rollers.

17. A machine according to claim **16**, characterised by pivotal levers carrying said idler rollers and spring means acting on said levers to bias said idler rollers into engagement with said containers in said channel, said idler rollers being yieldable against the action of said spring means.

18. A machine according to claim **1**, characterised by members made of spongy material at the other side of said channel, which members provide said label-engaging means and said container-engaging means, said members

being adapted to bear against said containers to apply said labels thereto and at the same time to exercise a peripheral braking action to cause said containers to turn about their axes.

19. A machine according to claim **8**, characterised by air pressure or suction means to support said labels in contact with said belts when they are fed to said channel.

20. A machine according to claim **1**, characterised by the fact that said container-engaging means comprise at least one air nozzle and means to supply air to said nozzle for discharge into said channel under pressure, in a direction to engage said labels during movement in said channel and to cause them to turn about their axes.

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