# United States Patent

[11] **3,616,016**


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[54] **LABELING METHOD AND LABEL APPLICATOR**
**4 Claims, 4 Drawing Figs.**


[52] **U.S. Cl.** ..... **156/238,** 156/542, 156/230
[51] **Int. Cl.** ..... **B44c 1/00,** B32b 31/10
[50] **Field of Search** ..... 156/230, 238, 285, 344, 540–542, 584, 361; 221/72–74



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**ABSTRACT:** A labeling method and label applicator are provided for applying pressure sensitive labels to articles such as cartons and the like. Each label is located in an initial position directly in front of an applicator plunger to which the label is caused to adhere by suction when the plunger occupies its normal retracted position. The label is applied to an article positioned in the path of the plunger by extending the plunger into contact with the article at a high velocity such that the air drag and inertial forces active on the label cause the label to adhere to the plunger to the end of its extension stroke, where the label is pressed firmly into adhesive bonding contact with the article.


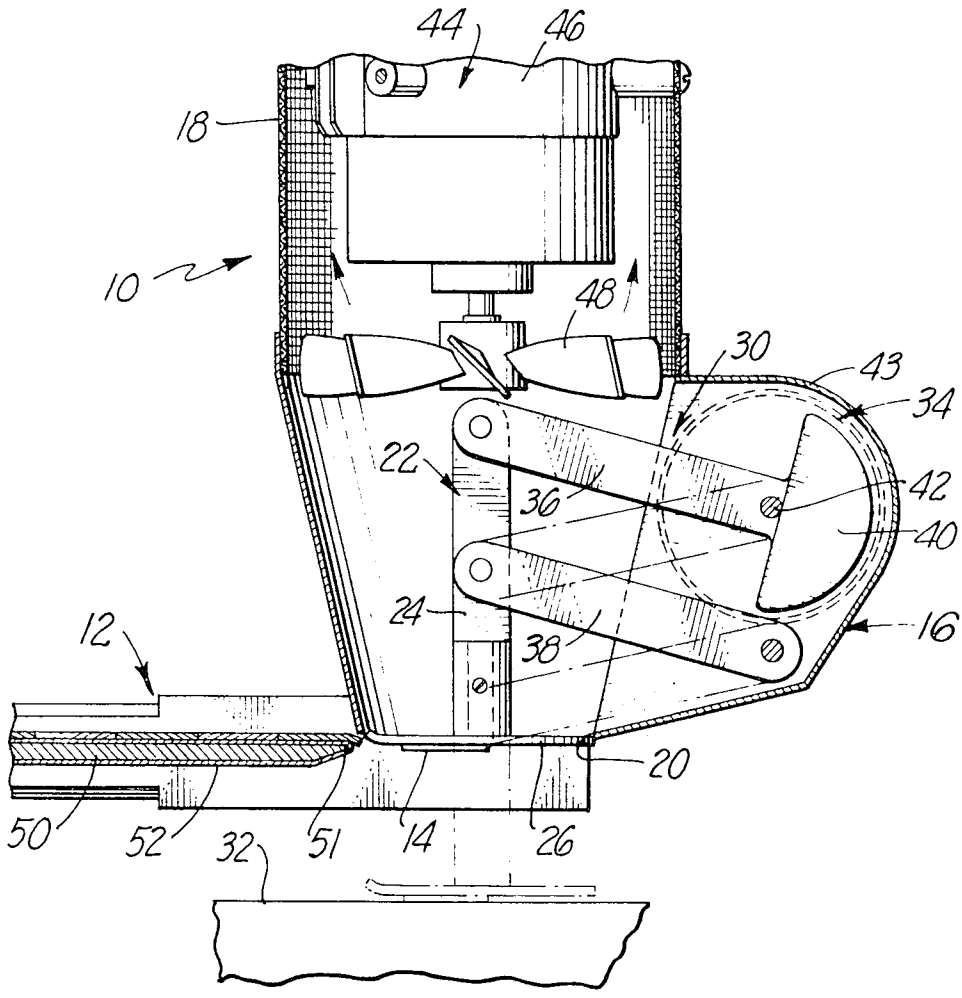

FIG. 1.

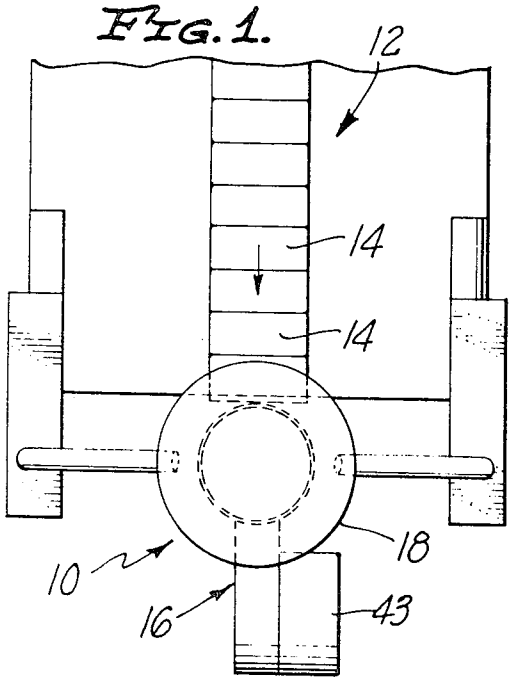


FIG. 2.

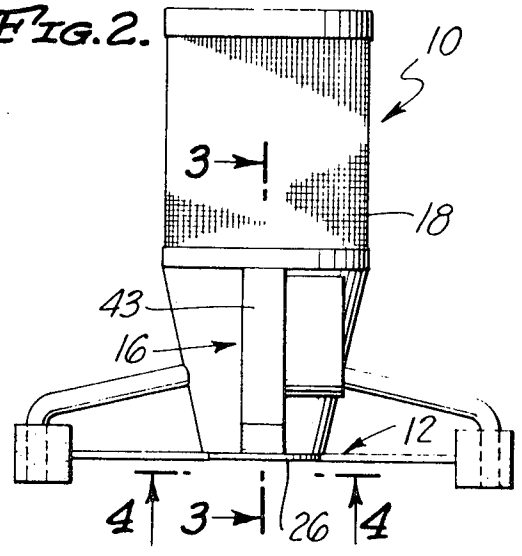


FIG. 4.

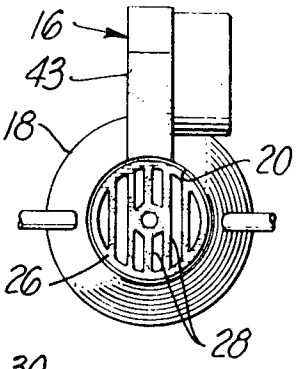


FIG. 3.




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# LABELING METHOD AND LABEL APPLICATOR

## BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to the art of applying pressure sensitive labels to articles, such as cartons and the like. The invention relates more particularly to a novel labeling method and label applicator for pressure sensitive labels.

2. Prior Art

The present invention is concerned generally with labeling machines of the class which have a label applicator proper for applying pressure-sensitive labels to articles and a label dispenser for dispensing the labels in succession to the applicator from a carrier or backing strip. The label applicator has an applicator plunger which is movable through a working cycle involving extension of the plunger into contact with an article positioned in the path of the plunger and return of the plunger to a normal retracted position. During each label application cycle of the machine, the label dispenser dispenses a pressure-sensitive label to a position directly in front of the retracted applicator plunger, with the pressure-sensitive surface of the label facing forwardly away from the plunger and toward the article to receive the label. The plunger is then extended to transport the label into adhesive bonding contact with the article, after which the plunger is returned to its retracted position to receive the next label. Labeling machines of this class are commonly installed opposite an article conveyor and actuated in timed relation to movement of articles on the conveyor past the labeling machine in such a way that each article receives a label from the machine.

## SUMMARY OF THE INVENTION

The present invention provides an improved label applicator for labeling machines of the class described. As will appear from the ensuing description, the label applicator of the invention may be used in conjunction with any suitable label dispenser capable of dispensing pressure-sensitive labels in succession to the applicator. However, the applicator is designed primarily for operation in conjunction with the label dispenser disclosed in my copending application Ser. No. 728,611, filed May 13, 1968, now U.S. Pat. No. 3,495,414 and will be disclosed in connection with this particular dispenser.

In general terms, the present label applicator embodies a frame mounting an applicator plunger for movement through a working cycle involving forward extension of the plunger into contact with an article positioned in the path of the plunger and return of the plunger to its normal retracted position. During each label application cycle of the applicator, a pressure sensitive label is located in an initial position directly in front of the retracted plunger with the pressure-sensitive surface of the label facing forwardly away from the plunger. According to one feature of the invention, the applicator is equipped with means, such as a high-spped, low-pressure blower, for creating a light section which causes the label to adhere to the leading end of the plunger in its retracted position. The plunger is then extended into contact with the article to receive the label, whereby the pressure-sensitive surface of the label is pressed into firm adhesive bonding contact with the article.

According to a unique and highly important feature of the invention, the plunger is driven through its extension stroke at a high velocity such that the air drag and inertial forces active on the label during this stroke cause the label to adhere to the plunger throughout its extension stroke into a final position, wherein the label is pressed firmly against the article. In this regard, the applicator differs from the existing label applicators in which a suction is utilized to hold the label on the applicator plunger during its entire extension stroke. The primary advantage of the present improved applicator design resides in its relative simplicity of construction and low cost of manufacture.



## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a label applicator according to the invention embodied in a labeling machine;

FIG. 2 is a side elevation of the label applicator looking from the bottom in FIG. 1;

FIG. 3 is an enlarged section taken on line 3—3 in FIG. 2; and

FIG. 4 is a view looking in the direction of the arrows on line 4—4 in FIG. 2.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to these drawings, there is illustrated a label applicator **10** according to the invention and a label dispenser **12** for dispensing pressure-sensitive labels **14** in succession to the applicator. The particular label dispenser **12** shown is of the type disclosed in my aforementioned copending application and, for this reason, has been illustrated in fragmentary fashion and will be described only in sufficient detail to enable a full and complete understanding of the present invention. In this regard, it should be recalled that the present label applicator may be used with other types of label dispensers.

Returning now to the label applicator **10**, the latter will be seen to comprise a frame **16** including an elongate housing **18**. In this instance, the housing is oriented with its longitudinal axis generally vertical. The lower end of the housing tapers to a diminishing cross section in a downward direction and terminates in a lower opening **20**. Positioned within the lower end of the housing, along the housing axis, is an applicator plunger **22**. Plunger **22** has an upper shaft **24** and a lower pressure foot **26**. The plunger shaft **24** is situated on the housing axis. The pressure foot **26** comprises a perforate plate normal to the axis. Formed in the foot are a number of slotlike openings **28**. Referring to FIG. **4**, it will be observed that the lower housing opening **20** is circular in cross section, and the pressure foot is circular in shape and dimensioned to fit closely within the opening.

Applicator plunger **22** is mounted on the housing **18** by means **30** for reciprocation along the housing axis between a normal retracted position illustrated in full lines and an extended position illustrated in broken lines in FIG. **3**. When retracted, the plunger is withdrawn upwardly into the lower end of the housing to a position wherein the pressure foot **26** of the plunger is situated within the lower housing opening **20**. When extended, the plunger projects downwardly from the housing to a position wherein the pressure foot is disposed to seat against an article **32** situated below and in the path of the plunger. Associated with the plunger **22** are driving means **34** for driving the plunger between its extended and retracted positions.

In the particular embodiment of the invention selected for illustration, the plunger mounting means **30** comprise a parallel linkage mechanism including a pair of parallel links **36** and **38**. Each link extends laterally of the plunger and is pivotally attached at one end to the applicator housing **18** and at the other end to the plunger shaft **24**. A counterweight **40** is mounted on the housing end of the link **36** to counterbalance the weight of the plunger and the links. The plunger driving means **34** comprises a rotary solenoid having a rotary driven shaft **42** fixed to the link **36** on its housing pivot axis, whereby the plunger may be extended and retracted by energizing and deenergizing the solenoid. Housing **18** has a lower lateral portion **43** which encloses the links and solenoid, as shown.

Mounted within the upper end of the applicator housing **18** are means **44** for creating a reduced pressure or suction within the housing and thereby inducing airflow into the housing through the openings **28** in the pressure foot **26** of the applicator plunger **22** when the latter is retracted. In this instance, the suction means **44** comprises a high speed low pressure blower including a motor **46** and an impeller or fan **48** driven by the motor. Fan **48** is driven in a direction to exhaust air from the housing through an upper exhaust opening in the housing and thereby suck air into the housing through its lower opening **20**.

As noted earlier, the illustrated label dispenser 12 is of the type disclosed in my aforementioned copending application and thus will not be described in complete detail. Suffice it to say that the dispenser has a peeling edge plate 50 disposed in the plane passing across the underside of the applicator housing 18, just below its opening 20 and normal to its axis. Plate 50 has a thin peeling edge 51 located adjacent the opening 20. The pressure-sensitive labels 14 to be applied are easily secured, by the pressure-sensitive surfaces, to a carrier or backing strip 52. This backing strip extends across the upper surface of the peeling edge plate 50 toward the applicator housing opening 20, then around the peeling edge 51 of the plate, and finally back across the underside of the plate. Means (not shown) are provided for periodically driving the backing strip 52 endwise in such a way that the labels are peeled or dispensed from the strip as the latter traverses the peeling edge of the plate. Each label is dispensed from the label dispenser to a position directly in front of or below the pressure foot 26 of the applicator plunger 22.

During operation of the applicator 10, the label dispenser 12 is periodically actuated to dispense a label 14 to a position directly below the pressure foot 26 of the applicator plunger 22 when the latter is retracted. The blower motor 44 is energized to drive the fan 48 and thereby create a suction or reduced pressure in the housing 18 which causes the labels to adhere to the pressure foot. In the course of the actual label application cycle of the label applicator, the solenoid 34 is momentarily energized to drive the applicator plunger 22 forwardly or downwardly through its extension stroke into contact with the article 32. The label 14 currently in position on the plunger pressure foot 26 is thereby transported into adhesive bonding contact with the article. The plunger is then retracted to receive the next label from the label dispenser 12 by deenergizing of the solenoid.

During the initial portion of the extension stroke of the applicator plunger 22, the suction created within the housing 22 by the blower 44 remains effective to retain the label 14 in contact with the plunger pressure foot 26. According to the present invention, the plunger drive means or solenoid 34 is constructed and arranged to drive the plunger through its extension stroke at a high velocity such that the air drag and inertial forces active on the label cause the latter to remain in contact with the plunger foot to the end of its extension stroke, where the label is pressed firmly against the article 32. This arrangement eliminates the need for a high-pressure blower or other powerful suction device to retain the label in contact with the pressure foot throughout its stroke and thereby simplifies the construction and reduces the cost of the applicator.

In actual use, a number of articles to receive labels may be transported past the label applicator 10 on a conveyor. The applicator 10 and label dispenser 12 will then be mounted above the conveyor, in the manner illustrated in the drawings, and the operation will be timed with the operation of the conveyor in such a way that each article on the conveyor receives a label from the applicator when the article arrives in labeling position in the path of the applicator plunger 22.

While the invention has been disclosed in connection with a particular physical embodiment thereof, various modifications of the invention are possible within the spirit and scope of the following claims.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. A label applicator comprising:
a frame,
an applicator plunger having a front face,
means mounting said plunger on said frame for movement through a working stroke between a retracted position and an extended position relative to said frame,
suction means operable in the retracted position only of said plunger for causing the label to adhere to said plunger in its retracted position, and
means for driving said plunger through its working stroke at a high velocity such that the air drag and inertial forces active on the label retain the label in contact with the plunger throughout its extension stroke.

2. A label applicator according to claim 1 wherein:
said applicator includes a housing containing said plunger,
said housing has an opening through which said plunger is movable between its retracted and extended positions,
said plunger includes a forward perforate pressure foot which is disposed within said housing opening in the retracted position of said plunger, and
said suction means comprise means within said housing to induce air flow into said housing through the openings in said pressure foot only when said plunger is retracted.

3. The method of applying a label to a workpiece comprises the steps of:
providing an applicator plunger having a front face and movable through a working stroke toward and away from an article positioned in the path of the plunger,
positioning said label in contact with said front plunger when said plunger is in a retracted position away from said article, and
extending said plunger into contact with said article at a high velocity such that the viscous drag and inertial forces active on the label cause the latter to adhere to the plunger throughout its extension stroke.

4. The method according to claim 3 including:
the additional step of pneumatically retaining said label in contact with said plunger face only when said plunger occupies its retracted position away from the article.