United States Patent

[11] 3,623,451

[72] Inventors **Billy Burgess**
Sylvania;
John H. Burgess, Sylvania, Ohio; Larry C. Gess, Samaria, Mich.; Robert P. Snyder, Sylvania; Washington I. McGillvery, Whitehouse, Ohio

[21] Appl. No. **768,060**
[22] Filed **Oct. 16, 1968**
[45] Patented **Nov. 30, 1971**

[73] Assignee **Advance Products, Inc.**
Whitehouse, Ohio

[54] **GLUE ROLLER ASSEMBLY**
9 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** **118/62,** 118/221, 118/245, 118/261
[51] **Int. Cl.** **B05c 1/02**
[50] **Field of Search** 118/204, 221, 259, 261, 245, 258, 62, 212

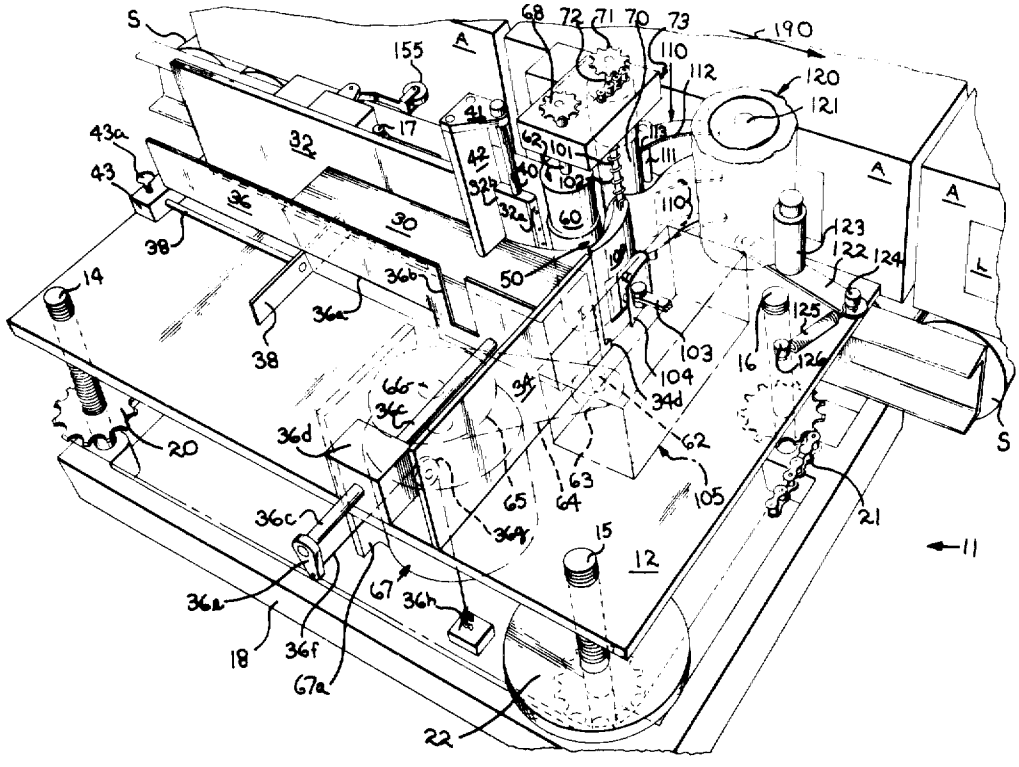
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Primary Examiner—John P. McIntosh
Attorney—Paul F. Stutz

ABSTRACT: A glue roller and reservoir apparatus for use in applying glue to the surface of a plurality of sequentially moving labels or tickets, said apparatus being inclusive of a vessel reservoir for liquid glue, a hollow rotatable glue applicator sleeve extending vertically upwardly out of said vessel for contact by the labels, a rod telescopically within said glue roller sleeve, said outer surface of said cylindrical roller having a plurality of spaced grooves therein, a bar mounted along side the sleeve having notches defining teeth complementary to said grooves and an arrangement for urgement of adhesive fluid in the vessel between the rod and the inner surface of the cylindrical glue roller whereby it moves upwardly, thence down the outer surface of the glue roller cylinder, the complementary notches and grooves serving to locate the downwardly moving adhesive in a plurality of spaced regions on the exterior surface of the cylinder glue roller.



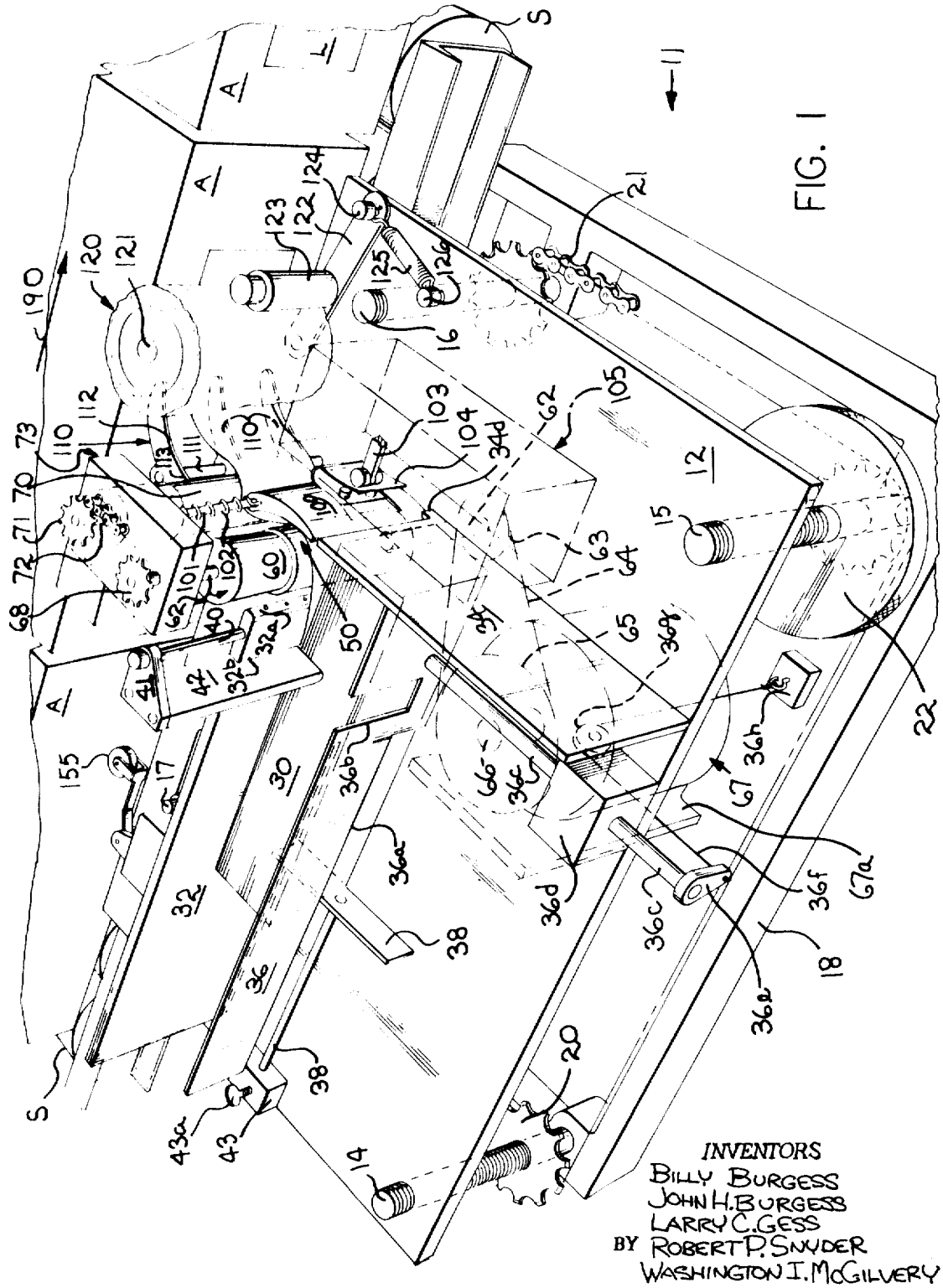


FIG. 1

INVENTORS
BILLY BURGESS
JOHN H. BURGESS
LARRY C. GESS
BY ROBERT P. SNYDER
WASHINGTON I. McGILVERY

ATTORNEY

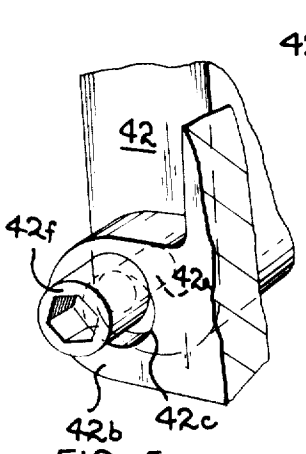


FIG. 5

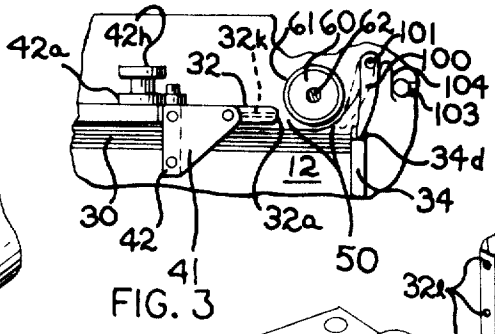


FIG. 3

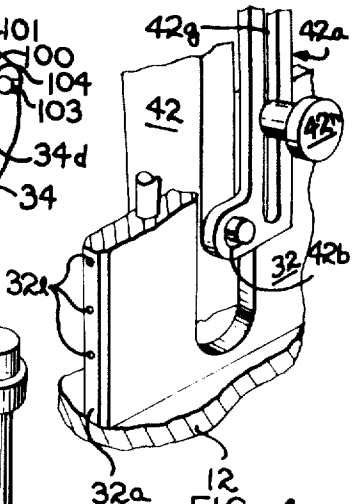


FIG. 4

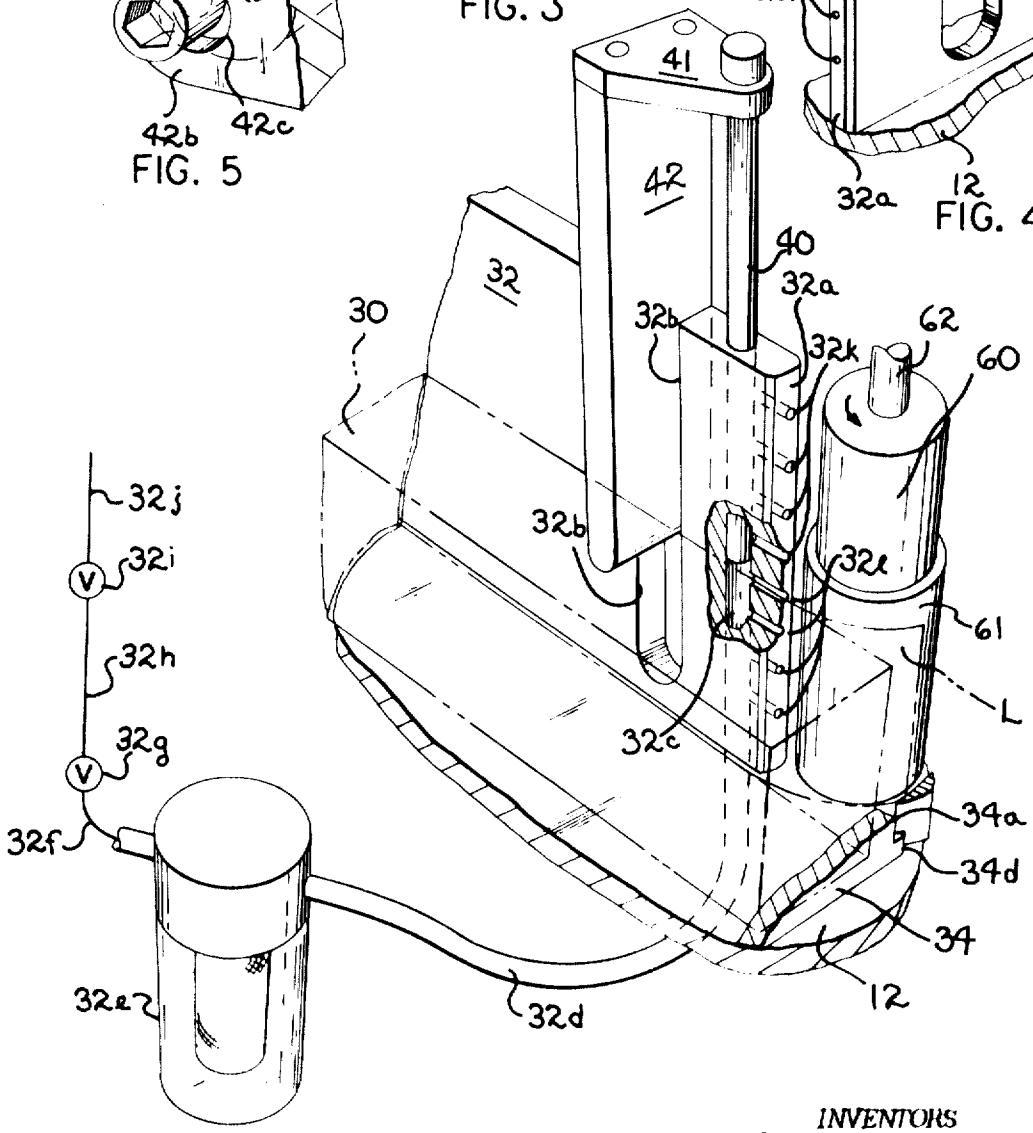
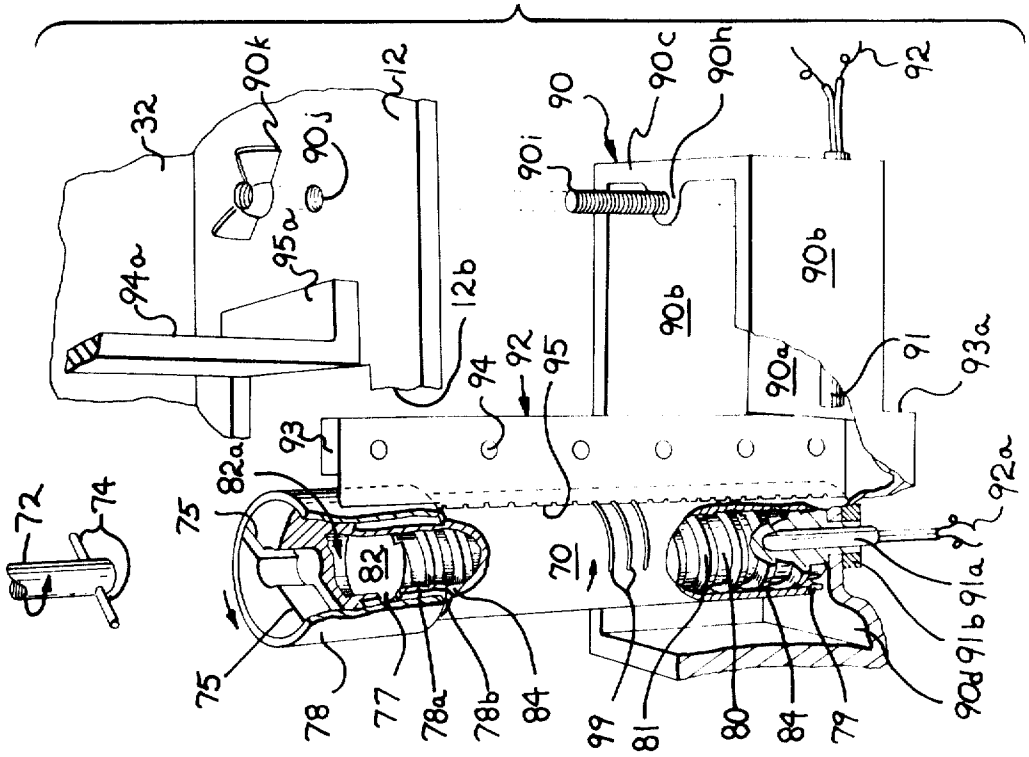


FIG. 2

INVENTORS
BILLY BURGESS
JOHN H. BURGESS
LARRY C. GESS
BY ROBERT P. SNYDER
WASHINGTON I. McGILVERY

ATTORNEY

FIG. 6



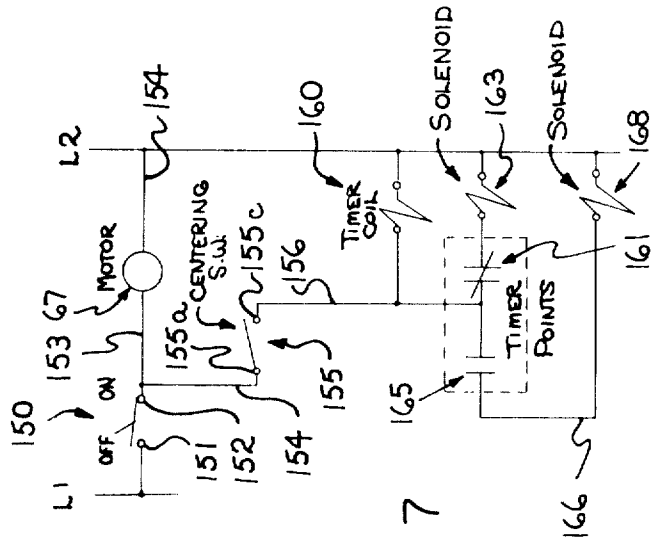


FIG. 7

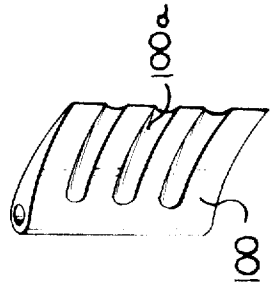


FIG. 8

INVENTORS
BILLY BURGESS
JOHN H. BURGESS
LARRY C. GESS
BY ROBERT P. SNYDER
WASHINGTON I. McGILVERY
ATTORNEY

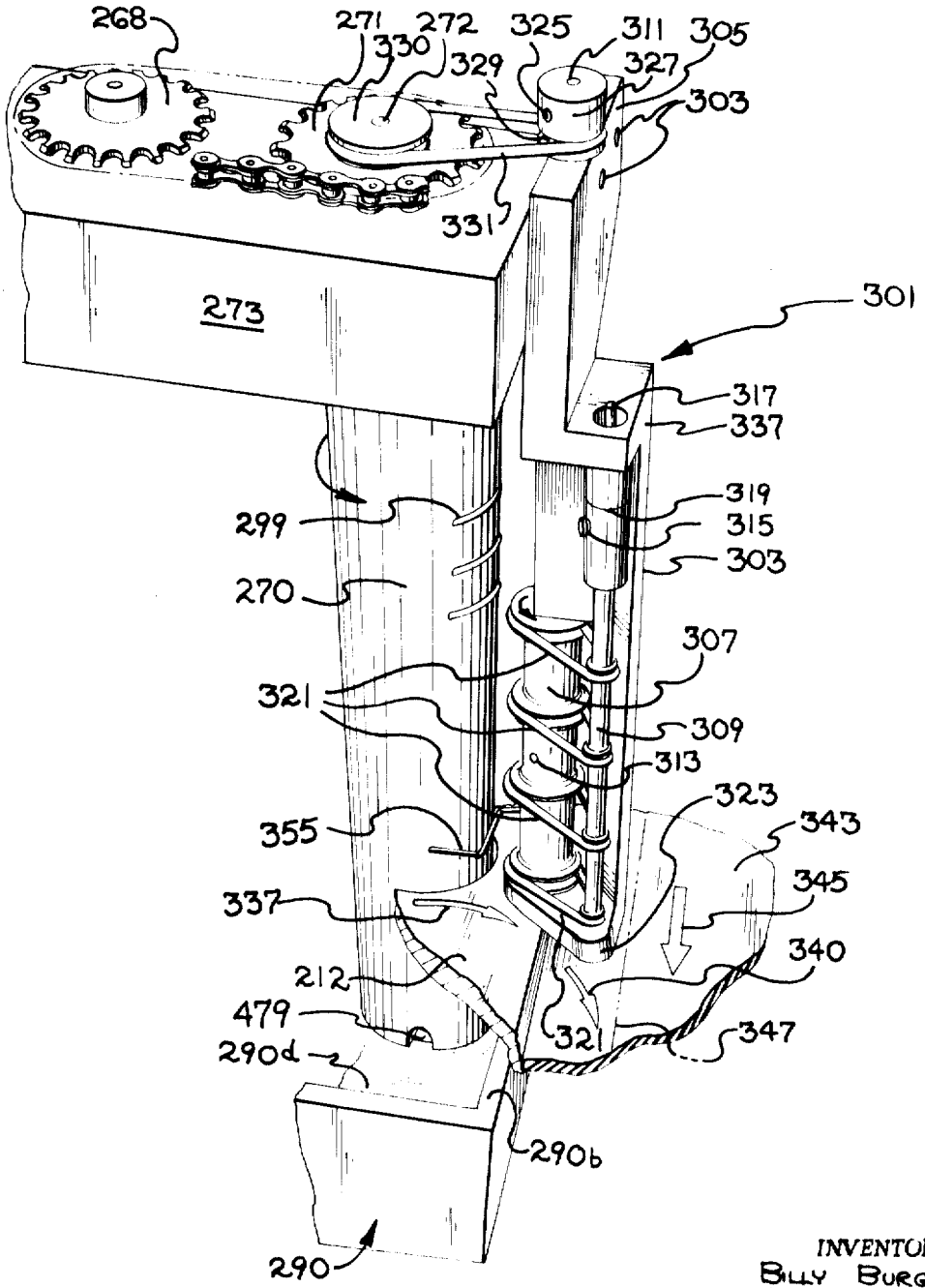


FIG. 9

INVENTORS
BILLY BURGESS
JOHN H. BURGESS
LARRY C. GESS
BY ROBERT P. SNYDER
WASHINGTON I. McGILVERY

ATTORNEY

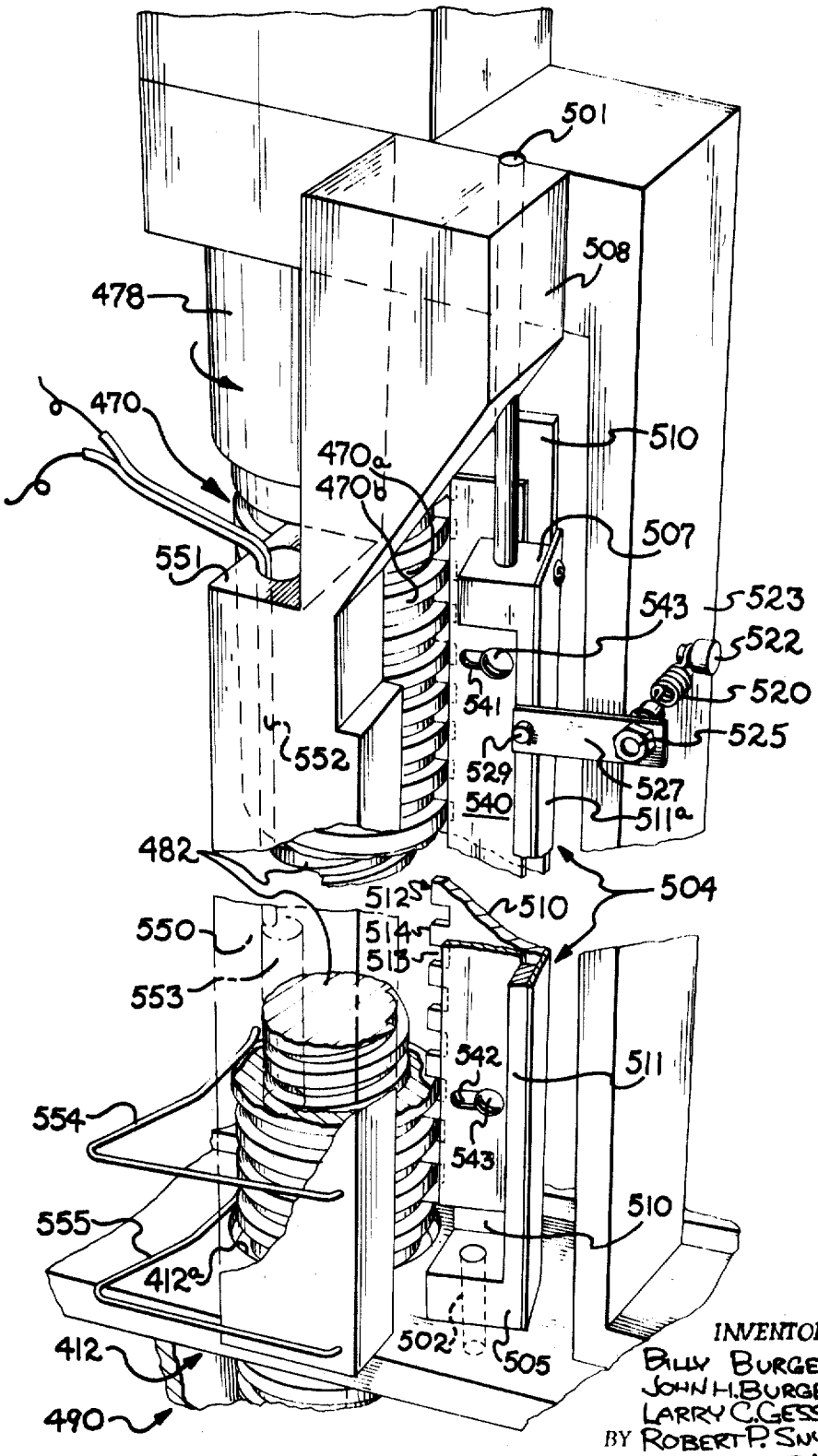


FIG. 10

INVENTORS
BILLY BURGESS
JOHN H. BURGESS
LARRY C. GESS
BY ROBERT P. SNYDER
WASHINGTON I. McGILVERY

ATTORNEY

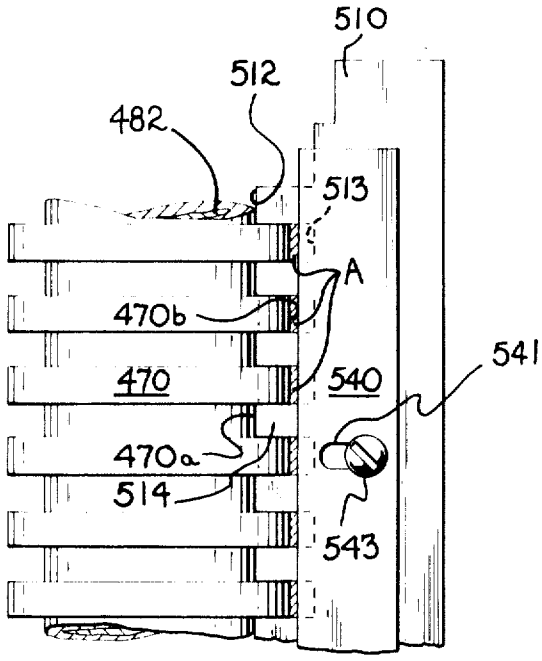


FIG. 11

INVENTORS
BILLY BURGESS
JOHN H. BURGESS
LARRY C. GESS
BY ROBERT P. SNYDER
WASHINGTON I. MCGILVERY

ATTORNEY

GLUE ROLLER ASSEMBLY

The present invention relates to an apparatus for applying labels to articles, e.g., products, controlled to move serially along a conveyor apparatus.

There are a large variety of labeling apparatus known in the art. Labeling apparatus or machines up to the present time have been largely unsatisfactory for a variety of reasons including the following. Present apparatus are cumbersome, expensive and inefficient. The present apparatus are subject to malfunction and consequent downtime of the product line which features desirably a labeling apparatus in line therewith.

Many of the present-day labeling machines involve a moving "magazine" containing the labels, requiring extensive mechanisms for moving the magazine from a remote position to a label delivery and application position. Many of the present labeling apparatus are beset by the problem of delivering double labels rather than a single label. Present machines are also undesirable because they require extensive downtime to change the internal features of the machine to accommodate a different size of label desired because of a different product to which the label is to be applied. With present machines, the glue supply and the various glue applicator components become clogged during temporary stoppage of the labeling for any reason.

It is a principal object of the present invention to provide a label apparatus which overcomes all of the deficiencies of label machines known heretofore.

In particular, it is an object of the present invention to provide a labeling apparatus which is of relatively simple and economical construction and at the same time provides reliable trouble-free single label delivery operation.

It is also an object of the present invention to provide a label apparatus which can be very quickly changed to accommodate a label of a different size and, as well, to accommodate a given label to a package or article of a given dimension. It may be here mentioned that the labels are most desirably applied to the product in a balanced location. The most common example resides in a consideration of how to apply a label to a rectangular planar sidewall. In such instance, it is usually desirable to have the label centered on the sidewall, both vertically and laterally.

It is still another object of the present invention to provide a label apparatus which can apply labels at an extremely rapid rate without any accompanying difficulty, either in terms of double labels or any difficulty of encountering a "no label" situation. In other words, the labeling apparatus of the present invention is extremely reliable, simple, economical and universal in terms of the size of label and the type and size of package or article to which the label is to be applied.

It is also an object of the present invention to provide an apparatus which includes arrangements for avoiding premature gelation of adhesive.

It is still another object of the present invention to provide a label apparatus which operates with a single power source, e.g., an electric motor powered by a suitable supply of current.

The above-enumerated objects, as well as many other objects of the present invention, will become apparent to those skilled in the art from the following detailed description taken in conjunction with the annexed sheets of drawings on which there is presented, for purposes of illustration only, a single embodiment of the present invention.

In the Drawings:

FIG. 1 is a three-quarter perspective view of the apparatus;

FIG. 2 is a three-quarter perspective view of one portion of the apparatus enlarged for purposes of showing in greater detail a particularly preferred feature of the present invention;

FIG. 3 is a partial top plan view of the segment of the apparatus illustrated in FIG. 2;

FIG. 4 is likewise a view also of the feature illustrated in FIGS. 2 and 3, but in perspective view formed from the reverse side of that shown in FIG. 2;

FIG. 5 is a somewhat enlarged view of one portion of the apparatus as viewed in FIG. 4;

FIG. 6 is an enlarged perspective view of an important part of the apparatus of the invention shown with the component parts thereof spaced apart for purposes of providing a clearer illustration;

FIG. 7 is a circuit diagram of the control system for the label apparatus of the present invention;

FIG. 8 is an enlarged elevation view of one component of the apparatus for purposes of illustrating a preferred construction;

FIG. 9 is a perspective view generally similar to FIG. 6 of a glue roller but from a slightly different angle in order to better illustrate a variant embodiment of the present invention;

FIG. 10 is a perspective view of a modified glue roller construction and, as well, several related subassemblies which cooperate therewith; the perspective being generally from the same angle as that of FIG. 6 and portions of the structure illustrated being broken away in order to show details of construction; and

FIG. 11 is a partial side elevation view, slightly enlarged, of the modified glue roller and its engagement with the cooperating subassembly.

Referring now more specifically to the drawings, the complete labeling apparatus **11** is shown in FIG. 1. Reference numeral **12** identifies a horizontal baseplate supported on threaded legs **14**, **15**, **16** and **17**. The legs are each threadingly engaged to the baseplate **12** and they in turn are mounted on a base support **18**. Each leg includes an integral sprocket **20** which is synchronously connected to the other sprockets by endless chain **21**. A knurled adjustment wheel **22** is secured to the leg **15**. Rotation thereof rotates the leg **15** and, as well, the other legs via the movement of the sprocket and chain arrangement whereby the baseplate **12** moves vertically upwardly or downwardly, depending on the rotation of the wheel **22**. An array of labels **30** rests on the upper surface of the baseplate **12**, stacked on edge in flush registering abutment, as shown. The labels rest in a reservoir area defined by a first upstanding wall member **32**, a second upstanding wall member **34**, a movable plate **36** in parallel relationship with the upstanding wall **32** and a linear bar **38** in spaced-parallel relationship with the wall **34**. Wall **34** includes a foot portion **34***d* on the edge **34***a* for a purpose to be described hereinafter. The wall members **32** and **34** are secured to the baseplate. Wall **34** is perpendicularly disposed to the wall **32** with one edge **34***a* spaced from edge **32***a* of upstanding wall member **32** and generally in alignment therewith to define a gateway **50** therebetween. The labels **30** rest flushly in horizontal array against the wall **32** with their end edges at one end contacting wall **34**, as shown. The opposite edges of the labels are in contact with bar **38** to which is attached rearwardly extending rod **38***a* extending slidably through bearing block **43** mounted along the margin of the baseplate **12**, whereby the bar **38** is movable to and fro towards the wall member **34**, and its location can be set via the setscrew means **43***a*. Wall plate **36** is cut away at **36***a* to provide for movement of the bar **38**. Wall plate **36** is notched as at **36***b* and upstanding wall **32***a* contains a corresponding notch **32***b* proceeding from the upper edge similarly to notch **36***b*. A connecting rod **36***c* extends from wall plate **36** through a block bearing **36***b* mounted on the baseplate **12**, terminating in a connected ear portion **36***e*. A cord **36***f* is secured to the ear member **36***e* which extends back toward the wall plate **36** beneath the baseplate **12** over pulley **36***g* carried by the baseplate and thence downwardly as urged by weight **36***h*. The arrangement just described urges the wall plate **36** toward wall **32** to hold the labels **30** firmly against wall **32**.

Wall member **32** has formed therein, proximately to and parallel with vertical edge **32***a*, an internal bore **32***c* (see FIG. 2). This bore **32***c* connects at its bottom extremity through baseplate **12** with conduit **32***d*. Conduit **32***d* connects with a combination filter and pressure reservoir cylinder **32***e* which in turn connects via line **32***f* with valve **32***g* connected by line **32***h* with valve **32***i*. Valve **32***i* connects via line **32***j* with a suitable air supply. Valve **32***g* is an "on-off" air valve con-

trolled by a solenoid **163** (see FIG. 7). Valve **32***i* is a manually set throttling valve for adjusting the amount of pressure in the line **32***h* extending through the pressure reservoir **32***e* in line **32***d* to the bore **32***c*. Connecting with the vertical bore **32***c* are a plurality of orifices **32***k* which extend normally therefrom to the facing edge **32***a* of the upstanding wall **32**. A rod extends freely but snugly slidably down into the bore **32***c*. A connecting plate **41** connects the rod **40** with a tamper bar **42** which is in parallel-spaced relationship and depends coextensively with the rod **40**. The tamper bar **42** slides in notch **32***b* and normally rests on the upper edges of labels **30**, as shown in FIG. 2; the labels **30** being shown in dotted outline. In the position as shown, the upper four orifices **32***k* in edge **32***a* are covered whereby any air flowing through conduit **32***d* connects only through the four lower orifices **32***e* which are not covered by rod **40**, for purposes as will be explained hereinafter. A slotted arm **42***a* (see FIGS. 3, 4 and 5) includes an offset ear portion **42***b* containing an elongated hole **42***c*. A stud **42***e* extends normally from the tamper bar **42** through the enlarged hole **42***c*, terminating in an enlarged head **42***f*, whereby the tamper bar **42** is free to move vertically within the limits provided by the elongated hole **42***c*. The elongated slotted arm **42***a* includes the linear slot **42***g* providing, via the fastening nut **42***h*, vertical positioning of the tamper bar **42** at any desired setting within the limits of the slot **42***g*. The nut **42***h* threadingly engages a threaded hole in wall **32**.

The walls **32** and **34** together with the movable plate **36** and movable bar **38** provide a reservoir for the labels **30**. As indicated, the spacing of perpendicular walls **32** and **34** leaves the gateway **50** between the edge **32***a* or wall **32** and edge **34***a* of wall **34**. Just outside the reservoir and partly in the gateway **50** is a vertical, rotatable transfer roller **60** bearing a rubber covering **61** for a portion of its height. The roller **60** lies midway in the gate **50** and is rotatably connected with the baseplate **12** and includes a drive shaft **62** extending vertically through baseplate **12** to connect with sprocket **63** which is in turn connected by chain **64** with sprocket **65** mounted on shaft **66** extending upwardly from electric motor **67** which, when energized, causes (via the shaft **66**, chain **64**, sprocket **63** and shaft **62**) the transfer roller **60** to rotate. The motor **67** is mounted on the base support **18** and partially supported by vertical wall **67***a*.

Reference numeral **100** identifies an arcuate guide shoe member having an enlarged portion through which extends a vertical mounting shaft **101** secured at one extremity of the baseplate **12** and the upper extremity in the overhead **73**. A spring **102** encircling shaft **101** extends from the overhead down to the shoe with the ends secure, thereby holding the guide shoe normally in the position shown in solid outline in FIG. 3. The guide shoe is controlled to move reciprocatingly from that position to a position (shown in dotted outline) just contacting the rubber covered transfer roller **60** as urged by arm **103** controlled by solenoid **168** (FIG. 7). The solenoid connects to arm **103** and is located in the box **105** shown in dotted outline on baseplate **12** abutting wall **34**. A U-shaped spring **104** has one leg riveted to the guide shoe and the other leg is free for contact by the solenoid arm **103**. The U-shaped spring cushions the reciprocating movement of the arm **103**. Thus, movement of the solenoid arm **103** first compresses the U-shaped spring member **104** and then urges the guide shoe towards the transfer roller and then back to the retracted position shown in dotted outline in FIG. 3. In a preferred form of construction, the guide shoe **100** has formed on its concave surface a plurality of spaced, horizontal scooplike grooves **100***a* which define slight corrugations in the tapered edge, as shown in FIG. 8. Also, the rubber covering **61** on the transfer roller preferably has a corrugated surface as defined by a plurality of spaced grooves which are offset with respect to the grooves **100***a* in the surface of the guide shoe. These just-described features cooperate to lend stiffness to the label as it passes therebetween in a manner to be described.

A vertically spaced array of label doctor members **110** are mounted on a shaft **111** in spaced relationship with the glue roller **70**. The doctor blades are of curved contour as at **112**. One edge extremity **113** of the doctor blades **110** rides against the rotating glue roller surface, preventing labels from wrapping thereabout, and the median portion is contoured as indicated at **112** to direct the label curvilinearly in the manner shown. A resiliently covered press roller **120** is rotatingly carried on a shaft **121**, in turn mounted on arm **122** which pivots about stud **123**. The arm **122** includes, at the end opposite roller **120***a*, upstanding stud **124** connected via spring **125** to a stud **126** upstanding from the baseplate **12** urging, by the foregoing construction, the resilient roller **120** against the surface S of the article A, compressing a single label L thereagainst in the manner to be more particularly described hereinafter.

A centering switch **155** is mounted along one marginal edge of the baseplate **12** which is proximate the glue roller **70**. A conveyor system S (not a part of the present invention) delivers a plurality of articles A tangentially past the apparatus for purposes of having labels applied thereto. As the articles proceed from left to right as viewed in FIG. 1, they actuate the switch **155**. This switch can be located and is adjustable just along the margin of the apparatus **11** and, in fact, can be situated further upstream or downstream as the labeling situation requires, as described in connection with FIG. 7.

A glue roller **70** is situated in upstanding spaced-parallel relationship with the transfer roller **60** on the line extending away from the gateway **50**. It is rotatingly mounted on the baseplate **12** and is driven in the same direction of rotation as transfer roller **60** through an overhead drive arrangement consisting of sprocket **68** mounted on shaft **62**, sprocket **71** mounted on shaft **72** and chain **69**. The glue roller is coaxially mounted on shaft **72**.

The shaft **72** driven by the sprocket **71** extends down through the overhead arrangement **73** and connects via oppositely projecting fingers **74** (see FIG. 6) with slots **75** formed in the upper cap **76** of the glue roller cylinder **70**. This arrangement also provides a quick disconnect of the glue roller from the drive shaft **72** for a reason to be explained hereinafter. Beneath the cap **76**, the glue roller **70** is essentially a hollow sleeve which telescopically receives a rod **80** having a continuous helical land or gear portion **81** formed on the exterior thereof and terminating at the upper end in a head **82** which is below the cap **76**, leaving a space **82***a*. The cylindrical sleeve member (glue roller) has a plurality of apertures **77** formed in the space **82***a* above said head portion **82**. The outer sleeve **70** also includes apertures **79** in its lower extremity proximate the bottom wall **90***d*. A cylindrical element **78** surrounds the upper portion of the cylinder **70** defining a depending skirt which extends downwardly below the apertures **77**. The rod **80** is mounted stationary on bottom wall **90***d* of vessel **90** composed additionally of spaced-parallel sidewalls **90***b* and spaced end walls **90***c*. The rod **80**, as indicated, is secured upstandingly from the bottom wall **90***a*, and particularly an end segment thereof **90***d* which is somewhat lower than the remainder **90***a*. Portions of the sidewalls have been broken away in order to show the interior construction and securement of the rod **80** to the bottom wall segment **90***d*. The vessel **90** constitutes a reservoir for a glue or adhesive. A resistance element **91** projects through end wall **90***c*, terminating in terminals **92** adapted to be connected to a source of current. A similar resistance element **91***a* extends upwardly through fitting **91***b* into the interior of rod **80** and additionally terminates in terminals **92***a* suited for connection with a source of electricity. The resistance elements permit the maintenance of a uniform elevated temperature of the so-called "hot melt" adhesion in the vessel **90** and proximate the glue roller **70**. Resistance element **91** is thermostatically controlled (not shown) while resistance element **91***a* is connected for constant operation via an on-off switch whereby, for cold setting adhesives, the element may be disconnected. A bar **93** is secured to the bottom wall, partially supported by the wall **93***a* marking the margin between the main bottom wall level **90***a* and the lower bottom wall level **90***b*. Secured as at **94** to

the bar 93 is a thin doctor blade 92 having a serrated edge as at 95 which scrapes against the cylinder (glue roller) 70. The doctor blade can be formed of a variety of materials, preferably an abrasion resistant plastic. The end wall 90*c* includes a reinforced ear portion 90*h* into which is set a threaded stud 90*i* adapted to extend up through aperture 90*j* in wall 12 for engagement with wing nut 90*k*. The baseplate 12 is cut away as at 12*b*, permitting the vessel 90, the rod 81 and glue roller assembly 70 to be moved upwardly in the direction indicated by the dotted lines; the bar 93 being then partially supported against lateral movement by the support member 94*a* having the flange portion 95*a* secured to the bottom wall 12. The just-described feature constitutes a very desirable feature of the present invention in that the glue roller and the glue reservoir can be dropped from the apparatus generally by simply disengaging the wing nut 90*k*. This feature is desirable when it becomes necessary to have a changeover in adhesive composition as, for example, changing from a cold setting adhesive to a "hot melt" adhesive.

The operation of the glue roller 70 and glue vessel reservoir 90 is as follows. The glue is contained in the vessel 90. The outer sleeve 70 and the interior rod 81 define an annular passageway 84 interrupted by the helical land portion 81 of the rod 80. Adhesive in the vessel 90 passes through the apertures 79 spaced about the lower extremity of the sleeve entering the vertically extending annular passageway 84 between the sleeve 70 and the rod 80. Rotation of shaft 72 translated by fingers 74 and slots 75 in the head portion 76 rotates the sleeve 70 in the direction indicated by the arrows, causing, as a consequence, contact of the moving interior surface of the sleeve 79 with the adhesive in the lower region of the passageway, causing, in turn, the adhesive to move upwardly in passageway 84 by reason of the continuous helical land proceeding in spiral fashion upwardly in counterclockwise direction. The rotation of the sleeve being counterclockwise, the adhesive or glue proceeds upwardly through the annular passageway to the space 82*a* above the head portion 82 of the rod from which it flows through the apertures 77 to the outer surface of the sleeve 70, draining downwardly between the space 78*a* between the skirt 78, thence over the shoulder 78*b* and thence to the outer surface from which it falls by gravity downwardly back into the vessel 90. The skirt portion 78 prevents splattering of the glue as might otherwise occur through the centrifugal force of the rotation of the glue roller 70. As the glue passes down the outer cylindrical surface of sleeve 70, the doctor blade strips off excess adhesive, leaving spaced bands 99 of adhesive.

In FIG. 7, there is disclosed a circuit diagram suitable for controlling the operation of the apparatus. It includes lines L–1 and L–2 and a principal "on-off" switch 150 which, as shown, is in the "off" position but, by actuation to the "on" position, connects terminals 151 and 152, connecting lines L–1 and L–2 via lines 153 and 154, impressing a current flow in motor 67 which causes continuous rotation of the transfer roller 60 and, through the overhear 73, the glue roller 70 as described hereinbefore. At the same time, current flows in line 154 leading to terminal 155*a* of centering switch 155. When this normally open switch is closed by reason of contact with a package moving along the conveyor system, the line current flows to terminal 155*c* and line 156 and energizes timer coil 160. The normally closed points 161 of the timer connects the current in line 156 with line L–2 across solenoid 163, opening momentarily the normally closed air valve 32*g* in FIG. 2. This timer, of course, is adjustable as to the duration in which the current is impressed across the solenoid 163. Thus, after a predetermined amount of time, the normally closed points 161 are opened by the timer coil and normally open points 165 are closed, whereby the current flows through line 166 to line L–2 actuating solenoid 168, moving arm 103, thereby urging connected guide shoe 100 against the transfer roller 60 as cushioned by spring 104. This position is maintained until the package is moved past and out of contact with centering switch 155 which disconnects terminal points 155*a*–155*c*, cutting off flow of current to the lines 156 and 166, deactivating solenoid 168 and the timer whereby the normally closed points 161 are closed and the normally open points 165 are opened. The circuit is thus ready for a repeat cycle as initiated by the next package closing contact with switch 155.

From the foregoing, it will be appreciated that with the labels positioned in the reservoir area, a package article "A" proceeding down the conveyor system "S" will contact the deflection switch 155, closing same, causing in timed sequence (via timer 160) actuation of the solenoid 163, momentarily opening the air valve 32*g*, sending a pulse of air of preset pressure via throttling valve 32*i* through line 32*f* to the combination reservoir and filter 32*e* and thence through conduit 32*d* to the bore 32*c* from which the air pulse proceeds out the orifices 32*k* which are not covered by rod 40 as determined by the location of the tamper bar 42. The latter is set by the height of labels in the reservoir. At the same time, the pulse of air exerts an upward force on the rod 40 which, due to the overhead connection plate 41, causes a momentary upward movement of the tamper bar 42 followed by a falling back down upon the upper edges of the labels, maintaining the upper edges of the labels in registration. Limited upper movement of the rod 40 and tamper bar 42 is controlled by the stud 42*e* in the elongated hole 42*c* and the ear portion 42*b* of the slotted arm 42*a* (FIGS. 4 and 5). The pulse of air through the orifices 32*k* across the surface of the endmost label L and through the restricted path defined by the position of the transfer roller 60 (see FIG. 3) causes a single label, and particularly the end segment proximate the wall 34, to move out of flush engagement with the remainder of the plurality of labels and towards and through the gate 50 in the direction of the transfer roller 60. Due to the control of the timer coil 160, there is effected, in timed relationship with the pulse of air, a movement of solenoid 168 which operates, through the arm 103 and the U-shaped spring 104, to move guide shoe 100 into contact with the rubber covering 61 carried by rotating transfer roller, urging the end of the label thereagainst. The transfer roller, of course, is continuously rotating as previously described whereby the physical contact urges the label, as partially directed by the guide shoe towards the continuously rotating glue roller 70, into tangential contact therewith and beyond, assisted by the inherent stiffness of the label. The label "doctor" members 110 and the curvilinear edges 112 prevent the label from being wrapped about the glue roller but rather deflect the label in the manner shown in FIG. 1 towards the article which is moving simultaneously past in the direction indicated by the arrow 190. The label bears, by reason of its contact with the glue roller, spaced lines or bands 99 of adhesive which cause the label to adhere to the article. The label is then pressed firmly against the article by the resilient or cushioned cover on roller 120 which is urged against the article by the spring and pivoted arm construction as described previously. Movement of the article out of closing contact with switch 155 terminates the cycle, leaving the components in their original position.

The next article proceeding along the conveyor system then recloses switch 155 which initiates the same sequence of operation including the pulse of air, removal of a single label, the tamping down of the upper edges of the label, the timed sequential actuation of the solenoid moving the guide shoe; all of these cooperating to move the next label through the gateway 50, and urged by the transfer roller tangentially past the glue roller and onto the article.

It will be noted that the cutaway notch 36*b* accommodates the tamper bar 42 when the supply of labels has been reduced sufficiently that the reservoir plate 36 is moving into close proximity with the upstanding wall member 32.

The adhesive in the vessel 90 flows continuously and circuitously through the glue roller annular passageway 84 as urged by rotation of the cylinder about the helical land on the stationary upstanding rod 81, thereby preventing any premature setting up of the glue or adhesive as might otherwise occur during a temporary shutdown of the labeling line or the

finishing line. Normally, in prior art labeling apparatus, a shutdown of any type would considerably interfere with the efficiency of the labeling operation since the glue or adhesive during such time would be in a static condition, leading to gelation at critical regions and/or components of the glue applicator. In the apparatus of this invention, as indicated, the glue is moving continuously. Also, provisions are made for maintaining an even elevated temperature in the case of hot melt adhesives, avoiding chilling and gelation as frequently occurs in prior equipment due to the necessity for exterior hose conduits, etc.

It will be appreciated that the deflection switch **155** may e located along the margin of the apparatus in any preselected location, depending upon the linear dimension of the article to which the label is to be applied. As a matter of fact, the deflector switch may be adjustably mounted on a bar bearing a scale with predetermined settings, permitting location of the deflector switch at a given scale indicia corresponding to a package size and based also upon a consideration of the linear dimension of the label. With this arrangement, the apparatus can be set up to allow the label to be applied to the article in a predetermined centered relationship with respect to the margins or ends of the article. Instead of the contact switch **155**, of course, it is envisioned that for certain applications a photoelectric cell would be preferable.

Similarly, vertical centering of the label on the article is relatively simply accomplished by adjustment of the single adjustment wheel **22** which actuates all of the support legs in threaded engagement with the baseplate **12**.

It is an important feature of the present invention that either recharging of the label reservoir or changing to a different sized label can be accomplished very simply. The setscrew **43***a* controlling marginal bar member **38** and adjusting nut **42***b* (on the rear side of the tamper bar **42**) controlling the tamper bar **42** are loosened, permitting the tamper bar **42** and rod **40** assembly to be elevated to a position corresponding to the height of the labels (or removed altogether) and the adjustable bar **38** to be moved away from wall member **34** to accommodate the new label of the given length. The bar is brought up firmly against the edges of the labels and the securement means **43** is tightened. At the same time, of course, the wall plate **36** is simply moved away from upstanding wall **32** a distance corresponding to the number of labels to be inserted into the reservoir. The notch **36***a* permits the wall plate **36** to move forwardly towards the wall **32** regardless of the position of the bar **38**.

The simultaneous air movement of a single label and the air movement of the tamper bar **42** represents an important feature of the present invention.

A feature of construction which aids in insuring single label delivery is the provision for a foot portion **34***d* (FIGS. **1**, **2** and **3**) on the wall **34**. The foot portion serves as an edge abutment for the labels, whereby they will not escape between the wall proper **34** and the guide shoe.

The label apparatus of the present invention is quite small, adding to its desirability and utility. The apparatus as illustrated measures 20½ inches in length by 12⅛ inches in width by 16 inches in height. It weighs 50–65 pounds. It can, of course, be scaled to a larger size if desired. The apparatus of the size above-indicated can handle labels measuring from 4 to 13 inches in length and one-half to 3½ inches in width (height as stacked in the reservoir).

The apparatus as described has been operated continuously for extended periods of time without encountering an instance of either delivery of "double labels" or "no labels." The apparatus described is also capable of rapid operation. For example, label delivery of several hundred labels per minute has been achieved over extended periods of time with no difficulty. The rotational velocity of the transfer roller and glue roller can be adjusted by changing the pulley drive system or use of a rheostat governing motor speed. Further, the relative speed of rotation of the transfer roller and glue roller can be changed by selection of appropriate drive sprockets in the overhead **73**. Usually, we have found that the glue roller should be rotating slightly faster than the transfer roller. This assists in preventing buckling of the label as it moves across the surface of the glue roller. A ratio of 5/6 has been found very desirable. Thus, 10 teeth on the glue roller drive sprocket and 12 teeth on the transfer roller drive sprocket represents a typical arrangement for achieving this ratio.

It will be appreciated that the apparatus as described is suited for applying labels to articles, packages, etc., moving from left to right as illustrated in FIG. 1 and this is termed a "right-hand" model. Obviously, "left-hand" models can be constructed utilizing the same features but of essentially "reverse hand" construction to accommodate article flow from right to left. The apparatus of this invention can also be employed for applying labels on the top or upper surface of continuously moving articles or packages. For this purpose, the apparatus as viewed in FIG. **1** is simply arranged in **90°** disposition with the plate **12** vertical and with the rollers consequently horizontal instead of vertical. The glue delivery system to the glue roller is changed simply by providing for gravity delivery of the glue to the surface of the glue roller.

Although not shown, it should be appreciated that adjustment of the timer can provide considerable variance in the timed sequence of the air pulse duration and, as well, the time interval between air pulse and movement of the arcuate guide shoe **100**. The latter, however, remains reasonably constant due to the proximity of the label, the transfer roller, the orifices and the guide shoe.

A subsidiary feature of the present invention resides in the provision for the reservoir/filter member **32***e* in the air conduit. Principally, this chamber operates as a safety spring or cushion whereby the pulse of air impressed in the conduit by the sudden opening of the valve **32***g* (by actuation of switch **155** and solenoid **163**) is not as such directed across the end portions of the labels through orifices **32***k*. Rather, since air is compressible, the chamber **32***e* operates as a surge tank, providing a cushion or spring action whereby the pulse of air is moderated before projecting across the face of the endmost label, thereby giving a more even pressure or venturi effect resulting in more even reliable label removal.

It, of course, will be appreciated that the glue roller **70** and stationary rod **80** may be modified to provide for the location of the helical land portion on the inside surface of the glue roller instead of on the rod. Also, various surface configurations of the rod and glue roller can be employed.

From all of the foregoing, it can be seen that an extremely efficient, compact and reliable, trouble-free labeling apparatus has been provided.

Recognizing that the label in its moving contact with the glue applicator roller and beyond to the package or article to be labeled can encounter difficulties, such as becoming misdirected, doubled up on a like label or hung up on the glue applicator roller, etc., several modifications in the nature of improvements of the apparatus as described hereinabove have been developed.

Briefly stated, one modification is concerned with an arrangement for directing and positively assisting in the movement of the label from the glue roller to the package or article to be labeled. The amount of space between the glue roller and the package or article to be labeled is suspected as contributing to the problem which occurs when a label becomes wrapped about the glue roller, in the nature of a hangup, instead of passing more or less tangentially past the roller to the package. In addition, labels may occasionally become misdirected in the space referred to so that it does not meet the moving article or package at the correct angle, whereby it does not become properly registered with respect to the area of the surface of the package or article to bear the label.

Another modification involves the glue roller construction itself, while still another involves a subassembly designed, in combination with the modified glue roller construction, to meter the amount of glue carried by the roller and to control the disposition thereof on the surface of the glue roller, or doctor wires.

Still another modification is concerned with an arrangement for insuring against label hangup on the glue roller and also tending to preclude premature gelation or hardening of a hot glue or adhesive formulation on the glue roller.

In the accompanying drawings, FIGS. **9**, **10** and **11** illustrate the above modifications.

In describing the structure modifications illustrated in FIG. **9**, reference numerals in the **200** series will be utilized; the second and third integer being the same as in FIGS. **1–8** for the same part. For example, in FIG. **9**, the glue roller is identified by the reference numeral **270**; while in FIG. **6**, the glue roller is identified by the reference numeral **70**. Furthermore, reference numerals in the **300** series will identify components and features of construction which are not in common with the apparatus illustrated in FIGS. **1–8** of the original application.

Referring now to FIG. **9**, reference numeral **273** identifies the overhead arrangement from which the glue roller **270** depends rotatingly by reason of its being carried on glue roller shaft **272** which extends above the overhead **273** and carries at its upper end the sprocket **271** connecting by chain with sprocket **268**. Reference numeral **301** identities the overall assembly constituting one embodiment of the present invention. This subassembly includes a vertically upstanding bracket member **303** which is secured to the overhead arrangement **273** by means of the screws **303** in spaced horizontal relationship. Between the screws **303**, there is located a vertical groove (not shown) formed in the upper end **305** on the side adjacent the overhead **273** which engages a vertical tongue (not shown) in the overhead **273**; this arrangement providing for accurate vertical disposition of the subassembly **301** with reference to the glue roller **270**. Mounted in the bracket **303** is a larger primary roller **307** and a smaller secondary roller **309**. The roller **307** is secured to shaft **311** via Allen Head setscrew **313**; the shaft being rotatably mounted in bracket base **323** and also in upper end **305** from which shaft **311** projects upwardly. The smaller secondary roller member **309** is secured via Allen Head setscrew **315** to shaft **317** which is parallel to shaft **311** and, like it, is mounted for rotation in bracket base **323** and extending to shoulder **337** of the bracket. The upper end of the secondary roller **309** beneath shoulder **337** is enlarged, as shown, and also segmented as at **319**, as is shaft **317**; the two segments of shaft **317** being in axial alignment, the upper segment terminating below the segmented portion **319** and the lower segment extending to the base. The purpose of the above construction is to allow for disassembly. Each of the rollers (major roller **307** and minor roller **309**) have machine formed on their outer surface projecting pulleys, of which there are four in number, serving as seats for four rubber O-rings **321**.

Shaft **311** has secured to its uppermost end by Allen Head setscrew **325** a cylindrical head **327** which has a recess portion **329** carrying therein belt **331** which is driven by shaft **272**, upon which the glue roller is mounted, via pulley **330**. The drive is such that roller **307**, in terms of the diameter of the pulley portion, is operating at the same speed as the glue roller, which, in effect, means that the lineal speed of the belt **321** is the same as the speed of the surface of the glue roller.

Connected to the back side of the bracket down near the bottom or base **323** is a springlike finger **355** which extends in the manner shown to terminate against the roller surface upwards of the base **212**.

In operation, the belt takeoff **331** drives the barrel head **327** secured to shaft **311**, rotating roller **307**. The O-rings **321** seated in the pulley seats, as shown, in turn rotate the roller **309** which is freely rotatable in base **323** and the offset shoulder **337** from which the upper end of shaft **317** projects. The O-ring members **321** thus move in a path which is counterclockwise, as shown by the arrow on the uppermost pulley, similarly to glue roller **270**. As a ticket or label is moved tangentially past the glue roller **270** in the direction indicated by the arrow **337**, it is picked off by the finger **355**. The ticket, being positively driven via the transfer roller **60** (see FIG. **1**) and guide shoe **100**, moves past the glue roller into contact with one or more of the O-rings depending upon the height of the ticket or label. The movement of the O-rings assist the labels' continued movement, and particularly the leading end of the tickets, in the path indicated by the arrow **337** and also the arrow **340**. At the same time, the article or package to be labeled is moving down the conveyor **343** in the direction indicated by the arrow **345**. The label, due to the operation of the assembly **301**, is urged into contact with the surface to bear the label at a somewhat inclined angle thereto. The surface referred to is not shown but indicated schematically by the dotted lines identified by the reference numeral **347**.

In the interest of clarity, the doctor blade arrangement **92**, **93**, **94** and **95** illustrated in FIG. **6** has been deleted from FIG. **9**, albeit the spaced lines **299** of adhesive are shown.

The label assist assembly **301** is conveniently secured to or removed from the overall glue roller assembly, requiring only taking out the Allen Head setscrews **303** and removal of the belt **331**. The assembly provides a unique cooperation between the spring finger **355** and the spaced O-rings. The spring finger precludes wrap around or "hang up" of the label since it rides flush against the surface of the glue roller. At the same time, once the ticket has been picked off, it moves only a short distance to contact the rotating O-rings which, by reason of their encirclement of the pulleys formed on spaced rollers **307** and **309**, present vertically spaced and elongated lines of contact; the number of which the label contacts depend upon the width or height of the label being handled. The O-rings, being rubberlike, exert a frictional urgement of the label in the direction referred to. It will be appreciated that arrangements are made for appropriated disposition of the doctor blade **92** of FIG. **6** so that none of the spaced lines of adhesive impinge upon any one of the four spaced O-rings, as would otherwise lead to a disruption of the spaced deposits of adhesive on the rear side of the label.

Reference may now be had to FIG. **10** in which parts of the apparatus illustrated which are the same as the basic labeling machine shown in FIGS. **1–8** will be identified by the same reference numerals but in the **400** series. For example, the glue roller **470** in FIG. **10** corresponds to the glue roller **70** in FIG. **1** and, as well, the glue roller **70** in FIG. **6**. Parts of the apparatus and subassemblies shown in FIG. **10** which are different from those in the overall machine labeling apparatus as illustrated in FIGS. **1–8** will be identified by the reference numerals in the **500** series.

In FIG. **10**, there is shown a modified glue roller **470**, in accordance with a further aspect of the invention, mounted suitably for rotation about its vertical axis. The details of the mounting of glue roller **470** is not illustrated in detail in FIG. **10** since the details are identical to those of glue roller **70** in FIG. **6**. It can generally be seen that the glue roller **470** depends from the overhead **473** with the lower end extending down through the passageway **412***a* in wall **412** into the glue pot **490**. The upper end of the glue roller is surrounded by sleeve member **478** which corresponds to and operates in the same manner as the sleeve member **78** in the glue roller assembly shown in FIG. **6**. In the embodiment illustrated in FIG. **10**, the blue roller **470** is not a smooth surfaced cylinder as in the glue roller **70** in the embodiment of FIG. **6**, but contains a plurality of vertically spaced horizontal grooves **470***a*, as illustrated. The vertically spaced grooves run peripherally about the glue roller whereby the glue or adhesive emanating by gravity from between the sleeve **478** and roller **470** near the bottom of the sleever **478** passes tortuously down the grooved surface.

Adjacent the glue roller, there is mounted, on upper and lower pins **501** and **502**, a support member **504** which has an apertured base **505** adapted to pivotably receive pin **502** upstanding from the bottom wall **490***d*. The upper end **507** of the support member **504** likewise is apertured to pivotably receive the pin **501** anchored in an upper support **508**. Along its length, the support member is composed principally of two normally disposed walls **510** and **511** connected by a thin plate **511***a*. The edge **512**, of wall **510**, facing the glue roller con-

tains a series of notches **513** defining teeth **514** which fit the grooves **470***a* of the roller. The depth of the notches **513** are greater than the depth of the grooves **470***a*. The teeth **514** formed on edge **512** of wall **510** are urged into the grooves **470***a* formed in the glue roller **470** by means of spring **520**; one end of which is secured to stud **522** projecting from support frame **523** and the other end being secured by the threaded nut arrangement as at **525** to a connecting plate arm **527** secured to the wall **511** via stud **529**. By means of this connection, the entire support member **504** is urged to pivot about the pins **501** and **502** whereupon the teeth **514** are urged into the grooves **470***a* to slide in surface abutment with the bottom or "root" portion of the grooves **470***a*. The adhesive running by gravity down the exterior surface of the glue roller is thus confined to the outer land or tooth portion **470***b* defined between the grooves **470***a* and the thickness of the adhesive carried on the land portion **470***b* is determined by the depth of the notches **513**. In order to provide variability of the thickness of the adhesive or glue carried by the land portion, there is further provided a doctor blade **540** which is secured to the wall **510** of the support **504**. The blade is essentially an elongated, planar rectangle containing two horizontally elongated slots **541** and **542**. The blade **540** is secured via screws **543** to the inside of the indicated wall **510** in the manner illustrated. The horizontal elongated slot and screw arrangement permits the blade **540** to be adjusted laterally such that it doctors off an amount of adhesive carried on the projecting land portion **470***b* defined by the grooves on the glue roller **470**. Movement of the doctor blade member **540** all the way to the right would leave the full amount of adhesive to be carried as governed by the depth of the notches **513** as compared to the depth of the grooves **470***a*. This relationship is illustrated most clearly in FIG. **11** where the glue carried on the land region **470***b* is identified by the reference letter "A." In any event, the described technique of doctoring is desirable since the doctor blade does not positively contact the glue roller and is therefore very efficient and reliable. The glue roller and the edge **512** of wall **510** are desirably formed of brass since they are riding in surface-to-surface contact. With the doctoring arrangement as described, the deposition of a reliable amount of glue onto the ticket or label is assured together with trouble-free operation due to the avoidance of actual contact between the doctor blade and the glue roller.

In accordance with a further embodiment of the present invention, there is featured, in the glue roller assembly as shown in FIG. **10**, an upstanding support bar assembly **550** providing several additional advantages and improvements in operation. The bar **550** is elongated and is mounted on the surrounding support structure such that it is closely contiguous but not in contact with the glue roller. The bar **550** contains an elongated bore extending downwardly from an upper offset portion **551**; the bore being identified in dotted outline **552**. The bore extends down into the lower region of the bar and into it is inserted an electrical resistance heating element **553** having exterior terminals for a connection to an appropriate source of electricity. Also mounted in the lower segment of the bar **550** are a pair of fingerlike spring elements **554** and **555**. These finger elements are identical and are vertically spaced. One terminal end of each of the spring members projects into the vertical bar **550** into close proximity with the heater element **553**. The springlike fingers then extend laterally outwardly, then at 90 towards the glue roller with the opposite terminus of each riding in spaced grooves of the glue roller. The proximity to the heater element causes the spring-finger members **554** and **555** to become heated. The terminal ends of these fingers riding in the spaced grooves function to remove the labels as they pass tangentially in sequence past the glue roller. These labels otherwise tend to become attached to the glue roller by reason of the adhesive thereon. The fact that the spring-finger member is heated lends to its effectiveness since it is in contact frequently with adhesive. The spring member, if it were not heated, would otherwise be chilly and would lead to glue hardening in the nature of a premature gelation. Premature glue hardening or thickening interferes with proper flow of the adhesive and also to defective securement of the label on the package. This feature, of course, is most pertinent in the use of hot melt systems in the labeling apparatus.

The glue roller, as indicated by the arrow near the sleeve **478**, is rotating in a counterclockwise direction. As a consequence, the glue on the land portion thereof is doctored off by the face of the blade **540** shown in FIG. **10**. The glue, accumulating on the blade during continued rotation with the assistance of gravity, runs vertically down the blade where it joins spaced accumulations from the other land portions in vertical spaced relationship. Continued operation finds, again depending upon the lateral spacing of the blade member **540**, a continuous stream of the glue falling vertically down the face thereof to return through opening **412***a* in bottom wall **412** to the glue or adhesive already present in the glue reservoir **490**.

The glue roller, as shown in FIG. **10** and representing a preferred embodiment of the invention, is grooved in order to provide spaced, continuous deposits of adhesive or glue on a label or ticket moved tangentially past the glue roller. As described, the arrangement including the notched bar **504** and doctor blade **540** assists in the facile accomplishment of this result. It is further envisioned that, in place of continuous grooves, the glue roller may feature discontinuous horizontal grooves or, in effect, a plurality of vertically and horizontally spaced recesses defining therebetween land regions which appear as spaced islands. In such a glue roller construction, the bar **540** is replaced by a second roller having a surface contour complementary to that of the glue roller, excepting that the recesses therein would be slightly deeper so that the raised or teeth portion would abut against the recesses of the glue roller, removing thereby any glue therein whereby adhesive accumulation is confined to the raised portion of the glue roller which does not contact the recessed portion of the second roller. The two rollers, of course, rotate in opposite directions with the complementary raised portions and recesses of each intermeshing and with glue consequently being present only on the spaced, isolated, raised regions of the glue roller. The design of the rollers can be varied considerably to meet the particular labeling job. It will be appreciated that a glue applicator, in accordance with the preceding, deposits spaced islands of glue or adhesive on the surface of the ticket or label; which ticket or label should be moved at a speed the same as the peripheral speed of the glue roller to avoid smudging and smearing of the spaced islands of adhesive. A doctor blade similar to the blade **540** can be used to regulate the thickness of the adhesive carried on the raised portion of the glue roller. The doctor blade must be positioned, however, in such case, just before the contact point of the ticket or label with the glue roller in order to achieve consistency in adhesive thickness on the raised portions of the glue roller. From the standpoint of simplicity of construction and operation, the glue roller construction, including the cooperating doctoring arrangement, illustrated in FIG. **10** is preferred over that featuring spaced recesses as described just previously.

Modifications may be resorted to without departing from the spirit and scope of the present invention as defined in the appended claims.

We claim:

1. A glue roller and reservoir apparatus adapted for continuous circulation of adhesive comprising:

a vessel having a bottom wall and upstanding marginal sidewalls,

a stationary rod member upstanding from said bottom wall,

a hollow sleeve telescopically disposed about said rod defining an annular passageway therebetween, the lower end of said sleeve including means fluidly connecting said vessel and said passageway, said sleeve having an aperture therein proximate the upper end of said rod, said sleeve being axially rotatable, said sleeve having a plurality of vertically spaced grooves formed to extend about its exterior surface, said grooves defining therebetween spaced "land" regions,

an upstanding bar mounted alongside said sleeve, said bar having an edge facing said roller which contains a plurality of notches defining teeth therebetween, and

means for urging fluid in said vessel into said annular passageway upwardly therethrough and through said aperture to drain by gravity down the exterior grooved surface of said sleeve returning to said vessel, said means comprising a shaped or contoured configuration on one of said rod member and the inner surface of said hollow sleeve whereby rotation of said sleeve in the appropriate direction coupled with the contoured configuration will cause said adhesive to move upwardly within said annular passageway to the upper end of said rod and through said aperture to the exterior grooved surface of said hollow sleeve.

2. Apparatus as claimed in claim 1, wherein said notches are deeper than said grooves.

3. Apparatus as claimed in claim 2, wherein said bar is pivotable about its vertical axis to move said teeth on said bar towards or away from said grooves.

4. Apparatus as claimed in claim 3, which includes spring means normally urging said bar to pivot as to urge said teeth into contact with the bottom of said grooves.

5. Apparatus as claimed in claim 1, which includes a blade and means for selective and adjustable transverse securement in any given position where a vertical edge of said blade overlies a portion of the depth of said notches whereby rotation of said glue roller carrying glue on said glue roller will cause a portion of said glue to be "doctored off" by said blade edge, thereby controlling the thickness of the glue lines on said glue roller.

6. Apparatus as claimed in claim 1, which includes means for moving an article in tangential relationship with the exterior surface of said glue roller whereby a plurality of deposits of glue are transferred from said "land" regions to said article.

7. Apparatus as claimed in claim 1, which includes at least one springlike finger member mounted with a terminal end riding in one of said grooves and being pointed in a direction opposite to the normal operational rotation of said roller.

8. The apparatus as claimed in claim 7, wherein said finger member is mounted in a support having internal heat means.

9. In a label handling apparatus comprising:

a horizontal baseplate,

means upstanding from said plate defining a reservoir for a plurality of labels, tickets or the like stacked on edge in mutually flush, registering relationship, said reservoir means including a gateway adapted to allow an end segment of a label proximate thereto to move out of flush abutment with the remainder of said labels,

an upstanding transfer roller, adapted for rotation about its vertical axis, located proximate said gateway and spaced slightly outside said reservoir area,

a glue applicator located in spaced relationship with said transfer roller on a line extending away from said gateway and

means for delivering a pulse of air across said gateway and at the same time tangentially across the surface of said transfer roller, thereby urging the end segment of the closest label out of flush contact with the remainder of said labels and toward said transfer roller and thence by said transfer roller to said glue applicator; the improvement wherein said glue applicator comprises:

a vessel having a bottom wall and upstanding marginal sidewalls,

a stationary rod member upstanding from said bottom wall,

a hollow sleeve telescopically disposed about said rod defining an annular passageway therebetween, the lower end of said sleeve including means fluidly connecting said vessel and said passageway, said sleeve having an aperture therein proximate the upper end of said rod, said sleeve being axially rotatable, said sleeve having a plurality of vertically spaced grooves formed to extend about its exterior surface, said grooves defining therebetween spaced "land" regions,

an upstanding bar mounted alongside said sleeve, said bar having an edge facing said roller which contains a plurality of notches defining teeth therebetween, and

means for urging fluid in said vessel into said annular passageway upwardly therethrough and through said aperture to drain by gravity down the exterior grooved surface of said sleeve returning to said vessel, said means comprising a shaped or contoured configuration on one of said rod member and the inner surface of said hollow sleeve whereby rotation of said sleeve in the appropriate direction coupled with the contoured configuration will cause said adhesive to move upwardly within said annular passageway to the upper end of said rod and through said aperture to the exterior grooved surface of said hollow sleeve.

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