Jan. 24, 1967 P. J. VAN LOBEN SELS 3,299,854

APPLICATOR FOR LIQUIDS AND SEMI-LIQUIDS

Filed May 3, 1965 3 Sheets-Sheet 1

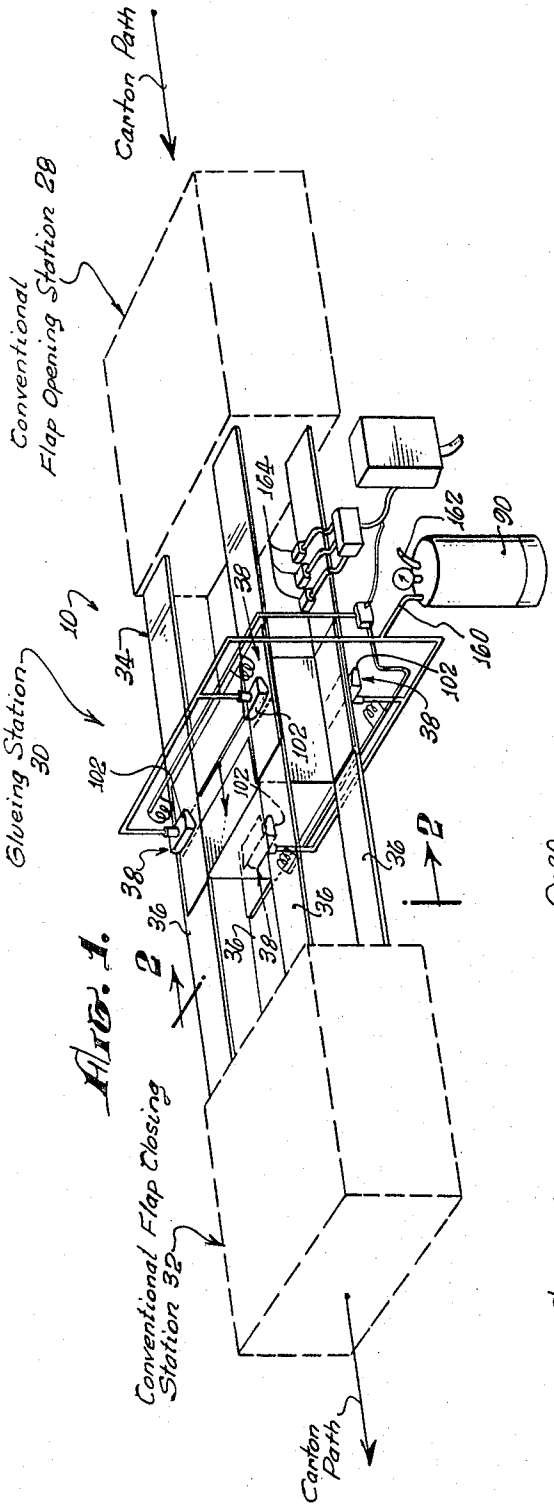


FIG. 1.

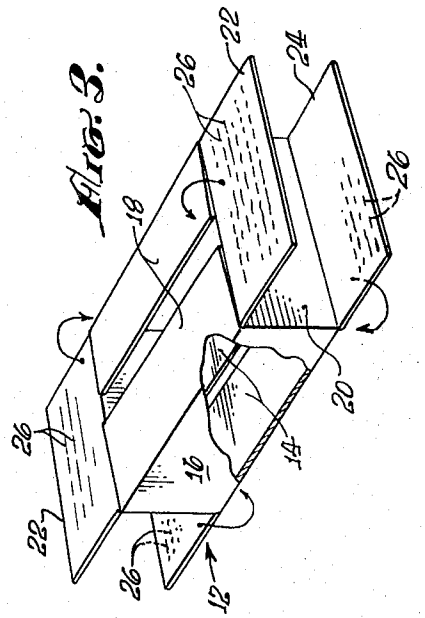


FIG. 3.

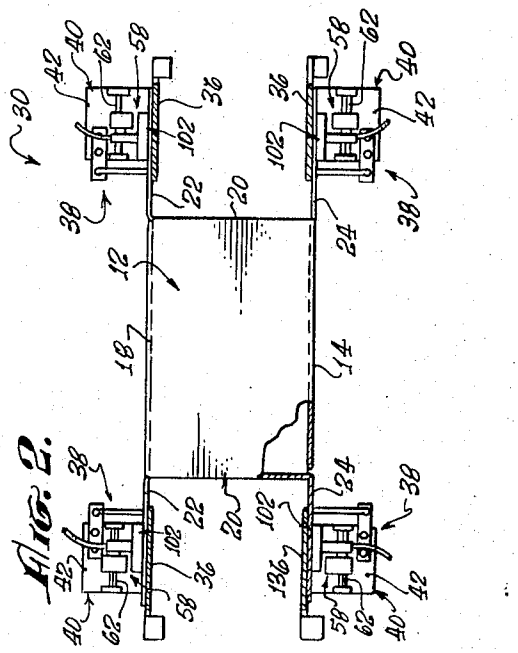


FIG. 2.

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Fig. 4.

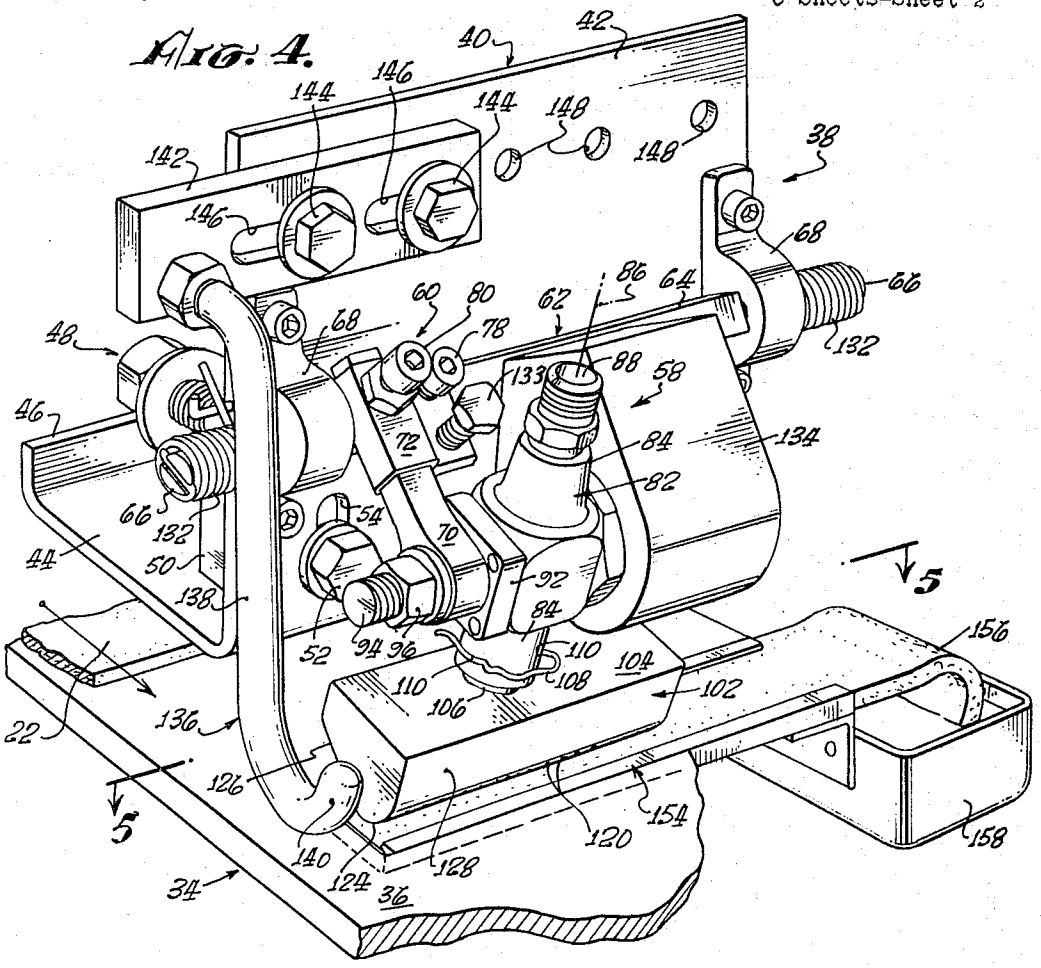
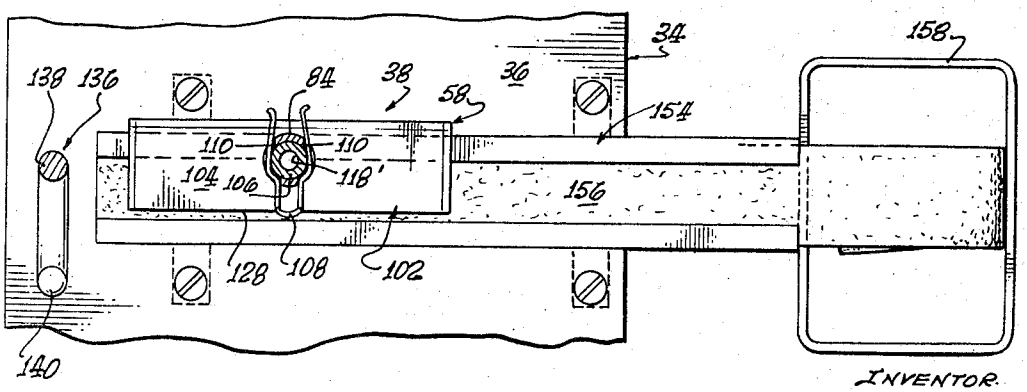


Fig. 5.



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FIG. 9.

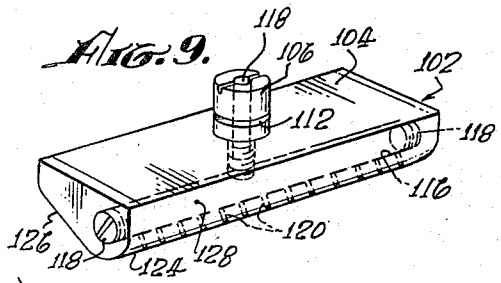
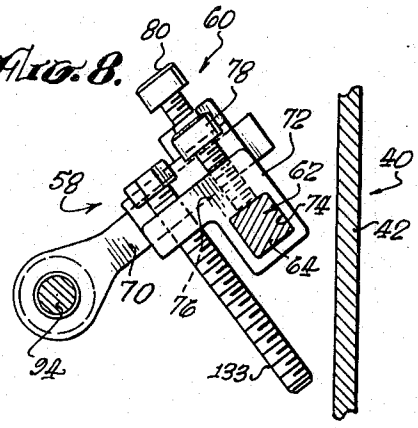


FIG. 8.



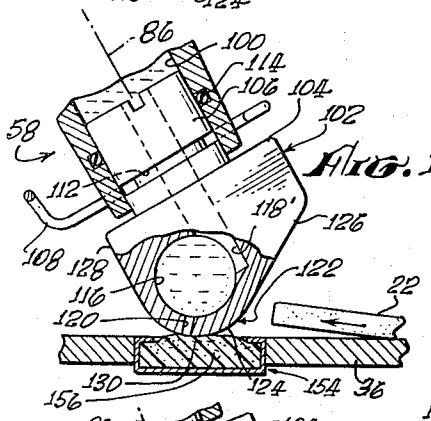


FIG. 10.

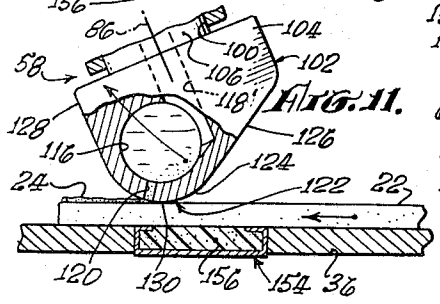
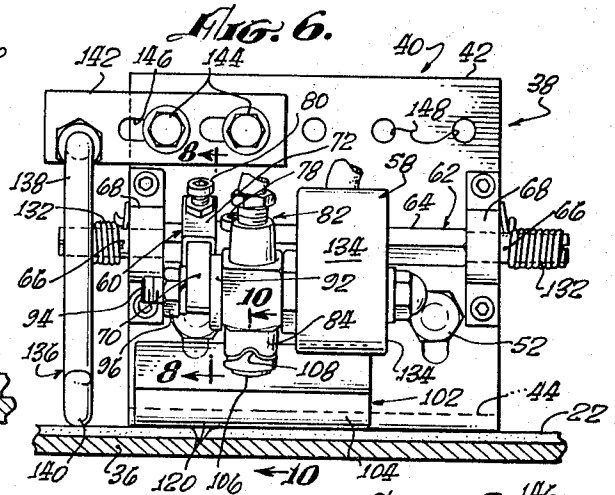


FIG. 11.

FIG. 6.



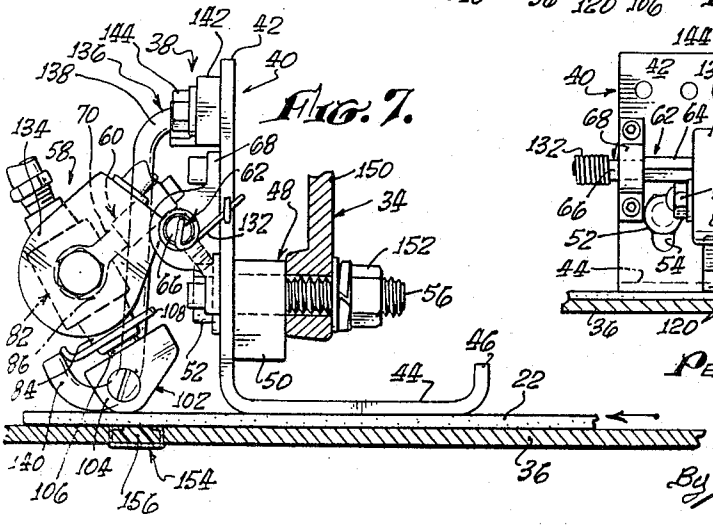
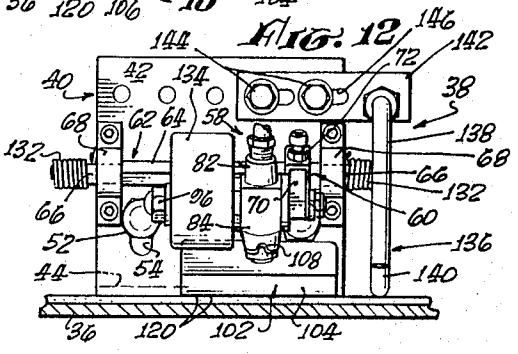


FIG. 7.

FIG. 12.



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3,299,854

APPLICATOR FOR LIQUIDS AND SEMI-LIQUIDS

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Filed May 3, 1965, Ser. No. 452,711
12 Claims. (Cl. 118—411)

The present invention relates generally to fluid dispensers; more particularly, the invention relates to an improved applicator for dispensing liquids and semi-liquids—i e., viscous liquids.

Although the applicator of this invention is capable of dispensing various liquids and semi-liquids, the applicator has primary utility in carton forming and/or sealing machines for dispensing glue onto the flaps of cardboard cartons prior to folding of the flaps to their final positions. For this reason, the applicator will be disclosed in connection with this particular application thereof.

Forming machines for cardboard cartons are generally quite complex and vary widely in design and construction, depending upon the particular type of carton each machine is intended to produce. All carton forming machines of the type with which this invention is concerned, however, are similar to the extent that they embody glue applicators for dispensing stripes of glue onto the flaps of the cartons being formed, prior to folding of these flaps to their final position. These glue applicators are commonly referred to in the trade as "glue guns." During operation of such carton forming machines, the cartons being formed are successively transported past the glue applicators, or glue guns, by a conveyor, in such manner that the unfolded flaps of each carton travel in glue striping relation to the applicators. After each carton emerges from the applicators, the adhesively coated carton flaps are folded to their final positions by means of so-called plows, or other flap folding devices.

Prior carton forming machines of this type are deficient for the reason that the glue applicators embodied therein are relatively complex. Moreover, the construction of the existing glue applicators, or glue guns, is such that these applicators are generally required to be mounted in relatively inaccessible positions within the machines. As a consequence, the applicators are difficult to install, service, and replace. For example, installation of many of the prior art glue applicators in existing carton forming machines requires partial disassembly of the machines, which is time consuming and costly to accomplish. Moreover, in some cases, such installation requires cutting or other destruction of various components of machines.

There is, accordingly, a definite need for an improved glue applicator for the purpose described. This invention provides such an improved glue applicator. As noted earlier, however, the applicator of the invention is capable of dispensing liquids and semi-liquids other than glue.

It is therefore a general object of the present invention to provide an improved applicator for dispensing liquids and semi-liquids.

An object of the invention is the provision of an improved liquid dispenser which has primary utility in carton forming machines for dispensing stripes of glue onto the flaps of cardboard cartons being formed prior to folding of these flaps to their final positions.

An important object of this invention is to provide a glue applicator of the character described which is of unitary, self-contained construction that permits installation of the applicator at any convenient location on a machine in which the applicator is to be utilized, whereby the applicator is readily accessible for installation, servicing and removal when necessary.

Another object of the invention is the provision of an improved applicator of the character described which is relatively simplified in construction, economical to manufacture, reliable in operation, easy to install and service, and is otherwise ideally suited to its intended purposes.

Other objects, features and advantages of the present invention will become apparent to those versed in the art from a consideration of the following description, the appended claims and the accompanying drawings, wherein:

FIGURE 1 diagrammatically illustrates a gluing station of a carton forming machine embodying a number of the present improved glue applicators;

FIGURE 2 is an enlarged sectional view taken at line 2—2 in FIGURE 1;

FIGURE 3 is a perspective view of a carton after emergence thereof from the gluing station of the carton forming machine illustrated in FIGURE 1;

FIGURE 4 is an enlarged perspective view of one of the present glue applicators embodied in the machine in FIGURE 1;

FIGURE 5 is a sectional view taken at line 5—5 in FIGURE 4;

FIGURE 6 is a front elevational view, on a reduced scale, of the glue applicator of FIGURE 4;

FIGURE 7 is a right hand side elevational view of the glue applicator of FIGURE 6;

FIGURE 8 is an enlarged sectional view taken at line 8—8 of FIGURE 6;

FIGURE 9 is an enlarged perspective view of a floating glue dispensing head or shoe embodied in the applicator;

FIGURE 10 is an enlarged sectional view taken at line 10—10 in FIGURE 6, showing the illustrated parts of the applicator in the normal positions which they occupy prior to movement of a carton flap past the applicator;

FIGURE 11 is a view similar to the view of FIGURE 10, showing the illustrated parts of the applicator in the positions which they occupy during passage of the carton flap past the applicator; and

FIGURE 12 illustrates an alternative mode of assembling the applicator.

The machine **10** diagrammatically illustrated in FIGURES 1 and 2 of these drawings is designed to form cardboard cartons of the type illustrated at **12** in FIGURE 3. Carton **12** comprises bottom flaps **14**, side walls **16**, cover flaps **18**, end walls **20**, and upper and lower end flaps **22** and **24**, respectively. In the course of fabrication of the carton **12**, the latter is initially formed to the partially completed condition illustrated in FIGURE 3, wherein it will be observed that the end flaps **22** and **24** have not yet been folded to their final positions. The carton is completed by applying stripes **26** of glue to the upper surfaces of the upper end flaps **22** and to the lower surfaces of the lower end flaps **24**, and then folding the upper and lower end flaps inwardly against the upper cover flaps **18** and bottom flaps **14**, respectively, as indicated by the arrows in FIGURE 3.

In FIGURES 1 and 2, only three stations of the carton forming machine **10** have been illustrated, to wit, a flap opening station **28**, a gluing station **30**, and a flap closing station **32**. During passage of the carton **12** through the flap opening station **28**, the carton is erected to the position shown in FIGURE 3. The end flaps **22** and **24** are then retained in the parallel positions shown and receive the glue stripes **26** during subsequent passage of the carton through the gluing station **30**. During final passage of the carton through the flap closing station

32, the glue coated end flaps are folded to their final positions to complete the carton. The carton is advanced through the stations 28, 30 and 32 by conveyor means (not shown).

Within the gluing station 30, the frame 34 of the carton forming machine 10 includes supporting members, or rails, 36 which slidably support the carton flaps 22, 24 in their unfolded positions of FIGURE 3. The main body of the carton is supported in the region between the rails by the conveyor means, just referred to. Mounted on the frame 34 at the gluing station are glue applicators, or glue guns, 38 which apply the glue stripes 26 to the carton flaps 22, 24 as the carton travels through the gluing station. These glue applicators represent the major contribution of the present invention. One of the applicators will now be described in detail by reference to FIGURES 4 through 12.

The illustrated glue applicator comprises a generally L-shaped mounting bracket 40 including a mounting flange 42 and work hold down flange 44. The free edge portion of the hold down flange, remote from the mounting flange, is turned up to form a curved lip 46. Mounting means 48 are provided for securing the bracket 40 to the machine frame 34 in the manner to be explained shortly. Suffice it to say at this point that the mounting means 48 comprises the bar 50 which seats against the rear side of the mounting flange 42. The mounting bracket 40 is adjustably secured to the bar 50 by bolts 52 which extend through slots 54 in the mounting flange of the bracket and are threaded in the bar. Additional mounting bolts 56 extend through slots in the mounting flange and through the bar for attaching the applicator to the machine frame 34.

Located at the front side of the bracket mounting flange 42 is a glue dispenser assembly 58. This assembly includes a mounting means 60 which mounts the assembly on the mounting flange for movement relative to the mounting bracket 40. Mounting means 60 is equipped with a rock shaft 62 including a polygonal central section 64 and cylindrical ends 66. Bolted to the front side of the bracket mounting flange 42 are bearings 68 in which the cylindrical rock shaft ends 66 are rotatably supported. The rock shaft 62 parallels the work hold down flange 44 of the mounting bracket 40.

Disposed in a plane normal to the rock shaft 62 is a dispenser supporting arm 70, one end of which is located adjacent the shaft. The latter end of the arm is secured to the rock shaft by an arm mounting bracket 72. Bracket 72 has a polygonal opening 74 slidably receiving the polygonal central section 64 of the rock shaft and an opening 76, at right angles to the opening 74, slidably receiving the supporting arm 70. A set screw 78 threaded in the arm mounting bracket releasably secures the latter to the rock shaft 62. A second set screw 80 threaded in the bracket releasably secures the latter to the dispenser supporting arm 70. It is apparent at this point, therefore, that the entire dispenser assembly 58 may be adjusted along the rock shaft 62 by loosening the set screw 78. The assembly may be adjusted radially of the shaft by loosening the set screw 80.

At the outer end of the dispenser supporting arm 70 is a dispenser 82 proper. This dispenser includes a dispenser body 84 having a central axis 86. At the upper end of the body is an inlet 88 for connection to a supply of glue to be dispensed. In FIGURE 1, this glue supply is shown to be a tank 90. Glue tank 90 will be referred to shortly. Fastened to the left hand side of the dispenser body 84, as the latter is viewed in FIGURE 4, is a plate 92 from which extends a threaded stub shaft 94. The axis of this stub shaft is normal to the body axis 86. Stub shaft 94 extends through an opening in the outer end of the dispenser supporting arm 70 normal to the longitudinal axis of the arm. Mounted on the stub shaft is a nut 96 for releasably securing the dispenser body to the dispenser supporting arm. The dispenser

body 84 may be angularly adjusted relative to the arm, about the axis of the stub shaft 94, by loosening the nut 96. Extending axially into the lower end of the dispenser body 84 is a bore 100 which communicates with the upper glue inlet 88 on the body.

Dispenser 82 includes, in addition to the body 84, a dispenser head 102. This dispenser head has an elongate body 104 and a cylindrical stem 106 projecting from the upper surface of the latter body, midway between its ends. The axis of this stem is normal to the longitudinal axis of the dispenser head body 104. Stem 106 is rotatably fitted in the bore 100 of the dispenser body 84. Straddling the lower end of the dispenser body is a generally U-shaped spring clip 108. The arms of this clip fit in slots 110 cut through opposite sides of the body in a plane normal to the body axis 86 and engage in a circumferential groove 112 in the stem 106 of the dispenser head 102. Clip 108 releasably and rotatably secures the head to the dispenser body. The head is thus free to rotate relative to the body, on its axis 86, and may be released from the body by spreading the clip arms 108 to disengage these arms from the dispenser head stem groove 112. The stem 106 is sealed to the dispenser body 84, above the groove 112, by an O-ring 114.

Extending longitudinally through the body 104 of the dispenser head 102 is a manifold bore 116. This manifold bore communicates with the dispenser body bore 100 through a passage 118'. The ends of the manifold bore 116 open through the ends of the dispenser head body 104 and are closed by removable plugs 118. These plugs may be removed to permit cleaning of the interior of the head. Extending transversely from the bore 116 are a multiplicity of dispensing ports 120. Dispensing ports 120 open through the lower, work engaging surface 122 of the dispenser head.

The work engaging surface 122 of the dispenser head 102 faces, generally, in one end-wise or axial direction of the dispenser body 84, i.e., in a downward direction in the applicator under consideration. This work engaging surface comprises a forward convex surface portion 124 and a rear flat surface portion 126. The convex surface portion 124 is generally cylindrically curved about an axis of curvature extending lengthwise of the body 104 of the dispenser head 102 and normal to the dispenser body axis 86. This axis of curvature is approximately coincident with the axis of the manifold bore 116. The convex surface portion merges tangentially with the flat surface portion 126 and with the opposite or forward side face 128 of the dispenser head.

As will appear presently, when an end flap 22 or 24 of the carton 12 travels past the applicator 38, i.e., flap 22 in the case of the applicator under consideration, the convex surface portion 124 of the dispenser head 102 engages the flap along a tangential line of contact which is designated by the reference numeral 130 in FIGURE 11. The flat surface portion 126 of the dispenser head is inclined toward the dispenser body 84 at an oblique angle relative to a plane tangent to the convex surface portion 124 along the contact line 130. The flat surface portion 126, therefore, faces obliquely in one lateral direction of the dispenser head—i.e., to the right or rear in FIGURES 10 and 11, and toward the mounting bracket 40. As will be explained presently this flat surface portion forms a camming surface which is engaged by each flap traveling past the applicator to cam the applicator out of the path of the flap. The dispensing ports 120 in the dispenser head 102 open through the convex surface portion 124 in laterally or forwardly offset relation relative to a plane normal to the plane of tangency, just referred to, and containing the contact line 130.

At this point, it is evident that the mounting means 60 supports the dispenser 82 on the mounting bracket 40 for movement in a generally end-wise or axial direction of the dispenser body 84. Means are provided for urging the dispenser in the end-wise direction of the

dispenser body in which the work engaging surface **122** of the dispenser head **102** faces, i.e., in the downward direction in the case of the applicator under consideration. These urging means comprise torsion springs **132** which are operatively connected between the mounting bracket **40** and the rock shaft **62** in such manner as to urge the latter in the counter-clockwise direction, as the shaft is viewed in FIGURES 7 and 8. An adjustable stop screw **133** is provided to limit this rotation of the dispenser.

Attached to the dispenser body **84** is a solenoid valve (not shown) for controlling the glue flow from the body inlet **88** to the dispensing ports **120** in the dispenser head **102**. The coil of this solenoid valve is enclosed in a valve housing **134** mounted on the side of the dispenser body **84** opposite the dispenser supporting arm **70**.

Indicated at **136** is a second work hold down **136**. This hold down includes a metal bar **138**. The lower end of the metal bar, as the latter is viewed in the drawings, is bent to the arcuate configuration shown to form a curved work engaging foot **140** on the hold down. The upper end of the hold down bar **138** is bent at generally right angles and in a direction opposite to the foot **140**. This bent upper end of the bar is secured to a mounting plate **142**. Mounting plate **142** is adjustably attached to the mounting flange **42** of the mounting bracket **40** by means of bolts **144** which extend through slots **146** in the plate **142** and are threaded in the mounting flange **42**. The under surface of the work engaging foot **140** on the hold down **136** is disposed approximately in a common plane with the work contact line **130** of the dispenser head **102**, when the latter occupies its dispensing position of FIGURE 11.

In FIGURE 4, the hold down **136** is located at the left end of the dispenser head **102**. The bracket mounting flange **42** is provided with additional threaded openings **148** for receiving the hold down mounting bolts **144**, thereby to permit the hold down **136** to be mounted at the right end of the dispenser head **102**, as the latter is viewed in FIGURE 12, as may be desirable in some applications. Also, of course, the hold down **136** may be left in the position illustrated and an additional hold down may be mounted at the right end of the dispenser head.

Referring again to FIGURE 1, it will be observed that the two upper glue applicators **38** are mounted at the upper side of the upper flap supporting members or rails **36**. The dispenser heads **102** of these applicators are located to engage the upper surfaces of the upper end flaps **22** on the carton **12** as the latter travels through the gluing station. In this regard, it is to be noted that the upper flaps ride along the upper surfaces of the upper flap supporting rails **36**. The lower glue applicators **38** are mounted below the lower flap supporting rails **36**. The dispenser heads **102** of these latter applicators are located to engage the under surfaces of the lower end flaps **24** of the carton **12** as the latter travels through the gluing station. It should be noted here that these latter carton flaps ride along the under surfaces of the lower rails. Each of the applicators **38** is mounted in the same relationship to its respective flap supporting rail. Accordingly, this relationship will be explained only in connection with one of the applicators, namely that illustrated in FIGURES 4 through 12. It is apparent that this latter applicator comprises one of the two upper applicators in FIGURE 1.

Returning, then, to FIGURES 4 through 12, and particularly to FIGURE 7, it will be observed that the applicator **38** is mounted on the machine frame **34** by inserting the mounting bolts **56** of the applicator through openings in a bracket **150** on the machine frame. Nuts **152** are then threaded on these mounting bolts to firmly clamp the bracket **150** between the nuts and the applicator mounting bar **50**. As shown in FIGURE 7, when the applicator **38** is thus installed on the machine frame **34**, the hold down flange **44** of the applicator mounting bracket **40** is located in spaced parallel relation to the adjacent flap supporting rail **36**. It is apparent from the eariler description that the spacing between the rail **36** and the hold down flange **44** may be adjusted by loosening the bolts **52** which secure the bracket **40** to the applicator mounting bar **50** and shifting the mounting bracket toward or away from the rail. In actual practice, the spacing between the rail **36** and the bracket hold down flange **44** is made just slightly greater than the thickness of the carton flaps **22**, **24**. Thus, a carton flap may pass freely between the hold down flange **44** and the adjacent flap supporting rail **36**. The applicator springs **132**, of course, urge the applicator dispenser **82** toward the adjacent rail.

Positioned in a cut-out in each flap supporting rail **36**, in line with the dispenser head **102** of the adjacent applicator, is a trough **154** containing a wick **156**. At one end of the trough **154** is a reservoir **158** to contain water for wetting the wick **156**. Normally, the springs **132** of each glue applicator urge the respective dispenser **82** toward the adjacent flap supporting rail **36** to the position illustrated in FIGURE 10, wherein the convex portion **124** of the work engaging surface **122** of its dispenser head **102** seats against the adjacent wick **156** in the region of the dispensing ports **120** in the head. This wick serves to collect any glue which may drain through the dispensing ports after the passage of each carton to the gluing station. In addition, the water in the wicks serves to prevent the glue remaining in the dispensing ports from setting and thereby blocking these ports.

During operation of the container forming machine **10**, each carton **12** formed by the machine travels through the gluing station **30** in the direction indicated by the arrow in FIGURE 1. This results in the movement of each carton flap **22** and **24** past its respective glue applicator **38** in a direction indicated by the arrows in FIGURES 10 and 11. Thus, as each carton flap travels first between the work hold down flange **44** of the applicator and the adjacent flap supporting rail **36**, this flange serves to hold the flap flat against the rail. Eventually, the leading edge of the flap engages the oblique rear surface **126** on the dispenser head **102** of the respective applicator. This produces a camming action which urges the respective dispenser assembly **58** away from the supporting rail **36**, thereby enabling the flap to pass between the dispenser head **102** of the applicator and the rail, as illustrated in FIGURE 11. The applicator springs **132**, of course, retain the convex portion **124** of the work engaging surface **122** on the dispenser head in contact with the opposing surface of the flap. Referring again, for the moment, to FIGURE 1, it will be observed that the glue tank **90** is connected, through a conduit **160**, to the glue inlets **88** of the several glue applicators **38**. The tank receives air under pressure through an air line **162**. The air pressure in the tank forces the glue from the tank, through the conduit **160**, to the applicators. Normally, the solenoid valves of these applicators are closed, whereby no glue flow occurs through the applicators. Mounted on the machine frame **34**, in advance of the glue applicators, are switches **164** which are actuated by a carton approaching the applicators. These switches are connected in circuit with solenoid valves in the applicators, in such manner that this actuation of the switches energizes and thereby opens the valves.

Accordingly, as each carton flap **22** and **24** travels past the dispensing head **102** of its respective applicator, glue is dispensed through the applicator ports **120** onto the opposing flap surface. This produces the glue stripes **26** (FIGURE 3) on the flaps. The applicator valves are then reclosed and remain closed until the valve switches **164** are operated by the following carton. As noted earlier, after pasing through the gluing station **30**, each carton enters the flap closing station **32**, wherein the glue coated flaps of each carton are folded to their final

positions, thereby to adhesively bond the flaps to one another and to the end walls of the respective carton.

Referring now more specifically to the operation of the glue applicators **38** of the invention, it is apparent that the hold down flange **44** of each applicator bracket **40** serves to retain the corresponding flap **22** or **24** of each carton **16** against its supporting rail **36** as the flap approaches the applicator head **102**. This assures proper engagement of the leading edge of the flap with the cam surface **126** of the applicator head and, thereby, proper camming of the head away from the rail to permit unrestricted movement of the flap between the head and rail. It is apparent that during this movement of the applicator head away from the rail, the applicator dispenser **82** swings about the axis of the rock shaft **62** as a center in such a way that the dispenser moves in a generally end-wise direction of the dispenser body **84**. The applicator springs **132**, of course, resiliently maintain the dispenser head **102** in continuous contact with the opposing surface of the flap to assure the proper application of the glue stripes **26** to the flap even though the latter is warped or as otherwise uneven. The hold down **136** serves to retain the flap in contact with its supporting rail **36** in the immediate vicinity of the applicator head **102**. This hold down, obviously, will tend to flatten out a warped flap as the latter travels past the applicator head. As noted earlier, the hold down **136** may be mounted at the opposite end of the applicator head, if desired, or an additional hold down **136** may be mounted at the latter end of the head in order to assure more effective retention of the flap in flat contact with its supporting rail in the immediate vicinity of the applicator head **102**.

It will be recalled that the applicator head **102** of each dispenser **82** is freely rotatable relative to the dispenser body **84** about the body axis **86**. As a consequence, the head tends to constantly align itself normal to the direction of travel of the carton flap past the head. As discussed shortly, this rotatability of the head presents an additional advantage.

As noted earlier, and as shown in FIGURE 2, the two upper glue applicators **38** apply glue to the upper surfaces of the upper carton end flaps **22** and the two lower applicators apply glue to the lower surfaces of the lower carton end flaps **24**. It will be recalled that the angle between the dispenser supporting arm **70** and the dispenser body axis **86** of each applicator may be adjusted by loosening the dispenser clamp nut **96**. This angular adjustment of each dispenser obviously regulates the angle between the dispenser axis and the surface of a carton flap engaged by the dispenser head **102**. According to the preferred practice of the invention, the dispenser **82** of each upper applicator **38** is set at such an angle relative to its supporting arm **70** that when its dispenser head **102** contacts an upper carton flap **22**, the axes of the dispensing ports **120** in the head are inclined, in the direction of travel of the flap past the head, at an oblique angle relative to a plane normal to the flap and containing the line **130** of contact between the head and the flap, as shown in FIGURE 11. When the dispenser is set at this angle, the dispensing ports **120** in the dispenser head **102** open into a narrow tapered gap, which may be readily observed in FIGURE 11, between the convex surface portion **124** of the head and the carton flap **22** engaged by the head. A small clearance is thereby provided between the trailing edge portion of each dispensing port **120**, relative to the direction of travel of the carton flap **24** past the port, and the opposing surface of the flap. Because of this clearance, each dispensing port is effective to apply a glue stripe of substantial thickness to the carton flap, as illustrated in FIGURE 11. It is apparent, of course, that the thickness of each glue stripe may be regulated by adjusting the angle between the dispenser axis **86** and the carton flap.

While glue stripes **26** having a thickness on the order of that illustrated in FIGURE 11 may be satisfactorily applied to the upper surfaces of the upper carton end flaps **22**, the thickness of the glue stripes applied to the under surfaces of the lower carton end flaps **24** must be substantially less to prevent the glue of the latter glue stripes from dripping. To this end, the glue dispenser **82** of each lower glue applicator **38** is set at such an angle relative to its supporting arm **70** that when its dispenser head **102** engages a lower carton flap **24**, the axes of the dispensing ports **120** in the head are substantially normal to the under surface of the flap. The portions of the lower applicator heads **102** trailing the dispensing ports **102** in these heads, therefore, effectively wipe the under surfaces of the lower carton flaps **24**, whereby the lower applicators apply relatively thin glue stripes to these flaps.

It is apparent, of course, that when the applicator dispensers **82** are angularly adjusted in the manner explained above, it may be necessary also to longitudinally adjust the dispenser supporting arms **70** relative to their respective supporting brackets **72** in order to provide the desired contact between the applicator heads **102** and the carton flaps. This adjustability of the dispenser supporting arms **70** and the glue dispensers **82**, in combination with the earlier described adjustability of the applicator mounting brackets **40** permits the applicators **38** to accommodate carton flaps of various thicknesses. It is apparent that when the dispenser body axis **86** is set at an angle, the ends of the dispenser head **102** can rotate up and down relative to the adjacent supporting rail **36** to accommodate a warped carton flap.

In some applications, it may be desirable to reverse the dispenser assembly **58**, as illustrated in FIGURE 12. This may be simply accomplished by loosening the set screw **80** which secures the dispenser supporting arm **70** in its mounting bracket **72** and withdrawing the arm from the bracket. The dispenser assembly is then turned end for end and the dispenser head **102** is rotated through 180° relative to its dispenser body **84**. Finally, the angle of the dispenser supporting arm **70** relative to the dispenser **82** is reversed and the arm is reinserted into its mounting bracket **72**. This results in the reversed positioning of the dispenser assembly, illustrated in FIGURE 12.

It is significant to note that each of the glue applicators **38** comprises a unitary structure which may be mounted in any convenient location on a carton forming machine. As a consequence, each applicator may be mounted in a readily accessible position, wherein the applicator may be easily removed for cleaning or servicing, when desired. The labor time required to service and repair the applicator is thereby minimized. This saving of labor time is particularly important in a carton forming machine having a number of glue applicators, as does the carton forming machine illustrated in FIGURE 1.

As noted earlier, while the invention has been described in connection with the use of the present liquid applicator in a carton forming machine for dispensing glue stripes onto carton flaps, the applicator is not limited to this use. Thus, it is apparent that the present applicator may be employed to dispense any liquid or semi-liquid and may be used to apply such liquids and semi-liquids to various types of workpieces other than carton flaps.

Those versed in the art will appreciate that the present invention achieves the objects and realizes the advantages hereinbefore mentioned.

Although a specific embodiment of the present invention has been illustrated and described herein, it will be understood that the same is merely exemplary of presently preferred embodiments capable of attaining the objects and advantages hereinbefore mentioned, and that the invention is not limited thereto; variations will be readily apparent to those versed in the art, and the invention is entitled to the broadest interpretation within the terms of the appended claims.

The inventor claims:

1. A liquid applicator comprising:

a mounting bracket,

means for removably mounting said bracket on a supporting frame,

a liquid dispenser including a body having a central axis and an inlet for connection to a supply of liquid to be dispensed, and a dispensing head on one end of said body having a work engaging surface presented in one endwise direction of said body and liquid dispensing ports communicating with said inlet and opening through said surface, said dispensing head being elongated in a direction normal to said body axis and said body axis being located approximately midway between the ends of said head,

said dispensing ports being spaced along said head,

said head being rotatable on said axis relative to said body,

means mounting said dispenser on said bracket for movement in a generally end-wise direction of said body, said mounting means including first adjustment means for angularly adjusting said dispenser relative to said bracket on an axis transverse to the direction of end-wise movement of said dispenser, second adjustment means for adjusting said dispenser relative to said bracket in a transverse direction of said latter axis, and third adjustment means for adjusting said dispenser relative to said bracket in a direction parallel to said latter axis, and

means for urging said dispenser in said one end-wise direction of said body.

2. An applicator according to claim 1 wherein:

said last mentioned means comprises spring means acting between said bracket and dispenser.

3. An applicator according to claim 1 including:

externally controllable valve means mounted on said dispenser for controlling liquid flow from said inlet to said dispensing ports.

4. An applicator according to claim 1 wherein:

said work engaging surface of said dispenser head includes a forward generally cylindrically curved convex surface portion centered on an axis of curvature normal to said body axis and a rear generally flat surface portion parallel to said axis of curvature and merging tangentially with said convex surface portion, and

said dispensing ports opening through said convex surface portion.

5. An applicator according to claim 1 wherein:

said work engaging surface of said dispensing head includes a forward generally cylindrically curved convex surface portion centered on an axis of curvature normal to said body axis and a rear generally flat surface portion parallel to said axis of curvature and merging tangentially with said convex surface portion,

said dispensing ports opening through said convex surface portion,

the axis of said dispensing ports being inclined, in a forward direction of said dispenser head, at an oblique angle relative to a plane parallel to said body axis and containing said axis of curvature, and

said flat surface portion being located at the rear side of said plane and being inclined toward said dispenser body at an acute angle relative to a second plane tangent to said convex surface portion along a line located between said dispensing ports and the line of intersection of said first plane with said work engaging surface, whereby said flat surface portion forms a camming surface which is obliquely presented in the rear direction of said dispensing head.

6. A liquid applicator comprising:

a mounting bracket,

means for removably mounting said bracket on a supporting frame,

a liquid dispenser including a body having a central axis and an inlet for connection to a supply of liquid to be dispensed, and a dispensing head on one end of said body having a work engaging surface presented in one end-wise direction of said body and liquid dispensing ports communicating with said inlet and opening through said surface,

said dispenser head is elongated in a direction normal to said body axis and said body axis is located approximately midway between the ends of said head,

said dispensing ports being spaced along said head, and

said head being rotatable relative to said body on said body axis,

a dispenser supporting arm,

means rotatably mounting one end of said arm on said bracket for swinging on a rotation axis generally normal to the longitudinal axis of said arm, said arm mounting means includes adjustment means for adjusting said arm and dispenser as a unit along said rotation axis,

means mounting said dispenser on the opposite end of said arm with said body axis disposed in the plane normal to said rotation axis and extending transversely of said arm axis whereby said dispenser is movable in a generally end-wise direction of said body, said dispenser mounting means includes adjustment means for angularly adjusting said dispenser relative to said supporting arm on an axis parallel to said rotation axis, and

means for urging said dispenser in said one end-wise direction of said body.

7. An applicator according to claim 6 wherein:

said arm mounting means comprises a rock shaft, means rotatably mounting said rock shaft on said bracket, and means securing said one end of said arm to said shaft, and

said urging means comprises spring means acting between said bracket and rock shaft.

8. An applicator according to claim 6 wherein:

an adjustable limit stop coacting between said arm and bracket for limiting movement of said dispenser relative to said bracket in said one end-wise direction of said dispenser body.

9. An applicator according to claim 6 including:

valve means mounted on said dispenser for controlling liquid flow from said inlet to said dispensing ports.

10. An applicator according to claim 6 wherein:

said work engaging surface of said dispensing head includes a forward generally cylindrically curved convex surface portion centered on an axis of curvature normal to said body axis and a rear generally flat surface portion parallel to said axis of curvature and merging tangentially with said convex surface portion,

said dispensing ports opening through said convex surface portion,

the axes of said dispensing ports being inclined, in the forward lateral direction of said dispenser head, at an oblique angle relative to a plane parallel to said body axis and containing said axis of curvature, and

said flat surface portion being located at the rear side of said plane and being inclined toward said dispenser body at an acute angle relative to a second plane tangent to said convex surface portion along a line located between said dispensing ports and the line of intersection of said first plane with said work engaging surface, whereby said flat surface portion forms a camming surface which is obliquely presented in the rear lateral direction of said head.

11. A liquid applicator comprising:

a generally L-shaped mounting bracket including a supporting flange having a front surface and a work hold down flange extending rearwardly from one edge of said supporting flange and having a work engaging surface disposed in a transverse plane of said front surface,

means for mounting said bracket on a supporting frame in a position wherein said work engaging surface of said hold down flange is disposed to engage one surface of a workpiece traveling in a forward direction relative to said bracket,

a rock shaft,

means rotatably supporting said rock shaft on said front surface of said supporting flange with the shaft axis generally parallel to and spaced from said plane of said work engaging surface,

a dispenser assembly including a supporting arm, an arm mounting bracket having a first opening slidably receiving said rock shaft and a second opening normal to said first opening and slidably receiving one end of said arm, whereby said arm bracket is adjustable along said shaft and said arm is longitudinally adjustable relative to said arm bracket, means adjustably securing said arm bracket to said shaft, means adjustably securing said arm to said arm bracket, a dispenser body having a central axis disposed in a plane normal to the axis of said rock shaft, means securing said body to the opposite end of said arm for angular adjustment of said body relative to said arm on an axis parallel to the axis of said rock shaft, said body having an axial bore opening through one end of the body, an elongate applicator head having a cylindrical stem intermediate its ends on an axis normal to the longitudinal axis of said head, said stem being rotatably fitted in said body bore, means rotatably securing said stem in said body bore, said head having on the side opposite said stem a work engaging surface presented in one end-wise direction of said body, said latter work engaging surface including a forward convex surface portion centered on an axis of curvature extending lengthwise of said applicator head and normal to said body axis and a rear flat surface portion parallel to said axis of curvature and merging tangentially with said convex surface portion, said head having dispensing ports spaced therealong and opening through said convex surface portion, the axes of said dispensing ports being inclined, in the forward direction of said head, at an oblique angle relative to a plane parallel to said body axis and containing said axis of curvature, said flat surface being inclined toward said dispenser body at an oblique angle relative to a plane tangent to said convex surface portion along a line located between said dispensing ports and the line of intersection of said first plane with said line of work engaging surface, whereby said flat surface forms a camming surface obliquely presented in the rear direction of said head, said dispenser body having an inlet communicating with said dispensing ports and adapted for connection to a supply of liquid to be dispensed, and externally controllable valve means mounted on said dispenser body for controlling liquid flow from said inlet to said ports, and

spring means connected between said rock shaft and said mounting bracket in a direction to resiliently urge said dispenser head in said one end-wise direction of said body.

12. The combination according to claim **11** including:

a water impregnated wick mounted on said member, flush with said surface thereof, in a position to engage said work engaging surface of said dispenser head in the region of said dispensing ports.

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