Dec. 20, 1966 W. GROBMAN ETAL 3,292,503

GLUED FLAP BOX BLANK AIR HOLD DOWN MECHANISM

Filed Oct. 14, 1963

FIG. 2.

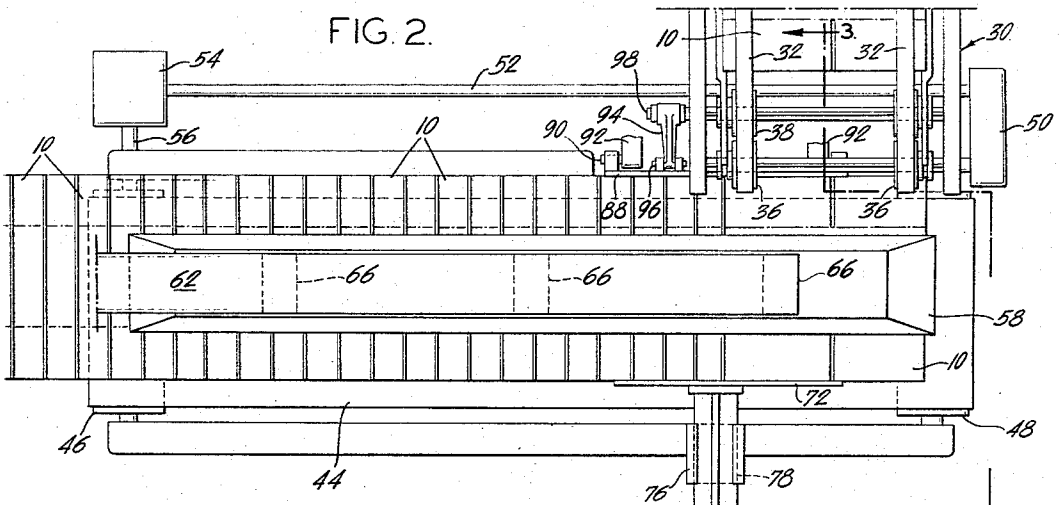


FIG. 1.

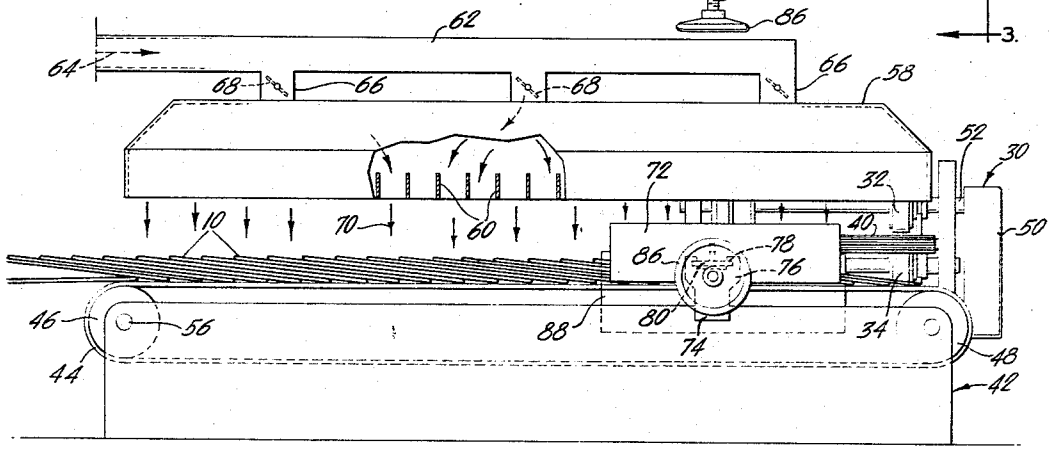


FIG. 4.

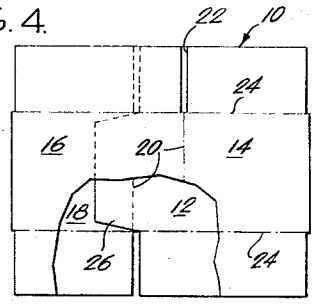


FIG. 3.

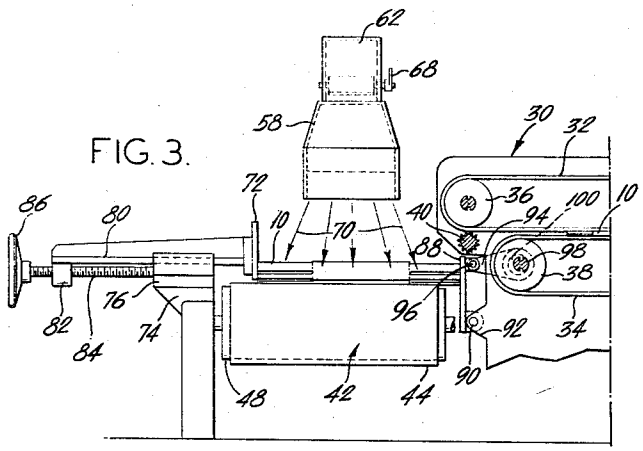
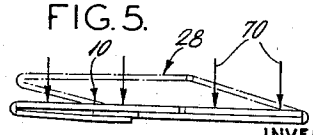


FIG. 5.



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GLUED FLAP BOX BLANK AIR HOLD DOWN MECHANISM

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The present invention relates to glued flap box machinery and more particularly to an improved machine to provide air hold down means at a compression section.

Heretofore folder gluer machines have been utilized which take a pre-scored box blank of various materials such as corrugated board, cardboard, solid board and others, and wherein the box blanks comprise four panels in side-by-side relation and on an edge of which a glue flap is provided, and apply glue to the flap and subsequently fold the blank into a folded condition, and subsequently hold down means are utilized to maintain the blank in folded condition until the glue has sufficiently set so as to prevent improper or inadequate glueing. At the same time precautions are taken to insure proper alignment or squaring of the panels in the folded blank.

The present invention is directed primarily to the hold down means referred to above, and a construction and operation are provided which eliminates previous drawbacks such as mechanical hold down means which utilized pressure wheels or the like which can result in crushing and/or marring of the printing.

To this end the present invention utilizes an air hold down construction at a compression section following a folder gluer section in which box blanks have been glued and folded to form a folded box blank.

An object of the invention is to provide air hold down means to prevent the glued joint from springing open after ejection from the gluer folder section, and in addition apply pressure to the glued joint during a squaring operation so that the squared box blank will stay in squared condition.

An additional feature of the invention eliminates the necessity of mechanical hold downs such as wheels which necessitate adjustment to accommodate different sizes of boxes.

Additional objects and advantages of the present invention will be more readily apparent from the following detailed description of an embodiment thereof when taken together with the accompanying drawings in which:

FIG. 1 is a side elevational view of the air hold down device of the present invention, portions thereof being broken away for clarity;

FIG. 2 is a top plan view of the device of FIG. 1;

FIG. 3 is a view taken on line 3, 3 of FIG. 2 and showing its arrangement with respect to the discharge end of a folder gluer section;

FIG. 4 is a plan view of a folded box blank of a type adapted to be processed in the apparatus of the present invention, with a portion thereof being removed for clarity; and

FIG. 5 is a side view of the folded box blank of FIG. 4, schematically depicting the direction of air hold down pressure, and showing in broken lines a folded box blank in the absence of hold down pressure thereon.

Referring now to the drawings, there is shown in FIG. 4 a folded box blank generally designated **10** of a type adapted for processing with the present invention, and which has previously been treated in the folder gluer section of the machine by application of glue to the flap and then folded as shown in FIG. 4 and in solid lines in FIG. 5. The box blank used for illustrative purposes includes four adjacent panels **12**, **14**, **16** and **18**, all formed from

a single sheet of material and separated or defined by score lines **20**. Slots **22** are also provided to define individual end flaps for closure of the box subsequent to erection and which are further defined by score lines as at **24**. On the end of panel **12** a glue flap **26** has been provided and usually formed in a printer slotter section of an overall machine. A gluer folder section of any known type can be used to apply glue to the flap **26** and subsequently fold the blank to form the folded blank as shown in FIGS. 4 and 5. Ordinarily there are two criterions which must be met subsequent to this processing which include means for maintaining proper contact between the glued flap and the abutted panel until such time as the glue has sufficiently set to prevent dislodgment and/or misalignment of the panels, since the glue as applied is in such liquid form that fast adherence does not immediately occur. Additionally there is the problem of possible spring-back of the glued joint as schematically depicted in broken lines at **28** in FIG. 5. The natural resiliency of the material from which the box blank is formed tends to cause this spring-back at the fold or score lines as is well known in the art.

The gluer folder section is fragmentarily shown at **30** and in a usual manner includes upper and lower belt runs **32** and **34** entrained over cylinders **36** and **38**. These belts coact to convey the blank **10** to a rejection point. A resilient toothed wheel **40** is positioned at the discharge end to coact with the lower run of belt **32** and provides sufficient friction to insure that the blank will be discharged from the end of this section.

The so ejected or discharged blanks are dropped onto a shingling conveyor generally designated **42** for further treatment and movement to a stacking station. It is this region in the overall machine wherein the present invention resides.

A continuous belt **44** is entrained over rotatably mounted end cylinders **46** and **48**. The belt is adapted to be driven at a slower rate of speed than the belts in the gluer folder section so as to provide sufficient time for setting of the glue and utilizing as short a run as possible. This results in a shingling or stacking arrangement of the blanks as seen in FIG. 1 of the drawings and this arrangement additionally aids in preventing spring-back of the blanks. The drive is from the main drive of the folder gluer by means of a speed reducer schematically shown at **50** which is operatively connected with the main drive. A shaft **52** is driven from speed reducer **50** and cylinder **46** is driven through transmission **54** and cylinder shaft **56**. The blanks when discharged from the folder gluer section are dropped onto the moving belt **44** and as pointed out above, are in a shingled or stacked relation due to the relative speeds of the belts.

Heretofore similar apparatus has utilized wheels or the like along this conveyor run to prevent spring-back of the blanks until the glue has been set or other mechanical hold down means could be used. Ordinarily however such mechanical hold down means were known to crush the material of the blanks and/or mar the printing as previously applied to the blank. In order to overcome this, the present invention utilizes an air device to exert downward pressure. In the embodiment shown for illustrative purposes, this includes a hood **58** having internally arranged louvers **60**. A header **62** is connected to a suitable source of air such as a blower which preferably will supply air at low pressure and high volume to the header **62** as indicated by the arrow at **64** and thence into the hood **58** by branch conduits **66** arranged at various locations and in which valves **68** can be provided to control the flow of air to various sections of the hood. By this arrangement, air is forced downwardly as indicated by arrows **70** substantially perpendicular to the upper surfaces of the folded and glued box blanks on the shingling

conveyor. This has proven very effective in preventing spring-back of the blanks. It is to be understood that while the hood is shown as extending substantially from one end of the shingling conveyor to the other, that the invention is not to be considered limited thereto since, if desired, the flow of air could be restricted to any portion of the shingling conveyor but preferably including that area where the blank is first dropped onto the conveyor, at which point the glue has not become set. It is also possible to vary and control the flow of air at different areas or regions of the shingling conveyor as dictated by conditions prevailing. It will be noted that the bottom of the hood is above the conveyor a substantial distance which permits adjustments of squaring means for the boards as will appear hereinafter without having to move the hood. It has been found in practice that this invention is especially useful on small boxes where panels are relatively short, although it works equally well on all sizes of cartons and is less complex and cumbersome than mechanical methods heretofore used.

An additional feature of the present invention is to provide means whereby perfect alignment of the various portions of the box blank is insured so that the subsequently erected box will be perfect. To this end, squaring means are provided in the area of initial dropping of the blanks onto the shingling conveyor.

The squaring means includes a vertically mounted squaring plate **72** aligned with the longitudinal axis of the shingling conveyor. A bracket **74** is mounted on the side frame of the shingling conveyor and carries at its upper end a U-shaped member **76** which has formed therein coacting grooves **78** on either side. A plate or spline member **80** is slidably mounted in the grooves and carries at its outer end an internally threaded collar **82** in threaded engagement with threaded shaft **84** which is rotatably carried in the bracket member. The shaft has a handwheel or the like **86** which upon rotation will serve to move squaring plate **72** toward or away from the inner end of the belt **42**. This permits adjustment of the squaring plate to accommodate different widths of box blanks in an obvious manner. The folded blanks discharged from the folder gluer section are impinged against the squaring plate **72**. In order to insure the squareness of the box blanks while the adhesive is still not completely set, a reciprocating squaring plate **88** is provided which extends along the run of the belt in substantially the same region as squaring plate **72** but on the opposite side thereof. The plate **88** is pivotally mounted on shafts **90** journalled in bearings generally designated **92**. An arm **94** is pivotally connected to plate **88** as indicated at **96**. This arm is journalled on an extended end of shaft **98** of cylinder **38** by means of an eccentric **100**. As the shaft **98** rotates accordingly the plate will be reciprocated in a manner to abut against the side of blanks deposited upon the shingling conveyor and act to align the edges by cooperation with the plate **72**. During this operation, the air impinging upon the upper surfaces of the box blanks will insure that the box blank will be pressed down and when squared will maintain a squared condition.

The air pressure, when using a hood as shown, will continue to apply pressure to the glued joint while it is on the conveyor and the glue is setting up so that upon discharge at a stacking station the joint will be set and the final setup of the adhesive takes place in the bundle. The use of the air pressure also serves to press down on the blanks on the conveyor to increase frictional contact therewith to prevent slippage. It will also be apparent that the air utilized could, if desired, be heated to facilitate setting of the glue.

While a particular embodiment of the invention has been hereinabove described and shown in the drawings, it will be apparent that minor changes in structure could be utilized without departing from the spirit and scope of the invention as defined in and limited solely by the appended claims.

We claim:

1. In a box blank folder gluer machine having a gluer folder section, a folded blank conveyor positioned at the discharge end of the gluer folder section to receive glued and folded blanks therefrom, and means positioned above said conveyor in the region where blanks are deposited thereon operable to direct a blast of air downwardly onto the upper surfaces of folded and glued blanks thereon as they are positioned on the conveyor to prevent the glued joint from springing open until the glue has been at least partially set.

2. In a box blank folder gluer machine as claimed in claim **1**, box blank squaring means positioned on the sides of the conveyor where the blanks are deposited thereon operable to square the box blanks, said air blast means being operable to apply downward pressure on a box blank while it is being squared.

3. In a box blank folder gluer machine as claimed in claim **2**, said air blast means extending over substantially the entire run of the conveyor to apply pressure to the glued joint of the box blank while being conveyed to the discharge end of the conveyor.

4. In a box blank folder gluer machine as claimed in claim **3**, said air blast means including control means whereby pressure and flow distribution can be varied for optimum operation.

5. A glued flap box blank hold down mechanism comprising a gluer folder section, a moving conveyor for receiving glued and folded box blanks, said conveyor adapted to convey glued and folded box blanks to a discharge station, the direction of movement of said conveyor being substantially perpendicular to the direction of movement of the glued and folded box blanks as delivered from the folder gluer, means positioned above said conveyor in the region where blanks are deposited thereon operable to direct a blast of air downwardly onto the upper surfaces of blanks thereon as they are positioned on the conveyor to prevent the glued joint from springing open until the glue has been at least partially set.

6. A glued flap box blank hold down mechanism comprising a moving conveyor adapted to receive glued and folded box blanks and convey them to a discharge station, means positioned above said conveyor in the region where blanks are deposited thereon operable to direct a blast of air downwardly onto the upper surfaces of blanks thereon as they are positioned on the conveyor to prevent the glued joint from springing open until the glue has been at least partially set, box blank squaring means positioned on the sides of the conveyor where the blanks are deposited thereon operable to square the box blanks, said air blast means being operable to apply downward pressure on a box blank while it is being squared.

7. A glued flap box blank hold down mechanism as claimed in claim **6**, said air blast means extending over substantially the entire run of the conveyor to apply pressure to the glued joint of the box blank while being conveyed to the discharge end of the conveyor.

8. A glued flap box blank hold down mechanism as claimed in claim **7**, said air blast means including control means whereby pressure and flow distribution can be varied for optimum operation.

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