

**Oct. 17, 1967**

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**3,347,732**

APPARATUS FOR THE MANUFACTURE OF CORRUGATED PAPERBOARD

Filed Dec. 17, 1965

3 Sheets-Sheet 1

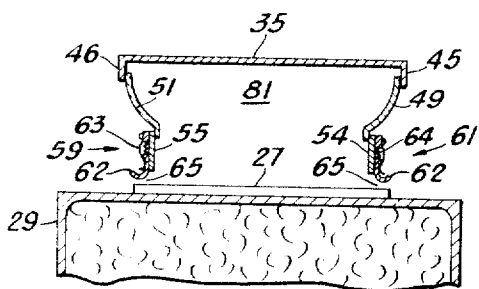
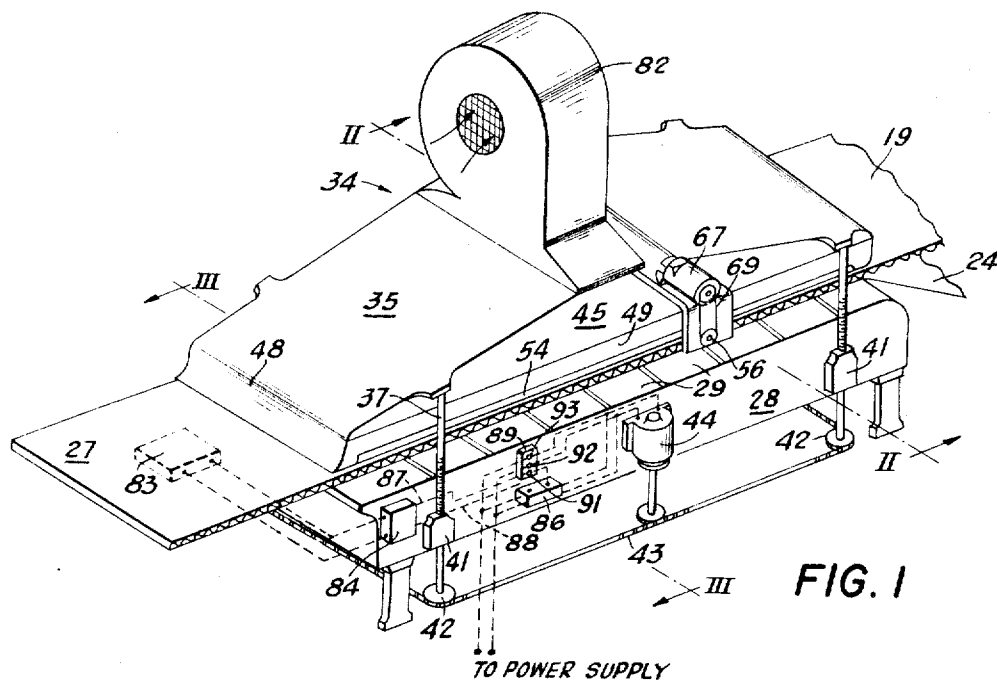


**FIG. 3**

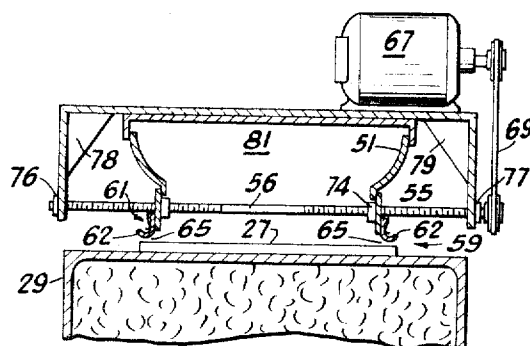


**FIG. 2**

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3 Sheets-Sheet 2

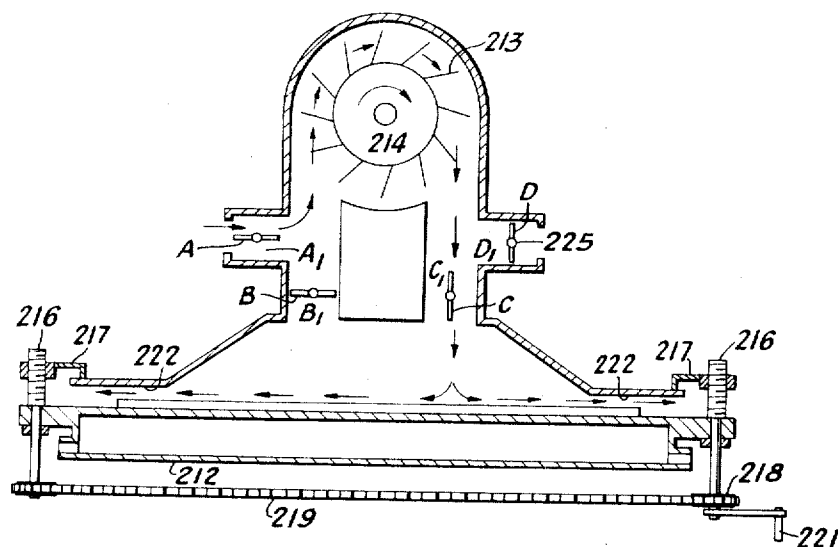


FIG. 4

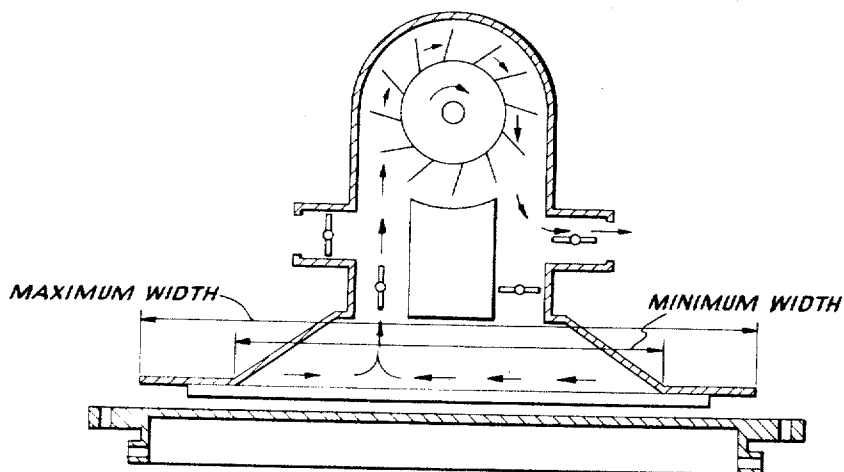


FIG. 5

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3 Sheets-Sheet 3

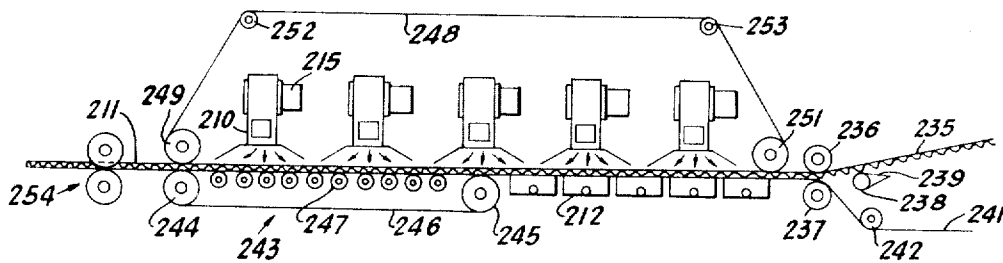


FIG. 6

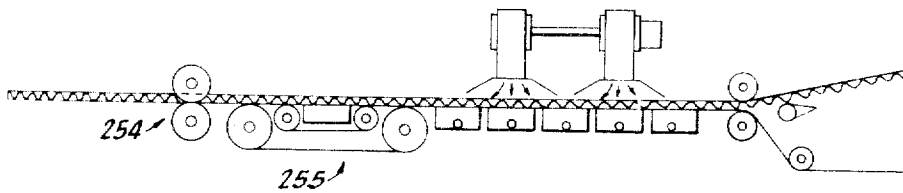


FIG. 7

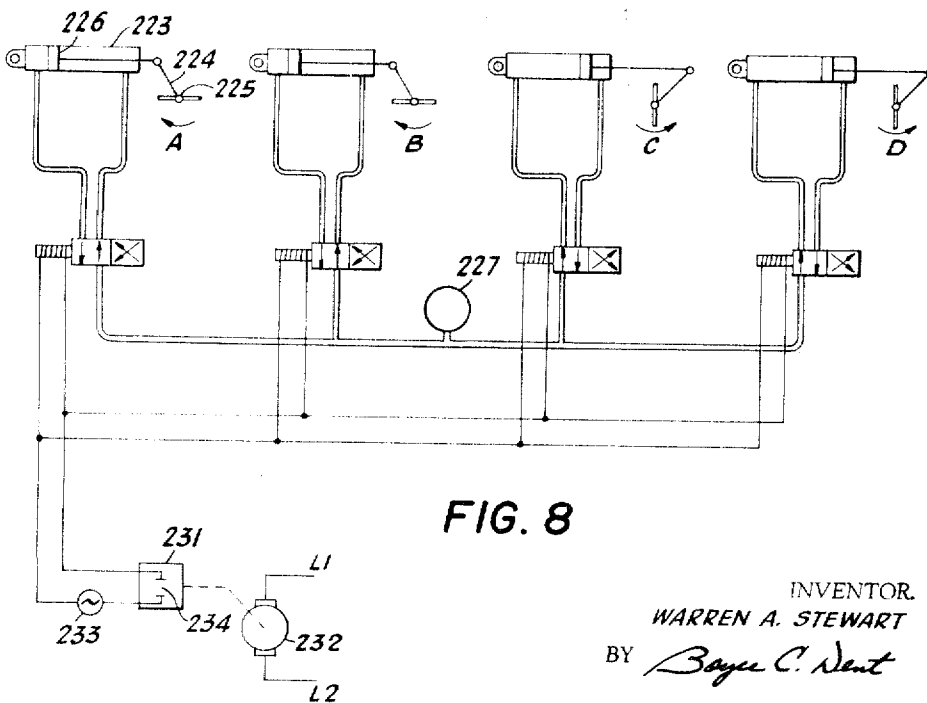


FIG. 8

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3,347,732

## APPARATUS FOR THE MANUFACTURE OF CORRUGATED PAPERBOARD

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8 Claims. (Cl. 156—497)

### ABSTRACT OF THE DISCLOSURE

Apparatus for applying pressure to one liner of a corrugated web being formed to facilitate the removal of moisture from the combined web comprising a heating surface supporting the medium, a hood spaced from said heating surface defining a plenum through which liner and corrugated medium passes, blower means for applying air pressure to the liner under the hood, adjustment means providing a space between the hood and the liner to control the escape of air from the plenum, and damper means operative to reverse the air pressure to create a vacuum for lifting the web away from the heating surface during web stoppage.

This invention relates to a device for applying heat and pressure to accelerate the bonding together of single-face board and a second liner to form a double-face corrugated paperboard web and is a continuation-in-part of my co-pending application Ser. No. 186,518, filed Apr. 10, 1962, now abandoned.

In the manufacture of corrugated board, glue is applied to one side of the fluted center element, a liner is attached to the glued side and the assembly is heated to set the glue and produce single-face board. Glue is then applied to the tips of the flutes of the other side of the center element and a second liner is pressed against the single-face in a double-backing operation. The completed corrugated web is drawn through a curing operation and finally slit into strips of the desired width and cut to the desired length in a cut-off mechanism.

The rapid production of corrugated paperboard requires the setting rate of the glue bond between the single-face and the liner to be accelerated to a substantial degree, usually by the use of heat. Pressure is also applied to the web to insure firm contact between the single-face and the liner and to improve the transfer of heat from the heating surface to the web. Accordingly, the newly formed corrugated web is drawn over a long series of steamheated plates or platens in a modern double-backer and pressure equal to about six inches of water is simultaneously applied to the top side of the board. This pressure has heretofore been mechanically applied to the board by a plurality of rollers and a long continuous belt, but since the application of pressure to the board is not uniform, the total pressure that is applied to the board must be kept low to prevent crushing of the newly assembled double-face board as it passes beneath the individual rollers. The rollers are built into the double-backer so that when a change is required in the amount of pressure to be applied to the board, substantial expense and loss of time result. Additionally, some of the moisture driven from the lower portion of the advancing board as a vapor condenses on the underside of the upper liner and some of this moisture passes on through the upper liner to the belt to cause the belt to become saturated and, instead of removing the moisture, to create a barrier to limit the further escape of moisture from the upper portion of the board. Consequently, the upper portion of the double-face web, particularly the upper liner, acquires a higher moisture content than the lower por-

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tion and retains this moisture during the period when the glue bond between the single-face and the bottom liner hardens. After the board leaves the double-facer and passes to the slitter and cut-off knives and is later stacked awaiting distribution, the moisture which had accumulated in the upper portion of the double-face leaves the board causing the upper liner to shrink and imposing a stress in the board which causes the board to warp. Boards which have become warped in this manner cause difficulties in the subsequent processing operations such as in the automatic handling processes involved in the production of cardboard blanks.

Another disadvantage of the belt and roller pressure device is that during times when the web is stopped, as for example, when the various machines are being adjusted for a different size order, the web lying against the heated surface must be lifted with mechanical lifters to prevent its being scorched. Generally, these lifters leave impressions in the web which are detrimental to its appearance when it is made into finished cartons.

It is, therefore, the object of the present invention to provide a device for applying controlled uniform pressure to the upper face of a corrugated web.

The invention contemplates a housing that is supported over the upper side of a double-face corrugated web as it passes through the hot section of a double-backer in contact with the heating surface, the housing adjustable vertically relative to the surface of the web, the housing and the surface of the web defining a plenum and means for supplying gas to the plenum, including means for selectively placing the gas under a positive pressure in said plenum to apply said pressure uniformly across the upper surface of the web and to control the pressure whereby the web is placed under a positive pressure to increase the engagement with the heating surface or under a negative pressure to pull the web away from the heating surface.

The above and further objects and novel features of the invention will appear more fully from the following detailed description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are not intended as a definition of the invention but are for the purpose of illustration only.

In the drawings wherein like parts are marked alike: FIGURE 1 is a projection showing an embodiment of the present invention,

FIGURE 2 is a sectional view taken on line 2—2 of FIG. 1,

FIGURE 3 is a sectional view taken on line 3—3 of FIG. 1,

FIGURE 4 is a schematic illustration of another embodiment of the present invention in lateral cross-section as it appears during normal operation,

FIGURE 5 is a schematic illustration of FIG. 4 as it appears during stoppage of web travel,

FIGURE 6 is a schematic illustration of the invention applied to a conventional double-backer with only the weight rolls removed,

FIGURE 7 is a schematic illustration of the invention applied to a double-backer utilizing a vacuum operated pulling device and with both the weight rolls and upper belt removed, and

FIGURE 8 is a schematic illustration of controls used to operate the damper mechanism of FIG. 4.

In the manufacture of corrugated board, a stock strip in a conventional manner is treated with steam and passed between complementary toothed corrugator rolls to impress corrugations or flutes in the strip. Then adhesive is applied to the outer tips of the flutes on one side of the strip by a doctor roll. These outer tips of the

flutes are brought into contact with a liner and the assembly is firmly joined to produce a single-face web which advances over a heating surface and past another glue station for the initiation of the double-backing operation where the single-face 19 is united with second liner 24 to produce the double-face board 27. Then, newly formed board 27 is drawn over the steam chest 28 whose surface comprises a long series of steamheated plates 29. Pressure and heat are simultaneously applied to the moving web to urge union of the web components and to cure the glue bonding together the double-face assembly. A conventional pull-off apparatus pulls board 27 through this heating stage.

An embodiment of the invention for applying pressure to board 27 in the hot section is shown in projection in FIG. 1. Hood 34 is positioned by four adjusting screws 37 at the desired height over the web or board 27. Each of the adjusting screws is engaged within a threaded bore which extends through each of the screw housings 41 that are affixed to the outer shell of the steam chest 28. A drive sprocket 42 at the lower end of each screw engages with chain 43 which is driven by a reversible motor 44. Actuation of chain 43 by motor 44 simultaneously rotates all adjusting screws 37.

As shown in FIGS. 2 and 3, hood 34 is comprised of rigid top 35, sides 45 and 46, and curved lead-in and exit plates 47 and 48. These rigid elements are preferably fabricated of rust-resistant metal but may be made of wood, reinforced plastic or other stiff material. Depending from sides 45 and 46 and connected to side plates 54 and 55 are flexible sheets 49 and 51 of rubber or gas-tight fabric such as canvas. Flexible sheet members 49, 51 permit adjustment of the lateral dimension of the pressure chamber by means of adjusting screw shaft 56 to insure that substantially the entire area of the board 27 under hood 34 is subjected to uniform pressure during the passage of the board over steam chest 28. To accommodate the lateral movement of side plates 54, 55, the flexible sheet members 49, 51 return around the far ends of side plates 54, 55 and they may be arranged with appropriate pleats to provide greater freedom of lateral movement. Although only a single adjusting screw shaft 56 is shown any number of such shafts driven by a common belt or otherwise simultaneously operable may be employed to provide sufficient rigidity for side plates 54, 55.

Side plate members 54, 55 may also support seal assemblies 59 and 61, which are optional. When used such seals extend for the length of members 54, 55 along the sides of hood 34. Each seal may, for example, comprise a J- or L-shaped member 62 in sliding engagement with each of plates 54 and 55 in combination with strap springs 63 and coil springs 64. A plurality of strap springs 63 are spaced longitudinally along members 62 urging these members into contact with rigid plates 54 and 55 and an equal number of coil springs 64 extend between plates 54, 55 and member 62 to partially offset the weight of member 62 thereby enabling the upward movement of member 62 under the application of small forces as may be exerted thereon during the passage thereunder of imperfections or wrinkles in board 27.

The underside of member 62 may be disposed as desired relative to the surface of board 27 by raising or lowering hood 34 to adjust the extent of longitudinally extending gap 65 along either side of hood 34. By adjusting the extent of gap 65 the pressure within hood 34 and thereby the amount of force to bias board 27 against the surface of plates 29 may be controlled to an infinite degree.

Board temperature and board speed are two parameters, either of which may be sensed for automatic control of the direction and extent of rotation of motor 44 to vary gap 65 to provide the optimum rate of drying for board 27. A further way in which this control may be exercised is by admitting the pressurizing air to hood

34 at a controlled rate with the rate of admission of air under pressure being determined by either of the two parameters mentioned above.

When it becomes necessary to provide for a corrugated web of different width, reversible motor 67 drives adjusting screw shaft 56 by means of belt 69 passing over pulleys 71 and 72. Screw shaft 56 passes through threaded blocks 73 and 74 in side plates 54 and 55 and is received in bearings 76, 77 mounted in reinforced overhanging brackets 78, 79 which are rigidly affixed to the top of hood 34. The ends of shaft 56 are threaded in opposite directions, the one end having a left-hand thread and the other end having a right-hand thread. Thus, when motor 67 is energized to rotate shaft 56 in a clockwise direction (as viewed from the pulley end of the shaft), threaded blocks 73 and 74 are moved apart along the threads of rotating shaft 56, moving side plates 54, 55 away from each other with flexible sheet members 49 and 51 readily conforming to this movement thereby increasing the size of the housing, the plenum and the area of coverage of board. Energization of motor 67 in the opposite direction will reduce the distance between side plates 54 and 55, reducing the size of the housing, the plenum and the area of board coverage.

A conventional temperature-sensing device, such as pyrometer 83, is located adjacent the surface of board 27 near its point of exit from the hot section to generate a signal voltage corresponding to the temperature of board 27. This signal voltage, after being amplified by amplifier 84, is conducted via electrical leads 87, 88 to motor control 86. Lead 87 has a conventional switch 89 connected therein so that push button 91 will either close or open switch 89 with respect to lead 87 to connect or disconnect the automatic control device. When button 91 is pressed to close switch 89, that portion of switch 89 ordinarily controlled by manual control push buttons 92 and 93 is moved to a neutral position thereby insuring automatic control. If either of manual control buttons 92 or 93 are pushed to rotate motor 44 in the desired direction, the portion of switch 89 controlled by button 91 is moved to its open position thereby disconnecting the automatic control device and enabling manual control of motor 44.

In operation, button 92 is pushed to actuate motor 44 to drive chain 43 to rotate adjusting screws 37, thereby raising hood 34 a distance enabling the insertion or threading of board 27 between hood 34 and steam chest 28. Button 93 is then pushed to actuate motor 44 whereby chain 43 is driven in the opposite direction to lower hood 34 until the proper gap 65 has been set between member 62 and board 27. Motor 67 is energized to properly set the spacing of side plates 54 and 55 to place each member 62 close to one edge of the double-face web 27. Steam will already have heated platens 29 to the proper temperature. Air is applied to plenum 81 under a pressure of about 1 to 6 inches of water (preferably from 4 to 5 inches of water) by running blower 82 at the requisite speed. The double-facer is ready for operation. As soon as pull-off apparatus (not shown) begins to draw board 27 over platens 29, button 91 is pushed to switch control of the pressure in plenum 81 automatically by way of pyrometer 83, amplifier 84, motor control 86, motor 44, chain 43 and adjusting screws 37. As an alternate construction (not shown) motor control 86 can be employed to control a variable speed motor employed to drive blower fan 82 or to provide control for a servomotor to position a draft gate positioned between blower 82 and plenum 81. This construction would be directed toward governing the admission of air under pressure to the plenum chamber in contrast to the embodiment shown in FIG. 1 wherein the mechanism is one of governing the rate of leakage of pressurized air from the plenum chamber.

During the operation, the newly formed double-face web 27 is pulled over steam chest 28 and is urged against

the heated platens 29 under the positive uniform pressure from plenum 81 applied over substantially the entire surface of board 27 under hood 34 at any instant of time. Air leaking out through gap 65 carries with it much of the moisture driven from the upper liner by the heated platens 29. If the air used to pressurize plenum 81 is preheated, it will absorb a greater amount of moisture per unit volume and carry this moisture with it as it escapes through gaps 65, 65. Make-up air must, of course, be supplied by blower 82 so the air under hood 34 will not be saturated to a degree to hinder the drying operation.

Turning now to FIG. 4, there is illustrated another embodiment of the invention. Hood 210 covers the moving double-face web 211 as it is drawn over steam chests 212 in the double-backer. Hood 210 contains a fan 213 mounted upon shaft 214 of driving motor 215 which is mounted to a side wall of hood 210. Air pressure generated by fan 213 is directed downward against web 211, thereby pressing it against steam chests 212. Hood 210 is supported slightly above the web 211 for were air forced against the web with no means of escape, it could create excessive pressure against the web, and crush it, and possibly stall the fan drive motor. Sliding friction between the hood 210 and web 211 is avoided by spacing the hood from the web. Heating of the glue at the interface of the single-face and liner drives moisture into the upper face of the web, and some of the moisture and heat are dissipated by the flow of air escaping from beneath hood 210.

The distance between the hood 210 and web 211 is a function of the pressure required to force the web against the steam chests 212 to accomplish satisfactory bonding. A pressure equal to six inches of water has been found to be optimum although as little as three inches minimum and as much as fifteen inches maximum will work. If a pressure less than the minimum is used, the single-face will not be pressed tightly enough against the liner to result in an acceptable bond. If more than the maximum pressure is used, the web can be crushed. To attain the desired optimum pressure, a space of one-sixteenth to one-eighth inches is provided between the bottom of hood 210 and the upper face of web 211. Of course, a larger space may be used if a larger horsepower motor is used to drive the fan. In practice, however, it has been found that a space of a few thousandths of an inch up to one-quarter inch will give the desired result using a five horsepower motor. Another advantage of having a space between the bottom of the hood and the web is that the bottom of the hood need not be machined since the magnitude of the space is not critical.

The space between the bottom of the hood 210 and the upper surface of web 211 is made adjustable since different types of adhesives and papers may require different pressures to achieve an optimum bond. Generally, low pressures are used when light-weight paper is being used for the liner and high pressure is used with heavy liner. The adjustment is accomplished by providing threaded screws 216 rotatably mounted in the steam chests 212 and threadedly engaged in suitable brackets 217 secured to the four corners of the hood 210. On the opposite end of the screws are secured sprockets 218 which are linked together with a roller chain 219. A crank 221 may be secured to the end of one screw 216 adjacent the sprocket 218 so that upon rotation, all of the screws 216 are caused to revolve. Thus, the threaded portion of screws 216 coact with brackets 217 to cause the hood to move up or down, depending upon the direction of rotation. If desired, the crank 221 may be replaced by an electric motor such as illustrated in FIG. 1.

Hood 210 has bottom flanges 222 substantially parallel with the upper face of the web 211. The flanges 222 extend parallel from a minimum to a maximum width dimension as shown in the drawings. The maximum width refers to the maximum width web which can be accommodated on a particular double-backer while the minimum width dimension refers to the minimum width web

which can be accommodated. For example, the double-backer may be designed to accommodate a web from 67 inches wide to 87 inches wide. Thus, no matter what width web is being made, a controlled space is provided through which the pressurized air can escape. In this manner no lateral adjustment need be provided on the hood 210 to accommodate different width webs. Not only is one less adjustment required but the air pressure is thereby able to bear against the entire upper surface of the web.

Another advantageous feature of the invention resides in the provision of dampers, as illustrated in FIGS. 4 and 5. The web travel must be halted at various times because of adjustments necessary to change orders or other reasons; and the web, if allowed to remain at rest over the steam chests, would be scorched so badly as to be unusable. To overcome this problem, dampers A, B, C and D are pivotably mounted in the hood 210. Dampers A and D are located within ducts A<sub>1</sub> and D<sub>1</sub> which are exposed to atmosphere. Dampers B and C are located within upright ducts B<sub>1</sub> and C<sub>1</sub> which connect the fan chamber with the lower chamber or plenum of hood 210. During normal operation, as illustrated in FIG. 4, with the web 211 moving, damper A is open to atmosphere while damper B is closed to atmosphere. Damper B closes duct B<sub>1</sub> and damper C opens duct C<sub>1</sub>. Thus, as the fan is driven, air is drawn through duct A<sub>1</sub> into the fan chamber and from there directed through duct C<sub>1</sub> into the plenum where it forces the web down the steam chests 212. The pressurized air in the plenum is permitted to escape to atmosphere via the space provided between the bottom flanges 222 and the upper surface of the web.

When the web is stopped for any reason, the dampers are caused to change their angular positions as shown in FIG. 5. Air is now withdrawn from the plenum through duct B<sub>1</sub> into the fan chamber and directed through duct B<sub>1</sub> to atmosphere. This action creates a suction above the web and it is therefore pulled upward against the lower flanges 222 where the web will remain until the dampers are caused to assume their original positions. Thus, the space which was previously between lower flange 222 and the web 211 is now between web 211 and steam chests 212. This space is sufficient to permit heat radiated from the steam chests 212 to be dissipated so as not to scorch the web 211. Consequently, frequent stoppage of web travel does not result in lengths of the web having to be scrapped. In the condition illustrated in FIG. 5 when the web is stopped, it may be desirable that damper A not be fully closed to atmosphere so as to avoid overloading or stalling fan drive motor 215.

It is desirable to have the dampers operate automatically upon stopping and starting of the web to free the operator for other tasks, and this may be conveniently accomplished by an arrangement as shown in FIG. 8. A fluid motor 223 is connected to each damper by means of connecting link 224 having one end rigidly secured to pivot shaft 225 of the damper and the other end pivotally connected to piston 226 of the fluid motor. Fluid motor 223 may be of a conventional type having a piston 226 which is displaced along a cylinder in response to differential pressure applied to either side of the piston. Fluid motor 223 may be trunnion mounted to the hood 210 in the most convenient manner as will be well understood by those skilled in the art. Fluid pressure supplied from a source, such as compressor 227, will operate the pistons 226 of fluid motors 223 to rotate the dampers from a first position to a second position.

In FIG. 8, the dampers are shown in their normal operating position, that is, they correspond to the position shown in FIG. 4; the operating position when the web is moving. To cause the dampers to rotate to the position shown in FIG. 5, which position is required when the web stops, valves 228 are placed in the line from compressor 227 to fluid motors 223. The valves 228 may be conventional solenoid operated two-position spool-type fluid control valves.

To operate the solenoids 229 of the respective valves, a conventional zero speed cut-out switch 231 is connected to the main drive motor 232 for the double-backer. The drive motor 232 is energized from power source L1 and L2. Power source 233 energizes the cut-out switch 231. When main drive motor 232 is stopped, the web consequently stops and the contacts 234 within cut-out switch 231 close thus energizing the solenoids 229 of the valves 228. When this occurs, the spools within the valves 228 shift thereby reversing the flow of fluid to the fluid motors 223. The pistons 226 will then shift within the cylinders and through connecting links 224 cause the dampers to pivot to the position shown in FIG. 5. When main drive motor 232 is again energized, the contacts 234 open, the solenoids 229 are de-energized and the spools return to their normal position and consequently, the dampers are returned to their normal operating position.

Although valves and fluid motors are shown for each damper, if preferable, the dampers may be linked so as to be operable by only one valve and fluid motor. It is also contemplated that the dampers may be operated manually or by solenoids alone without the use of fluid motors. It will be noted that the operation of the dampers permits the various functions to be accomplished without changing the direction of rotation of the fan.

The present invention may be applied to a conventional double-backer such as illustrated in FIG. 6. In a conventional double-backer, single-face web 235 is supplied from a single-facer (not shown) and directed between rolls 236 and 237. A coating of adhesive is applied to the tips of the flutes of the single-face by a glue roll 238 in glue-pot 239 in the conventional manner. Concurrently, a liner 241 is drawn from a spool (not shown) and directed around tensioning roll 242 and into contact with the flutes of the single-face 235 as they pass between rolls 236 and 237. Thereafter, the single-face 235 and liner 241, at this stage becoming double-face web 211, is passed over a plurality of steam chests 212 which radiate heat to drive out the moisture in the adhesive. Following this, the web 211 passes over a cooling section 243 which cools the adhesive and permits it to set so that the single-face 235 and liner 241 are firmly joined together to form double-face web 211. The cooling section 243 comprises two head-rolls 244-245 around which is driven a continuous belt 246. Between the head rolls 244-245 are a number of supporting rolls 247.

To keep the single-face 235 and liner 241 firmly pressed together during the gluing operation, a continuous belt 248 is driven around head-rolls 249-251 and supporting rolls 252-253. The lower run of belt 248 rests on the top surface of web 211. One or more hoods 215 are placed along the belt 248. Air pressure in the plenum of hood 210 exerts a force evenly through the lower run of belt 248 and against the web 211. When the web is stopped, the belt 248 is drawn up against the bottom flanges 222 of hood 210. Of course, the pressure against the web 211 is relieved, but the web itself remains against steam chests 210.

This invention as applied to a double-backer is illustrated in FIG. 7. In this embodiment, the cooling section 243 is replaced by a vacuum pulling machine 255 such as described in my now issued U.S. Patent No. 3,140,030. This machine grips the web 211 and urges it into subsequent processing machinery such as slitters 254 and a cut-off knife (not shown). Pressurized air in the lower chamber of hoods 210 coats directly with the web 211 so that pressure is applied evenly across the upper surface of the web. This also permits the web 211 to be drawn upward and away from the steam chests when the web is stopped so as to prevent scorching.

It should be noted here that all of the foregoing rolls, belts, hoods, etc. are supported by upright stanchions (not shown) in accord with conventional practice. It should also be mentioned that only one hood assembly need be used although more than one will usually be preferred

because of the ratio of the length of the steam chests 12 to their width. Further, the fans may be connected by suitable shafts and couplings so that only one drive motor 215 as illustrated in FIG. 7 need be used.

From the foregoing it can be seen that this invention has several advantages. It permits the application of infinitely variable pressure evenly and uniformly over the top surface of the web; it permits the web to be automatically drawn away from the steam chests during stoppage so that none of the web need be scraped due to scorching and without leaving lifting marks in the web such as occurs in conventional double-backers; maintenance of upper belts is eliminated; and little, if any, adjustments are necessary during the web-making process. With the design of bottom flanges of the embodiment of FIG. 4, no adjustments are required to compensate for various widths of webs likely to be made, and the pressure can act completely across the width of the web.

Having thus described my invention in its best embodiment and mode of operation, what I desire to claim by Letters Patent is:

1. Apparatus for producing a double-face corrugated board web by bonding a single-face board having glue thereon to a liner so that said web has first and second outer faces separated by a fluted inner strip comprising:

- a base,
- a heating surface supported by said base for contacting one face of said web for applying heat thereto,
- a housing supported by said base and juxtapositioned over said heating surface to define a plenum therewith,
- supply means for supplying gas under pressure to said plenum whereby said gas exerts a substantially uniform pressure on said web to urge said one face against said heating surface, and
- positioning means for adjusting the position of said housing relative to said web to control the rate of escape of gases from between said housing and said web.

2. The apparatus of claim 1 including means for actuating said hood positioning means as a function of the temperature of said web as it emerges from said housing.

3. The apparatus of claim 1 wherein said positioning means includes a plurality of threaded bores in said base, and a plurality of threaded screws extending from said housing to said bore whereby rotation of said screws adjusts the position of said housing relative to said web.

4. The apparatus of claim 3 including a sprocket affixed to each of said screws, a continuous chain engaged with said sprockets, and means for traveling said chain for simultaneous adjustment of said screws.

5. The apparatus of claim 1 wherein said housing has flanges substantially parallel with said web and spaced therefrom,

- said flanges extending laterally from a minimum width of said web to a maximum width of said web,
- thereby providing an escape route for said gas under pressure requiring no adjustment to compensate for various width webs.

6. The apparatus of claim 1 including means for changing the effective lateral dimensions of said housing to increase and decrease the area of exertion of said gas pressure comprising oppositely movable laterally spaced walls for said housing and a threaded shaft operable to move said walls toward and away from one another whereby the walls can be spaced to overlie the edges of said web.

7. The apparatus of claim 6 wherein the supply means comprises a driven fan mounted in said housing in communication with atmosphere and with said plenum for forcing air drawn from atmosphere into said plenum to thereby urge said web uniformly against said heating surface and, in addition, means responsive to stoppage of the web operative to reverse the flow of air thereby creating a vacuum in said plenum to lift said web against said

housing and away from said heating surface so as to prevent heat damage to the web during said web stoppage.

8. The apparatus of claim 7 wherein the means for withdrawing said gas and means creating a vacuum comprises:

(a) said fan being in first and second communication with atmosphere and said plenum,

(b) first damper means interposed between the fan and said first communication with atmosphere and said plenum, said first damper means being in open position during movement of the web, and

(c) second damper means interposed between the fan and second communication with atmosphere and said plenum, said second damper means being in closed position during movement of the web, said first damper means assuming a closed position and said

second damper means assuming an open position in response to stoppage of the web, thereby reversing the flow of air from atmosphere to the plenum to atmosphere from the plenum.

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